



Invitation For Bid

Federal

**REPLACEMENT OF CHILLER AND
COOLING TOWER ACCESSORIES
AT EIGHT (8) METRO-RAIL
STATIONS: DC, MD, and VA**

IFB NO.: FQ18102/KKB

IFB Publicized Date: April 17, 2018

IFB Due Date: May 16, 2018

**MINORITY BUSINESS ENTERPRISES ARE
ENCOURAGED TO RESPOND TO THIS
SOLICITATION NOTICE**

Volume 1, Specifications, Divisions 00-01

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SECTION 00100
INVITATION FOR BIDS

This Section includes Project information for Bidders.

NOTICE TO BIDDERS

Contract No.: FQ18102 includes IFB Documents for:

Project Name: Replacement of Chiller and Cooling Tower Accessories at Eight (8) Metro-Rail Stations.
DC, MD, and VA

Bids for the Work described herein shall be submitted before 2:00 PM (local time) on May 16, 2018. Questions may be directed to the Contract Administrator, Mr. Kamoru Banjo at (202) 962-1395 or kkbanjo@wmata.com. See Section 00200, INSTRUCTIONS FOR BIDDERS, for Bid submittal instructions.

DIRECTIONS TO SUBMITTING BIDDER: Read and comply with the Invitation Instructions. In addition to other submission requirements set forth in this Invitation for Bids and all Amendments, the following must be properly executed, completed, and submitted as part of the Bid:

A. BID:

1. Bid Form, Section 00413 (properly executed)
2. Bid Price Schedule, Section 00434
3. Bid Guarantee, Section 00431
4. Completed and signed Representations and Certifications, Section 00451
5. Compliance Information, Section 00432
6. Buy America Certification
7. List of DBE Certified Firms
8. DBE Data, Section 00453

BID(S) MUST SET FORTH FULL, ACCURATE, AND COMPLETE INFORMATION AS REQUIRED BY THIS INVITATION FOR BIDS, INCLUDING ALL AMENDMENTS

00101 GENERAL STATEMENT OF WORK:

- A. This invitation is for the submittal of Bids for Replacement of Chiller and Cooling Tower Accessories at Eight (8) Metro-Rail Stations.

00102 GENERAL SCOPE OF WORK:

The general scope of this project shall include furnishing and installation of the chillers, cooling tower accessories, refrigerant leak detection systems and chilled/ condenser water system accessories at CWP11 Farragut North (A02), CWP15 Bethesda (A09), CWP16 Medical Center (A10), CWP22 Federal Center SW (D04), CWP23 Columbia Heights (E04), CWP24 Capitol Heights (G02), CWP21 Clarendon (K02) and CWP22 Ballston (K04) chiller plant locations. The Contractor shall furnish all labor, tools, permits, coordination, materials, transportation, and other items necessary to satisfactorily complete this Project as written in the Specifications and as indicated on the contract drawing. Refer to Specification Section 01000 Scope of Work for detailed requirements for each chiller plant.

Contractor shall be responsible for all permits and inspections. Contractor shall comply with Federal and jurisdictional requirements and codes pertaining to this project. Contractor shall also comply with all safety requirements and permits required by WMATA.

00103 PROJECT BID SCHEDULE

The Bid schedule for this Project is as follows:

1. Issue Invitation for Bid: April 17, 2018
2. Pre-Bid Conference/Site Visit: Monday, April 30, 2018 at 08:00a.m. (Please arrive at the Lobby Receptionist between 7:30 – 08:00 a.m.) at WMATA, Jackson Graham Building, 600 5th Street, Washington, DC 20001. The second site visit will be on the following day after the first site visit at 10:00 and the starting location would be arranged during the first site visit.

WMATA will have representatives of our procurement, insurance, DBE, safety, and DECO. WMATA certified DBE's are strongly encouraged to attend.

All attendees must provide a WMATA Contractor ID or a government issued identification for entry into the Jackson Graham Building. Individuals that plan to attend the meeting are requested, but not required, to send an email to kkanjo@wmata.com, 24 hours in advance, with name, title, company name, mailing address, telephone, and email for each attendee.

Attendees should arrive early in order to clear security and/or receive temporary badges.

WMATA will conduct site visits at all locations immediately after the Pre-Bid Conference. The site visit will start at the Pre Bid Conference. Attendees must ride the Metrorail to each station. Attendees must be escorted by WMATA personnel.

Attendees that have a current WMATA Contractor ID shall display their ID and bring PPE and WMATA approved safety vest. Attendees not holding WMATA Contractor ID with PPE and vest should specifically identify themselves to the WMATA escorts. WMATA must arrange escorts based upon the number of attendees.

3. Bid Opening: May 16, 2018
4. Projected Contract Award: June 8, 2018

END OF SECTION

SECTION 00200
INSTRUCTIONS TO BIDDERS

This Section includes procedures with which Bidders must comply and conditions affecting award of the Contract.

00201 GENERAL INSTRUCTIONS

A. Definitions as used herein:

1. The term "Invitation" used in this document means this Invitation for Bids (IFBs).
2. The term "Bid" used in this document means a response to this Invitation.
3. The term "PMSS" used in this document refers to the Authority's project management software system.
4. For further explanation of Contract terms, refer to Section 00701, DEFINITIONS, of the General Conditions.

B. Method of Procurement:

1. This is an Invitation for Bids ("IFBs") method of procurement. A single Contract for all items shall be awarded to the lowest responsive and responsible Bidder.

C. Basis for Award:

1. Award will be made to that Bidder:
 - a. Award of this Contract will be made based solely on the lowest price as stated in Section 00203, BID PROCEDURES, EVALUATION FACTORS, AND INSTRUCTIONS, and
 - (i) Whose bid is judged to be responsive to the terms of the solicitation;
 - (ii) Who demonstrates to the Contracting Officer's satisfaction, that it is responsible for purposes of award of this Contract.
 - b. The Authority reserves the right to reject all bids and cancel this solicitation at any time prior to award.
 - c. A written award notice mailed or otherwise furnished to the successful bidder within **90** calendar days from the date of bid opening shall result in a binding contract without further action by either party.
2. The Authority will make a single award to one Bidder as the result of this Invitation. See Notes to Bidders in Section 00434, BID PRICE SCHEDULE, for further award information.
3. A written award of acceptance of Bid mailed or otherwise furnished by the Authority to the successful Bidder within the specified Acceptance Period shall result in a binding contract without further action by either party.

D. Type of Contract: The Authority contemplates award of a Firm Fixed Price contract for all of the items in the Price Schedule.

E. Invitation Documents:

1. Invitation Documents will be made available to Bidders on the WMATA website at http://www.wmata.com/business/procurement_and_contracting/solicitation/index.cfm and on the Federal Business Opportunities website, Fedbizopps.gov (www.fbo.gov).

In order to avoid IFB download problems, please immediately download the latest version of Adobe Acrobat Reader available for free at <http://get.adobe.com/reader/>.

F Preparation of Bids:

- 1 The Bidder shall complete the Bid Forms furnished in Section 00400, BID FORMS AND SUPPLEMENTS, or copies thereof, and submit them according to the instructions given in this IFB. If erasures or other changes appear on the forms, they must be initialed by the person signing the Bid.
2. Each Bidder shall furnish the information required by the Invitation. Bidders are expected to examine the IFB Documents. Failure to do so will be at the Bidder's risk.
3. Alternative bids will not be considered.

G Explanation to Bidders:

1. All explanations desired by a Bidder regarding the meaning or the interpretation of this IFB or all other Bid documents must be requested in writing 14 Days prior to the date set for Bid opening to allow sufficient time for a reply to reach all Bidders before the submittal of their Bids. These requests shall be forwarded to the Contract Administrator at kkanjo@wmata.com. Oral explanations or instructions given before the award of the Contract will not be binding. Any information given to a prospective Bidder concerning the Invitation will be furnished promptly to all prospective Bidders as an Amendment to this IFB, if the information is necessary in submitting Bids or if lack of such information would be prejudicial to other prospective Bidders.
2. The Authority reserves the right to amend the IFB prior to the date set for Bid opening. Copies of such Amendments as may be issued will be furnished to all prospective Bidders on both the WMATA website and the federal Business Opportunities website.
3. If the Amendments would require material changes in the Bids, the date set for the receipt of Bids may be postponed by such number of Days as in the opinion of the Contracting Officer will enable Bidders to revise their Bids. In such cases, the Amendment will include an announcement of the new date for Bid opening.

H. Acknowledgment of Amendments:

1. Bidders are required to acknowledge receipt of all Amendments to this Invitation on copies of the Bid Forms and 00413, BID FORM, in the space provided. Failure to acknowledge all Amendments may cause the Bid to be considered non responsive to the Invitation, which may require rejection of the Bid.
2. If this Invitation is amended, all terms and conditions, which are not modified, remain unchanged.

I Submission/Withdrawal of Bids:

1. Bids and modifications thereof shall be enclosed in sealed envelopes and addressed to the office specified in the solicitation. The bid shall show the hour and date specified in the solicitation for bid opening, the solicitation number, and the name and address of the bidder on the face of the envelope. Failure to do so may result in a premature opening of or failure to open such bid.

2. Facsimile Bids will not be considered.
3. Bids may be withdrawn by written notice before award. Bids may be withdrawn in person by a Bidder or an authorized representative, if the representative's identity is made known and the representative signs a receipt for return of the Bid before award.

J. Late Bids, modification or Withdrawals:

- a. Any offer received at the office designated in the solicitation after the exact time specified for bid opening will not be considered unless it is received before award is made and it
 - (1) Was sent by registered or certified U.S. mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been sent by registered mail by the 15th);
 - (2) Was sent by U.S. mail or a recognized commercial carrier, and it is determined by the Authority that the late receipt was due solely to mishandling by the Authority after receipt;
 - (3) Was sent by U.S. Postal Service Express Mail Next Day Service Post Office or similar express service from a recognized commercial carrier to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of offers. The term "working days" excludes weekends and U.S. Federal holidays; or
 - (4) Is the only bid received.
- b. Any modification or withdrawal of a bid, is subject to the same conditions as in subparagraphs (a)(1), (2), and (3) of this provision.
- c. The only acceptable evidence to establish the date of mailing of a late offer, modification, or withdrawal sent by registered or certified mail is the U.S. or Canadian Postal Service postmark on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date or the bid, modification or withdrawal shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, offerors should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and the envelope or wrapper.
- d. The only acceptable evidence to establish the time of receipt by the Authority is the time/date stamp of that installation on the bid wrapper or other documentary evidence of receipt maintained by the Authority.
- e. The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent by Express Mail Next Day Service Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph d. of this provision, excluding postmarks of the Canadian Postal Service. Therefore, bidders should request the postal clerk to place a legible hand cancellation bulls eye postmark on both the receipt and the envelope or wrapper.
- f. Notwithstanding paragraph "a" above, a late modification of any otherwise successful bid that makes its terms more favorable to the Authority will be considered at any time it is received and may be accepted.
- g. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for bid opening, the identity of the person requesting withdrawal is established and that person signs a receipt for the bid.

K Bid Guarantee:

1. A Bid guarantee is required by the Invitation to Bid. Failure to furnish a Bid guarantee in the proper form and 5% of Total Bid Price, by the time set for Bid opening, may be cause for rejection of the Bid. Bid guarantee shall be sealed, marked, and submitted in an envelope by the Bidder and received at the Office of Procurement, Washington Metropolitan Area Transit Authority, Office of Procurement, PRMT File Room 3C-02, 600 Fifth Street, N.W., Washington D.C., 20001 by the specified bid opening time on the date of bid opening.
2. A Bid guarantee shall be in the form of a firm commitment, such as a Bid bond (see Section 00431, BID SECURITY (Bid Bond Form)), postal money order, certified check, cashier's check, irrevocable letter of credit from a State or Federally chartered bank or, in accordance with Treasury Department regulations, or certain bonds or notes of the United States. Corporations executing the Bid bond as sureties must be among those appearing on the U.S. Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Bid guarantees, other than Bid bonds, will be returned as follows:
 - a. To unsuccessful Bidders: As soon as practicable after Bid opening.
 - b. To the successful Bidder:
 - 1) Upon execution of such further contractual documents and bonds as may be required by the Bid as accepted.
 - 2) If the successful Bidder, upon acceptance of its Bid by the Authority within the Acceptance Period, fails to execute such further Bid guarantees and give such bond(s) as may be required by the terms of the Contract, its Contract may be terminated for default. In such event, the successful Bidder shall be liable for any cost of procuring the Work, which exceeds the amount of its Bid, and the Bid guarantee shall be available toward offsetting such difference.

L. Minimum Bid Acceptance Period:

1. Acceptance Period, as used in this Section, means the number of Days available to the Authority for awarding a contract from the most current date specified in this Invitation for Bid.
2. The Authority requires an Acceptance Period of 90 calendar Days from the date of Bid opening.

M. Contract and Bonds: The Bidder whose Bid is accepted shall, within the time established in this Invitation, enter into a written contract with the Authority and furnish performance and payment bonds on standard Authority forms in the amounts indicated in Section 00600, BONDS AND CERTIFICATES.

N. Conditions Affecting the Work:

1. Bidders should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work and the general and local conditions which can affect the work or the cost thereof.
2. Failure to do so will not relieve bidders from the responsibility for estimating properly the difficulty or associated risks and cost of successfully performing the work.

O. Opportunity for Disadvantaged Business Enterprises to Bid: The Washington Metropolitan Area Transit Authority hereby notifies all Bidders that the Bidder shall ensure that in regard to any contract entered into pursuant to this Invitation, disadvantaged business enterprises will be afforded full opportunity to submit Bids in response to this Invitation and will not be discriminated against on the grounds of race, color, or national origin, sex, disability, sexual preference and/or gender identity in consideration for award.

P. Disadvantaged Business Enterprises: (See Section 00453, DBE DATA)

1. It is the policy of the Authority (WMATA) that Disadvantaged Business Enterprises (DBEs) shall have an equal opportunity to receive and participate in performing WMATA contracts, including contracts and subcontracts at any tier, and of the Federal Transit Administration (FTA) and the U. S. Department of Transportation (US DOT) in receiving and participating in federally assisted contracts. The DBE requirements, if any, are set forth in Section 00453, DBE DATA, and in Section 00765, DISADVANTAGED BUSINESS ENTERPRISE, to this Invitation, and are applicable if the Bid is \$500,000 or more for construction (and construction-related) contracts and for supply and service contracts having a total dollar value of \$150,000 or greater. The DBE goal percentages, if applicable, are listed in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE.
2. If the Bidder is not a DBE, then the DBE goal set forth in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, if any, shall be met by Subcontracts or joint ventures with DBEs.
3. If a DBE goal is specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, the Bidder shall submit with its Bid a list of WMATA-certified DBE firms that it intends to enter into subcontract agreements with for this Contract. The documentation requirements of Section 00453, DBE DATA, shall be completed and submitted at the time of Bid. Also, if no goal is specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, but the Bidder still intends to utilize DBEs in the performance of this Contract, the Bidder shall submit with its Bid a list of those WMATA-certified DBE firms. If a DBE goal is specified. Bidders who fail to complete and return this information, with their Bid, will be deemed to be non-responsive and will be ineligible for contract award. The documentation requirements, if applicable, are as follows:
 - a. SCHEDULE OF DBE PARTICIPATION and executed LETTER(S) OF INTENT TO PERFORM AS A SUBCONTRACTOR/JOINT VENTURE with agreed price sufficient to meet the DBE goal set forth in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE; or
 - b. A request for waiver of the DBE goal or portion of the goal, if any, and reasons therefore as stipulated in Paragraph F.3 of Section 00453, DBE DATA. Request must be made on company stationery and signed by the responsible official.
4. Bidders that fail to meet the DBE goal set forth in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, and fail to demonstrate "good faith efforts" to justify waiver of the DBE goal, may be deemed to be non-responsive and will be ineligible for contract award.
5. In connection with the performance of this Contract, the Contractor agrees to cooperate with the Authority in meeting its commitments and goals with regard to the maximum utilization of Disadvantaged Business Enterprises (DBE), and further agrees to exert good faith efforts to satisfy the requirements of Section 00453, DBE DATA, by subcontracting portions of the Work to disadvantaged firms, by entering into joint ventures with disadvantaged firms, or both.
6. If there is no goal in this Contract, DBE participation is encouraged and pursuant to the Authority's race-neutral program, is anticipated to be as specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE.

Q. Civil Rights: The Contractor will be required to comply with all applicable Equal Employment Opportunity laws and regulations of Section 00764, CIVIL RIGHTS.

R. Debarred or Ineligible Bidders: All Bidders will be required to certify that they are not on any list of ineligible or debarred contractors (see Section 00451, REPRESENTATIONS AND CERTIFICATIONS FORM).

S. Notice of Protest Policy:

1. WMATA policy and procedure for the administrative resolution of protests is set forth in Chapter 17 of the Procurement Procedures Manual (PPM). The PPM contains strict rules for filing a timely

protest, for responding to a notice that a protest has been filed, and other procedural matters. The Contracting Officer can furnish a copy of Chapter 17 upon request.

2. FTA Circular C 4220.1F, paragraph 7.I addresses Bid Protests. Review of protests by FTA is discretionary and will be limited to:
 - a. a grantee's failure to follow its protest procedures or its failure to review a complaint or protest;
or
 - b. violations of Federal law or regulation.
3. A protester must exhaust all administrative remedies with the Authority before filing an appeal to the FTA. An appeal to FTA must be received by the cognizant FTA regional or Headquarters Office within 5 working days of the date the protester learned or should have learned of an adverse decision by the Authority of other basis of appeal to FTA.
4. Alleged violations on other grounds must be submitted to the Contracting Officer who will administratively decide the protest.
5. The United States District Courts for the Districts of Maryland, Virginia, and the District of Columbia, and the local courts in Maryland, Virginia, and the District of Columbia have jurisdiction over court actions concerning protest decisions.

T. Requirement for Cost Data Prior to Contract Award:

1. Bids received hereunder shall be subject to a price analysis to determine price reasonableness. A price analysis involves a comparison of the overall price to WMATA's estimate and to other prices for comparable items, either prior purchases by WMATA or by other agencies.
2. Should WMATA determine that there is not adequate price competition or that a price analysis does not provide an acceptable basis for determining price reasonableness, it may conduct a cost analysis. A cost analysis involves an evaluation of the various cost elements (labor, materials, overhead and profit) which constitute the proposed price or prices. It may include an audit of the proposer's overhead, general and administrative expenses, and profit. Such cost analysis and audit will be conducted in accordance with applicable Federal cost principles in FAR part 31.
3. Refusal of a Bidder to provide the required information and access to its records to conduct a cost analysis, including an audit if conducted, may result in the Bidder's bid being rejected as unreasonably priced.
4. The preparation, submittal, and certification of Certified Cost or Pricing Data shall be as described by FAR 15.403 and in Section 00700, GENERAL CONDITIONS.

- U. Davis-Bacon Wage Determination Decision: Under 49 U.S.C. § 533(a), Davis-Bacon Act prevailing wage protections apply to laborers and mechanics employed on FTA assisted construction, alteration or repair projects in excess of \$2,000.00, The Davis-Bacon Act requires that the Contractor pay wages to laborers and mechanics at a rate of not less than the minimum wages specified in the wage determinations made by the U.S. Secretary of Labor, at least one (1) time per week, without subsequent deductions or rebate on any account, except such payroll deductions as permitted by the U.S. Secretary of Labor. The Contractor understands that Contract award is conditioned upon its acceptance of U.S. DOL's prevailing wage determinations that are attached to this solicitation. The Contractor agrees to comply with the Davis-Bacon Act, 40 U.S.C. § 3141, *et. seq.* and implementing DOL regulations "Labor Standards Provisions Applicable to Contracts Governing Federally Financed and Assisted Construction. 29 C.F.R. Part 5.

WMATA may upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the Contractor under this Contract, or any other Federal contract that the Contractor has with WMATA, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, so much of the accrued payments or advances as may be

necessary to pay laborers and mechanics, including apprentices, trainees, and helpers employed by the Contractor or any subcontractor, the full amount of the wages required by this Contract. In the event that the Contractor fails to pay any laborer or mechanic, including any apprentice, trainee or helper employed or working on the jobsite, all or part of the wages required by this Contract, WMATA may, after written notice to the Contractor, suspend further payments or advances or guarantees until such violations have ceased.

- (a) The Contractor shall maintain payrolls and basic records relating thereto during this Contract and for three (3) years thereafter. The Contractor shall submit weekly for each week in which any Contract work is performed, a copy of all payrolls to the COTR, for transmission to FTA. The payrolls shall contain all information required by 29 C.F.R. Part 5. Each payroll submitted shall be accompanied by a "Statement of Compliance" signed by the Contractor or subcontractor. Falsification of any required certification may subject the Contractor or subcontractor to criminal prosecution or a civil suit pursuant to 18 U.S.C. § 1001 and/or 31 U.S.C. §23, respectively. The Contractor or subcontractor shall make the records required under this clause available to authorized representatives of FTA or DOL and shall permit such representatives to interview employees during working hours on the jobsite. If the Contractor or subcontractor fails to submit the required records or make them available, the Federal agency may take further action to cause the suspension of payments, advances or guarantee of funds. Failure to submit the required records may be grounds for suspension or debarment.
- (b) The Contractor or subcontractor shall insert the clauses contained in 29 C.F.R. § 5.5(a) and such other clauses that FTA may require in all subcontracts issued hereunder. The Contractor shall require subcontractors to include these clauses in lower tier subcontracts. The Contractor will be responsible for the compliance by any subcontractor with all of the clauses contained in 29 C.F.R. § 5.5.
- (c) Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general "Disputes" article of this Contract. Such disputes shall be resolved in accordance with U.S. Department of Labor procedures set forth in 29 C.F.R. parts 5, 6 and 7. Disputes within the meaning of this article include disputes between the Contractor (or any of its subcontractors) and WMATA, the U.S. Department of Labor or any of its employees or representatives.
- (d) By entering into this Contract, the Contractor certifies that neither it nor any person or firm who has an interest in the Contractor's firm is a person or firm that is ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis- Bacon Act of 29 C.F.R. § 512.

The Authority's Compact requires that all mechanics and laborers employed by Contractor or Subcontractors on construction and maintenance contracts be paid wages not less than those prevailing on similar contracts in this locality as determined by the Secretary of Labor in accordance with Section 00767, LABOR PROVISIONS. The Wage Determination Decision of the Secretary of Labor is referred to in Section 00769, LABOR PROVISIONS, and attached as APPENDIX D in Section 00800, SUPPLEMENTARY CONDITIONS.

V. WMATA's Tax Exempt Status:

1. Pursuant to Article XVI, Paragraph 78, of the Washington Area Metropolitan Transit Authority Compact, as adopted by the State of Maryland, the District of Columbia, and the Commonwealth of Virginia, with the authorization and consent of the Congress of the United States, the Authority has been accorded exemption from taxes as follows:
 - a. "The Authority and the Board of Directors shall not be required to pay taxes or assessments upon any of the property acquired by it or under its jurisdiction, control, possession or supervision, or upon its activities in the operation and maintenance of any transit facility or upon any revenues there from, and the property and income derived there from shall be exempted from all Federal, State, District of Columbia, municipal, and local taxation. This exemption shall include without limitation, all motor vehicle license fees, sales taxes and motor fuel taxes."
2. It has been the practice of the District of Columbia to apply the Authority's tax-exempt status to certain purchases of materials required under Authority construction contracts and acquired by Contractor for physical incorporation into the Work. This has not been the practice in either Maryland or Virginia. The Authority does not represent or warrant that the District of Columbia practice applies to this Project or,

if it does, that it will continue in effect during the term of this Project. It is the responsibility of the Contractor to determine its liability for any and all taxes applicable to this Project. Assessment or payment of taxes by the Contractor, including taxes resulting from changes in existing laws or the application thereof or of new or additional taxes, shall not constitute the basis for an increase in the Contract price, except as otherwise allowed under Section 00772, FEDERAL, STATE, AND LOCAL TAXES.

3. By submission of its Bid, the Bidder certifies that none of the taxes to which the Authority is exempt are included in its Bid price(s) or the final Contract Price. In the event that the Authority learns that any taxes to which the Authority is exempt are included in the final Contract Price, the Authority shall be entitled to a reduction in the Contract Price reflecting such amount and a refund of monies paid related to such taxes, plus applicable interest.

W. Advance Cost Agreement: Within 30 Days after Notice of Award, the Contractor shall make available for audit review, information on its accounting system used to project fixed and variable overhead rates applicable to possible Contract Modifications. The Authority's Office of the Inspector General, to the extent possible, will review and approve said accounting system. When appropriate and if possible, as a result of the audit review, Advance Cost Agreements may be executed between the Contracting Officer and the Contractor. The Cost Agreements shall be a supplemental agreement to the Contract.

X. Proprietary Data in Bids:

1. The Authority will provide all reasonable precautions to ensure that proprietary, technical, and pricing information remains within the review process except where otherwise ordered by an administrative or judicial body, or necessary to use in a judicial or administrative proceeding. Bidders shall attach to each page of all proprietary data submitted with the Invitation the following notation:
 - a. "This data furnished pursuant to this IFB shall not be disclosed outside the Authority, be duplicated, or used in whole or in part for any purpose other than to evaluate the offer; provided that, if a contract is awarded on the basis of that offer, the Authority shall have the right to duplicate, use, and disclose this data, in any manner and for any purpose whatsoever."
2. The Authority's right to use information contained in this data is not limited if the information is or has been obtained by the Authority from another independent legitimate source.
3. Except for the foregoing limitation, the Authority and its agents may duplicate, use, and disclose in any manner and for any purpose whatsoever and, all data furnished in response to this Invitation.

Y. Contract Performance Evaluation: The Bidder is advised that a Performance Evaluation will be completed at the end of the Contract. Factors to be included in the Performance Evaluation are as follows: Quality of Work, Timely Performance, Effectiveness of Management, Compliance with Labor Standards, Compliance with Safety Standards, and an Overall Evaluation. The Performance Evaluation may be used in determinations of responsibility for future WMATA contracts.

00202 BID FORMAT

- A. Bid Page and Character Size: The page size shall not exceed 8-1/2 by 11 inches, except for foldouts, which may not exceed 11 by 17 inches. The page margins shall not be smaller than 1 inch on all four sides. The type size for text shall not be smaller than 10 point, with at least a line spacing of one. The type size for figures and tables shall be no smaller than 8 point.
- B. Elaboration: Legibility, clarity, and completeness are essential. Unnecessarily elaborate brochures or other presentations beyond that sufficient to present a complete and effective Bid are not desired and may be construed as an indication of the Bidder's lack of cost consciousness. Elaborate artwork, expensive paper and bindings, and expensive visual and other presentation aids are neither necessary nor wanted.

- C. Completeness: Include all forms and Project-specific information as required in this Section. Include pre-printed literature if directly relevant to this Project. Failure to provide forms or any other information required in the response to this Invitation may cause the Bid to be deemed non-responsive, and the Bid may be subsequently rejected.
- D. Bid: Provide one (1) hard copy each and one (1) electronic copy each on a flash/thumb drive.

Book	Part	Title
1	A	Price Submission
1	B	Forms and Contractual Information

00203 BID PRICE PROCEDURES, EVALUATION FACTORS AND INSTRUCTIONS

A. Bid Price Evaluation Factors:

1. The Authority will evaluate Bid Price for completeness, clarity, conciseness, realism, and responsiveness to the IFB-requested information.
2. Submittal of Bid prices for both the Base and the Options, if any. Failure to do so will necessitate rejection of the Bid.
3. Materially unbalanced prices: Bids that are materially unbalanced as to prices for the various categories of work items may be rejected as non-responsive.
4. The Authority will compare the Bid Prices to the Authority's estimate and otherwise determine reasonableness by performing a price analysis if adequate competition exists. A cost analysis will be performed, if adequate price competition does not exist, to ascertain whether or not the proposed price is fair and reasonable. The Authority may request that Bidders provide a cost breakdown, which identifies major cost drivers and request supporting documentation, such as Supplier and Subcontractor quotes in support of their Bid.

B. Bid Price Instructions: The information provided should be complete and clearly presented. If the information requested is presented elsewhere in the Bid, the Bidder should cross reference this information that is provided elsewhere rather than duplicating it.

1. Complete, sign, and submit Section 00413, BID FORM. Additionally, submit the following:
 - a. Signed and completed Section 00451, REPRESENTATIONS AND CERTIFICATIONS FORM.
 - b. A completed Section 00434, BID PRICE SCHEDULE, with an amount on each line item where one is requested and a total amount representing the sum of individual amounts requested.
 - 1) Bid Price Schedule prices shall include all services, labor, material, equipment, overhead, incidentals, and profit, unless otherwise specified.
 - 2) In case of a discrepancy between a unit price and an extended price, the unit price will be presumed to be correct, subject however, to correction to the same extent and in the same manner as any other mistake.
 - 3) Where the Bid Price Schedule explicitly requires that the Bidder bid on all items; failure to do so will disqualify the Bid. When submittal of a price on all items is not required, Bidders shall insert the words NO BID in the space provided for an item on which no price is submitted.

- 4) Bids for construction services other than those specified will not be considered unless authorized by the Invitation. Unless specifically called for, alternate Bids will not be considered.
- c. List of DBE-certified firms that it intends to enter into subcontract agreements with (if a DBE goal is specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, or if no goal is specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE, but the Bidder still intends to utilize DBEs in the performance of this Contract).
- d. An executed Bid Guarantee with Surety Certificate (Section 00431, BID SECURITY (BID BOND FORM)). The Bid Guarantee shall be based on the Total Base Bid Plus Total Option Price, if any. The Performance and Payment Bonds shall be based on the award amount.
- e. A signed and completed Section 00452, BID DATA FORM, with attachments. **(Submit during pre-award)**

00204 MINIMUM TECHNICAL REQUIREMENTS

- a. The Contracting Officer will conduct a pre award survey to determine if the bidder eligible for award is responsible both financially and technically and has the capability to perform the Work of the Contract in accordance with the requirements of the Specifications and the Drawings and within the time or times specified.
- b. Accordingly, the apparent lowest responsive bidder is required to furnish, within five calendar days after bid opening, pre award data as follows:

(1) Bid Data Form:

- A. The Bidder shall furnish a completed and signed Bid Data Form

(2) Past Experience and Qualifications:

The Bidder shall furnish, in addition to the information required in the Bid Data Form, satisfactory evidence of past experience, qualifications and capabilities required by the contract plans and specifications. The following information must be included:

- a. In order to be considered, at a minimum, the Contractor shall have performed/completed as the prime contractor at least three (3) contracts of similar scope, difficulty and complexity to the work specified in the contract plans and specifications within the past ten years. The Contractor must list these completed projects including the following information: owner, address, up-to-date phone number, architect-engineer, contract name, amount, duration, character and type of work and the portions of the work accomplished with the Bidder's own forces.
- b. Personnel: The contractor shall submit a list of the key personnel and their respective resumes.
- c. Copies of all necessary certifications, licenses and other documentation, including any specialized licenses required to meet IFB requirements.

(3) Performance Plan

The following information shall be submitted regarding how the bidder proposes to accomplish the Work:

- (a) A detailed narrative description, no more than 10 pages, of how the bidder proposes to accomplish the Work of the Contract including an organization chart with responsibilities including all subcontractors. The organization chart shall demonstrate who subcontractors

report to in the Bidder's team; how the team will be structured to accomplish the construction and management activities for the Work;

- (b) In accordance with the articles for Progress Schedules, the bidder shall submit its proposed preliminary schedule in sufficient detail to demonstrate that the bidder can accomplish the Work within the prescribed period of performance including, if required, any interim completion dates or milestones.
- (c) The performance Plan must address the jurisdictional requirements necessary for the successful completion of the project including permitting, utility coordination, subcontractor coordination and use of public rights of way.
- (d) A list of major materials and all major equipment that the bidder expects to use to accomplish the Work of this Contract.

(4) Financial Statements

The Contractor must furnish complete financial statements for the last three (3) years, including Statement of Financial Position (Balance Sheet), Results of Operations (Income Statement), Statement of Changes in Financial Position (Net Change in Resources) and Statements of Current and Retained Earnings. These statements shall be certified indicating disclosure of all facts which could impair or affect the statements presented. These financial documents are subject to review by the Office of the Inspector General (OIG). If found to be financially incapable, the Bidder will be determined to be not responsible.

(5) Safety Requirement

The Bidder shall furnish the following information regarding its past safety performance:

- (a) Experience Modification Rating (EMR) which compares the number of OSHA recordable injuries and illnesses for the bidder to the average for the bidder's standard industry code. Bidders with an EMR factor greater than 1.2 will be determined to be not responsible.

00210 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

- A. Procedures for Product Substitutions During the Bidding Period - Use of brand names within the technical requirements (as used in this clause, the term "brand name" includes identification of products by make and/or model in IFB Documents):
 - 1. If items called for by the IFB Specifications have been identified by a "brand name or equal" description, such identification is intended to be descriptive, but not restrictive, and is to indicate the quality and characteristics of products that will be satisfactory. Bidders offering "equal" products including products of the brand name manufacturer other than the one described by brand name, will be considered by the Authority if such products are clearly identified in the Bid and are determined by the Authority to meet fully the salient characteristics requirements in the IFB Specification.
 - 2. Unless the Bidder clearly indicates that it is offering an "equal" product by submitting Section 00433, BRAND NAME OR EQUAL FORM, the Bidder shall be considered as offering a brand name product referenced in the IFB Documents.
 - 3. If the Bidder proposes to furnish an "equal" product, the brand name, if any, of the product to be furnished shall be otherwise clearly identified and the determination as to equality of the product offered shall be the responsibility of the Authority and will be based on information reasonably available to the Authority.

4. If the Bidder proposes to modify a product so as to make it conform to the requirements of the IFBs' Specification, it shall (i) include a clear description of such proposed modifications, and (ii) clearly mark descriptive material to show the proposed modifications.
5. Caution to Bidders: The Authority is not responsible for locating or securing any information, which is not identified and reasonably available to the Authority. Accordingly, to ensure that sufficient information is available, the Bidder must furnish all descriptive material (such as catalogue cuts, illustrations, drawings, or other information) necessary for the Authority to (i) determine whether the product offered meets the salient characteristic requirements of the IFB Specification and (ii) establish exactly what the Bidder proposes to furnish and what the Authority would be binding itself to purchase by approval by the Authority. The information furnished may include specific references to information previously furnished or to information otherwise available to the Authority.

00250 PRE-BID MEETINGS AND SITE VISIT SCHEDULE

- A. Unless otherwise notified, a pre-Bid conference will be held as noted in the Project Bid Schedule, Section 00103, PROJECT BID SCHEDULE. The purpose of this conference will be to answer questions regarding, or requests for clarifications of, the Invitation documents. It is requested that Bidders submit their questions and requests for clarifications of the terms, conditions, and requirements of this Invitation for Bids to the Contracting Officer in writing either in advance of the meeting or during the meeting. Questions from the floor, however, are permissible.
- B. All attendees must provide a WMATA Contractor ID or a government issued identification for entry into the Jackson Graham Building (cameras, cell phones, computers and other mobile devices are permitted). Attendees should arrive early in order to clear security and/or receive temporary badges. Contractors are responsible to be at the Pre-Bid Conference on time.
- C. Bidders are encouraged to visit the Site of the Work and inform themselves of all local conditions that may affect the Work or the cost thereof.
- D. The Bidder acknowledges and agrees that it shall be bound by all the terms of the Contract regardless of its attendance at the pre-Bid conference, or the thoroughness of its Site investigation prior to submitting its Bid.

00260 PRE-AWARD MEETING

The Authority reserves the right to require that a pre-award meeting be held with the apparent low bidder prior to Contract award in order to further assist the Authority in determining the bidder's responsibility for purposes of award.

END OF SECTION

SECTION 00300
INFORMATION AVAILABLE TO BIDDERS

This Section includes information made available to the Bidders.

00301 INVITATION FOR BID (IFB) DOCUMENTS

- A. The IFB Documents, including General Conditions, Supplementary Conditions, General Requirements, Specifications, Drawings, reports, safety and security requirements, and quality requirements of this Invitation IFB No: FQ18102/KKB and referenced in this Section establish requirements for the construction of the Project. These IFB Documents shall be used by the Bidder to prepare the Bid.

00302 GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, AND GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and General Requirements contain requirements for the administration and construction of the Project.

00303 CONTRACT SPECIFICATIONS

- A. Specifications (Divisions 00-01, 02, 03, 05, 07, 09, 15 & 16 of the Contract Specifications) are the parts of the Contract Documents containing written directions or requirements that specify the requirements, which must be fulfilled for the completion of the Work.
- B. The WMATA Manual of Design Criteria establishes general design criteria for the Project that shall govern the design of temporary works as defined in the Specifications unless jurisdictional codes and regulations are more stringent, in which case the codes and regulations shall govern.

00304 CONTRACT DRAWINGS

- A. Contract Drawings are the plans, profiles, typical cross sections, general cross sections, elevations, schedules, and details listed or included in the Contract Documents, which represent requirements for the Project.
- B. The WMATA CAD Manual shall be adhered to for the preparation of As-built Drawings by the Contractor.

00310 EXISTING CONDITIONS

- A. Bidder should visit the site and take such other steps as may be reasonably necessary to ascertain the nature and location of the work and general and local conditions which can affect the work or the cost thereof.
- B. Failure to do so will not relieve bidders from the responsibility for estimating properly the difficulty or associated risks and cost of successfully performing the work.

00320 GEOTECHNICAL INFORMATION – NOT APPLICABLE

- A. Geotechnical Information is NOT included in the IFB Documents.

00330 ENVIRONMENTAL REPORT – NOT APPLICABLE

- A. An Environmental Report is not included in the IFB Documents.

00340 WMATA SAFETY AND SECURITY REQUIREMENTS

- A. This Section lists the safety and security related documents that establish the safety requirements for the Project.

1. WMATA Construction Safety and Environmental Manual Requirements: A compilation of the safety and reporting requirements for the Project.
2. WMATA Safety and Security Certification Program Plan: A compilation of the safety and security certification requirements for the Project.

00350 QUALITY ASSURANCE AND QUALITY CONTROL

- A. Section 01470, QUALITY MANAGEMENT SYSTEM, establishes the quality requirements for the development of the Quality Management Plan by the Contractor for execution of the Project.

END OF SECTION

SECTION 00400
BID FORMS AND SUPPLEMENTS

THIS PAGE NOT USED

SECTION 00410
BID FORMS

SECTION 00413

BID FORM

(Submit with Bid)

IFB Number: FQ18102/KKB

Date of Request: _____

Project Name: Replacement of Chiller and Cooling Tower Accessories at Eight Metro-Rail Stations

Project Location: Washington DC, Maryland, and Virginia

INVITATION FOR BIDS containing information requested herein shall be submitted by the Bidder so as to be received before the time and date listed in Section 00100, INVITATION FOR BIDS, at the Washington Metropolitan Area Transit Authority, Office of Procurement, PRMT File Room 3C-02, 600 Fifth Street, N.W., Washington, D.C. 20001. Questions may be directed to the Contract Administrator, Mr. Kamoru Banjo at (202) 962-1395 or kkbanjo@wmata.com.

In response to the Invitation for Bid for the above referenced Contract, the undersigned hereby proposes to furnish all labor, equipment, and materials and perform all work to construct the Project in strict accordance with the Contract requirements for the consideration of the amount Bid on the Contract Bid Schedule. If awarded the Contract within the Bid Acceptance Period, the undersigned agrees to execute the Contract within 10 Days and to furnish, if required, performance and payment bonds on standard Authority forms with good and sufficient surety or sureties.

If the Contract is executed, the undersigned further agrees to commence the Work within 10 Days after the receipt of Notice to Proceed and to complete the Work within the time specified in the Contract.

The undersigned acknowledges receipt of the following amendments to the **Invitation for Bid** under **IFB No.: FQ18102/KKB**

Spec Note: If more than five Amendments, add Amendment Number and date as appropriate.

Amendment Number _____, dated _____

Amendment Number _____, dated _____

Amendment Number _____, dated _____

Amendment Number _____, dated _____

Amendment Number _____, dated _____

Note: Failure to acknowledge receipt of all amendments may cause the Bid to be considered non responsive to the request, which would require rejection of the Bid as unacceptable.

BIDDER:

Firm Name

Bidder's Name

Street Name

Bidder's Signature

City, State, Zip Code

Bidder's Title

DUNS Number

Alternate Authorized Representative Name

Directions for Submitting Bid

1. Read and comply with the Invitation Instructions. This form shall be submitted with your Bid.
2. Bid Form and related required documents must be sealed, marked, and addressed as follows:

**Washington Metropolitan Area Transit Authority
PRMT File Room 3C-02
Bid under IFB FQ18102/KKB
Office of Procurement
600 Fifth Street, N.W.
Washington, D.C.**

3. Bids shall be timely mailed or hand delivered to reach WMATA before 1400 (local time) on day of Bid opening.

SECTION 00431
BID SECURITY (BID BOND FORM)
(Submit with Bid)

This Section includes the Supplementary Bid Forms that are required to be submitted with the Bid.

Invitation for Bid No.: IFB FQ18102/KKB Bid Closing Date: _____
Penal Sum of Bond: \$ _____ or _____ % 5% of Bid Price or Amount: \$ _____
Date Bond Executed: _____

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety(ies) hereto, are firmly bound to the Washington Metropolitan Area Transit Authority in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: provided, that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the Bid identified above:

NOW, THEREFORE, if the Principal, upon acceptance by the Authority of his Bid identified above, within the period specified therein for acceptance (60 Days if no period is specified), shall execute such further contractual documents, if any, and give such bond(s) as may be required by the terms of the Bid as accepted within the time specified 10 Days if no period is specified) after receipt of the forms by him, or in the event of failure so to execute such further contractual documents and give such bonds, if the Principal shall pay the Authority for any cost of procuring the work which exceeds the amount of its Bid, then the above obligation shall be void and of no effect.

Each Surety executing this instrument hereby agrees that its obligation shall not be impaired by any extension(s) of the time for acceptance of the Bid that the Principal may grant to the Authority notice of which extension(s) to the Surety(ies) being hereby waived provided that such waiver shall apply only with respect to extensions aggregating not more than 60 Days in addition to the period originally allowed for acceptance of the Bid.

Principals

1. Firm Name: _____ Firm Address: _____ Signature: _____ Name and Title: _____	State of Inc.: _____ _____	Corporate Seal
2. Firm Name: _____ Firm Address: _____ Signature: _____	State of Inc.: _____ _____	Corporate Seal

Name and Title: _____		
3. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____	State of Inc.: _____ _____	Corporate Seal

Corporate Surety(ies)			
Surety A	Surety Name: _____ Surety Address: _____ _____ Name & Title: _____ Signature: _____	Liability Limit: \$ _____ Or _____% State of Inc.: _____	(Corporate Seal)
Surety B	Surety Name: _____ Surety Address: _____ _____ Name & Title: _____ Signature: _____	Liability Limit: \$ _____ Or _____% State of Inc.: _____	(Corporate Seal)
Surety C	Surety Name: _____ Surety Address: _____ _____ Name & Title: _____ Signature: _____	Liability Limit: \$ _____ Or _____% State of Inc.: _____	(Corporate Seal)

Attach additional pages as needed.

Instructions

1. This form is authorized for use whenever a Bid guaranty is required in connection with construction work.
2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership or joint venture, or an officer of the corporation involved, evidence of his or her authority must be furnished.
3. The penal sum of the bond may be expressed as a percentage of the proposal price (e.g., 5% of the Bid Price) if desired or may be expressed in dollars and cents.
4. Corporation executing the bond as sureties must be among those appearing on the U.S. Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "Corporate Surety(ies)".
5. Corporations executing the bond shall affix their corporate seals.
6. The name of each person signing this proposal bond should be typed in the space provided.

SECTION 00432
COMPLIANCE INFORMATION

(Submit with Bid)

Indicate whether the Bid submitted is intended to fully comply with the IFB Documents of this Invitation for Bid.

Check one statement below.

☐ The Bidder certifies that its Bid is intended to comply fully with all IFB Documents.

SECTION 00433
BRAND NAME OR EQUAL FORM
(Submit with Bid)

Bidder is required to state in the spaces below the Manufacturer's Name, Part/Product Number, Description, and to provide relevant specifications, including technical data and Material Safety Data Sheets. Be advised that these items, if any, are only set apart for identification. If products, other than those specified, are not listed here, the Bid will be viewed as providing the as-specified products.

Spec Section/Product Specified:	_____
Manufacturer:	_____
Product Proposed:	_____
Manufacturer:	_____
Spec Section/Product Specified:	_____
Manufacturer:	_____
Product Proposed:	_____
Manufacturer:	_____
Spec Section/Product Specified:	_____
Manufacturer:	_____
Product Proposed:	_____
Manufacturer:	_____
Spec Section/Product Specified:	_____
Manufacturer:	_____
Product Proposed:	_____
Manufacturer:	_____

NOTE: If applicable, attach additional sheets as necessary in this format. This form is included to establish a format for submission by the Bidder of an "or Equal" and will be utilized for the Bid submittal to the Authority for equal products by the Contractor. *This form may also be used during the construction of the Contract.*

SECTION 00434

BID SCHEDULE

(Submit with Bid)

A. DESCRIPTION OF WORK

1. The Contractor shall build the Facilities in the manner and at the locations set forth in the IFB Documents of this Invitation, and in accordance with the Bid as finally accepted by the Authority. The Contractor shall construct the facility in strict accordance with the Contract Documents and in full compliance with the Rules and Regulations of the Jurisdictional Authorities.

B. BASIS FOR AWARD

1. A single contract for all line items will be awarded to the lowest priced responsive and responsible bidder.

C. BID SCHEDULE

Unit Price Schedule

Bid Item No.	Item Description	Qty.	Unit	Unit Price	Extended Price
1	A02 – Farragut North	1	EA		
2	A09 - Bethesda	1	EA		
3	A10 - Medical Center	1	EA		
4	D04 – Federal Center	2	EA		
5	E04 – Columbia	1	EA		
6	G02 – Capitol Heights	1	EA		
7	K02 - Clarendon	2	EA		
8	K04 - Ballston	2	EA		
9	Railroad Protective Liability Insurance (Allowance) Columbia Heights, Clarendon, Farragut North, and Bethesda Locations ONLY	1	EA	\$55,412	\$55,412

Total Bid Price _____

Notes to Bidders

1. The Bid Item No. Amount shall include all work at each location.
2. Unless otherwise specified, whether lump sum or unit priced item, the contractor should include all labor, material, equipment, management, supervision, permits, insurance, overhead, profit, subcontractor costs if any, G&A, and other incidentals needed to complete the item of work at the stated prices.
3. Payment for the various bid items listed in the Unit Price Schedule shall constitute full compensation for performing all operations required to complete the work in conformity with Drawings and Specifications. All costs for work not specifically mentioned in the Unit Price Schedule shall be included in the Contract prices for the items listed.
4. Any bid which is materially unbalanced as to prices for the various items may be rejected as non-responsive. Bidders are advised not to unbalance their bid prices which will be subject to technical review and approval prior to award. Any bid that is materially unbalanced (i.e. one in which prices of some elements of work are materially overstated) may be rejected as non-responsive.

5. Bidders who furnish a Bid Bond (with their bid package) must utilize WMATA's Bid Bond Form as identified on the next few pages. WMATA's Bid Bond form provides the terms and conditions established for the bidder and WMATA. Do not use an AIA Bid Bond Form. The Bidders Bid Bond amounts must equal 5% of the bidder's Total Bid Price. Refer to Section 00431 and WMATA's INSTRUCTIONS TO BIDDERS, for further details.
6. Bidder's shall comply with DBE requirements of this contract. DBE forms and data shall be submitted with the bid as identified under Appendix B. In order to be eligible for contract award resulting from a WMATA solicitation where there are DBE participation goals established, it is required that ..."all proposed DBE contractors and subcontractors be fully certified under WMATA's DBE Certification Program at the time of bid submittal...". When bidders submit Letters of Intent, a copy of WMATA's Certification Letter confirming the proposed firm's DBE status, should be included as well.
7. Experience Modification Rating (EMR) is issued by the NCCI. Bidders must submit evidence after bid opening that they possess a EMR factor greater than 1.2. If not they will be determined non-responsible
8. Contractor's staff is required to attend Right-of-Way safety training provided by the Authority prior to performing any work under this contract. Refer to Section 01114, SAFETY/ENVIRONMENTAL REQUIREMENTS.
9. All lump sum bid items will be paid in accordance with the cost loaded CPM schedule as established by Section 01322 CONTRACT PROGRESS REPORTING.
10. WMATA Railroad Protective Liability Program Option – See Division 01, Section 00877, INDEMINIFICATION AND INSURANCE REQUIREMENTS, Article-WMATA Blank RRP Program Option. The Authority may offer to waive the requirement for the Contractor to procure PRP if (1) the work can be covered under the Authority's blanket RRP program, and (2) the Contractor prepays the waiver fee which shall be determined by the rate schedule promulgated by the insurer in effect as of the effective date of this Contract. Contractor shall be advised of and pay the applicable waiver, or procure a standalone RRP policy on the Authority's behalf.

If the contractor chooses to not utilize the WMATA RRPL, then WMATA will reimburse the contractor for the actual cost with no markups up to the amount (not alliance) that would have been paid for the WMATA waiver fee.

SECTION 00451
REPRESENTATIONS & CERTIFICATIONS
(FEDERALLY FUNDED SUPPLY/SERVICE/CONSTRUCTION CONTRACTS)

REPRESENTATIONS
(Submit with Bid)

Instructions: Check or complete all applicable boxes or blocks on this form and submit it with your offer.

1. TYPE OF BUSINESS ORGANIZATION

By submission of this offer, the offeror represents that it operates as ☐ an individual, ☐ a partnership, ☐ a limited liability company, ☐ a joint venture, ☐ a nonprofit organization, or ☐ a corporation, incorporated under the laws of the State of _____.

Name	Signature
Title	Company
Date	

2. AFFILIATION AND IDENTIFYING DATA

Each offeror shall complete 2.1, 2.2 if applicable, and 2.3 below, representing that:

2.1 It ☐ is, ☐ is not, owned or controlled by a parent company. For this purpose, a parent company is defined as one that either owns or controls the activities and basic business policies of the offeror. To own another company, means that the parent company must own at least a majority, i.e., more than fifty percent (50%), of the voting rights in that company. To control another company, such ownership is not required. If another company is able to formulate, determine or veto the offeror's basic business policy decisions, such other company is considered the parent of the offeror. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, Contractual arrangements or otherwise.

2.2 If the offeror is owned or controlled by a parent company, it shall insert in the space below the name and main office address of the parent company:

Name of Parent Company

Main Office Address (including ZIP Code)

2.3 If the offeror has no parent company, it shall provide in the applicable space below its own employer's identification number (E.I.N.), (i.e., number used on Federal tax returns or, if it has a parent company, the E.I. N. of its parent company).

Offeror E.I. N.: _____ or, Parent Company's E.I. N.: _____

Name	Signature
Title	Company
Date	

3. **PREVIOUS CONTRACTS AND COMPLIANCE REPORTS**

This representation is applicable to federally assisted contracts. By submission of this offer, the offeror represents that:

3.1 It [] has, [] has not, participated in a previous contract or subcontract subject to either the Equal Opportunity Clause of this solicitation, or the clause contained in Parts II and IV of Executive Order 11246, as amended; that prohibits discrimination on the basis of race, color, creed, national origin, sex, age; and

3.2 It [] has, [] has not, filed all required compliance reports; and

3.3 Representations indicating submittal of required compliance reports signed by proposed subcontractors will be obtained prior to subcontract awards.

Name	Signature
Title	Company
Date	

4. **DISADVANTAGED BUSINESS ENTERPRISE**

This representation is applicable to federally assisted contracts. By submission of this offer, the offeror represents that:

4.1 It [] is, [] is not, a disadvantaged business enterprise.

"Disadvantaged Business Enterprise" means a for-profit small business concern that is at least fifty one percent (51%) owned by one or more individuals who are both socially and economically disadvantaged individuals or, in the case of a corporation, in which fifty one percent (51%) of the stock is owned by one or more such individuals; and whose management and daily business operations are controlled by one or more socially and economically disadvantaged individuals who own it.

"Socially and Economically Disadvantaged Individual" is defined in Appendix B. Notice of Requirements for Disadvantaged Business Enterprise (DBE). By submission of this offer, the offeror represents that:

4.2 It [] is, [] is not, currently certified by Metropolitan Washington Unified Certification Program (MWUCP) as a disadvantaged business enterprise.

4.3 Special Certification Requirements for Transit Vehicle Manufacturers. Each transit vehicle manufacturer, as a condition of being authorized to bid or propose on FTA funded transit vehicle procurements, must certify that it has complied with the DBE requirements of 49 C.F.R. Part 26.

The offeror represents that it [] is or [] is not a transit vehicle manufacturer and [] has or [] has not complied with the DBE requirements of 49 C.F.R Part 26.

Name	Signature
Title	Company

5. **SMALL BUSINESS ENTERPRISE (MAY 2015)**

“Small Business Enterprise” means a for profit small business concern that is at least fifty one percent (51%) owned by one (1) or more individual(s) who are economically disadvantaged. “Economically Disadvantaged Individual” is defined in Appendix B-1, Definitions, in Notice of Requirements for Small Business Enterprise (SBE) Program.

5.1 It ☐ is, ☐ is not, a small business enterprise. A firm must be a small business as defined by the U.S. Small Business Administration (SBA) by applying current SBA business size standards found in 13 C.F.R. Part 121 that are applicable to the type of work the firm seeks to perform in USDOT assisted contracts. The fifty one percent (51%) owner must be a U.S. citizen or permanent resident. A firm must be organized for profit in order to be eligible for SBE certification. The firm’s average gross receipts cannot exceed the overall USDOT size standard for a small business [\$23.98 million averaged over the three (3) previous fiscal years or part of year that the business has been in existence.] Set forth in 49 C.F.R. § 26.65, at least fifty one percent (51%) of the firm’s ownership must be held by individuals who meet the personal net worth (PNW) cap of \$1.32 million as prescribed by 49 C.F.R. § 26.67.

5.2 It ☐ is, ☐ is not, currently certified by WMATA as a small business enterprise.

Name	Signature
Title	Company
Date	

6. AFFIRMATIVE ACTION COMPLIANCE

This representation is applicable to federally assisted contracts of \$50,000 or more that are awarded to contractors with fifty (50) or more employees. By submission of this offer, the offeror represents that:

6.1 It has a workforce of _____ employees.

6.2 It ☐ has developed and has on file, or ☐ has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 C.F.R. §§ 60.1 and 60.2), or

6.3 It ☐ has not previously had contracts subject to the written affirmative action program requirements of the rules and regulations of the U.S. Secretary of Labor.

Name	Signature
Title	Company
Date	

CERTIFICATIONS

7. COVENANT AGAINST GRATUITIES

By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement:

Neither it nor any of its employees, representatives or agents have offered or given gratuities (in the form of entertainment, gifts or otherwise) to any Board member, employee or agent of the Authority with the view toward securing favorable treatment in the awarding, or administration of this Contract.

Name	Signature
Title	Company
Date	

8. CONTINGENT FEES

By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement:

8.1 It [] has, [] has not, employed or retained any company or persons (other than a full-time, bona fide employee working solely for the offeror) to solicit or secure this Contract, and

8.2 It [] has, [] has not, paid or agreed to pay any company or person (other than a full-time, bona fide employee working solely for the offeror) any fee, commission, percentage, or brokerage fee contingent upon or resulting from the award of this Contract.

Name	Signature
Title	Company
Date	

9. CLEAN AIR ACT AND CLEAN WATER ACT CERTIFICATION

This certification is applicable if the Contract will be federally assisted and the offer exceeds \$150,000, or the Contracting Officer believes that orders under an indefinite type Contract in any year will exceed \$150,000 or a facility to be used has been the subject of a conviction under the Clean Air Act [42 U.S.C. § 7413(c)(1)] or the Clean Water Act [33 U.S.C. § 1319(c)], is listed by the U.S. Environmental Protection Agency (EPA) as a violating facility, and the acquisition is not otherwise exempt:

9.1 Any facility to be utilized in the performance of this Contract [] is, or [] is not listed on the EPA's List of Violating Facilities;

9.2 Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communications from the Administrator, or a designee of the EPA, indicating that any facility that it proposes to use in the performance of this Contract is under consideration to be listed on the EPA's List of Violating Facilities; and

9.3 Offeror will include a certification substantially the same as this certification, including this paragraph, in every non-exempt subcontract.

Name	Signature
Title	Company
Date	

10. DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION

This certification is applicable to federally assisted contracts over \$25,000.

10.1 Primary Covered Transactions. This certification applies to the offer submitted in response to this solicitation and will be a continuing requirement throughout the term of any resultant Contract.

10.1.1 In accordance with the provisions of 2 C.F.R. Part 1200 and 2 C.F.R. Part 180, Subpart C, the offeror certifies to the best of its knowledge and belief that it and its principals:

10.1.1.1 are not currently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal or state department or agency;

10.1.1.2 have not, within a three (3) year period preceding this offer, been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) transaction or contract under a public transaction; violation of Federal or state antitrust statutes, or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

10.1.1.3 are not currently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, state, or local) with commission of any of the offenses enumerated in paragraph (1) (ii) of this certification; and have not, within a three (3) year period preceding this offer, had one (1) or more public transactions (Federal, state, or local) terminated for cause or default.

10.1.2 Where the offeror is unable to certify to any of the statements in this certification, the offeror shall attach an explanation to this offer.

10.2 Lower Tier Covered Transactions. This certification applies to a subcontract at any tier expected to equal or exceed \$25,000 and will be a continuing requirement throughout the term of this Contract.

10.2.1 The prospective lower tier subcontractor certifies, by submission of this offer, that neither it nor its principals is currently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal or state department or agency.

10.2.2 Where the prospective lower tier subcontractor is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

10.3 The Certification required by 10.2, above, shall be included in all applicable subcontracts and the Contractor shall keep a copy on file. The Contractor shall be required to furnish copies of certifications to the Contracting Officer upon his or her request.

Name	Signature
Title	Company
Date	

11. CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

11.1 By submission of its offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement:

11.1.1 The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or with any other competitor;

11.1.2 Unless otherwise required by law, the prices that are quoted in this offer have not been knowingly disclosed by the offeror and will not be knowingly disclosed by the offeror prior to award (in the case of a negotiated procurement), directly or indirectly, to any other offeror or to any competitor; and

11.1.3 No attempt has been made or will be made by the offeror to induce any other person or firm to submit or not to submit an offer, for the purpose of restricting competition.

11.2 Each person signing this offer certifies that:

11.2.1 He or she is the person in the offeror's organization responsible for the decision regarding the prices being offered herein and that he/she has not participated, and will not participate, in any action contrary to 11.1.1 through 11.1.3 above; or

11.2.2 He or she is not the person in the offeror's organization responsible for the decision regarding the prices being offered herein, but that he/she has been authorized in writing to act as agent for the persons responsible for such decision in certifying that such persons have not participated; and will not participate, in any action contrary to 11.1.1 through 11.1.3 above; or and as their agent he or she does hereby so certify.

Name	Signature
Title	Company
Date	

12. CERTIFICATION OF NONSEGREGATED FACILITIES

This certification is applicable to federally assisted contracts over \$10,000.

12.1 By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement:

12.1.1 It does not and will not maintain or provide for its employees, any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control, where segregated facilities are maintained.

12.1.2 The offeror agrees that a breach of this certification is a violation of the Equal Opportunity clause in this Contract.

12.1.3 As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in

fact segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise.

- 12.1.4** It further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will:
- 12.2** Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity clause;
- 12.3** Retain such certifications in its files; and
- 12.4** Forward the following notice to such subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Non-segregated Facilities must be submitted prior to award of a subcontract exceeding \$10,000 that is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for such subcontract or for all subcontracts during a period (i.e., quarterly, semiannually or annually).

Name	Signature
Title	Company
Date	

13. NONDISCRIMINATION ASSURANCE

- 13.1** By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, in connection with this procurement, that it will not discriminate on the basis of race, color, creed, religion, national origin, sex, age, disability, sexual preference and/or gender identity in the performance of this Contract. The offeror is required to insert the substance of this clause in all subcontracts and purchase orders. The Contractor's failure to carry out these requirements is a material breach of this Contract, that may result in the termination of this Contract or such other remedy as the Authority deems appropriate. The offeror further agrees by submitting this offer, that it will include this certification, without modification, in all subcontracts and purchase orders.

Name	Signature
Title	Company
Date	

14. CERTIFICATION OF RESTRICTIONS ON LOBBYING

This certification is applicable to federally assisted contracts if the offer exceeds \$100,000.

- 14.1** By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that to the best of his or her knowledge or belief:

- 14.1.1** No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 14.1.2** If any funds other than federally appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Contract, the undersigned shall complete and submit Standard Form--LLL, "Disclosure of Lobbying Activities."
- 14.1.3** The undersigned shall require that the language of this certification be included in all sub-awards (including subcontracts, sub-grants and contracts under grants, loans and cooperative agreements) at all tiers and that all sub-recipients shall certify and disclose accordingly.
- 14.2** This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352, as amended. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
- 14.3** The Contractor certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C.A. § 3801, *et seq.* apply to this certification and disclosure, if any.

Name	Signature
Title	Company
Date	

15. BUY AMERICA ACT CERTIFICATION

The Buy America Act requirements apply to federally assisted construction contracts, and acquisition of goods or rolling stock contracts valued at more than \$150,000.¹

- 15.1** By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement it will comply with 49 U.S.C. § 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. § 661.7. Separate requirements for rolling stock are set out at 49 U.S.C. § 5323(j)(2)(C) and 49 C.F.R. § 661.11.
- 15.2** An offeror must submit to the Authority, the appropriate Buy America Act certification (below) with all offers on FTA funded contracts, except those subject to a general waiver. Offers that are not accompanied by a completed Buy America Act certification must be rejected as

¹ If the funding for this Contract comes from an FTA grant issued before December 26, 2014, then the limit is \$100,000.

nonresponsive. This requirement does not apply to lower tier subcontractors. Mark the applicable certifications below:

15.2.1 Certification requirement for procurement of steel, iron, or manufactured products:

- ☐ *Certificate of Compliance with 49 U.S.C. § 5323(j)(1)*
The offeror hereby certifies that it will meet the requirements of 49 U.S.C. § 5323(j)(1) and the applicable regulations in 49 C.F.R. § 661.5.
- ☐ *Certificate of Non-Compliance with 49 U.S.C. § 5323(j)(1)*
The offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. § 5323(j)(1) and 49 C.F.R. § 661.5, but it may qualify for an exception pursuant to 49 U.S.C. §§ 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. § 661.7.

15.2.2 Certification requirement for procurement of buses, other rolling stock and associated equipment:

- ☐ *Certificate of Compliance with 49 U.S.C. § 5323(j)(2)(C)*
The offeror hereby certifies that it will comply with the requirements of 49 U.S.C. § 5323(j)(2)(C) and the regulations at 49 C.F.R. § 661.11.
- ☐ *Certificate of Non-Compliance with 49 U.S.C. 5323§ (j)(2)(C)*
The offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. § 5323(j)(2)(C) and 49 C.F.R. § 661.11, but may qualify for an exception pursuant to 49 U.S.C. §§ 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. § 661.7.

Name	Signature
Title	Company
Date	

16. CERTIFICATION OF NON-DELINQUENT TAXES

This certification is applicable to federally assisted contracts.

16.1 By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that in connection with this procurement:

- 16.1.1** It has not been convicted over the past three (3) years of violating any Federal criminal tax law or failed to pay any tax.
- 16.1.2** It has certified if it has been notified of an unresolved tax lien or any unsatisfied Federal tax delinquency in excess of \$3,000 and that it is paying tax debts through an installment agreement or has requested a collections due process hearing.
- 16.1.3** The offeror agrees that a breach of this certification is a violation of the Federal Acquisition Regulation (FAR).
- 16.1.4** As used in this certification, the term "tax delinquency" means an outstanding debt for which a notice of lien has been filed in public records.
- 16.1.5** It further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will:

- 16.2** Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the FAR.;
- 16.3** Retain such certifications in its files; and
- 16.4** Forward the following notice to such subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATION
OF NON-DELINQUENT TAXES**

A Certification of Non-Delinquent Taxes must be submitted prior to award of a subcontract exceeding \$100,000 that is not exempt from the provisions of the FAR. The certification may be submitted either for such subcontract or for all subcontracts during a period (i.e., quarterly, semiannually or annually).

Name	Signature
Title	Company
Date	

17. DISCLOSURES OF INTERESTS OF WMATA BOARD MEMBERS

For purposes of this disclosure, terms in bold are defined by the Code of Ethics for Members of the WMATA Board of Directors a copy of which is available at www.wmata.com. Financial interests include ownership interests and prospective and actual income. Firm includes parents, subsidiaries and affiliates.

By submission of this offer, the offeror certifies, and in the case of a joint offer, each party thereto certifies as to its own organization, that to the best of its knowledge, information and belief in connection with this procurement:

- 17.1** [] No WMATA **Board member, household member or business associate** has a financial interest in this firm, in a **financial transaction** with the Authority to which this firm is a party or prospective party, or in an **actual or prospective business relationship with the Authority** to which this firm is a party.
- 17.2** [] The following WMATA **Board member(s), household member(s) or business associate(s)** has a financial interest in this firm, in a **financial transaction** with the Authority to which this firm is a party or prospective party, or in an **actual or prospective business relationship with the Authority** to which this firm is a party, Include in "Nature of Interest" below, a description of the financial interest and (1) for ownership interests, the value of the interest, the name and address of the firm in which the interest is held, and the total equity or equivalent interest of the firm; and (2) for income, the amount of all income received by the **Board member, household member or business associate** in the current and preceding fiscal year for services provided, and the name and address of the firm from which the income was received.

Name of Board Member Household Member or Business Associate	Nature of Interest
---	--------------------

- 17.3** The certifications required by 17.1 and 17.2 above shall be included in all subcontracts. The prime contractor shall furnish copies of certifications to the Contracting Officer and retain a copy for inspection upon his or her request.

Name	Signature
Title	Company
Date	

18. CRIMINAL BACKGROUND SCREENING CERTIFICATION (QUARTELY)

By submission of this offer, the offeror certifies that:

- 18.1 It will conduct with or engage a reputable third-party vendor to conduct, criminal background screenings of all Contractor personnel who would have access to WMATA's customers, WMATA's property, or WMATA's information in connection with this Contract. This requirement also applies to Contractors who engage with the general public on WMATA's behalf.
- 18.2 It will screen for criminal convictions, taking into consideration (1) the nature of the services or work being performed under the contract with particular regard for the individual's access to, and interaction with, WMATA's customers, property, and confidential information; (2) the nature or gravity of the offense or conduct resulting in a criminal conviction; and (3) the time that has lapsed since the conviction and/or completion of the sentence, all Contractor personnel who will have access to WMATA's customers, the general public, WMATA's property, or WMATA's information and who work on this Contract during each calendar year within this Contract's period of performance. The Offeror will provide certification that it conducted these screenings to the Contracting Officer's Technical Representative (COTR) on a quarterly basis, on a form provided.
- 18.3 The Contractor shall submit to the COTR, a list of all employees and agents who will require Contractors' access badges not less than 7 days prior to the date on which access will be required.
- 18.4 The Offeror will determine that all Contractor personnel working on this Contract during the calendar year passed the Contractor's criminal background screening and will be in good standing and otherwise fit to work on this Contract.
- 18.5 The Offeror has not obtained or otherwise been made aware of any information about any Contractor personnel working on this Contract that contradicts or otherwise impacts the Contractor's determination that such persons passed the Contractor's criminal background screening and/or are fit to work on this Contract.
- 18.6 The Contractor will flow this requirement down to all of its subcontractors who will have access to WMATA's customers, the general public, WMATA's property, or WMATA's information within this Contract's period of performance.

Name	Signature
Title	Company
Date	

19 CERTIFICATION REQUIRED FOR ALL SAFETY-SENSITIVE² CONTRACTS.

- 19.1** By submission of this offer, the offeror represents and certifies that it will comply with the Federal Transit Administration (FTA) regulations, "Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations," 49 C.F.R. Part 655, and applicable provisions of the U.S. Department of Transportation (DOT) regulations, "Procedures for Transportation Workplace Drug and Alcohol Testing Programs," 49 C.F.R. Part 40.
- 19.2** Offeror agrees that its employees and agents, including but not limited to, safety-sensitive subcontractors will be enrolled in a drug and alcohol testing program that meets the policy and procedural requirements listed in Appendix A of this document.
- 19.3** Offeror understands that Washington Metropolitan Area Transit Authority (WMATA) will perform oversight during the contract's period of performance to ensure that the successful offeror complies with the DOT/FTA regulations.
- 19.4** Failure to comply with this certification may result in WMATA issuing sanctions and pursuing available contractual remedies.

Name	Signature
Title	Company
Date	

² See the Combined Glossary for a definition of "safety-sensitive."

SECTION 00452
BID DATA FORM
(Submit during pre-award)

Contract Number: FQ18102

Date of Request: _____

Project Name: Replacement of Chiller and Cooling Tower Accessories s at Eight (8) Metro-Rail Stations

Project Location: Washington DC, Maryland, and Virginia

1. Name of Firm: _____
2. Legal Address: _____

3. Legal Entity: ☐ Individual ☐ Partnership ☐ Joint venture ☐ Corporation
4. Date Organized: _____
5. State in which incorporated: _____
6. Names and Addresses of Officers or Partners:
 - a. Name of Officer or Partner": _____
Officer or Partner's Address: _____

 - b. Name of Officer or Partner": _____
Officer or Partner's Address: _____

 - c. Name of Officer or Partner": _____
Officer or Partner's Address: _____

 - d. Name of Officer or Partner": _____
Officer or Partner's Address: _____

7. How long has your firm been in business under its present name? _____
8. Attach as SCHEDULE 7 a list of current contracts, each with contract amount, owner, architect-engineer, and character or type of work and percentage of completion. Also, include those projects on which you are apparent low bidder, but for which you have not received an award of contract.
9. Attach as SCHEDULE 8 a list of contracts, each with contract amount, owner, architect engineer, and character or type of work, for contracts completed in the last 5 years.

10. What is the estimated work placement value required per year to complete the work described in SCHEDULE 7. 2018: \$_____ 2019: \$_____ 2020: \$_____
11. Have you ever been denied an award on which you were low bidder? ☐ Yes ☐ No If the answer is YES, attach as SCHEDULE 10 the full particulars regarding each occurrence.
12. Have you ever failed to complete any contract, on which you were the low bidder? ☐ Yes ☐ No If the answer is YES, attach as SCHEDULE 11, the full particulars regarding each occurrence.
13. Have you ever been assessed liquidated damages or actual damages for late completion within the last five years? ☐ Yes ☐ No If the answer is YES, attach as SCHEDULE 12 the full particulars regarding each occurrence.
14. Financial resources available as working capital for this Contract:
 - a. Cash on hand: \$_____ Date: _____
 - b. Sources of credit: _____
15. Attach as SCHEDULE 14 certified financial statements and letters from banks regarding credit as required by Section 00200, INSTRUCTIONS TO BIDDERS, of this Contract.
16. Attach as SCHEDULE 15 the design and construction experience of each officer and principal individual of your organization; include present position, years of design and construction experience, magnitude and type of work, and in what capacity.
17. What percentage of the Work (Contract amount) do you intend performing with your own personnel? _____%
18. Attach as SCHEDULE 17 a list of all Subcontractors and the percentage and character of work (contract amount) which each will perform.
19. Attach as exhibits completed Bid Data Forms for each of the Subcontractors listed in SCHEDULE 17 above.
20. If the Contractor or Subcontractor is a joint venture, submit Bid Data Forms for each member of the joint venture.

The above information is confidential and will not be divulged to any unauthorized person or persons. The signatory of this questionnaire certifies to the truth and accuracy of all statements, answers, and attachments.

For: _____

Firm Name

DUNS # _____

Dated: _____

Signatory's Name, Signature and Signatory's Title

Location: _____

SECTION 00453
DISADVANTAGED BUSINESS ENTERPRISE (DBE) DATA
(Submit with the Bid)

For Disadvantaged Business Enterprise (DBE) Data and forms, refer to Appendix B of Section 00800, Supplementary Conditions, Disadvantage Business Enterprise.

SECTION 00492
BID AS ACCEPTED

- A. Instructions: Insert here the Bid as Accepted.
- B. See Section 00910, AMENDMENTS, for Amendment Letters.

END OF SECTION

SECTION 00500
AGREEMENT

NOTICE TO BIDDERS:

- A. This Section includes the Contract Form to be submitted by the successful Bidder and represents the legal instrument binding the two parties to the Work once the document is signed by the Authority and the Contractor.
- B. The following form is included for the Contractor's information and use in the event Bidder is awarded the Contract. It is not required to be submitted with the Bid.

SECTION 00510
CONSTRUCTION CONTRACT FORM

Contractor: _____

Contract Number: FQ18102

Date: _____

Contract For: Replacement of Chiller and Cooling Tower Accessories at Eight (8) Metro-Rail Stations

Contract Price: \$ _____

Period of Performance: 210 calendar days

In consideration of the covenants contained herein, the Washington Metropolitan Area Transit Authority (hereinafter called the Authority), represented by the Contracting Officer executing this Contract, and the individual, partnership, joint venture, or corporation named above (hereinafter, the Contractor), mutually agree to perform this Contract in strict accordance with its provisions. The Contract consists of: the IFB Documents and all documents referenced or attached to the IFB Documents including the following:

1. Bid as finally accepted.
2. Other publications referenced in the IFB Documents.
3. Amendment Number(s):

MODIFICATIONS: The following modifications were made to this Contract before it was signed by the parties hereto:

In Witness Whereof, the parties hereto have executed this Contract as of the date entered above.

Contractor

Attest _____

*By: _____

Contractor

Attest _____

*By: _____

Contractor

Attest _____

*By: _____

Washington Metropolitan Area Transit Authority

By: _____

*NOTE: Execution for the Contractor that is an individual, corporation or partnership shall be accompanied by the Power of Execution (Section 00542) that follows. A Joint Venture Contractor must complete the Power of Attorney (Section 00541) that follows. All persons executing this Contract must complete the appropriate Certification of the person's authority to act on behalf of the Contractor.

SECTION 00540
ATTACHMENTS TO THE CONTRACT

The following attachments to supplement this Agreement are included for the Bidder's information and use in the event Bidder is awarded the Contract. They are not required to be submitted with the Bid.

SECTION 00541
POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that _____,
constituting all of the venturers of the joint venture known as _____,
Organized and existing under the laws of the State of _____ which is desirous of
entering into a contract with the Washington Metropolitan Area Transit Authority, do hereby designate and
appoint _____, one of the venturers
hereinafter called the "Managing Sponsor," as their true and lawful attorney with the power, on their behalf and
in the name and on behalf of the joint venture, to represent and bind the undersigned and the joint venture in all
matters in connection with Contract, to make, execute, seal, and deliver on behalf of the joint venture and as its
act and deed, any and all contracts, modifications, monthly and final payment certificates, and other contract
documents. The undersigned specifically acknowledge and agree that the execution of such Bid or Contract by
the Managing Sponsor shall constitute the agreement of each venturer to be jointly and severally liable for any
and all of the duties and obligations of the joint venture arising from such Bid or Contract.

IN WITNESS WHEREOF, the undersigned have executed this Power of Attorney

this _____ day of _____, 20_____.

Contractor

Attest _____ By: _____

Contractor

Attest _____ By: _____

Contractor

Attest _____ By: _____

SECTION 00542
POWER OF EXECUTION

KNOW ALL PERSONS BY THESE PRESENTS, that _____,
constituting all of the venturers of the joint venture known as _____,

Organized and existing under the laws of _____ which is desirous of entering into
a contract with the Washington Metropolitan Area Transit Authority, do hereby designate and appoint
_____, one of the venturers hereinafter called the
"Managing Sponsor," as their true and lawful attorney with the power, on their behalf and in the name and on
behalf of the joint venture, to represent and bind the undersigned and the joint venture in all matters in connection
with Contract, to make, execute, seal, and deliver on behalf of the joint venture and as its act and deed, any and
all contracts, contract documents, monthly and final payment certificates, and other contract documents. The
undersigned specifically acknowledge and agree that the execution of such Bid or Contract by the Managing
Sponsor shall constitute the agreement of each venturer to be jointly and severally liable for any and all of the
duties and obligations of the joint venture arising from such Bid or Contract.

IN WITNESS WHEREOF, the undersigned have executed this Power of Execution

this _____ day of _____, 20_____.

Contractor

Attest _____

By: _____

Contractor

Attest _____

By: _____

Contractor

Attest _____

By: _____

SECTION 00550
NOTICE TO PROCEED (NTP)

END OF SECTION

SECTION 00600
BONDS AND CERTIFICATES

This Section includes bond forms required to be submitted by the Contractor.

THIS PAGE NOT USED

SECTION 00610
BOND REQUIREMENTS

- A. Requirements: Within 10 Days after the prescribed forms are presented for signature to the Bidder to whom award is made, a written Contract and Attachments (Power of Attorney and Power of Execution) on the forms provided in Section 00500, AGREEMENT, shall be executed and delivered to the Contracting Officer, together with a performance bond and payment bond if the Contract Price is \$150,000 or more, each with good and sufficient surety or sureties acceptable to the Authority. Corporations executing the bonds as sureties must be among those appearing on the U. S. Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. The penal sums of such bonds shall be as follows:
1. Performance Bond: The penal sum of the performance bond shall equal 100 percent of the Contract Price.
 2. Payment Bond: The penal sum of the payment bond shall equal (1) 50 percent of the Contract Price if the construction contract price is not more than \$1,000,000; (2) Forty percent of the contract price if the contract price is more than \$1,000,000 and not more than \$5,000,000; or (3) when the contract price is more than \$5,000,000; the payment bond shall be \$2,500,000.
- B. Failure to Furnish: In the event the required bonds are not furnished as specified, the Contracting Officer may issue the Notice To Proceed, however, no payment will be made to the Contractor until the required bonds are furnished.

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SECTION 00611
PERFORMANCE BOND

BIDDER'S INFORMATION NOTICE: The following is included for the Bidder's information and use in the event Bidder is awarded the Contract. It is not required to be submitted with the Bid.

Contract Number: FQ18102

Date: _____

Penal Sum of Bond: \$ _____

Date Bond Executed: _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, the Principal and Surety(ies) hereto, are firmly bound to the Washington Metropolitan Area Transit Authority (hereinafter called the Authority) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: Provided, that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal entered into the Contract identified above:

NOW, THEREFORE, if the Principal shall perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the Authority, with or without notice to the Surety(ies), and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety(ies) being hereby waived, then the above obligation shall be void and of no effect. Surety acknowledges Authority can advance the date of payments to Contractor, and by so doing the Surety remains liable under the terms of the bond.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this performance bond and have affixed their seals on the date set forth above.

Principals

1. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____ _____	State of Inc.: _____ _____	Corporate Seal
2. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____ _____	State of Inc.: _____ _____	Corporate Seal

3. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____	State of Inc.: _____ _____	Corporate Seal
--	-------------------------------	----------------

Corporate Surety(ies)			
Surety A	Surety Name: _____	Liability Limit:	(Corporate Seal)
	Surety Address: _____	\$ _____	
	_____	Or _____%	
	Name & Title: _____	State of Inc.: _____	
Surety B	Surety Name: _____	Liability Limit:	(Corporate Seal)
	Surety Address: _____	\$ _____	
	_____	Or _____%	
	Name & Title: _____	State of Inc.: _____	
Surety C	Surety Name: _____	Liability Limit:	(Corporate Seal)
	Surety Address: _____	\$ _____	
	_____	Or _____%	
	Name & Title: _____	State of Inc.: _____	

Attach additional pages as needed.

Bond Premium Schedule	Total Premium	\$ _____ _____
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Performance Bond Instructions:

1. This form is authorized for use in connection with contracts for construction work or the furnishing of labor, materials, equipment, supplies, and services.
2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership or joint venture, or an officer of the corporation involved, evidence of their authority must be furnished.
3. Corporation executing the bond as sureties must be among those appearing on the Treasury Department's therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "Corporate Surety(ies)".

SECTION 00612
PAYMENT BOND

Contract Number: FQ18102

Date: _____

Penal Sum of Bond: \$ _____

Date Bond Executed: _____

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety(ies) hereto, are firmly bound to the Washington Metropolitan Area Transit Authority (hereinafter called the Authority) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: Provided, that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas the Principal entered into the Contract identified above:

NOW, THEREFORE, if the Principal shall promptly make payment to all claimants as hereinafter defined supplying services, labor, material, and/or equipment in the prosecution of the Work provided for in said Contract, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety(ies) being hereby waived, then the above obligation shall be void and of no effect, otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental of equipment directly applicable to the Contract.
2. The above-named Principal and Surety hereby jointly and severally agree with the Authority that every claimant as herein defined, who has not been paid in full before the expiration of a period of 90 Days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due the claimant, and have execution thereon. The Authority shall not be liable for the payment of any costs or expenses of any such suit.
3. No suit or action shall be commenced hereunder by any claimant:
 - a. Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to the Principal within 90 Days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal at any place where it maintains an office or conducts business, or its residence or such notice shall be served in any manner in which legal process may be served in the state or District of Columbia in which the aforesaid Project is located, save that such service need not be made by a public officer.
 - b. After the expiration of one year following the date of final settlement of said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
 - c. Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this payment bond and have affixed their seals on the date set forth above.

Principals

1. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____ _____	State of Inc.: _____ _____	Corporate Seal
2. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____ _____	State of Inc.: _____ _____	Corporate Seal
3. Firm Name: _____ Firm Address: _____ _____ Signature: _____ Name and Title: _____ _____	State of Inc.: _____ _____	Corporate Seal

Corporate Surety(ies)

Surety A	Surety Name: _____	Liability Limit: \$ _____ Or _____ % State of Inc.: _____	(Corporate Seal)
	Surety Address: _____		
	Name & Title: _____		
	Signature: _____		
Surety B	Surety Name: _____	Liability Limit: \$ _____ Or _____ %	(Corporate Seal)
	Surety Address: _____		

	Name & Title: _____ Signature: _____	State of Inc.: _____	
Surety C	Surety Name: _____ Surety Address: _____ _____ Name & Title: _____ Signature: _____	Liability Limit: \$ _____ Or _____ % State of Inc.: _____	(Corporate Seal)

Attach additional pages as needed.

Bond Premium Schedule	Total Premium	\$ _____
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Payment Bond Instructions

1. This form is authorized for use in connection with contracts for construction work or the furnishing of labor, materials, equipment, supplies, and services.
2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership or joint venture, or an officer of the corporation involved, evidence of their authority must be furnished.
3. Corporation executing the bond as sureties must be among those appearing on the U.S. Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "Corporate Surety(ies)".
4. Corporations executing the bond shall affix their corporate seals.
5. The name of each person signing this performance bond should be typed in the space provided.
6. The date this bond is executed must be later than the Contract execution date.

THIS PAGE NOT USED

SECTION 00613

PERFORMANCE AND PAYMENT BONDS (ADDITIONAL BOND SECURITY)

- A. If any surety upon any performance bond furnished in connection with this Contract becomes unacceptable to the Contracting Officer, or if any such surety fails to furnish reports as to its financial condition from time to time as requested by the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required to protect the interests of the Authority and of persons supplying labor or materials in the prosecution of the Work contemplated by this Contract.
- B. If any surety upon any payment bond furnished in connection with this Contract becomes unacceptable to the Contracting Officer, or if any such surety fails to furnish reports as to its financial condition from time to time as requested by the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required to protect the interests of the Authority and of persons supplying labor or materials in the prosecution of the Work contemplated by this Contract.

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SECTION 00620
CERTIFICATES

- A. This Section provides an area for conforming the IFB Documents with required Affidavits and Certificates provided by the Contractor; i.e., Certificates of Acceptance, Application for Payment, Insurance, Compliance including ADAAG Design and Construction Compliance and Checklists, Substantial Completion, Acceptance, and Final Payment.
- B. Instructions: Insert here all required Certificates to conform to the Contract Documents.

END OF SECTION

SECTION 00700

GENERAL CONDITIONS

This section includes a compilation of contractual and legal requirements that list the rights, responsibilities, and relationships of the parties to a Contract and define duties and limits of authority for design professionals and construction management.. This section shall be read in conjunction with "Section 00800, Supplementary Conditions," which specifies modifications to these General Conditions, and which will be cited using the same last 2 digits of the Section number; i.e., a modification to Section 00724 will be indicated as Section 00824.

00701 DEFINITIONS

A. AS USED THROUGHOUT THE CONTRACT, THE FOLLOWING TERMS SHALL HAVE THE MEANINGS SET FORTH BELOW:

1. Acceptance: Acknowledgement by the Authority of full and satisfactory physical completion and commissioning of all work including punch list items, all in accordance with the Contract.
2. Agreement: The Authority's form entitled "Contract Form" in this Invitation for Bids (IFBs) that, upon execution by the Contractor and the Authority, creates the Contract between the two parties.
3. Amendment: Written or graphic instructions issued to clarify, revise, add, or delete IFB requirements that are issued before the execution of an Agreement.
4. Approval of a Submittal or any other item shall be solely for the purpose of establishing conformance to the IFB Documents.
5. As-Built Drawings: Drawings prepared by or through the Contractor, which reflect final as-built condition of the project and include all known changes to the issued "For Construction" drawings.
6. As-Built Specifications: Those specifications prepared by or through the Contractor in CSI format to reflect final information only and showing revisions from the "Issued for Construction" specifications.
7. As shown, as indicated, as detailed, as described, as specified or words of similar import: Shall be understood to mean that reference is made to the IFB.
8. Authority: The Washington Metropolitan Area Transit Authority ("WMATA," or "Metro"), created effective February 20, 1967, by Interstate Compact by and between Maryland, Virginia, the District of Columbia, and the Federal Government pursuant to Public Law 89-774, approved November 6, 1966.
9. Basis of Design: In a Design-Build contract, the IFB that shall be used by the Design-Builder for the preparation of the "Issued for Construction" specifications and drawings.
10. Board of Directors: The Board of Directors of the Washington Metropolitan Area Transit Authority.
11. Claim: A written demand or assertion by the Contractor seeking, as a legal right, the payment of money, adjustment or interpretation of Contract terms, or other relief, arising under or relating to this Contract.
12. Contract: The written Agreement between the Authority and the Contractor covering the work as set forth therein. The Contract consists of the IFB, all amendments issued before the effective date of the agreement, and all modifications issued after the effective date of the Contract; the Notice to Proceed; including the Contractor's price and technical proposals, as finally accepted by the Authority.
13. Contracting Officer (CO): An employee with authority duly delegated from the Chief Procurement Officer to legally bind the Authority by signing a contractual instrument. The Contracting Officer is the Authority's primary point of contact for pre-award administration,

modifications/changes above the limits of the Contracting Officer's Representative (COR), and final settlement.

14. Contracting Officer Representative (COR): The person to whom the Contracting Officer delegates authority and responsibility for certain post- award administration duties. The Contracting Officer's Representative is the Authority's primary point of contact with its Contractor.
15. Contractor: In a Design-Bid-Build contract, the individual, partnership, firm, corporation, or other business entity that is contractually obligated to the Authority to furnish, through itself or others, the construction services described in the Contract, including all incidentals that are necessary to complete the work in accordance with the Contract. Wherever this contract references rights or responsibilities as applied to the Contractor, they shall also apply to the Design-Builder on a Design-Build Contract.
16. Contract price: The amount payable to the Contractor under the Contract based on lump- sum prices, unit prices, fixed prices or combination thereof, with adjustments made in accordance with the Contract.
17. Day: Calendar day except where the term "work day" or like terms are used.
18. Design-Builder: In a Design-Build contract, the individual, partnership, firm, corporation, or other business entity that is contractually obligated to the Authority to furnish, through itself or others, the design and construction services described in the Contract, including all incidentals that are necessary to complete the work in accordance with the Contract.
19. Designer: In a Design-Build contract, the individual, partnership, firm, corporation or other business entity that is either the Design-Builder, or employed or retained by the Design-Builder, to manage and perform the design services for the project.
20. Design Drawings: In a Design-Build contract, those drawings prepared by or through the Design-Builder to demonstrate compliance with the IFB..
21. Design Specifications: In a Design-Build contract, those specifications prepared by or through the Contractor to demonstrate compliance with the IFB; or Equivalent or Equal or better quality and performance to that specified in the IFB. Equivalency determinations shall be made in WMATA's sole discretion.
22. Final Payment: The last payment made to the Contractor following acceptance of the work, as more fully described herein.
23. General Conditions: A compilation of contractual and legal requirements that lists the rights, responsibilities, and relationships of the parties to the Contract and defines duties and limits of authority for design professionals and construction management in performance of the contract..
24. General Requirements: A compilation of the conditions and performance requirements (Division 1) that govern the design and construction work.
25. Industry Standards: Drawings, documents, and specifications or portions thereof published by industry organizations. Industry Standards are not part of the Contract unless specifically listed as such in the technical specifications.
26. Issued "For Construction" Drawings/Specifications: Drawings, specifications, and documents that are prepared by the Authority to be used in construction, fabrication, and implementation of the project.
27. Jurisdictional Authority: Refers to Federal, State and local authorities or agencies having approval authority over work to which reference is made.
28. Legal Requirements: All Federal, State and local laws, ordinances, rules, orders, decrees, and regulatory requirements such as: building codes, mechanical codes, electrical codes, fire codes, Americans with Disabilities Act Accessibility Guidelines (ADAAG) and other regulations of any government or quasi-government entity that are applicable to the project.

29. MATOC (Multiple Award Task Order Contract): a type of Indefinite Delivery/Indefinite Quantity (IDIQ) procurement where multiple firms are pre-selected based on technical qualifications and awarded contracts for a general scope of services to be performed. Individual task orders for a specific scope of work are then competed among the pre-selected firms on a competitive basis.
30. Milestone: A specified date in the Contract by which the Contractor is required to complete a designated portion or segment of the work
31. Modification: A written document issued pursuant to Section 00748, CHANGES, that alters the Statement/Scope of the Work, the Schedule, the Contract price, the period of performance, or makes any other change to the Contract after execution of the Contract.
32. Notice to Proceed: Written notice issued by the Authority establishing the date on which the Contractor may commence work and directing the Contractor to proceed with all or a portion of the work.
33. Operations Readiness Date (ORD): The date upon which the Authority certifies that the system and equipment are complete and capable of supporting revenue service.
34. Option: A unilateral right in the Contract by which, for a specified time or in a specified amount, the Authority may elect to purchase, at a predetermined price specified in the Contract, additional equipment, supplies, services, or work called for by the Contract.
35. Period of Performance: The time required for all work to be completed in accordance with the Contract. The period of performance begins upon the effective date of the Notice to Proceed and ends on the date of final acceptance.
36. Product Data: Information furnished by the Contractor to describe materials used for some portion of the work, such as written or printed descriptions, illustrations, standard schedules, performance charts, instructions, brochures, and diagrams.
37. Project: The design and construction of the facility described in the IFB.
38. Project Schedule: The time allotted in the contract to complete the work without assessment of liquidated damages, or without the Authority's written extension of the work completion date.
39. Proposal: The written offer of a proposer submitted to the Authority as required by the IFB.
40. Proposer: The prospective Contractor who submits proposals to perform the work of the Contract.
41. Punch List: Work that remains to be completed after substantial completion. This work must be completed as a condition of final completion and acceptance.
42. Shop Drawings: Fabrication, erection, layout, setting, schematic, and installation drawings prepared by the Contractor for permanent structures, equipment, and systems that it designs to comply with the Contract, the "Issued for Construction" specifications and "Issued for Construction" drawings.
43. Site: The areas upon which construction work will be performed that are used by the Contractor and subcontractors during the project as indicated in the IFB..
44. Subcontract: Any Contract between the Contractor and an individual, firm, partnership, corporation or other business entity at any tier, to perform a portion of the work.
45. Submittal: Written or graphic document or sample prepared by the Contractor or a subcontractor and submitted to the Authority, including shop drawings, product data, samples, schedules of material, or other data.
46. Substantial completion: Work or a portion thereof that has progressed to the point where it is sufficiently complete in accordance with the Contract (including receipt of test and inspection reports) so that it can be utilized for its intended purpose(s). After substantial completion, only incidental work will remain for physical completion in accordance with the Contract.

47. Substitution: A significant difference in material, equipment, or configuration, that meets the requirements of the IFB, but the Contractor submits it in lieu thereof.
48. Supplementary Conditions: The term "Supplementary Conditions" means modifications to the General Conditions for requirements unique to a specific project.
49. Task Order: A defined scope of work that is competed among pre-selected Design-Builders/Contractors on a MATOC contract.
50. Utility: A public and/or private facility or installation, other than an Authority system facility, which relates to (1) the conveyance and supply of water, sewage, gas, chemicals, steam, petroleum products, and other piped installations, or (2) electrical energy, telephone, internet? communications, radio, television, and cellular or wireless communications.
51. Utility standards: Drawings and specifications for utilities published or issued by municipalities or utility companies.
52. WMATA: Refers to the Washington Metropolitan Area Transit Authority, or the Authority.
53. WMATA CAD Manual: Manual that establishes drafting criteria for drawings and electronic files and provides templates for drawing/plotter configuration to Design-Builders.
54. WMATA Manual of Design Criteria: Document that outlines the design criteria, measures and process requirements that must be followed for the submittal of project information to the Authority, when constructing a project in the vicinity of, or impacting the Authority's systems and facilities.
55. WMATA Safety Manual: A compilation of the appropriate safety and reporting requirements for the project as specified herein.
56. WMATA Safety and Security Certification Program Plan: A compilation of the appropriate system safety and security certification requirements for the project.
57. Work: All construction services, including supervision, quality control and quality assurance, labor, materials, machinery, equipment, tools, supplies and facilities required to complete the project, or the various separately identifiable parts thereof including, but not limited to safety, security, system safety certification and commissioning requirements, in accordance with the terms of the Contract.
58. Working Drawings: Plans prepared by the Contractor for temporary structures such as decking, temporary bulkheads, excavation support, utilities support, groundwater control systems, and for such other work as may be required for construction, but which do not become an integral part of the completed project, as specified in Section 01330, SUBMITTAL PROCEDURES.

00702 ORDER OF PRECEDENCE

- A.** Any inconsistency in this solicitation or Contract shall be resolved by giving precedence in the following order:
 1. Contract Modifications (only) in Section 00904, AMENDMENTS AND MODIFICATIONS.
 2. The Agreement Form and Attachments in Section 00500, AGREEMENT, Section 00600, BONDS AND CERTIFICATES, and Amendments (only) in Section 00900, AMENDMENTS AND MODIFICATIONS.
 3. Representations and Certifications in Section 00451, REPRESENTATIONS AND CERTIFICATIONS FORM.
 4. Supplementary Conditions in Section 00800, SUPPLEMENTARY CONDITIONS.
 5. General Conditions in Section 00700, GENERAL CONDITIONS.
 6. General Requirements - Division 1.
 7. Project Specific Documents – IFB Drawings, Reports and Studies.
 8. WMATA's Manual of Design Criteria

9. WMATA's Standard Specifications
 10. WMATA's Standard Drawings.
 11. Issued "For Construction" Specifications.
 12. Issued "For Construction" Drawings.
- B. In the event of a conflict within, between, or among the above listed order of precedence, the more stringent requirement shall apply.

00703 GENERAL REQUIREMENTS, DRAWINGS, AND SPECIFICATIONS

- A. In a Design-Build contract, during the design phase of the project, the Design-Builder shall keep at the work site, a copy of the Contract. During the construction phase of a project, the Contractor shall keep at the jobsite, a copy of the "Issued For Construction" Specifications and "Issued For Construction" Drawings. The Design-Builder/Contractor shall at all times give the Contracting Officer's Representative access thereto.
- B. The Division 1, General Requirements, shall govern the Contract.
- C. All provisions of WMATA's Standard Specifications and WMATA's Standard Drawings shall be incorporated into each respective document.
- D. In case of discrepancy between WMATA's Standard Specifications and WMATA's Standard Drawings, WMATA's Standard Specifications shall govern. In case of discrepancy among the figures within WMATA's Standard Drawings, the matter shall be promptly submitted, in writing, to the Contracting Officer's Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, who will promptly resolve the discrepancy in writing. Conflicts among the requirements and criteria indicated in either WMATA's Standard Specifications, WMATA's Standard Drawings, or required by local, State, or Federal jurisdictions or utilities, as specified in Section 01112, DESIGN AND PROGRAM REQUIREMENTS, that affect the scope, cost, or quality of the work, shall be promptly submitted, in writing, to the Contracting Officer's Representative for a written determination in accordance with Section 01330, SUBMITTAL PROCEDURES. Any adjustment by the Design-Builder/Contractor without such a determination shall be at the Design-Builder/Contractor's own risk and expense.
- E. Wherever in WMATA's Standard Specifications and/or in the "Issued for Construction" Specifications the imperative form of a verb is used, such as the words "directed," "ordered," "designated," "prescribed," or words of like import, it shall be understood that the "direction," "requirement," "order," "designation," or "prescription" of the Contracting Officer's Representative is intended. Similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean "approved by," "acceptable to," or "satisfactory to" the Contracting Officer's Representative.
- F. Should it appear that the work to be performed is not sufficiently detailed or explained in the Contract, then the Design-Builder/Contractor shall promptly ask the Contracting Officer's Representative, in writing, in accordance with Section 01330, SUBMITTAL PROCEDURES, for a written explanation. The Design-Builder/Contractor shall promptly notify the Contracting Officer's Representative, of all errors, omissions, inconsistencies, or other defects including inaccuracies, that it discovers in the Contract, and shall provide options to the Contracting Officer's Representative to remedy such errors, omissions, or other defects. The Design-Builder/Contractor shall obtain from the Contracting Officer's Representative, in writing, specific instructions regarding any such error, omission, or defect before proceeding with the design work affected thereby. Omission or inaccurate descriptions of details of the work from the Contract that are necessary to carry out its intent shall not relieve the Design-Builder/Contractor from performing such omitted or inaccurately described work no matter how extensive.

00704 INTENT OF CONTRACT

- A. The Contractor shall, upon execution of this Contract and receipt of the Notice to Proceed (NTP), perform all work as defined herein to complete the project as described in this Contract. The Authority has detailed its requirements in the Contract. The Authority has not specified the precise

details of performing the work, unless such details are essential for the successful completion of the work. The Contractor shall not deviate from the Contract without the written Approval of the Authority.

- B.** The Contractor shall conduct a pre-design meeting jointly with the Authority. During the design of the project, the Contractor and the Authority shall meet periodically to confer about the progress of the design as specified in Section 01312, PROJECT MEETINGS. At these design review meetings, the Contractor shall identify the evolution of the design and all changes or deviations from the requirements of the Contract , as well all associated potential changes.. The Contractor, in a timely manner, shall provide minutes of all such meetings to all attendees to review and approve as specified in Section 01312, PROJECT MEETINGS, in accordance with Section 01330, SUBMITTAL PROCEDURES. The Authority will review and approve subsequent design submittals that are consistent with the Contract , the Design Specifications and the Design Drawings pursuant to agreements reached at the design review meetings and documented in meeting minutes approved by the Authority. Any agreement that involves changes to the Contract shall be documented in a fashion consistent with Section 00748, CHANGES. The Authority will perform its design reviews solely for the purpose stated in Section 00719, AUTHORITY REVIEWS.
- C.** It is the intent of the Contract to describe a functionally complete project to be designed and constructed in accordance with the “Issued for Construction” Specifications and “Issued for Construction” Drawings. All work, materials, or equipment that may reasonably be inferred from the Contract , from prevailing custom, or trade usage as being required to produce the intended results will be furnished and performed whether or not specifically listed. . Unless otherwise defined in the Contract, when words or phrases having a well-known technical, construction industry, or trade meaning are used to describe work, labor, services, materials, tools, or equipment, such words or phrases shall be interpreted in accordance with that meaning.
- D.** The Design-Builder/Contractor accepts the relationship of trust and confidence established between it and the Authority by the Contract. The Design-Builder/Contractor agrees to furnish the architectural, engineering, and construction services set forth herein, and agrees to furnish efficient business administration and superintendence, including quality control and quality assurance, and use its best efforts to complete the project in the most expeditious and economical manner consistent with the requirements of the Contract , the “Issued for Construction” Specifications and “Issued for Construction” Drawings. The Contractor agrees to perform its design services in accordance with the responsibilities and requirements set forth in Section 00707, RESPONSIBILITY OF THE CONTRACTOR FOR DESIGN RELATED SERVICES, in Section 00708, REQUIREMENTS FOR PROFESSIONAL REGISTRATION, Section 01111, KEY CONTRACTOR FUNCTIONS, and in Section 01112, DESIGN REQUIREMENTS AND PROGRAM CRITERIA.
- E.** The Design-Builder or Contractor shall be responsible for performing and requiring its subcontractors to perform design, construction services and related services in all phases of the project in accordance with the best general practices as specified in Section 01111, KEY CONTRACTOR FUNCTIONS. Only new materials and workmanship of the best standard quality shall be used. Unless otherwise specified, the Contractor shall furnish all work, services, labor, materials, tools, equipment, and incidentals, that are necessary to complete the work in a proper, substantial, and workmanlike manner in accordance with the Contract the “Issued for Construction” Specifications and the “Issued for Construction” Drawings.
- F.** Nothing contained herein shall create a contractual relationship between the Authority and any party other than the Contractor. However, it is understood and agreed that the Authority is an intended third-party beneficiary of all subcontracts for design, engineering, or construction services between the Contractor and third parties related to those services. The Contractor shall incorporate the obligations of this Contract into its respective subcontracts, supply agreements, and purchase orders.

00705 LEGAL REQUIREMENTS

- A.** The Contractor shall perform the work in accordance with all requirements, including, but not limited to Section 01410, REGULATORY REQUIREMENTS, in Section 01420, REFERENCES, in Section

00706, PERMITS AND RESPONSIBILITIES, and in Section 00707, RESPONSIBILITY OF THE Design-Builder FOR DESIGN RELATED SERVICES. The Contract price and period of performance may be adjusted to compensate the Contractor for changes in the requirements enacted after the date of this Contract affecting the performance of the work. Such effects may include, without limitation, revisions the Contractor is required to make to the Design Specifications and Design Drawings because of changes in requirements. Any change in requirements, which affects the method or manner of performance of the work, but not the final design of the work incorporated into the project, shall be at the Contractor's risk and at no additional cost to the Authority.

- B. The Contractor's failure to design or construct the work in conformance with all applicable requirements in force as of the Notice to Proceed shall not be the basis for a change to either the contract price or period of performance. The Contractor shall remedy all such failures to design or construct the work in conformance with all such requirements at its own expense.
- C. The Contractor shall be responsible for remaining informed of all changes in requirements that may occur after the Notice to Proceed and shall perform the work in accordance with such changed requirements.

00706 PERMITS AND RESPONSIBILITIES

- A. In a Design-Build Contract, the Design-Builder shall, without additional expense to the Authority, be responsible for obtaining necessary licenses, permits, and easements and for complying with applicable International, Federal, State, local, or municipal laws, codes, or regulations in connection with this Contract.
- B. The Contractor shall be responsible for all damages to persons or property that occur as a result of its or its subcontractors' fault or negligence subject to an allocation or proportion of any such liability, loss, cost, or expense, if caused by a party indemnified hereunder. The Contractor shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire project, except for any completed unit of construction that was accepted, in writing, by the Authority.

00707 RESPONSIBILITY OF THE DESIGN-BUILDER FOR DESIGN-RELATED SERVICES

- A. The Design-Builder shall be responsible for performing professional design and related services in all phases of the project as specified in Section 01111, DESIGN-BUILDER KEY STAFF, and in Section 01112, DESIGN AND PROGRAM REQUIREMENTS. The Design-Builder shall require its Designer to perform the services in accordance with the Contract and in accordance with professional standards of skill, care, and diligence adhered to by firms recognized for their expertise, experience, and knowledge in performing services of a similar nature. The Design-Builder shall be responsible for the professional quality, technical accuracy, completeness, and coordination of the services. The Authority will be relying upon such professional quality, technical accuracy, completeness, and coordination in utilizing the services for implementation of the project.
- B. The Design-Builder shall, without additional compensation, correct or revise all errors or deficiencies in its designs, drawings, specifications, and other services. In addition, the Design-Builder, in performing its design services, shall be responsible for project management, quality control/quality assurance, and other elements of the work required for the successful completion of the project.
- C. The Design-Builder shall be liable to the Authority for all costs of any kind caused by or resulting from the Design-Builder's failure to perform design services consistent with the terms and conditions of this Contract. Disagreements regarding the responsibility for costs, shall constitute a dispute within the meaning of Section 00730, DISPUTE RESOLUTION.
- D. Neither the Authority's review, approval, or acceptance of, nor payment for, the services required under this Contract shall be construed as a waiver of any rights or cause of action arising out of this Contract. The Design-Builder shall remain liable to the Authority in accordance with applicable

law for all damages caused by the Design-Builder's performance of any of the services furnished under this Contract.

- E. The Design-Builder shall be responsible to the Authority for acts, errors, and/or omissions of its designer, subcontractors, suppliers, agents, and employees, whether employed directly or as subcontractors..
- F. The rights and remedies of the Authority provided for under this Contract are in addition to any other rights and remedies at law or in equity.

00708 REQUIREMENTS FOR PROFESSIONAL REGISTRATION

- A. All architecture, engineering, and other design services rendered by or through the Design-Builder under this Contract shall be accomplished, reviewed, and approved by Designers licensed to practice in the particular professional field involved in the jurisdiction where the project being designed will be constructed. The Design-Builder shall comply with local laws regarding the licensing of design firms and personnel providing services for the project.

00709 PROJECT MANAGEMENT AND SUPERINTENDENCE AND KEY STAFF

- A. The Contractor shall provide project management and supervision.
- B. The Contractor shall provide personnel for the positions specifically identified by the Authority in this Contract as required Key Staff and other personnel it deems essential for performance of the work. (See Section 01111, CONTRACTOR KEY STAFF, for responsibilities of key personnel.) All positions shall be filled by competent, full-time personnel satisfactory to the Contracting Officer's Representative.. Individuals holding any key position, shall not be changed without permission of the Contracting Officer's Representative. The Contractor shall acquire written Authority approval for substitutions of key personnel as specified in Section 01111, CONTRACTOR KEY STAFF. The Contractor shall provide the Authority, (in accordance with Section 01330, SUBMITTAL PROCEDURES), with all information as may be reasonably requested regarding proposed and actual substitutions.. The proposed and actual substitutions shall share similar or better qualities than the personnel being substituted. The Authority shall be entitled to satisfactory performance of all services described in this Contract, and the Contractor shall promptly remove from the project, any employee or other person performing services hereunder in a manner that the Authority deems is contrary to its best interests.
- C. The Contractor shall present, as specified in Section 00725, COMMENCING THE WORK, and Section 01111, CONTRACTOR KEY STAFF, confirmation of the credentials of key staff, to the Contracting Officer's Representative for his or her review and acceptance in accordance with Section 01330, SUBMITTAL PROCEDURES.

00710 WORK BY CONTRACTOR

- A. The Contractor shall perform, with its own organization, work equivalent to at least the percentage specified in Section 00810, WORK BY CONTRACTOR, for the construction work.
- B. The percentage shall be determined by the dollar value of the construction work done by its own organization in comparison to total value of construction work in the Contract. The cost of the work performed by skilled and unskilled labor carried on the Contractor's own payroll, together with the cost of materials installed, may be included in the above percentage. The Contractor's markup for overhead and profit on work performed by Subcontractors shall not be included in determining the percentage.
- C. If, during the progress of the Work, the Contractor requests a reduction in such percentage, and if the Contracting Officer's Representative determines that it would be in the Authority's best interests, the Contracting Officer's Representative may approve such a reduction at his or her sole discretion.

00711 SUBCONTRACTS AGREEMENTS:

- A.** After Contract award, the Contractor will be required to submit copies of a conformed and signed subcontract agreement with all subcontractors to be used on the Contract to the Contracting Officer or designee.. The terms of payment for the subcontracts shall be in conformance with Section 00744, Method of Payment. The divisions or sections of the specifications are not intended to control the Contractor in dividing the work among subcontractors or to limit the work performed by a trade.
1. The Contractor shall not enter into subcontracts totaling in amount, more than the percentage of the total Contract price permissible under Section 00710, WORK BY CONTRACTOR, without the written permission of the Contracting Officer.
 2. No subcontractor will be permitted to perform work until the subcontractor, or the Contractor, in compliance with the provisions of Section 00777, INDEMNIFICATION AND INSURANCE REQUIREMENTS, has furnished satisfactory evidence of insurance, as required.
 3. The Contractor shall, under this Contract, establish procedures to ensure timely payment of amounts due pursuant to the terms of its subcontracts. The Contractor shall pay each subcontractor for satisfactory performance of its contract, or any billable portion thereof, no later than ten (10) days from the date of the Contractor's receipt of payment from the Authority for work by that subcontractor. The Contractor shall also release, any retention withheld from the subcontractor within ten (10) days of satisfactory completion of all work required by that subcontractor.
 4. The Contractor shall certify on each payment request to the Authority that payment has been or will be made to all subcontractors in accordance with paragraph (a) above. The Contractor shall notify the Contracting Officer with each payment request, of any situation where scheduled subcontractor payments have not been made.
 5. In the event of a claim by any subcontractor that the Contractor has failed to comply with the terms of this section, the Contractor agrees to fully cooperate in any Authority investigation, and, if deemed appropriate by the Authority, to implement appropriate remedial measures to ensure future compliance.
 6. The Contractor agrees that the Contracting Officer may provide information that he or she deems appropriate in response to inquiries from subcontractors seeking to determine the status of the Authority's payments to the Contractor.
 7. Nothing contained in this article or elsewhere in this Contract shall create a Contractual relationship between the Authority and any subcontractor, shall make the subcontractor an intended beneficiary of this Contract or shall alter or affect traditional concepts of privity of contract.

00712 OTHER CONTRACTS

- A.** The Authority may award other contracts for additional work, and the Contractor shall fully cooperate with such other Contractors as may be directed by the Contracting Officer's Representative. The Contractor shall not commit or permit any act, that will interfere with the performance of work by any other Contractor..
- B.** The Contractor shall conduct all work in a manner that will minimize interference with the operations of other Contractors involved in the performance of related work. All work shall be brought to a stage of completion that will conform to the Contract, the "Issued for Construction" Specifications and the "Issued for Construction" Drawings.

00713 CONFIDENTIALITY

The Contractor or its Subcontractors shall not divulge any confidential or proprietary information, which is so designated by the Authority in the course of performance of this Contract.

00714 CONDITIONS AFFECTING THE WORK

The Contractor shall be responsible for ascertaining the nature and location of the work, and the general and local conditions, that can affect the work or the cost thereof as described in Section 01711, ACCEPTANCE OF CONDITIONS. Any failure by the Contractor to do so will not relieve the Contractor from responsibility for successfully performing work without additional expense to the Authority. The Authority assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of this Contract, unless such understanding or representations are expressly stated in the Contract.

00715 SITE INVESTIGATION

The Contractor acknowledges that it has investigated and satisfied itself as to the conditions affecting the work including, but not restricted to, those bearing upon transportation, disposal, handling, and storage of materials; availability of labor, water, electric power, and roads; and uncertainties of weather, river stages, tides, or similar physical conditions at the site, the conditions of the ground, and the character of equipment and facilities needed preliminary to and during prosecution of the work as described in Section 01711, ACCEPTANCE OF CONDITIONS. The Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered as reasonably ascertainable from an inspection of the site, including a review of all exploratory work and information provided by the Authority, and made a part of this Contract. The Contractor shall also examine the character and extent of existing work on the site or adjacent thereto, and any other work being performed thereon, at the time of the submission of its proposal as described in Section 01711, ACCEPTANCE OF CONDITIONS. Any failure by the Contractor to review the available information will not relieve it from responsibility for estimating properly the difficulty or cost of successfully performing the work. The Authority assumes no responsibility for any of the Contractor's conclusions or interpretations made on the basis of Authority-provided information.

00716 PRECONSTRUCTION INSPECTION

- A.** The Contractor will conditionally inspect buildings and/or structures in the immediate vicinity of the project, that may reasonably be expected to be affected by the work..
- B.** Prior to beginning excavation or any other work, the Contractor shall inform the Authority of buildings or structures on which it intends to perform work or that performance of the work will affect.
- C.** The Contractor shall provide the Authority with sufficient notice of this inspection and afford it an opportunity to participate in the inspection. The Contractor shall submit for approval, in accordance with Section 01330, SUBMITTAL PROCEDURES, the preconstruction inspection records as specified in Section 01711, ACCEPTANCE OF CONDITIONS, to the Authority prior to beginning work.

00717 DIFFERING SITE CONDITIONS

- A.** The Contractor shall promptly, and before such conditions are disturbed, notify in writing the Contracting Officer, through the Contracting Officer's Representative, of (1) subsurface or latent physical conditions at the site that materially differ from those indicated in this Contract or (2) unknown physical conditions at the Site, of an unusual nature, that materially differ from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract .
- B.** The Contracting Officer's Representative will promptly investigate the site conditions, after receiving the notice. If the Contracting Officer's Representative finds that such conditions do materially so differ and cause an increase or decrease, in the Contractor's cost of, or the time required for, performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified, in writing, accordingly.

- C. No claim or request for equitable adjustment by the Contractor under this section will be allowed unless the Contractor has given the notice required in Paragraph A above;
- D. No claim by the Contractor for an equitable adjustment hereunder will be allowed if asserted after final payment under this Contract.

00718 ROLE OF THE AUTHORITY

- A. The character and extent of the work to be performed by the Contractor shall be subject to the general oversight and approval of the Authority.
- B. The Authority will not supervise, direct, or have control over, or be responsible for, the Contractor's means, methods, techniques, sequences, or procedures of design and construction or the safety precautions and programs incidental to the work, or for any failure of the Contractor to comply with requirements. The Authority will not be responsible for the Contractor's failure to perform or furnish the work in accordance with the Contract, the "Issued for Construction" Specifications and "Issued for Construction" Drawings.

00719 AUTHORITY REVIEWS

- A. The Authority will review information submitted by the Contractor, furnish required information and required approvals, and render decisions pertaining thereto, all in a timely manner in order to facilitate the orderly progress of the work in cooperation with the Contractor and in accordance with the planning, scheduling, and budgetary requirements and constraints of the project.
- B. The Authority will review and approve design submittals solely for the purpose of establishing their conformance to the Contract. Such review and approval shall not be deemed to transfer any liability from the Contractor to the Authority.
- C. The Authority will review and approve identified construction submittals solely to determine if the items covered by the submittal will, after installation or incorporation in the construction, conform to the requirements set forth in the "Issued for Construction" Specifications and "Issued for Construction" Drawings and be compatible with the design concept of the completed project as a functioning whole as indicated in the Contract.. Construction submittals requiring Authority review and approval are specified in WMATA's Standard Specifications. Construction submittals not so specified shall be submitted to the Authority for information only. The Authority's review and approval of construction submittals will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for in this Contract) or to safety precautions or programs incidental thereto. The Authority's approval will be general and shall not be construed as: (1) permitting any departure from the Contract ; (2) relieving the Contractor of the responsibility for any errors including details, dimensions, and materials; or, (3) approving departures from details furnished by the Contractor or the Authority, except as otherwise specified.
- D. The Authority reserves the right to review design and construction submittals and to disapprove any submittal when, in its sole judgment, the submittal deviates from the requirements of the Contract the "Issued for Construction" Specifications and the "Issued for Construction" Drawings and compromises the integrity of the construction element. The Authority's review, approval, or acceptance of any submittal required under this Contract shall not be construed to operate as a waiver of the Contractor's responsibility for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, construction, and other services provided by the Contractor under this Contract.

00720 SUBMITTALS

- A. The Contractor shall submit for review and approval a preliminary schedule of required submittals, as described in Section 01330, SUBMITTAL PROCEDURES, including the times for submitting, reviewing, and processing each submittal.
- B. The Contractor shall maintain a "Document Submittal Log" as described in Section 01330, SUBMITTAL PROCEDURES, to show the status of all submittals. The submittal log and all approved submittals shall be kept at the project site and shall at all times be made available for

Authority inspection. Approved submittals and certificates shall be turned over to the Authority at completion as part of the project records in accordance with Section 01775, CLOSEOUT.

- C. The Authority will, in a timely manner, review and approve those submittals that it deems necessary. during the design, construction, and closeout of the project. The Authority's review of design or construction submittals shall be solely for the purposes stated in Section 00719, AUTHORITY REVIEWS. The Authority's review and approval of separate items, will not indicate approval of the assembly in which the item functions. The Contractor shall make corrections to submittals as required and shall return corrected copies for additional review and approval.
- D. The Authority's review and approval of any submittal that it deems necessary shall not relieve the Contractor from responsibility for any variations from the requirements of the Contract , the "Issued for Construction" Specifications, and the "Issued for Construction" Drawings unless the Authority has given written approval of each such variation by written notice incorporated in or accompanying the submittal.
- E. Where a submittal is required by the Contract, the "Issued for Construction" Specifications and the "Issued for Construction" Drawings, any related work provided prior to the appropriate review and approval of a submittal shall be at the sole risk, expense, and responsibility of Contractor.

00721 VALUE ENGINEERING INCENTIVE

- A. This section applies to those value engineering change proposals (VECPs), that the Contractor initiates and develops during Contract performance to modify the Authority's Design Criteria or other requirements of this Contract including commitments made in the Contractor's bid, as finally accepted. In order to be accepted under this section, each VECP shall:
 - 1. Be identified by the Contractor at the time of submittal to the Contracting Officer's Representative using the prescribed Authority VECP form;
 - 2. Require a significant change to this Contract;;
 - 3. Decrease the Contract price;
 - 4. Maintain the Contract requirements such as safety, service life, reliability, economy of operation, ease of maintenance, and necessary standardized and architectural features of the facility or system;
 - 5. Not require an unacceptable extension of original period of performance; and
 - 6. Be reviewed and evaluated by way of a two-phase process.
 - a) Phase One - Conditional Approval: In addition to the use of the Authority's VECP form, all VECPs that the Contractor submits shall be in sufficient detail to clearly define the proposed change including the following items:
 - 1) A description of the difference between the existing and the proposed Contract requirements and the comparative advantages and disadvantages of each;
 - 2) Contract requirements recommended by the Contractor to be changed;
 - 3) Separate detailed cost estimates for both the basic Contract requirement and the proposed change, and an estimate of the change in Contract price including an accounting of the costs of development, implementation, Authority review of the VECP and the sharing arrangement as set forth in Paragraph E;
 - 4) A statement from the Contractor predicting all effects that the proposed VECP will have on the life-cycle costs of the work to include and identify separately, the cost for increased or decreased maintenance and operations;
 - 5) A statement of the time by which the proposal must be accepted to obtain the maximum price reduction and not delay the original period of performance. The time required for VECP review shall be considered and included in this statement and in a separate bar chart;

- 6) A list of codes and the Authority standards applicable to the work to be carried out by the VECP and a statement that the proposed VECP will be in compliance with the requirements set forth in listed codes and standards;
 - 7) The identification of a project where the materials, methods of construction, and/or special equipment have been previously and successfully performed on construction similar to that which is being proposed under this Contract;
 - 8) Preliminary architectural and engineering analysis, including calculations and 11 x 17-inch drawings, in sufficient detail, for each Contract requirement that must be changed if the VECP is accepted. The Contractor shall make recommendations for accomplishing each change and state its effect on unchanged work.
- B.** The Contracting Officer's Representative may, at any time during the two-phase review and evaluation process, reject part or all of the VECP by giving the Contractor written notice thereof. Until final approval, the Contractor shall remain obligated to perform in accordance with the terms of the original Contract. VECPs will be processed expeditiously, however, the Authority shall not be liable for any delay in acting upon any proposal submitted pursuant to this section. The Contracting Officer's Representative's acceptance or rejection of any such proposal shall be final and shall not be subject further review, under this Contract, at law or in equity.
- C.** The Contractor has the right to withdraw part or all of the VECP at any time prior to acceptance or rejection by the Authority. Such withdrawal shall be made, in writing, to the Contracting Officer through the Contracting Officer's Representative. If the Contractor desires to withdraw the proposal, it shall be liable for the cost incurred by the Authority in reviewing the proposal.
- D.** Upon notice of conditional approval of the concept of the VECP, the Contractor shall proceed with final VECP design in accordance with the agreed schedule.
- E.** Phase Two - Final Approval: Final Approval of the VECP by the Authority will be contingent upon the following :
1. The Contractor shall address, to the Authority's satisfaction, all design issues and review all comments prior to submitting the VECP to the Authority for final approval.
 2. An equitable adjustment to the Contract Price and appropriate changes to all other affected provisions of the Contract shall be made, in accordance with Section 00748, CHANGES, or other applicable sections of this Contract.
 3. Fifty percent (50%) of the net savings resulting from the change shall be provided to the Contractor and fifty percent (50%) of the net savings shall be provided to the Authority.. Net savings shall be determined by deducting from the estimated gross savings, the Design-Builder/Contractor's costs of developing and implementing the proposal, including any amount attributable to a subcontractor and the estimated amount of increased costs to the Authority resulting from the change, such as costs for review, implementation, inspection, related items, and Authority-furnished property. Estimated gross savings shall include Contractor's labor, material, equipment, overhead, profit, and bond. The Contract Price shall be reduced by the sum of the Authority's costs and share of the net savings.
 4. The Contractor is entitled to share in instant contract savings only, to the full extent provided for in this Section. For purposes of sharing, the term 'instant contract' shall not include any supplemental agreements to or other Modifications of this Contract, executed subsequent to acceptance of the particular VECP, by which the Authority increases the quantity of any item or adds any item.
 5. Notwithstanding any review, Approval, or acceptance of any VECP by the Authority, the Contractor agrees to be liable to the Authority for all costs of any kind whatsoever caused by or resulting from any error, omission, deficiency, negligence, or combination thereof, of any kind in the design, drawings, or specifications submitted to the Authority in connection with any VECP proposal under this Contract. The rights and remedies of the Authority provided in this Section are in addition to any other rights or remedies provided by law or under this Contract.

- F. The Contractor shall use its best efforts to include Value Engineering arrangements in any Subcontract, which in its judgment, appears to offer sufficient value engineering potential.
- G. A VECP identical to one submitted under any other contract, by this or any other Contractor, may also be submitted under this Contract.
- H. The Contractor may restrict the Authority's right to use any VECP data by marking it with the following statement:

"This data, furnished pursuant to the VALUE ENGINEERING INCENTIVE Section of this Contract, shall not be duplicated, used, or disclosed, in whole or in part, for any purpose except to evaluate the VECP, unless the proposal is accepted by the Authority. This restriction does not limit the Authority's right to use information contained in this data if it is or has been obtained, or is otherwise available, from the Contractor or from other source, without limitations. When this proposal is accepted by the Authority, the Authority shall have the right to duplicate, use, and disclose any data in any manner and for any purpose whatsoever, and have others do so whether under this or any other Authority contract."

00722 QUALITY ASSURANCE / QUALITY CONTROL

- A. The Contractor shall be responsible for conducting an ongoing Quality Plan as described in Section 01470, QUALITY MANAGEMENT SYSTEM, during the entire term of the Contract based on the approved detailed Quality Plan. The purpose of the Quality Plan is to effectively and economically ensure technical quality in the Design, other Contract deliverables, and construction of the Work, thus reducing the potential for:
 - 1. Adverse construction schedule and cost impacts;
 - 2. Personal and public safety problems and incidents and their attendant costs;
 - 3. Those operational and maintenance problems, disruptions, and costs that result from design errors and omissions; and,
 - 4. A poor quality design,
 - 5. Poor construction quality,
 - 6. Design deliverables and completed work, which does not comply with applicable codes and regulations.
- B. The Contractor shall Submit for Approval in accordance with Section 01330, SUBMITTAL PROCEDURES, all required quality Submittals as specified in Section 01470, QUALITY MANAGEMENT SYSTEM.
- C. An effective Design-Build Quality Program is fundamental to all work performed by the Contractor and will be considered by the Authority in assessing the Contractor's progress, performance, and earnings entitlement.

00723 PROGRESS SCHEDULES AND REQUIREMENTS FOR MAINTAINING PROGRESS RECORDS

- A. Progress Schedules. Prepare and Submit to the Contracting Officer Representative for Approval schedules showing the order in which the Contractor proposes to carry on the Work, the dates on which it will start the several major features of the Work, including procurement of materials, plant, and equipment, and the contemplated dates for completing the same for both design and construction. The schedules shall be in a form acceptable to the Authority, and as described in Section 01322, CONTRACT PROGRESS REPORTING, and shall be in such detail that, in conjunction with the progress reports hereinafter required, the Authority will be able to chart the status and progress of the Work while it is being performed. If actual progress deviates from the schedule, update the schedule to show the accurate progress. Failure to comply with the terms of this Section may affect the processing of progress payment requests submitted by the Contractor as provided for in this Contract.
- B. If, in the opinion of the Contracting Officer Representative, the Contractor falls significantly behind the Approved progress schedule for design or construction, take any and all steps necessary to

improve the progress of the Work. In this event, without cost to the Authority, the Contracting Officer Representative may require the Contractor to Submit for Approval supplemental progress schedules detailing the specific operational changes to be instituted to regain the Approved schedule. Additionally, the Contracting Officer Representative may require the Contractor to increase the number of shifts, initiate or increase overtime operations, increase days of work in the work week, or increase the amount of the construction plant. Such requirements by the Authority shall not be construed or interpreted to imply that the Authority is in any way responsible for the means, methods, or sequencing of the Work. The additional cost of such requirements shall be borne solely by the Contractor.

- C. Failure of the Contractor to comply with the requirements of the Progress Schedule under this Section shall be grounds for determination that the Contractor is not prosecuting the Work with such diligence as will ensure completion within the time specified. Upon such determination, the Authority may terminate the Contractor's right to proceed with the Work, or any separate part thereof, in accordance with Section 00727, TERMINATION FOR DEFAULT, DAMAGES FOR DELAY, AND TIME EXTENSIONS.

00724 PERIOD OF PERFORMANCE AND/OR PROJECT SCHEDULE

- A. Perform, complete, and advance all work under this Contract in accordance with the schedule set out in Section 00824, PERIOD OF PERFORMANCE AND/OR PROJECT SCHEDULE.
- B. The Authority may modify the Contract, pursuant to Section 00748, CHANGES, to extend the Period of Performance and/or Project Schedule as deemed necessary until completion of this Contract.
- C. Early Completion: If the Contractor submits a schedule or expresses an intention to complete the work earlier than any required milestone, interim, or final completion date, the Authority shall not be liable for any costs incurred because of delay or hindrance should the Contractor be unable to complete the work before such milestone, interim, or final completion date. The duties, obligations, and warranties of the Authority to the Contractor shall be consistent with and applicable only to the completion of the Work and completion dates set forth in this Contract.

00725 COMMENCING THE WORK

- A. The Contractor will commence the work within ten (10) days after the date of receipt of the Notice to Proceed (NTP). The Contractor will prosecute the work diligently to complete it within the time specified in the Contract and meet all specified interim milestone dates.
- B. A Pre- Construction Conference will be held to establish a working understanding among the parties and to discuss the project goals, schedules, procedures for handling submittals, processing applications for payment, maintaining required records, quality control, and other matters.
- C. The following items require submittal and approval prior to commencement of design activities, construction activities, or offsite fabrication associated with the project. Submit in accordance with Section 01330, SUBMITTAL PROCEDURES:
 - 1. Executed Contract (as specified in Section 00521, CONTRACT FORM), with Power of Attorney (as specified in Section 00541, POWER OF ATTORNEY), and Power of Execution (as specified in Section 00542, POWER OF EXECUTION); Required Performance Bond (as specified in Section 00611, PERFORMANCE BOND), and Payment Bond, (as specified in Section 00612, PAYMENT BOND); Insurance Certificates (as specified in Section 00778, INDEMNIFICATION AND INSURANCE REQUIREMENTS), within ten (10) days after award of Contract.
 - 2. Designer, builder, major subcontractors, and key project personnel confirmations (as specified in Section 00709, PROJECT MANAGEMENT AND SUPERINTENDENCE AND KEY PERSONNEL, and Section 01111, KEY CONTRACTOR FUNCTIONS), within ten (10) days after award of Contract.

00726 SUSPENSION OR DELAY OF WORK

- A. The Authority may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period as it may determine to be appropriate for the convenience of the Authority.
- B. If the performance of all or any part of this Contract is delayed in a material manner or extent by the Authority's acts or omissions that are not expressly or impliedly authorized by this Contract or by applicable provisions of law, the Contracting Officer shall make an adjustment (excluding profit) for any increase in the cost of performance of this Contract caused by such delay and shall modify the Contract, in writing. The Contracting Officer shall make an adjustment to the delivery or performance dates and to any other Contractual provision, if such delay or interruption affected Contract compliance. The Contracting Officer shall make no adjustment under this Contract for any delay or interruption, if performance was or could have been delayed by any other cause, including, without limitation: (i) the fault or negligence of the Contractor or any subcontractor; (ii) an act constituting a force majeure event pursuant to this Contract; or (iii) any other cause for which an adjustment is provided under any other article of this Contract, at law or in equity.
- (C) An adjustment pursuant to paragraph (B) shall not be allowed:
 - 1. For any costs incurred more than twenty (20) days before the Contractor notifies the Contracting Officer, in writing, of the delay.
 - 2. Unless the claim, in a sum certain, is asserted in writing as soon as practicable after the termination of the delay. In no event, shall a Contractor assert a delay claim later than thirty (30) days after its termination. The delay claim shall be accompanied by appropriate documentation, specifically supporting the nature and extent of the claimed impact upon the cost and/or time required for performance. In any instance where it is not possible for the Contractor to fully project such impact within the thirty (30) day period, it shall support the claim with such documentation as is then reasonably available, along with a statement of the anticipated time frame when the Contractor expects to provide the additional materials. The Contracting Officer shall maintain the right throughout the process to request such additional materials as he or she shall reasonably require in consideration of the claim and shall be under no obligation to conclude his or her consideration of the claim prior to review of all relevant materials. Any adjustment to the Contract price pursuant this clause must be determined prior to final payment under this Contract.

00727 TERMINATION FOR DEFAULT, DAMAGES FOR DELAY, AND TIME EXTENSIONS

- A. If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will ensure its completion within the time specified in this Contract, or any extension thereof, or fails to complete said work within such time, or otherwise materially breaches any of its obligations under this Contract, the Contracting Officer may, by written notice ("Notice to Cure"), to the Contractor, direct it to cure the breach within ten (10) days or such additional time as the Contracting Officer authorizes.. If the Contractor fails to cure the breach in the time specified in the Notice to Cure, the Contracting Officer may terminate this Contract, in whole or in designated part, for default, after providing notice ("Notice of Default") to the Contractor.
- B. Upon receipt of a "Notice of Default," the Contractor shall immediately cease performance of the work so terminated. In such event, the Contracting Officer may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such design product, materials, appliances, and other work product as may be on the site of the work or previously submitted to the Authority, all of which shall become the property of the Authority. Whether or not Contract is terminated, in whole or designated part, he Contractor and its sureties shall be liable for all damage to the Authority resulting from its refusal or failure to complete the work in the specified time.
- C. If liquidated damages are fixed and agreed to in this Contract, and if the Contracting Officer terminates this Contract, the resulting damage shall consist of liquidated damages assessed daily until such reasonable time that the final project is accepted by the Authority, together with any

increased costs occasioned to the Authority. Even if the Contracting Officer does not terminate the contract, liquidated damages may be assessed daily for any delay, until the work is accepted.

D. The Contract shall not be terminated and/or the Contractor shall not be charged with resulting damage under the following circumstances:

1. If the delay in the completion of the Contract arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, acts war or insurrection, fires, floods, strikes, freight embargoes, unusually severe weather, or other events or circumstances of like nature.

a) Unusually severe weather conditions:

b) Pursuant to Paragraph D.1 above, the Authority will use the following table as the basis for determining allowable time extensions to the Contract for unusually severe weather conditions and the impact of such weather at the construction site.

c) The column below labeled WORKING DAYS represents the average delays, that may be expected in each month named within the Washington Metropolitan Area, based on a five (5) day work week:

Month	Working Days
January	4
February	4
March	4
April	5
May	5
June	2
July	2
August	3
September	2
October	3
November	4
December	4

d) Time extensions for weather delays during a given month will be allowed only for actual working days in excess of the numbers listed above and only when those excess days of delay affect the current critical path(s) leading to specified Contract completion or milestone dates.

E. The Contractor, within ten (10) days from the beginning of any such delay, must notify the contracting officer of the causes for the delay, unless he or she grants a further extension for the notice. Upon receipt of the notice, the contracting officer will ascertain the facts and the extent of the delay and may extend the time for completing the contract when, in he or she judgment, the findings of fact justify such an extension. The contracting officer's findings of fact shall be final and conclusive on the parties, subject only to appeal as provided section 00730, dispute resolution.

F. If, after notice of termination for default of the Contract under the provisions of this section, it is determined for any reason, that the Contractor was not in default or that the default was excusable, the termination shall be converted to a termination for convenience and the rights and obligations of the parties shall be determined in accordance with Section 00728, TERMINATION FOR CONVENIENCE OF THE AUTHORITY.

G. Any dispute or disagreement regarding any issue arising under this section shall be subject to adjudication in accordance with the "Disputes" section of this Contract. In no event shall the

Authority's issuance of a "Notice to Cure" pursuant to paragraph (A) be the basis of a dispute pursuant to the "Disputes" section or otherwise be subject to further review under this Contract or otherwise. The pendency of any dispute shall not constitute a basis for the delay or suspension of, or otherwise affect the Authority's right to proceed in accordance with this section, including without limitation, its right to complete the work or its right to insist that the Contractor complete any portion of the Contract that was not terminated.

- H. The rights and remedies of the Authority provided in this Section are in addition to any other rights and remedies provided under this Contract, at law or in equity.

00728 TERMINATION FOR THE CONVENIENCE OF THE AUTHORITY

- A. The Contracting Officer may terminate this Contract in whole or, in part, if he or she determines that a termination is in the Authority's interests. The Contracting Officer shall terminate, by delivery to the Contractor by certified mail, return receipt requested, of a Notice of Termination specifying the nature, extent of the termination, and the date upon which such termination becomes effective.
- B. After receipt of a Notice of Termination, except as the Contracting Officer otherwise directs, the Contractor shall immediately:
1. Discontinue all services and stop all work under the Contract on the date and to the extent specified in the Notice of Termination;
 2. Complete performance of work not terminated;
 3. Place no further orders or subcontracts for materials, services, or facilities, except as may be necessary to complete the remaining portion of the Contract; terminate all orders and subcontracts to the extent that they relate to the work terminated;
 4. Assign to the Authority, to the extent directed by the Contracting Officer, all of the right(s), title, and interest(s) of the Contractor under the orders and subcontracts so terminated. The Contracting Officer shall have the right to settle or pay any termination costs or all claims arising out of the termination and shall have no further liability to the Contractor for the work that was the subject of such subcontracts.
 5. Settle all outstanding liabilities and all claims arising from termination of orders and subcontracts, with the approval of the Contracting Officer;
 6. As the Contracting Officer directs, transfer title and deliver to the Authority:
 - a) Parts, work in process, completed work, supplies, and other material procured as a part of, or acquired for the work terminated; and.
 - b) All data, completed or partially completed plans, design specifications and design drawings, reports, estimates, summaries, and other information and materials that would have been required to be furnished to the Authority if the Contract had been completed.
 7. Take any action that may be necessary, or as the Contracting Officer directs, for the protection and preservation of property related to this Contract that is in the Contractor's possession or control, and in which the Authority has or may acquire an interest. Use its best efforts to sell, as the Contracting Officer authorizes, any property of the types referred to in Paragraph B.6 above. The Contractor:
 - a) Will not be required to extend credit to any purchaser, and
 - b) May acquire any such property under the conditions the Contracting Officer prescribes. The proceeds of any such transfer or disposition shall be applied to reduce any payments to be made to the Contractor under this Contract, shall be credited to the price or cost of the work or paid in any other manner as the Contracting Officer may direct.
- C. After receipt of a Notice of Termination, submit to the Contracting Officer through the Contracting Officer's Representative its termination settlement proposal (TSP) in the form that the Contracting Officer prescribes detailing the costs to which it asserts entitlement pursuant to this section. The TSP shall be submitted promptly, but in no event later than on (1) year from the effective date of termination, unless one or more extensions in writing are granted by the Contracting Officer, upon

request of the Contractor made in writing. However, if the Contracting Officer determines that the facts justify such action, the Contracting Officer may act upon any TSP at any time after such 1-year period or any extension thereof. Upon failure of the Contractor to submit its TSP within the time allowed, the Contracting Officer may determine, on the basis of information available to him or her, the amount, if any, due to the Contractor by reason of the termination and shall authorize payment in the amount so determined.

- D. Subject to the provisions of Paragraph C above, the Contractor and the Contracting Officer may agree upon the whole, or any part, of the amount or amounts to be paid to the Contractor for the total or partial termination, which amount may include a reasonable allowance for profit on work done. The agreed amount exclusive of settlement costs, shall not exceed the total Contract price as reduced by the amount of payments otherwise made and as further reduced by the Contract price of work not terminated.
- E. The Contract shall be amended accordingly, and the Contractor will be paid the agreed amount. Nothing in Paragraph F below, prescribing the amount to be paid in the event of a disagreement upon the whole or any part of the amount to be paid to the Contractor by reason of the termination, will be deemed to limit, restrict, or otherwise affect the amount that may be agreed upon pursuant to Paragraph D above.
- F. In the event of a disagreement, as provided in Paragraph D above, over amount to be paid to the Contractor, the Contracting Officer will pay the Contractor the amounts he or she determines as follows, but without duplication of any amounts agreed upon in accordance with Paragraph D:
 - 1. The costs incurred prior to the effective date of the Notice of Termination, in performance of the work terminated, without duplication of any items, agreed to above:
 - a) Termination costs under terminated subcontracts or orders that are properly chargeable to the terminated portion of the Contract, if not excluded,
 - b) A sum, representing profit on Paragraph D above, that the Contracting Officer determines to be fair and reasonable, pursuant to section 49.202 of the Federal Acquisition Regulation in effect on the date of this Contract. If it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, the Contracting Officer will allow no profit and will reduce the settlement to reflect the projected rate of loss.
 - 2. The reasonable indirect costs of settlement of the work terminated, including:
 - a) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of TSP(s);
 - b) The termination and settlement of subcontracts (excluding the amounts of such settlements); and
 - c) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.
- G. Except for normal spoilage, and except to the extent that the Contracting Officer otherwise expressly assumed the risk of loss, there will be excluded from the amounts payable to the Contractor the fair value, as determined by the Contracting Officer, of property, which is destroyed, lost, stolen, or damaged so as to become undeliverable to the Authority, or a third party.
- H. The cost principles and procedures of FAR Part 31 in effect on the date of this Contract, shall govern all costs claimed, agreed to, or determined under this article, except that the Authority shall not be obligated to pay interest, however represented, on any claimed costs.
- I. The Contractor shall have the right of appeal, under Section 00730, DISPUTE RESOLUTION, from the Contracting Officer's determination under Paragraphs C or E above. If the Contractor failed to Submit its TSP within the time provided in Paragraph C above or failed to request extension of such time, it shall waive its rights to appeal the Contracting Officer's determination.
- J. In arriving at the amount due the Contractor under this section, the following will be deducted:

1. All unliquidated advances or other payments to the Contractor, under the terminated portion of this Contract.
 2. The value, as the Contracting Officer determines, of any claim, which the Authority may have against the Contractor under with this Contract, including any third party claim if the Contracting Officer is not satisfied that sufficient insurance coverage is in place; and.
 3. The agreed price for, or the proceeds from sale of any materials, supplies, or other items that the Contractor procured or sold, pursuant to the provisions of this section, and not otherwise recovered by or credited to the Authority.
- K.** If the Contractor asserts that any partial termination, has rendered enforcement of the remainder of the Contract at the remaining Contract price inequitable, the Contractor may file with the Contracting Officer's Representative, a request in writing for an equitable adjustment to the price for the continued portion of the Contract, Such proposal shall be submitted within ninety (90) days from the effective date of termination, unless the Contracting Officer extends it in writing, and shall be accompanied by appropriate supporting documentation.
- L.** The Contractor's responsibilities and obligations under this section shall remain in full force and effect notwithstanding the pendency of any dispute or other delay relating to determination of the appropriate price adjustment or any other issue arising from the termination for convenience.
- M.** Unless otherwise provided for in this Contract, or by applicable statute, the Contractor, and all subcontractors whose work is encompassed in the termination settlement shall preserve , all of its books, records, documents, and other evidence bearing on the costs and expenses under this Contract for three (3) years after final settlement. The Contractor shall make these records and documents available to the Authority, its governing jurisdictions and any other Federal, state, or local entities providing funding for this Contract, and to the U.S. Comptroller General or the agents or representatives of any of them, at the Contractor's office, at all reasonable times, without any direct charge.

00729 ASSIGNMENT

- A.** The Contractor shall not transfer or assign any of its rights or obligations under this Contract, or any portion thereof to any other party, without the Contracting Officer's consent. The Contracting Officer may recognize a third party as successor in interest to the Contract where the third party's interest is incidental to the transfer of all the assets of the Contractor, i.e., sales of assets, transfer of assets pursuant to merger or consolidation, or incorporation of a proprietorship or partnership. Such recognition of the transfer shall be at the Contracting Officer's discretion after review of the facts and circumstances surrounding each request. The Contracting Officer shall not approve the assignment unless the surety, in writing, agrees to the assignment and accepts the assignee as the Contractor and principal on the payment and performance bonds.
- B.** This Contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency. It is the Authority's intent to recognize assignments only to bona fide lending institutions; therefore, assignment to any private corporation, business, or individual, that does not qualify as such, is specifically prohibited and void *ab initio*.
- C.** Any attempt to transfer by assignment not authorized by the Contracting Officer shall constitute a breach of this Contract, and the Contracting Officer may terminate the Contract for default, and the Contractor and its sureties shall be liable to the Authority for excess costs incurred by the Authority.

00730 DISPUTE RESOLUTION

- A.** Any dispute arising under or related to this Contract that are not disposed of by agreement, will be decided by the Contracting Officer, who will reduce his or her decision to writing and mail, by certified mail, return receipt requested, a copy thereof to the Contractor. The Contracting Officer's decision is final and conclusive unless, within thirty (30) calendar days from receipt the Contractor mails or otherwise furnishes to the Contracting Officer a written notice of appeal in accordance with

Section 01330, SUBMITTAL PROCEDURES, addressed to the Authority's Board of Directors. Such notice shall indicate that an appeal is intended and shall reference the decision and Contract number. The decision of the Board of Directors or its duly authorized representative for the determination of such appeals shall be final and conclusive unless in proceedings initiated by either party for review of such decision in a court or board of competent jurisdiction, it determines that the decision was fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or is not supported by substantial evidence. In any appeal under this Section, the appellant will be afforded an opportunity to be heard and to offer evidence in support of its appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of this Contract in accordance with the Contracting Officer's decision. The Armed Services Board of Contract Appeals ("ASBCA") is the authorized representative of the Board of Directors for final decisions on appeal..

- B. This section does not preclude consideration of questions of law in connection with decisions provided for in Paragraph A above. Nothing in this Contract, however, shall be construed as making final, the decisions of the Board of Directors or its representative on a questions of law.

00731 USE AND POSSESSION PRIOR TO COMPLETION

The Authority shall have the right to take possession of or use any completed or partially completed part of the work. Such possession or use shall not be deemed an acceptance of any work not completed in accordance with the Contract. While the Authority is in such possession, the Contractor, will be relieved of the responsibility for loss or damage to the work other than that resulting from the Contractor's fault or negligence or that of its Subcontractors or agents. If such possession or use by the Authority delays the Contract or causes additional expense to the Contractor, an equitable adjustment to the Contract price or the time of completion will be made and the Contract may be modified in writing, accordingly.

00732 ACCEPTANCE AND INSPECTION OF WORK

- A. "Acceptance," as used in this section, means the Contracting Officer's Representative's acts approving specific services in partial or complete performance of the Contract. As used in this section, "correction" means the elimination of a defect.
- B. Unless otherwise provided in this Contract, the COR's acceptance will be made as promptly as practicable after completion and inspection of all work required by this Contract. Acceptance shall be final and conclusive except for latent defects, fraud, willful misconduct or such gross mistakes as may amount to fraud, or as otherwise provided in this Contract. All punch list items identified during final inspections and noted at the time of acceptance shall be corrected by the Contractor as soon as is practicable as specified in Section 01775, CLOSEOUT.
- C. The Contracting Officer Representative will give written notices of defects or non-conformances to the Contractor if and when discovered, but no later than acceptance except for latent defects, fraud, willful misconduct or such gross mistakes as may amount to fraud which may be discovered following such acceptance. This notice will state either:
1. That the Contractor shall correct or re-perform defective or nonconforming services; or,
 2. That the Authority does not require correction or re-performance. The Contractor shall be liable to the Authority for all costs incurred of any kind caused by or resulting from the Contractor's defective workmanship or noncompliance with the Contract, the Design Specifications and Design Drawings.
- D. If the Contractor or the Authority deems it necessary, to make an examination of work already completed, by removing or tearing it out before final acceptance, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material to do so. If such work is found to be defective or nonconforming in any material respect, the Contractor shall pay for all of the expenses of such examination and of satisfactory reconstruction and pay all delay damages. If, however, such work is found to meet Contract requirements, the "Issued for Construction" Specifications

and "Issued for Construction" Drawings, an equitable adjustment will be made to the Contract price to compensate the Contractor for the additional services involved in such examination and reconstruction. If completion of the work has been delayed thereby, the Contracting Officer may grant the Contractor a suitable extension of time.

- E. All work, which includes but is not restricted to, materials, workmanship, and fabrication of components, shall be subject to the Authority's inspection and testing, at all reasonable times prior to acceptance as specified in Section 01470, QUALITY MANAGEMENT SYSTEM, and Section 01820, DEMONSTRATION AND TRAINING. Any such inspection and testing is for the sole benefit of the Authority and shall not relieve the Contractor of the responsibility for providing quality control measures to ensure that the work strictly complies with the Contract, the "Issued for Construction" Specifications and the "Issued for Construction" Drawings. No inspection or testing by the Authority shall be construed as acceptance. Inspection or testing shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, or in any way affect the continuing rights of the Authority after acceptance of the completed work.
- F. The Contractor shall furnish promptly, without additional charge, all services, work, labor, materials, tools, equipment, and facilities reasonably needed for performing such safe and convenient inspections and tests as may be required. All inspections and tests will be performed in such manner as not to unnecessarily delay the Contract. The Authority shall receive adequate advance notice submitted in accordance with Section 01330, SUBMITTAL PROCEDURES, to conduct inspections and witness all tests as part of its overall quality oversight of the project as specified in this Contract. If the Authority does not witness tests, due to the Contractor's failure to provide timely notice, such tests shall have no effect. Special, full scale and performance tests shall be performed as described in the Contract, the Design Specifications and Design Drawings.
- G. If the Contractor is required to correct or re-perform any services, they shall be done without additional cost or fee to the Authority, and they shall be subject to this section to the same extent as work initially performed. If the Contractor fails or refuses to correct or revise errors or deficiencies in its performance within thirty (30) days of the Authority's request, the Authority may, by contract or otherwise, correct or replace the services with similar ones and charge the Contractor with the cost incurred or make an equitable adjustment to the Contract price.
- H. Disagreement regarding the responsibility for costs for corrective actions, either incurred by the Contractor or by the Authority, shall constitute a dispute and shall be subject to the provisions of Section 00730, DISPUTE RESOLUTION.
- I. The rights and remedies of the Authority provided in this Section are in addition to any other rights or remedies provided under this Contract, at law or in equity.
- J. The Contractor shall give the Contracting Officer's Representative at least fourteen (14) days advance notice of the date that the work, or separate portion thereof, will be fully completed and ready for final inspection, testing, and acceptance in accordance with this Contract.

00733 AUTHORITY-FURNISHED PROPERTY

- A. The Authority will make available to the Contractor, for use only in connection with this Contract, the property, if any, described in the Section 00833, AUTHORITY-FURNISHED PROPERTY, , at the times and locations stated therein. If the Authority-furnished property, suitable for its intended use, is not made available to the Contractor in a timely fashion, the Contracting Officer will, upon timely written request from the Contractor , equitably adjust any affected provision of this Contract pursuant to any procedures of Section 00748, CHANGES.
- B. Title to Authority-furnished property shall remain with the Authority. The Contractor shall maintain adequate property control records of Authority-furnished property in accordance with sound industrial practice.
- C. Unless otherwise provided in this Contract, the Contractor, upon acceptance of Authority-furnished property, assumes the risk of and shall be responsible for loss, theft or damage thereto except for

reasonable wear and tear and except to the extent that such property is consumed in the performance of this Contract.

- D. The Contractor shall, upon completion of this Contract, prepare for shipment, deliver FOB origin, or dispose of all Authority-furnished property not consumed in the performance of this Contract or not delivered to the Authority as directed. The net proceeds of such disposal will be credited to the Contractor's price or paid in such other manner as the Contracting Officer directs.

00734 MATERIAL, WORKMANSHIP, AND EQUIPMENT

- A. All equipment, materials, and articles incorporated in the project covered by this Contract shall be new and of the most suitable grade for the purpose intended. Notwithstanding the Authority's review and approval of any substitution, nothing herein relieves the Contractor of its obligations to satisfy its requirements under the Contract.
- B. Reference to any equipment, materials, or articles to be incorporated in the project and any patented processes, by trade name, make, or catalog number in the Contract "Issued for Construction" Specifications and the "Issued for Construction" Drawings shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that in the Authority's judgment, is equal to that named. When required by this Contract or when called for by the Authority, the Contractor shall furnish to the Authority for approval in accordance with Section 01330, SUBMITTAL PROCEDURES, the name of the manufacturer, the model number, and other identifying data, samples and information regarding performance, capacity, nature, and rating of machinery and other equipment, that the Contractor contemplates incorporating in the work.. Machinery, equipment, material, and articles installed or used without required approval shall be at the risk of subsequent rejection.
- C. The Contractor shall provide construction equipment in first class working order and safe condition, of sufficient quantities and sizes to complete the work as specified in the Contract, the "Issued for Construction" Specifications and "Issued for Construction" Drawings within the period of performance, and shall provide adequate maintenance of this equipment throughout the duration of the project.
- D. Items of equipment that, at any time, prove ineffectual or hazardous to personnel or property, shall be promptly brought to acceptable condition or shall be removed from the site, as directed by the Authority or by any jurisdictional agency.

00735 HAZARDOUS MATERIALS

- (a) The Contractor agrees to submit a Material Safety Data Sheet (U.S. Department of Labor Form OSHA-20), as prescribed in Federal Standard No. 313B, for all hazardous materials five (5) days before delivery of the material, whether or not listed in Appendix A of the Standard. This obligation applies to all materials delivered under this Contract that involve exposure to hazardous materials or items containing these materials.
- (b) "Hazardous material," as used in this clause, is defined in Federal Standard No. 313B, in effect on the date of this Contract.
- (c) Neither the requirements of this clause nor the Authority's acts or omissions shall relieve the Contractor of any responsibility or liability for the safety of Authority's, personnel or property.
- (d) Nothing contained in this article shall relieve the Contractor from complying with applicable Federal, state, and local laws, codes, ordinances, and regulations (including the requirement to obtain licenses and permits) in connection with hazardous materials.
- (e) The Authority's rights in data furnished under this Contract regarding hazardous materials are as follows:

- (1) To use, duplicate and disclose any data to which this clause is applicable. The purposes of this right are to (a) apprise personnel of the hazards that they may be exposed to in using, handling, packaging, transporting, or disposing of hazardous materials (b) obtain medical treatment for those affected by the materials; and (c) have others use, duplicate, and disclose the data for the Authority for these purposes.
- (2) To use, duplicate, and disclose data furnished under this article in precedence over any other provision of this Contract providing for rights in data.
- (3) The Authority is not precluded from using similar or identical data acquired from other sources.
- (4) The data shall not be duplicated, disclosed, or released outside of the Authority, in whole or in part, for any acquisition or manufacturing purpose, if the following legend is marked on each piece of data to which this clause applies -

"This data furnished under this Contract shall not be used, duplicated, or disclosed for any acquisition or manufacturing purpose without the Contracting Officer's permission. This legend shall be marked on any reproduction of this data."
- (5) The Contractor shall not place any restrictive legend on any data that (i) the Contractor or any subcontractor previously delivered to the Authority without limitations; or (ii) should be delivered without limitations under the "Rights in Technical Data" clause.
- (6) The Contractor shall insert this article including this paragraph, with appropriate changes in the designation of the parties, in subcontracts at any tier (including purchase designations or purchase orders) under this Contract involving hazardous materials.

00736 PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the work site, that are not to be removed and that do not unreasonably interfere with the work. Care shall be taken in removing trees authorized for removal to avoid damage to vegetation that will remain in place. The Contractor shall be obligated to replace or restore all existing vegetation that is destroyed, removed, or damaged in the performance of the work to the condition that existed before work commenced.
- B. The Contractor shall protect from damage all adjacent property including, but not limited to, land, existing structures, improvements, and utilities at or near the site of the work. The Contractor shall repair or restore any damage to such facilities that results from failure to comply with Contract requirements or the failure to exercise reasonable care in the performance of the work. If the Contractor fails or refuses to repair any such damage promptly, the Contracting Officer's Representative may have the necessary work performed and charge the costs thereof to the Contractor.

00737 OPERATIONS AND STORAGE AREAS

- A. All of the Contractor's operations, including storage, shall be confined to areas that the Contracting Officer's Representative approves. Temporary buildings such as storage sheds, shops, and offices may be erected by the Contractor only with the Contracting Officer's approval and shall be built without expense to the Authority. Such temporary buildings and utilities shall remain the Contractor's property and shall be removed by the Contractor at its expense upon the completion of the work. With the written consent of the Contracting Officer, such buildings and utilities may be abandoned and need not be removed. Temporary construction facilities are more fully described in Section 01520, TEMPORARY CONSTRUCTION FACILITIES.
- B. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways or construct and use such temporary roadways as may be authorized by the Contracting

Officer . Where materials are transported in the prosecution of the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, protection against damage shall be provided by the Contractor, and damaged roads, curbs, or sidewalks shall be repaired by or at the expense of the Contractor.

00738 ACCIDENT PREVENTION

- A. To protect the life and health of employees and other persons, to prevent damage to property, materials, supplies, and equipment, and to avoid work interruptions in the performance of this Contract, the Contractor shall comply with all pertinent provisions of the Authority's safety requirements as specified in Section 01114, SAFETY/ENVIRONMENTAL REQUIREMENTS, and shall also take or cause to be taken such additional measures as the Contracting Officer's Representative may determine to be reasonably necessary for that purpose.
- B. All work under this Contract shall be performed in a skillful and workmanlike manner. The Contracting Officer's Representative may, in writing, require the Contractor to remove from the project any employee that the Contracting Officers Representative deems to be contrary to the best interests of the Authority.
- C. The Contractor shall maintain an accurate record of and shall report to the Contracting Officer's Representative in the manner and on the forms he or she prescribes, exposure data and reports of all accidents resulting in death, traumatic injury, occupational disease, and damage to property, materials, supplies, and equipment incidental to work performed under this Contract, immediately after of such incident.
- D. The Contracting Officer's Representative will notify the Contractor if there is any noncompliance with the foregoing provisions and the action(s) to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or its representative at the work site , shall be deemed sufficient for this purpose. If the Contractor fails or refuses to promptly comply, the Contracting Officer's Representative may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop work order shall be made the subject of a claim for extension of time or for the Contractor's excess costs or damages..
- E. The Contractor shall ensure compliance with this section by subcontractors.
- F. Prior to commencement of the Work, the Contractor shall:
 - 1. Submit, in writing in accordance with Section 01330, SUBMITTAL PROCEDURES, an accident prevention plan;
 - 2. Meet with the Authority to discuss and develop an agreement regarding the administration of the overall safety program.

00739 FIRE PROTECTION EQUIPMENT AND LIFE SAFETY AGREEMENT

The Contractor shall submit, in accordance with Section 01330, SUBMITTAL PROCEDURES, a plan for fire protection systems and equipment as specified in Section 01114, SAFETY/ENVIRONMENTAL REQUIREMENTS, for use during the term of this Contract.

00740 SAFETY REQUIREMENTS

- (a) The Contractor shall be responsible for ensuring compliance with the most stringent provisions of the applicable statutes and regulations of the District of Columbia, State of Maryland, Commonwealth of Virginia or political subdivision where the work is being performed, as well as the METRO Construction Safety and Environmental Manual (1984, as amended) issued by the Authority, and the U.S. Department of Labor OSHA standards pertaining to the safe performance of the work. In the absence of a specific construction industry standard, the Contractor is required

to comply with either an established OSHA General Industry Standard, National Institute for Occupational Safety and Health (NIOSH) guidelines, American Conference of Governmental Industrial Hygienists (ACGIH) guidelines, American National Standards Institute (ANSI) guidelines, the WMATA System Safety Program Plan, the WMATA Construction Safety and Environmental Manual, or the Metrorail Safety Rules and Procedures Handbook. For contracts where work will be performed on, or will interface with the Metrorail System, the Contractor shall also comply with the publication entitled "Metrorail Safety Rules and Procedures Handbook." In the event of a conflict between these guidelines and applicable Federal, State or local health and safety laws, regulations or standards, the more stringent standard shall apply. Further, the Contractor shall ensure that all methods of performing the work do not involve danger to the personnel working at the site, the public and private property, whether or not these methods are cited or indicated in the Contract. The Contractor shall immediately provide to the Contracting Officer, a copy of all citations and/or warnings of safety violations received from any Federal, State or local jurisdiction or agency thereof, and/or all notifications of safety violations from insurance companies. The Contractor shall also provide to the Contracting Officer, copies of any and all subpoenas, complaints or other documents relating to any law suit alleging safety violations.

- (b) The Contractor shall employ and assign a full-time Safety Superintendent for Contracts involving "safety sensitive" functions (See Combined Glossary attached hereto for a definition). The Safety Superintendent shall have a minimum of three (3) years of construction safety experience and hold an OSHA thirty (30) hour course card. He or she shall have the ability to develop and conduct safety training courses. He or she shall be familiar with industrial hygiene equipment and testing as required for the protection of all employees. The Safety Superintendent shall be employed exclusively for the purpose of supervising the safety of persons on or about the worksite and the property affected thereby. The Safety Superintendent shall also be responsible for providing first aid at the worksite and must have a current Red Cross First Aid Certificate. The Contractor shall notify the Contracting Officer a reasonable amount of time beforehand, any time that the Safety Superintendent will not be on site during work hours. If, at any time, the worksite is without the services of an approved Safety Superintendent for a period of three (3) calendar days or more, the work may be closed down at the Contracting Officer's discretion. The Safety Superintendent must be acceptable to the Contracting Officer and his or her performance will be reviewed on a continuing basis. If the Safety Superintendent's effectiveness is below standard, the Contractor shall provide immediate replacement at the Contracting Officer's direction. Once employed, the Safety Superintendent shall not be changed without the Contracting Officer's permission. The Safety Superintendent can be terminated at any time, at the Contracting Officer's discretion.
- (c) The Contractor shall provide, at the site of the work, a first aid kit which shall be fully equipped to meet the needs of the anticipated work force.
- (d) The Contractor shall follow all appropriate RAIL Operational Rules, Operational Administrative Procedures (OAPs), Standard Operational Procedures (SOPs) and General and Special Orders while on the operational railroad and all Start-Up Rules and Manager's Notices when in declared start-up areas.

00741 CONSIDERATION AND BASIS OF PAYMENT

- A.** In consideration of its performance under this Contract, the Contractor will be paid the sums set forth in this Contract, which shall constitute complete payment for all work required to be performed under this Contract and for all expenditures, that may be made and expenses incurred. The basis of payment will be the Contract price, as shown on Section 00521, DESIGN-BUILD CONTRACT FORM, and which shall constitute complete compensation for performance of all work required by the Contract.
- B.** The approved monthly progress report and updated ninety (90) day schedule as specified in Section 01322, CONTRACT PROGRESS REPORTING, and the Approved Quality Manager's Quality Compliance Certification shall be the basis for progress payments to the Contractor.

- C. When satisfactory progress has not been achieved by the Contractor during any period for which a progress payment is to be made, a percentage of the progress payment may be retained. Retainage should not be used as a substitute for good contract management, and the Contracting Officer should not withhold funds without cause. Determinations to retain and the specific amount to be withheld shall be made by the Contracting Officer on a case-by-case basis. Such decisions will be based on the Contracting Officer's assessment of past performance and the likelihood that such performance will continue. The amount of retainage withheld shall not exceed ten percent (10%) of the approved, estimated amount in accordance with the terms of this Contract and may be adjusted as the Contract approaches completion to recognize better than expected performance, the ability to rely on alternative safeguards, and other factors. Upon completion of all Contract requirements, retained amounts shall be paid promptly.
- D. The basis of payment will be the total base price as negotiated and accepted. The basis of payment includes any options exercised and any modifications to the Contract in addition to the total base price, which shall constitute complete compensation for performance of all work required by the Contract.

00742 CONTRACT PRICES AND BID PRICE SCHEDULE

Payment for the various bid items listed in the Bid Price Schedule shall constitute full compensation for furnishing all , labor, equipment, appliances, and materials and for performing all operations required to complete the Work in conformity with the Contract, the "Issued for Construction" Specifications and "Issued for Construction" Drawings developed by the Contractor. All costs for work not specifically mentioned in the Bid Price Schedule shall be included in the Contract Prices for the items listed.

00743 VARIATION IN ESTIMATED QUANTITIES

Where the quantity of a pay item in this Contract is an estimated quantity provided by the Authority, and where the actual quantity of such pay item varies more than 15 percent above or below the estimated quantity stated in this Contract, an equitable adjustment in the Contract Price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contracting Officer Representative will, upon receipt of a written request submitted in accordance with Section 01330, SUBMITTAL PROCEDURES, for an extension of time within 10 Days from the beginning of such delay, or within such further period of time, which may be granted by the Contracting Officer Representative prior to the date of Final Payment of the Contract, ascertain the facts and make such adjustment for extending the Period of Performance as in the Contracting Officer Representative's judgment the findings justify.

00744 METHOD OF PAYMENT

- A. The Authority will make progress payments monthly as the Work proceeds on estimates approved by the Contracting Officer Representative for design related work and by estimates reviewed and approved by the Contracting Officer Representative for construction-related work. At least 5 Days before submission of any Application for Payment, a Preliminary Monthly Progress and Quality Status Report Review meeting will be held to review acceptability of the Contractor's schedules and its Quality System. The Contractor shall have an additional 5 Days to make corrections and adjustments and to complete and resubmit the schedules. A Formal Progress and Quality Status Report Review meeting will be held to approve the schedules. No progress payment will be made to Contractor until the schedules are provided and accepted by the Contracting Officer Representative, whose acceptance will not be unreasonably withheld. The progress schedule shall be acceptable to Authority as providing an orderly progression of the Work to completion within any specified Milestones and the Period of Performance, but acceptance of the progress schedule shall neither impose on the Authority responsibility for the sequencing, scheduling, or work progress nor interfere with or relieve the Contractor from Contractor's full responsibility for the Work. The format and structure of the progress schedule shall be as set forth in Section 01322, CONTRACT PROGRESS REPORTING. The Authority's acceptance shall not be deemed to confirm that the schedule is a reasonable plan for performing the Work.

- B.** The Contractor's progress payment requests will be reviewed based on the scheduled and actual progress of the Work as reflected on the design schedule, cost-loaded progress schedule or bar graph as applicable, and monthly updates. The Contractor shall not be entitled to progress payments, and the Authority shall have no obligation to review or approve progress payment requests if the Contractor has failed to submit or update the schedules, if the applicable schedule or update submitted by the Contractor fails to accurately reflect the actual progress of the Work, or if the Contracting Officer Representative declines to approve the submitted schedules for any of the reasons stated in this Contract. A decision not to approve a request for progress payments based upon the Contractor's failure to comply with the schedule and update submission requirements as committed under this Contract shall be at the sole and absolute discretion of the Contracting Officer Representative. The Contracting Officer may delegate this function to the Contracting Officer Representative, if the amount of the progress payment is less than the COR's warranty authority.
- C.** Furnish a breakdown of the total Contract Price showing the amount included therein for each principal category of the Work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates, the Contracting Officer Representative may authorize material delivered to the Site and preparatory work completed to be taken into consideration. Material delivered to the Contractor at locations other than the Site may also be taken into consideration if the Contractor furnishes satisfactory evidence that the Contractor has acquired title to such material and that it will be utilized on the Work covered by this Contract.
- D.** If the Contract Price is more than \$50,000, material delivered that will be incorporated into the Project will be taken into consideration in computing progress payments, provided the material is delivered on the Site, or is delivered to the Contractor and properly stored in a warehouse, storage yard, or similar suitable place within 25 miles of the Site or such reasonable distance in excess of 25 miles as may be approved by the Contracting Officer Representative, provided, however, that the Contractor has the proper storage facilities, security, and insurance for the stored material as Approved by the Contracting Officer Representative. Before each such payment is made for delivered material on the Site, the Contractor shall furnish to the Contracting Officer Representative such evidence as may be required as proof of the ownership, quantity, and value of such materials. Before each such payment is made for delivered materials off the Site, the Contractor will furnish the Contracting Officer Representative evidence of ownership and properly executed bills of sale to the Authority for the delivered material upon which payment is being made.
- E.** In determining progress accomplished, the Authority will allow as an element of work accomplished, i.e., progress toward completion, only 50 percent of the invoiced costs of materials or equipment delivered to the Site, or suitable location as described in Paragraph D above, but not incorporated in the construction up to the time the materials or equipment are actually incorporated in the Work.
- F.** In making such progress payments, 5 percent of the estimated amount of work completed will be retained until final completion and Acceptance of the Contract Work. Also, whenever the Work is substantially complete, and the Contractor is in compliance with all provisions of the Contract, if the Contracting Officer Representative considers the amount retained to be in excess of the amount adequate for the protection of the Authority, the Contracting Officer Representative may use discretion in releasing to the Contractor all or a portion of such excess amount.
- G.** Where the time originally specified for completion of this Contract exceeds 1 year, the Contracting Officer Representative, at any time after 50 percent of the Work has been completed, if the Contracting Officer Representative finds that satisfactory progress (satisfactory progress includes prosecution of physical work, adherence to DBE if applicable, quality assurance, and all other provisions of the Contract) is being made, may reduce the total amount retained from progress payments to the minimum level necessary to protect the interests of the Authority.
- H.** All material and work covered by progress payments made shall thereupon become the sole property of the Authority but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the

restoration of any damaged work, or as waiving the right of the Authority to require the fulfillment of all of the terms of the Contract.

- I. See Section 01775, CLOSEOUT, for Final Inspection requirements.
- J. Upon completion and Acceptance of all work, the amount due the Contractor under this Contract will be paid upon the presentation of a properly executed voucher as specified in Section 01775, CLOSEOUT, and after the Contractor furnishes the Authority with a release of all Claims against the Authority arising by virtue of this Contract other than Claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the Contract has been assigned, a release may also be required of the assignee.
- K. The Authority may, at its sole discretion, withhold payment from the Contractor at the appropriate percentage for work, or portions thereof, that it deems to be defective or in nonconformance with the requirements of the IFB Documents and the Issued for Construction Specifications and Issued for Construction Drawings.
- L. Satisfactory records for design, inspection, testing, or other quality elements required under the approved Quality System; operation and maintenance manuals; As-Built Drawings and As-Built Specifications; electronic media; as-built Project Schedule; spare parts list, delivery information and distribution of spare parts; configuration management system; training manuals, lesson plans, and student's training manual and electronic media of such, as applicable; survey record log; correspondence file; releases; vouchers; request for Final Payment; certifications, affidavits warranties and guarantees; must be submitted in order to receive payment for the completed Work. Final Payment will be made in accordance with this Section.

00745 PROGRESS PAYMENTS FOR LUMP SUM ITEMS

If requested, the Contractor shall furnish to the Contracting Officer Representative a breakdown of the total Contract Price for every lump sum item on the Bid Price Schedule, showing the amount included therein for each principal category of the Work, in such detail as to provide a basis for determining progress payments. The breakdown shall be supported by such data to substantiate its correctness as the Contracting Officer or his or her Representative may require.

When satisfactory progress has not been achieved by a Contractor during any period for which a progress payment is to be made, a percentage of the progress payment may be retained. Retainage should not be used as a substitute for good contract management, and the Contracting Officer should not withhold funds without cause. Determinations to retain and the specific amount to be withheld shall be made by the Contracting Officer on a case-by-case basis. Such decisions will be based on the Contracting Officer's assessment of past performance and the likelihood that such performance will continue. The amount of retainage withheld shall not exceed ten percent (10%) of the approved, estimated amount in accordance with the terms of this Contract and may be adjusted as the Contract approaches completion to recognize better than expected performance, the ability to rely on alternative safeguards, and other factors. Upon completion of all Contract requirements, retained amounts shall be paid promptly.

00746 GARNISHMENT OF PAYMENTS

Payment under this Contract shall be subject to any garnishment attachment orders and/or levies issued pursuant to the laws of the United States, Maryland, Virginia, and the District of Columbia.

00747 SUBCONTRACT PAYMENTS

- A. The Contractor shall establish procedures to ensure timely payment of amounts due pursuant to the terms of its Subcontracts. The Contractor shall pay each Subcontractor for satisfactory performance of its contract, no later than 10 Days from the date of the Contractor's receipt of payment from the Authority for work by that Subcontractor. Release, within 10 Days of satisfactory

completion of all work required by the Subcontractor, any retention withheld from the Subcontractor.

- B.** The Contractor shall certify on each payment request submitted to the Authority that payment has been or will be made to all Subcontractors in accordance with Paragraph A above. The Contractor shall notify the Contracting Officer Representative with each payment request, of any situation in which scheduled Subcontractor payments have not been made.
- C.** If a Subcontractor alleges that the Contractor has failed to comply with this Section, the Contractor agrees to support any Authority investigation, and, if deemed appropriate by the Authority, to consent to remedial measures to ensure future compliance.
- D.** The Contractor agrees that the Authority may provide appropriate information to interested Subcontractors who want to determine the status of Authority payments to the Contractor.
- E.** Nothing in this Section is intended to create a contractual obligation between the Authority and any Subcontractor, to make the subcontractor an intended beneficiary of this Contract or to alter or affect traditional concepts of privity of contract between all parties.

00748 CHANGES

- A.** The Contracting Officer of his or her Representative (depending on the level of authority required) may, at any time, and without notice to the sureties, by written order designated or indicated to be a Modification, make any change in the Work within the general scope of the Contract including, but not limited to,:
 - 1. Reduction in the Scope of the Work or Contract Documents;
 - 2. In the IFB Documents, the Issued for Construction Specifications, and the Issued for Construction Drawings;
 - 3. In the method or manner of performance of the Work;
 - 4. In the Authority-furnished facilities, equipment, materials, services, or Site; or
 - 5. Directing acceleration in the performance of work.
- B.** Any other written order, which terms as used in this Paragraph B, shall include direction, instruction, interpretation, or determination from the Contracting Officer Representative or Contracting Officer, which causes any such change, shall be treated as a Modification under this Section, provided that the Contractor gives the Contracting Officer Representative written notice in accordance with Section 01330, SUBMITTAL PROCEDURES, stating the date, circumstances, and source of the order and that the Contractor regards the order as a Modification.
- C.** Except as herein provided, no order, statement, or conduct of the Contracting Officer or his or her Representative shall be treated as a change under this Section or entitle the Contractor to an equitable adjustment hereunder.
- D.** If any change under this Section causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the Work under this Contract, whether or not changed by any order, an equitable adjustment will be made and the Contract modified in writing accordingly: Provided, however, that no Claim for any change under Paragraph B above will be allowed for any costs incurred more than 20 Days before the Contractor gives written notice as therein required. This 20-Day limitation will be strictly applied regardless of whether the Authority is prejudiced by any lack of notice.
- E.** If the Contractor intends to request an equitable adjustment under this Section, it must, within 30 Days after receipt of a written Modification under Paragraph A above or furnishing of a written notice under Paragraph B above, submit to the Contracting Officer Representative in accordance

with Section 01330, SUBMITTAL PROCEDURES, a written proposal in accordance with this CHANGES Section, unless this period is extended by the Contracting Officer Representative. The proposal hereunder may be included in the notice under Paragraph B above.

- F.** No Claim by the Contractor for an equitable adjustment hereunder will be allowed if asserted after Final Payment under this Contract.

Disagreement regarding either party's right to any adjustment in price or time for performance as the result of a change implemented pursuant to this Section shall be subject to adjudication in accordance with the "Disputes" Section of this Contract. Notwithstanding the pendency of any such dispute, the Contractor expressly acknowledges that it shall remain fully obligated to perform the Contract as so changed. For additional Modification procedures see Section 01250, CONTRACT MODIFICATION PROCEDURES.

- G.** The Contractor shall promptly notify the Contracting Officer of matters, whether implemented as change orders or otherwise, that the Contractor believes may reasonably result in either an increase or decrease in the Contract price or the time required for performance of any part of the Contract and shall take action as the Contracting Officer directs. The Contractor's failure to provide such notification shall constitute a waiver of its right to seek an adjustment in the Contract price or time required for such performance.
- H.** In no event shall the Contractor be entitled to payment for change orders, additional or extra supplies or services or other modifications to this Contract, unless the Contracting Officer authorizes, it in writing.

00749 PRICING OF ADJUSTMENTS

- A.** When costs are a factor in any determination of a Contract Price adjustment pursuant to Section 00748, CHANGES, or any other Section of this Contract, such costs shall be in accordance with the contract cost principles and procedures in Subpart 31.1 of the Federal Acquisition Regulations (48 CFR 31.1). Where general and administrative expense is recoverable as part of any pricing adjustment under this Contract, the adjustment shall be based on the relationship between the entity's total general and administrative expenses allowable under FAR cost principles for all construction-type operations during the fiscal or calendar year covering the actual performance period of the work included in this pricing adjustment, and the entity's total cost input (excluding General and Administrative costs) for construction-type operations during the same period, expressed as a percentage, applied to the direct and overhead Contract costs included in the pricing adjustment; i.e., general and administration expenses will be paid on a percentage of cost basis, not on a daily rate type basis.
- B.** Notwithstanding any interpretation of the aforementioned contract cost principles and procedures to the contrary, the Authority shall not be liable for interest, however represented, on or as a part of any Claim, request, proposal, or adjustment (including equitable adjustments) whether said Claim, request, proposal or adjustment (including equitable adjustments) arises under the Contract or otherwise.
- C.** As part of its proposal for any Contract modification requiring a price adjustment in excess of \$100,000, the Contractor shall submit to the Contracting Officer, cost or pricing data under the conditions described in this paragraph and certify that, to the best of its knowledge and belief, the cost or pricing data submitted is accurate, complete and current as of the date submitted. At the Contracting Officer's discretion, the Contractor, may be required to submit cost or pricing data for price adjustments less than \$100,000.
- D.** The Contractor shall ensure that this article is included in all subcontracts at any tier, if the value of the subcontracted work exceeds \$100,000.

00750 ACCOUNTING AND RECORD KEEPING

- A.** Applicability. This Section shall become effective for and shall apply to any adjustment in the price of this Contract initiated by the Contractor or the Authority. However, where the original amount of this Contract is less than \$1,000,000, Paragraph C of this Section does not apply unless the adjustment is expected to exceed \$50,000.
- B.** Forward Priced Adjustments. Unless expressly waived in writing in advance by the Contracting Officer, the Contractor shall furnish to the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, a cost proposal in advance of performance of any work for which a price adjustment is requested under this Contract. The proposal format shall be as detailed in Section 00748, CHANGES. The Contractor shall generate such records as are necessary to substantiate all elements of the pricing proposal. Such records supporting the costs of each pricing adjustment request shall be specifically segregated and identified in the Contractor's accounting system as being applicable to the pricing adjustment request.
- C.** Post-Pricing Adjustments.
1. In addition to the records required to be originated under Paragraph B above, in the event pricing of an adjustment under this Contract is not agreed upon between the Contractor and the Contracting Officer or his or her Representative prior to the commencement of work for which the pricing adjustment is requested, the Contractor and any Subcontractor engaged in work for which the pricing adjustment is requested, shall maintain accounts and original cost records specifically segregated and identified by job order or other appropriate accounting categories approved by the Contracting Officer or his or her Representative of all incurred separated costs related to the work for which the pricing adjustment is requested. Proposed cost records and accounting procedures shall be submitted to the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, for approval. The Contractor shall maintain accounts and records, which segregate and account for the costs of all work associated with that part of the Project for which the pricing adjustment is requested and shall allocate among:
 - a) Work required under the base Contract or under any Option if applicable;
 - b) Work requested to be reimbursed under the pricing adjustment; and
 - c) work claimed or determined to be related to other actual or proposed pricing adjustments, including but not limited to, changes orders, differing site conditions, and the like. The accounts and records so established shall accumulate such costs under logical costs groups, such as material, labor, equipment, subcontracts, field overhead and the like. The Contractor shall record these costs on a form approved by the Contracting Officer.
- D.** In addition to the accounting system established to segregate and account for Contract Price adjustments, which shall accumulate such costs by work activity under logical cost groups, such as material, labor, equipment, Subcontracts, field overhead, and the like, the Contractor shall maintain field records associated with these costs on a form approved by the Contracting Officer Representative. Subject to agreement between the Contractor and the Contracting Officer Representative, or upon direction of the Contracting Officer Representative for work under Section 00748, CHANGES, the Contractor shall use Authority Forms (Daily Report - Labor, Materials, and Equipment), to be supplied by the Authority at the request of the Contractor and submitted in accordance with Section 01330, SUBMITTAL PROCEDURES. The terms of Section 00748, CHANGES, shall apply regardless of the form used. The use of Authority Forms to segregate Modification costs does not, in and of itself, invoke the provisions of Section 00748, CHANGES.
- E.** Availability. B and C above together with all other accounts, records, and costs information related to this Contract, shall be maintained and made available by the Contractor or Subcontractor(s):

1. At the office of the Contractor or Subcontractor(s) at all reasonable times for inspection, audit, reproduction, or such other purposes as may be required by the Contracting Officer Representative, or pursuant to any other Sections of this Contract;
 2. Until the expiration of three years from the date of payment of the final \$100 (Final Payment) under this Contract or such lesser time as is specified in Contractor Records Retention, Subpart 4.7 of the Federal Acquisition Regulations (48 C.F.R. 4.7) and for such longer period, if any, as is required by applicable statute, or by any other Sections of this Contract, or by Paragraphs E.2.a) and E.2.b) below:
 - a) If the Contract is completely or partially terminated, for a period of 3 years from the date of Final Payment; and
 - b) If a pricing adjustment is involved in any appeal under Section 00729, DISPUTE RESOLUTION, or in any litigation related to this Contract, for a period of 1 year following the final disposition of the appeal or litigation.
- F.** When asserting a Claim under the various Sections of this Contract, the Contractor shall grant the Authority access to review and ascertain the validity of the accounting records being maintained for segregation of costs, including base cost records, and to audit such costs as are deemed appropriate by the Contracting Officer Representative. No payment will be made to the Contractor on its Claim until such records are made available and access is permitted.
- G.** Limitation on Pricing Adjustments.
1. In the event the Contractor or any Subcontractor fails to originate or to maintain, or to make available any accounts or records as required under this or any other Section of the Contract, any pricing adjustment or portion thereof previously granted by the Contracting Officer or his or her Representative for which records are not available, shall be rescinded and re-computed, or if a pricing adjustment has not yet been granted, shall be computed, in an amount not to exceed the direct costs for which accounts or records are not available, plus a single markup for indirect expenses not to exceed ten percent (10%) of the direct costs so determined by the Contracting Officer or his or her Representative. The adjustment will be established by the Contracting Officer or his or her Representative based upon, at its election, one of the following:
 - a) An audit of any existing books and records of the Contractor or Subcontractor; or
 - b) An Authority estimate adopted by the Contracting Officer; or
 - c) A combination of Paragraphs G.1.a and G.21.b above.
 2. The Contractor and Subcontractors will not be allowed any profit for the work for which the Contractor or Subcontractor fails to originate, maintain, or to make available any accounts or records as required under this Contract.
- H.** Flow-down clause.

The Contractor shall insert a clause containing all the provisions of this Section in all Subcontracts issued under this Contract, modified as necessary, for proper identification of the contracting parties, the Contracting Officer and the Contracting Officer Representative under this Contract.

00751 AUDIT - PRICE ADJUSTMENTS

- A.** General: The Contracting Officer and his or her representatives, including representatives of the Authority's governing jurisdictions, any federal, state, or local entity providing funding for this Contract and the Comptroller General of the United States, shall have access, audit, and inspection rights as described in the applicable Paragraphs B, C, and D below.
- B.** Examination of costs: If this is a cost-reimbursement type, incentive, time and materials, labor-hour or price re-determinable contract, or any combination thereof, the Contractor shall maintain, and

the Authority shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred for the performance of this Contract. Such right of examination shall include inspection at all reasonable times of the Contractor's plant, or such parts thereof, as may be engaged in the performance of this Contract.

- C. Cost or pricing data: If the Contractor is required to submit cost or pricing data in connection with the pricing of this Contract or any change or modification thereto submitted in accordance with Section 01330, SUBMITTAL PROCEDURES, the Authority shall have the right to examine and audit all of the Contractor's books, records, documents, and other data of the Contractor related to the negotiation, pricing, or performance or such Contract change or modification, for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data submitted. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted along with the computations and projections used therein.
- D. The accounts, records and cost information required to be originated under this Contract, together with all other accounts, records and cost information related to this Contract, shall be maintained and made available by the Contractor and subcontractor(s):
 - 1. At their offices at all reasonable times, for inspection, audit, reproduction or such other purposes as may be required by the Contracting Officer, by anyone he or she authorizes or pursuant to any other provision of this Contract; and
 - 2. Except to the extent otherwise expressly set forth in this Contract, until three (3) years from the date of final payment under this Contract. If this Contract is completely or partially terminated, such records shall be maintained for a period of three (3) years from either the date of any resulting final settlement or the date of final payment, whichever is later. If a pricing adjustment results in any dispute or litigation related to this Contract, such records shall be maintained for a period equal to the later of three (3) years from the date of final payment or one (1) year following the final disposition of the dispute or litigation.
- E. The Contractor shall insert a clause containing all the provisions of this Section, in all Subcontracts hereunder except altered as necessary for proper identification of the contracting parties and the Contracting Officer Representative under this Contract.

00752 CERTIFICATE OF CURRENT COST OR PRICING DATA

The Contractor shall provide a Certificate of Current Cost or Pricing Data to the Authority in accordance with Section 01330, SUBMITTAL PROCEDURES, on a form suitable to the Contracting Officer as required in Subpart 15.403.1 of the Federal Acquisition Regulations (48 CFR 15.403) in support of any negotiated contract expected to exceed \$150,000 or any modification to a formally advertised or negotiated contract on which the aggregate of the increases and decreases in cost are expected to exceed \$100,000. The Contracting Officer Representative at its discretion may request cost or pricing data for modifications on which costs are less than \$100,000 and an attendant certificate of current cost or pricing data. Cost or Pricing data submittal procedures are specified in Section 00201, GENERAL INSTRUCTIONS, and Section 00748, CHANGES.

00753 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - PRICE ADJUSTMENTS

If the Contracting Officer determines that any price, including profit or fee, previously negotiated in connection with any modification to this Contract involving changes in cost plus applicable profit in excess of \$100,000 was based upon the Contractor's or subcontractor's cost or pricing data that was not complete, accurate or current, such that the amount the Authority paid to the Contractor for such price adjustment was greater than the Contractor would have been entitled to, based upon accurate and complete data, the Authority shall be entitled to an adjustment in an amount equal to such overpayment. The Authority's rights hereunder shall be in addition to any other rights it may have under this Contract, at law or in equity.

- A. If any price, including profit or fee, negotiated in connection with any price adjustment under this Contract was increased by any significant sums because:
1. The Contractor furnished cost or pricing data in accordance with Section 01330, SUBMITTAL PROCEDURES, which was not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data;
 2. A Subcontractor, pursuant to the Section 00754, SUBCONTRACTOR COST OR PRICING DATA, or any Subcontract provision therein required, furnished cost or pricing data in accordance with Section 01330, SUBMITTAL PROCEDURES, which was not complete, accurate, and current as certified in the Subcontractor's Certificate of Current Cost or Pricing Data;
 3. A Subcontractor or prospective Subcontractor furnished cost or pricing data in accordance with Section 01330, SUBMITTAL PROCEDURES, which was required to be complete, accurate, and current and to be submitted to support a Subcontract cost estimate furnished by the Contractor in accordance with Section 01330, SUBMITTAL PROCEDURES, but which was not complete, accurate, and current as of the date certified in the Contractor's Certificate of Current Cost or Pricing Data; or
 4. The Contractor or a Subcontractor or prospective Subcontractor furnished any data, not within Paragraphs A.1, A.1, or **Error! Reference source not found.** above in accordance with Section 01330, SUBMITTAL PROCEDURES, which was not accurate, as submitted; then the price shall be reduced accordingly and the Contract shall be modified in writing as may be necessary to reflect such reduction. However, any reduction in the Contract Price due to defective Subcontract data of a prospective Subcontractor, when the Subcontract was not subsequently awarded to such Subcontractor, will be limited to the amount, plus applicable overhead and profit markup, by which the actual Subcontract, was less than the prospective Subcontract cost estimate submitted by the Contractor in accordance with Section 01330, SUBMITTAL PROCEDURES, provided the actual Subcontract price was not affected by defective cost or pricing data.

00754 SUBCONTRACTOR COST OR PRICING DATA

- A. The Contractor shall require Subcontractors hereunder to submit cost or pricing data in accordance with Section 01330, SUBMITTAL PROCEDURES, prior to award of any Subcontract over \$150,000. The Contractor shall require Subcontractors to certify that to the best of their knowledge and belief, the cost and pricing data submitted under this Paragraph is accurate, complete, and current as of the date of execution, which date shall be as close as possible to the date of agreement on the negotiated price of the Subcontract. The Contractor shall insert the substance of this Section in each of its Subcontracts over \$150,000 hereunder. The Contractor also shall insert the substance of this Section in each Subcontract with respect to any change or other modification made pursuant to one or more Sections of this Contract, which involves a price adjustment greater than \$150,000. The Contractor shall conduct a cost analysis of all negotiated Subcontracts.
- B. The requirements that follow shall become operative only with respect to any change or other modification made pursuant to one or more Sections of this Contract, which involves a price adjustment in excess of \$150,000. The requirements of this Section shall be limited to such price adjustments:
1. The Contractor shall require Subcontractors hereunder to submit cost or pricing data in accordance with Section 01330, SUBMITTAL PROCEDURES:
 - a) Prior to award of any Subcontract exceeding \$150,000;
 - b) Prior to the pricing of any Subcontract change or other modification for which the price adjustment is expected to exceed \$100,000; except where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public or prices set by law or regulation.

2. The Contractor shall require Subcontractors to certify that to the best of their knowledge and belief the cost and pricing data submitted under this Paragraph B is accurate, complete and current as of the date submitted, which date shall be as close as possible to the date of agreement on the negotiated price of the Contract Modification.
- C. The Contractor shall insert the substance of this Section in each Subcontract hereunder, which exceeds \$150,000.

00755 FINAL PAYMENT

- A. The Authority will make Final Payment to the Contractor following Acceptance of Work, including receipt of releases from owners of property affected by the Contractor's performance under this Contract, and submittal of a final Affidavit of Amounts Paid to all businesses participating under the Contract. Final Payment shall include the entire sum found to be due hereunder after deducting therefrom such amounts as the terms of this Contract permit. Prior estimates and payments, including those relating to extra work or work omitted, shall be subject to correction by the Final Payment. Final Payment will be made only for materials actually incorporated in the Work; and, all materials remaining for which progress payments have been made shall revert to the Contractor, unless otherwise agreed, and progress payments made for these items shall be deducted from the Final Payment for the Work.
- B. By accepting Final Payment, the Contractor will be deemed thereby to have released the Authority from all Claims of the Contractor and all liability to the Contractor for things done or furnished in connection with the Work and for every act and omission of the Authority and its employees or agents relating to or arising out of the Work.

00756 ACCESS AND EXAMINATION OF RECORDS

- A. The Contractor agrees to provide the Authority, the FTA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor, which are directly pertinent to this Contract for the purposes of making audits, examinations, excerpts, and transcriptions. The Contractor also agrees, pursuant to 49 CFR. 633.17 to provide the FTA Administrator or its authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U. S. C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U. S. C. 5307, 5309, or 5311.
- B. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- C. The Contractor agrees to maintain all books, records, accounts and reports required under this Contract for a period of not less than three years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of Claims arising from the performance of this Contract, in which case the Contractor agrees to maintain same until the Authority, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives have disposed of all such litigation, appeals, Claims, or exceptions related thereto. Reference 49 CFR 18.39(i)(11).
- D. The Contractor agrees that the Contracting Officer, and the Comptroller General of the United States and the United States Secretary of Transportation if applicable, or their duly authorized representatives, shall, until the expiration of three years after Final Settlement under this Contract, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this Contract, for the purpose of making audits, examinations, excerpts, and transcriptions.
- E. The Contractor further agrees to include in all its Subcontracts hereunder, a provision to the effect that the Subcontractor agrees that the Contracting Officer, and the Comptroller General of the United States and the United States Secretary of Transportation if applicable, or their duly authorized representatives, shall until the expiration of 3 years after Final Settlement under this

Contract, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Subcontractor involving transactions related to the Subcontract, for the purpose of making audit, examination, excerpts, and transcriptions. The term "Subcontract," as used in this Section, excludes:

1. Purchase Orders Not Exceeding \$2,500 and,
2. Subcontracts or purchase orders for public utility services at rates established from standard costs applicable to the public.

00757 WARRANTY/GUARANTEE OF CONSTRUCTION

- A.** Unless otherwise specifically provided for in the Contract, the Contractor, notwithstanding any final inspection, acceptance or payment, guarantees that all work performed and materials and equipment furnished under this Contract are in accordance with the Contract requirements. The Contractor also guarantees that when installed all materials and equipment were free from defects and will remain so for a period of at least two years from the date of Acceptance by the Authority.
- B.** If defects of any kind should develop during the period such guarantees are in force, the Contracting Officer will immediately notify the Contractor in writing of such defects. The Authority thereupon shall have the right, by a written notice to that effect, to require the Contractor to repair or replace all inferior or defective work, material, or equipment or permit it to remain in place and assess the Contractor the costs it (the Contractor) would have incurred had the Contractor been required to effect repair or replacement.
- C.** Corrections or replacement of parts, materials, equipment, supplies or construction made pursuant to the provisions of this Section shall also be subject to the provisions of the Contract including this clause to the same extent as parts, material, equipment, supplies or construction originally installed. The warranty, with respect to such new or corrected parts, materials, equipment, supplies or construction, shall be equal in duration as that set forth in Paragraph A above and shall run from the date that such parts, materials, equipment, supplies, or construction are replaced or corrected and accepted by the Authority.
- D.** The Contractor guarantees to reimburse the Authority for, or to repair or replace, damages to the Site, buildings, or contents thereof that are caused by inferior or defective workmanship, or the use of inferior or defective materials or equipment in the performance of this Contract. The Contracting Officer will immediately notify the Contractor in writing when such damage occurs. The Authority shall have the right to require the Contractor to repair or replace such damaged areas or equipment, or elect to permit such damage to remain as is and assess the Contractor the costs it would have incurred had it been required to effect repair or replacement.
- E.** Should the Contractor fail to proceed promptly, after notification by the Contracting Officer, to repair or replace inferior or defective work, material, or equipment, or damage to the Site, buildings, or contents, thereof, caused by inferior or defective work, or the use of inferior or defective materials, or equipment, the Authority may have such work, material, equipment, or damage repaired or replaced and charge all costs incident thereto to the Contractor.
- F.** Special guarantees that may be required under the Contract shall be subject to the elections set forth above unless otherwise provided in such special guarantees.
- G.** Should the Contractor fail to prosecute the Work or fail to proceed promptly to provide guarantee period services after notification by the Contracting Officer, the Authority may, subject to Section 00727, TERMINATION FOR DEFAULT, DAMAGES FOR DELAY AND TIME EXTENSIONS, contained in this Contract, and after allowing the Contractor 10 Days to correct and comply with the Contract, terminate the right to proceed with the Work (or the separable part of the Work) that has been delayed or unsatisfactorily performed. In this event, the Authority may take over the Work and complete it by contract or otherwise, and may take possession of and use any materials, appliance, and plant on the Work Site necessary for completing the Work. The Contractor and its sureties shall be liable for damages to the Authority resulting from the Contractor's refusal or failure

to complete the Work within this specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes increased costs incurred by the Authority in completing the Work.

- H. The decision of the Contracting Officer as to liability of the Contractor under this Section is subject to the appeal procedure provided for in Section 00730, DISPUTE RESOLUTION, of this Contract.
- I. All Subcontractor's, manufacturers', and Suppliers' warranties and guarantees, expressed or implied, respecting any part of the Work and any material used therein shall be deemed obtained in accordance with Section 01775, CLOSEOUT, and shall be enforced by the Contractor for the benefit of the Authority without the necessity of separate transfer or assignment thereof, provided that, if directed by the Authority, the Contractor shall require such Subcontractor's, manufacturers and Suppliers to execute such warranties and guarantees in writing to the Authority in accordance with Section 01775, CLOSEOUT. In connection therewith, the Contractor further agrees to perform the Work in such a manner or consistent with and so as to preserve all such warranties and guarantees.
- J. Certain WMATA Standard Specifications Sections and General Requirements provide for a warranty longer than the general warranty provided in this Contract, or commence from dates other than Final Completion and Acceptance of the Work. Where such warranties are specified as both in addition to the general warranty and in total years, the total years shall govern, and the warranty period shall commence from Final Completion and Acceptance of the Work.

00758 CORRECTION OF DEFICIENCIES

- A. This Section shall apply only to those deficiencies discovered by either the Authority or the Contractor within two years after Acceptance. Materials or equipment will be regarded as having a deficiency if a type of material or equipment in like service accumulates a failure rate greater than five percent within a period of two years following Acceptance by the Authority. Systems or subsystems will be regarded as having a deficiency if they exhibit conditions or characteristics, which are not in compliance with the Contractor's Issued for Construction Specifications and Issued for Construction Drawings, and intent of this Contract anytime during a period extending for two years following their Acceptance by the Authority.
- B. Notice of deficiency to Contractor: If the Authority determines that a deficiency exists in any of the materials, equipment, systems, or subsystems provided the Authority under this Contract, it will promptly notify the Contractor of the deficiency, in writing, within 30 Days.
- C. Recommendation for correction: Upon timely notification of the existence of such a deficiency, or if the Contractor independently discovers a deficiency in accepted materials, equipment, systems, or subsystems, the Contractor shall promptly submit to the Authority its recommendation for corrective actions, together with supporting information in sufficient detail for the Authority to determine what corrective action, if any, shall be undertaken in accordance with Section 01775, CLOSEOUT. The recommendation shall be submitted to the Authority within 15 working days of discovery or receipt of notice of the deficiency.
- D. Direction to Contractor concerning correction of deficiencies: Within 30 Days after receipt of the Contractor's recommendations for corrective action and adequate supporting information, the Contracting Officer, at its sole discretion, will give the Contractor written notice not to correct any deficiency, or to correct or partially correct any deficiency within a reasonable time and at a specified location.
- E. Schedule of deficiency corrections: The Contractor shall prepare Schedule of Deficiency Corrections and deliver it to the Authority for approval in accordance with Section 01775, CLOSEOUT, within 15 working days of discovery of deficiency by the Contractor or receipt of notice of discovery of a deficiency by the Authority.
- F. Correction of deficiencies by Contractor: The Contractor shall promptly comply with all timely written directions by the Contracting Officer to correct or partially correct a deficiency, at no increase

in the Contract Price. The Contractor shall also prepare and furnish to the Authority in accordance with Section 01775, CLOSEOUT, data and reports applicable to corrections required under this Section (including revision and updating of all other affected data called for under this Contract) at no increase in the Contract Price.

- G.** Modification of Contract with respect to uncorrected deficiencies: In the event of timely notice of a decision not to correct or only to partially correct a deficiency, the Contractor shall submit to the Authority within 15 working days, a technical and cost proposal to amend the Contract in accordance with Section 01775, CLOSEOUT, to permit acceptance of the affected materials, equipment, systems, or subsystems in accordance with the revised requirements, and an equitable reduction in Contract Price shall promptly be negotiated by the parties and stated in a Modification to this Contract.
- H.** Failure to correct: If the Contractor fails or refuses to present a detailed recommendation for corrective action and to prepare and furnish data and reports as required in Paragraph G above, then the Contracting Officer will give the Contractor written notice specifying the failure or refusal and setting a period after receipt of the notice within which it must be corrected. If the failure or refusal is not corrected within the specified period, the Contracting Officer may, by contract or otherwise, as required:
1. Obtain detailed recommendations for corrective action;
 2. Either:
 - a) Correct the materials, equipment, systems or subsystems, or
 - b) Replace the materials, equipment, systems or subsystems; and if the Contractor fails to furnish timely disposition instructions, the Contracting Officer may dispose of non-conforming materials, equipment, systems or subsystems for the Contractor's account in a reasonable manner, in which case the Authority is entitled to reimbursement from the Contractor or from the proceeds for the reasonable expense of care and disposition, as well as for excess costs incurred or to be incurred;
 3. and obtain applicable data and reports.
 4. Charge to the Contractor the cost occasioned to the Authority thereby.
- I.** Correction of deficient replacements and re-performances: Materials or equipment corrected or furnished in replacement and systems or subsystems revised pursuant to this Section shall also be subject to all the provisions of the Contract to the same extent as materials, equipment, systems, or subsystems initially accepted.
- J.** The correction of materials or equipment exhibiting a failure rate greater than five percent means taking of any and all actions necessary to correct the deficiencies, including removal and replacement of all pieces of material or equipment in like service in a manner satisfactory to the Contracting Officer Representative. The correction of systems or subsystems exhibiting one or more deficiencies means taking any and all actions necessary to eliminate any and all deficiencies in a manner satisfactory to the Authority.
1. Disassembly/reassembly expense: The Contractor shall be liable for reasonable cost of disassembly/reassembly of larger items necessary to remove the materials or equipment to be inspected and/or returned for correction or replacement.
 2. Transportation charges:
 - a) When the Authority returns supplies to the Contractor for correction or replacement pursuant to this Section, the Contractor shall be liable for transportation charges up to an amount equal to the cost of transportation by the usual commercial method of shipment from the designated destination point under this Contract to the Contractor's plant, in

addition to any charges provided for in Paragraph J.2.b) below. The Contractor shall also bear the responsibility for the supplies while in transit.

- b) When compliance with the terms of this Section by the Contractor involves shipment of corrected or replacement supplies from the Contractor to the Authority, the Contractor shall be liable for transportation charges up to an amount equal to the cost of transportation by the usual commercial method of shipment from the Contractor's plant to the designated destination point under this Contract, in addition to any charges provided for Paragraph J.2.a) above. The Contractor shall also bear the responsibility for the supplies while in transit.
- K. No extension in time for performance; no increase in Contract Price: In no event shall the Authority be responsible for extension or delays in the scheduled deliveries or periods of performance under this Contract as a result of the Contractor's obligations to correct deficiencies, nor shall there be any adjustment of the delivery schedule or Contract Performance Time as a result of such correction of deficiencies, except as may be agreed to by the Authority in a supplemental agreement with adequate consideration.
- L. The Contractor shall not be responsible under this Section for the correction of deficiencies in Authority-furnished property, except for deficiencies in installation, unless the Contractor performs or is obligated to perform any modifications or other work on such property. In that event, the Contractor shall be responsible for correction of deficiencies to the extent of such modifications or other work.
- M. The Contractor shall not be responsible under this Section for the correction of deficiencies caused by the Authority.

00759 COVENANT AGAINST CONTINGENT FEES

- A. The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this Contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies utilized by the Contractor for the purpose of securing business. For breach or violation of this warranty, the Contracting Officer shall have the right to terminate this Contract without liability or in his or her discretion to deduct from the Contract Price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.
- B. If fraud is suspected, the Authority's only remedy prior to final adjudication by a court of competent jurisdiction is to report the matter to the Authority's Office of Inspector General (OIG), the U.S. Department of Transportation's Office of Inspector General (DOT-OIG), the Offices of Inspectors General of any agency providing funding under this Contract and/or appropriate federal, state and/or local law enforcement authorities.

00760 OFFICIALS NOT TO BENEFIT

- A. No member of or delegate to Congress, resident commissioner or member of a state or local public body shall be admitted to any share or part of this Contract, or to any benefit that may arise therefrom during his or her tenure or for two (2) years thereafter, unless his or her interest in the business entity that is awarded this Contract is placed in a blind trust in accordance with the rules and regulations of the U.S. Office of Government Ethics (OGE).
- B. Enforcement of this clause shall be consistent with 18 U.S.C. §431.

00761 GRATUITIES

- (a) In connection with performance of this Contract, or any changes or modifications relative thereto, the giving of or offering to give gratuities (in the form of entertainment, gifts or otherwise) by the Contractor, or any agent, representative or other person deemed to be acting on behalf of the Contractor, or any supplier or subcontractor furnishing material to or performing work under this

Contractor, to any Board member, employee or agent of the Authority; with a view toward securing this Contract or securing favorable treatment regarding this Contract is expressly forbidden. The terms of this "Gratuities" clause shall be strictly construed and enforced in the event of violations hereof.

- (b) Reported instances of the giving or offering to give gratuities within the context of this "Gratuities" clause will be investigated by the Authority's Board of Directors or its duly authorized representative. A preliminary investigation will be made to determine whether there is probable cause to suspect that a violation of this clause exists. If such probable cause exists, the Board of Directors, or its duly authorized representative, shall formally notify WMATA's Office of Inspector General (OIG), the U.S. Department of Transportation's Office of Inspector General (DOT-OIG), the Offices of Inspectors General of any state or Federal agency providing funding under this Contract and/or appropriate Federal, state and/or local law enforcement authorities.
- (c) The rights and remedies of the Authority provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided under this Contract, at law or in equity.

00762 ORGANIZATIONAL CONFLICTS OF INTEREST

- A. An organizational conflict of interest (OCI) exists when the nature of the work to be performed under a proposed contract or a subcontract may, without some restriction on future activities result in an unfair competitive advantage to the Contractor or subcontractor; because of (1) unequal access to information, (2) biased ground rules or (3) impaired objectivity. An unequal access to information OCI may exist if in performing a Contract, a Contractor obtains access to non-public information that provides a competitive advantage to it in a later competition. A biased ground rules OCI may exist if the Contractor has a role in setting rules for a source selection in which it will compete. An impaired objectivity OCI may exist if, in performing a Contract, a Contractor is called upon to evaluate an offer from or performance by itself or an affiliated entity.
- B. In the event that the Contractor believes that it or any of its potential subcontractors may have an OCI, it shall notify the Contracting Officer, in writing, within five (5) working days after it becomes aware of the potential or actual OCI. The written notification shall identify the nature and circumstances of the perceived conflict and propose appropriate measures to eliminate or mitigate the OCI. The Contracting Officer will review the circumstances and the proposed mitigation plan and notify the Contractor stating whether: (1) no mitigation is required; (2) the conflict cannot be mitigated; or (3) the conflict can be mitigated and he or she accepts the proposed measures, or recommends additional measures.
- C. The Contractor's failure to identify such perceived conflicts may result in the Contract being rescinded or terminated.
- D. Should the Contractor identify or become aware of a conflict during the term of this Contract, including any extension thereof that it could not reasonably anticipate prior to award, it shall notify the Contracting Officer in accordance with paragraph (b), or request an exception to the restriction with supporting rationale. The Contracting Officer shall consider the Contractor's proposed measures to mitigate or eliminate the conflict, or the request for an exception.
- E. If the proposed measures are not determined to be feasible or are otherwise not acceptable to the Contracting Officer, he or she may terminate the Contract. If the Contracting Officer does not grant a request for an exception, and the Contract is not terminated, the Contractor shall be notified in writing and be given ten (10) days from the date of the written notification to take all necessary actions to comply with this clause.
- F. If the proposed measures are determined to be acceptable to the Contracting Officer, he or she may grant a specific exception to this restriction, when in the Contracting Officer's judgment, the exception will not create a conflict between the Contractor's duties and obligations under this Contract and the duties and obligations imposed on the Contractor under another contractual or other relationship.

- G. If the Contractor fails to comply with the terms of this clause, and no fraud is suspected, the Contracting Officer, may withhold payments due under this Contract until such time as the Contractor is in compliance or, should the non-compliance remain uncorrected at the expiration of ten (10) days from the Contracting Officer's written notice as provided in paragraph (b), terminate the contract for default pursuant to this Contract.
- H. If fraud is suspected, the Authority's only remedy prior to a final determination by a court of competent jurisdiction is to report the matter to the Authority's Office of Inspector General (OIG), the U.S. Department of Transportation's Office of Inspector General (DOT-OIG), the Offices of Inspectors General of any state or Federal agency providing funding under this Contract and/or appropriate Federal, state and/or local law enforcement authorities.
- I. The Contractor, in performing this Contract, shall avoid any conduct that might result in or give the appearance of creating for Board members or employees of the Authority in their relationship with the Contractor, any conflicts of interest or favoritism and/or the appearance thereof and shall avoid any conduct that might result in a Board member, or employee failing to adhere to any Code of Ethics or standards of conduct adopted by the Authority's Board of Directors.
- J. The Contracting Officer's determination under this clause shall be final and shall be considered a question of fact within the meaning of the "Disputes" Section of this Contract.

00763 EMPLOYMENT RESTRICTION WARRANTY

- A. The Contractor warrants that it will not offer employment to, solicit or discuss prospective employment with, or otherwise engage in substantive employment related discussions or communications with, any present or former Board member of the Authority who has been involved, directly or indirectly, in any matter of financial interest to the Contractor until at least two (2) years after the Board member has ceased involvement in the matter. The post-employment restriction on former Authority employees is one (1) year from the date of their last employment with the Authority. The Contractor shall not knowingly engage in communications of the nature described above with any immediate family member or member of the household of any Authority employee or Board member during the period when such employee or Board member is involved in any matter of financial interest to the Contractor.
- B. If a former Board member or employee of the Authority is eventually hired, the Contractor shall ensure that the former Board member or employee is not involved in negotiating or otherwise dealing with the Authority on any particular matter over which he or she had responsibility during his or her tenure.
- C. Should the Contractor fail to comply with the provisions hereof, and no fraud is suspected, the Contracting Officer shall have the right to withhold payment under this Contract in an amount not to exceed two percent (2%) of the total Contract amount as liquidated damages to the Authority, such withholding to be in addition to any other withholding or retainage under this Contract. Any dispute shall be settled in accordance with the "Disputes" clause of this Contract.
- D. If fraud is suspected, the Authority's only remedy prior to a final decision by a court of competent jurisdiction is to report the matter to the Authority's Office of Inspector General (OIG), the U.S. Department of Transportation's Office of Inspector General (DOT-OIG), the Offices of Inspectors General of any state or Federal agency providing funding under this Contract and/or appropriate Federal, state and/or local law enforcement authorities.

00764 CIVIL RIGHTS

- A. *Nondiscrimination Assurance.* In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. §2000 (d), section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. §6102, section 202 of the American with Disabilities Act of 1990, 42 U.S.C. §12132, D.C. law and Federal transit law at 49 U.S.C. §5332, the Contractor, sub-recipient, or subcontractor agrees that it will not

discriminate against any employee or applicant for employment because of race, color, creed, religion, national origin, sex, age, sexual preference, gender identity and/or disability. In addition, the Contractor, sub-recipient, or subcontractor agrees to comply with applicable Federal implementing regulations and other regulations that FTA may issue.

- B. The Contractor, sub-recipient, or Subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as the recipient deems appropriate.
- C. Equal Employment Opportunity: The following equal employment opportunity requirements apply to this Contract.
1. *Race, Color, Creed, National Origin, Sex.* In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. §2000(e), and Federal transit laws at 49 U.S.C. §5332, the Contractor agrees to comply with all applicable equal opportunity requirements of the U.S. Department of Labor (U.S. DOL) including, but not limited to "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Part 60 *et. seq.*, [implementing Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000(e) note], and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of this Contract. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, creed, national origin, sex or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements that FTA may issue.
 2. *Age.* In accordance with Section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements that FTA may issue.
 3. *Disabilities.* In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. §12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements that FTA may issue.
- D. Special DOL EEO Clause for Construction Projects: The equal opportunity clause published at 41 CFR 60-1.4(a) of this chapter is required to be included in, and is part of, all nonexempt Federal contracts and subcontracts, including construction contracts and subcontracts. In addition to the clauses described above, all Federal contracting officers, all applicants and all non-construction Contractors, as applicable, shall include the specifications set forth in this section in all Federal and federally assisted construction contracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to §60-4.6 of this part and in construction subcontracts in excess of \$10,000 necessary in whole or in part to the performance of non-construction Federal contracts and subcontracts covered under the Executive order.

When undertaking "construction" as recognized by the U.S. Department of Labor (U.S. DOL), the Contractor agrees to comply with U.S. DOL regulations "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Part 60, and Executive Order 11246 "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246, Relating to Equal Employment Opportunity," 42 U.S.C. § 2000 (e) note.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS
(EXECUTIVE ORDER 11246)**

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction Contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals

are published periodically in the FEDERAL REGISTER in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female

employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR § 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contractors and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a Contractor association, joint Contractor-union, Contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively

participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR §60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
 - A. ***The Contractor also agrees to include these requirements in each Subcontract, financed in whole or in part, with federal assistance provided by the FTA, modified only, if necessary, to identify the affected parties.***

- B. Failure by the Contractor, sub-recipient, or subcontractor to carry out these requirements is a material breach of this Contract, that may result in the termination or such other remedy as the Authority deems appropriate.

00765 DISADVANTAGED BUSINESS ENTERPRISE

- A. In connection with the performance of this Contract, the Contractor agrees to cooperate with the Authority in meeting its commitments and goals with regard to the maximum utilization of Disadvantaged Business Enterprises (DBE) and further agrees to exert good faith efforts to satisfy the requirements of Section 00453, DBE DATA, by subcontracting portions of the Work to disadvantaged firms, by entering into joint ventures with disadvantaged firms, or both.
- B. For federally funded contracts that exceed \$150,000 and to which the Disadvantaged Business Enterprise (DBE) Requirements (Appendix B) apply, the failure to perform in accordance with requirements of Appendix B may result in a partial or full suspension of payment, including progress payments, if applicable.
- C. If the Contractor is found to be in noncompliance with the DBE requirements of Appendix B, the progress of the work shall also be deemed to be unsatisfactory, and an amount equal to the DBE participation in the Contract shall be retained from payment (or progress payments, if any) made to the Contractor.
- D. If the Contract value is over \$150,000, the prime Contractor will be responsible for submitting a monthly report of the status of its DBE subcontractors to the Contracting Officer.
- E. If the Contractor fails to submit the required monthly DBE reports, the Contracting Officer may suspend payments (or progress payments), until such time as the monthly reports are submitted and accepted by the Authority.
- F. The goal for this Contract is as specified in Section 00865, DISADVANTAGED BUSINESS ENTERPRISE.

00766 UTILIZATION OF SMALL BUSINESS CONCERNS

- A. It is the policy of the Authority that a fair proportion of the purchases and contracts for supplies and services for the Authority be placed with small business concerns.
- B. The Contractor agrees to accomplish the maximum amount of subcontracting to small business concerns that the Contractor finds to be consistent with the efficient performance of this Contract.

00767 DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS

A. Minimum Wages:

1. All laborers and mechanics employed or working upon the Site of the Work (or under the United States Housing Act of 1937 or under the Housing-Act of 1949 in the construction or development of the project), shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, 29 C.F.R. Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at the time of payment computed at rates not less than those contained in the Wage Determination of the Secretary of Labor, which is attached hereto and made a part hereof as specified in APPENDIX D to Section 00800, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b) (2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 C.F.R.

§5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs that cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided at 29 C.F.R. §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 C.F.R. §5.5(a)(1)(ii) And the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractor at the Site of the Work in a prominent and accessible place where it can be easily seen by the workers.

2. The Authority will require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The Authority will approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - a) Except with respect to helpers as defined in 29 C.F.R. 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - b) The classification is utilized in the area by the construction industry, and
 - c) The proposed wage rate, including bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
 3. If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the Contracting Officer Representative to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 Days of receipt and so advise the Contracting Officer or will notify the Authority within the 30-Day period that additional time is necessary.
 4. In the event the Contractor, the laborers, or mechanics to be employed in the classification or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer will refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 Days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-Day period that additional time is necessary.
 5. The wage rate (including fringe benefits where appropriate) determined pursuant to Paragraphs A.3 and A.4 above, shall be paid to all workers including helpers performing work in the classification under this Contract from the first day on which work is performed in the classification.
- B.** Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit, which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
1. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs

reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the Contractor submitted through the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, that the applicable standards of the Davis-Bacon act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

- C. Withholding: The Authority will, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor, under this agreement or any other Authority contract with the same recipient, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the Authority may, after written notice to the Contractor, sponsor, applicant, or owner take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee or funds until such violations have ceased.

D. Payrolls and Basic Records

1. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the Site of the Work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the Project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(b) of the Davis-Bacon act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 C.F.R. §5 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(b) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records, which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
2. The Contractor shall submit weekly in accordance with Section 01330, SUBMITTAL PROCEDURES, for each week in which any Contract work is performed, a copy of all payrolls to the Authority. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. §5.5(a)(3)(i). This information may be submitted in any form desired. Optional form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock no. 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The Contractor is

responsible for the submission of copies of payrolls by all Subcontractors in accordance with Section 01330, SUBMITTAL PROCEDURES.

- a) Each payroll submitted shall be accompanied by a "Statement of Compliance" signed by the Contractor or Subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and submit in accordance with Section 01330, SUBMITTAL PROCEDURES and shall certify the following:

- 1) That the payroll for the payroll period contains the information required to be maintained under 29 C.F.R. §5.5(a)(3)(i), and that such information is correct and complete;
 - 2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth at 29 C.F.R. Part 3;
 - 3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.
- b) The weekly submission in accordance with Section 01330, SUBMITTAL PROCEDURES, of a properly executed certification set forth on the reverse side of optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by 29 C.F.R. §5.5(a)(3)(ii)(B).
 - c) The falsification of any of the above certifications may subject the Contractor or Subcontractor to civil or criminal prosecution under 18 U.S.C. §1001 and 31 U.S.C. §3729.
 - d) The Contractor or Subcontractor shall make the records required under 29 C.F.R. §5.5(a)(3)(i) available for inspection, copying, or transcription by authorized representatives of the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or Subcontractor fails to submit the required records in accordance with Section 01330, SUBMITTAL PROCEDURES, or make them available, the Authority may, after written notice to the Contractor, sponsor, applicant, or owner take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or make such records available may be grounds for debarment action pursuant to 29 C.F.R. §5.12.

E. Apprentices and Trainees

- a. Apprentices: Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship, Training and Employer Labor Services, or with a State apprenticeship agency recognized by the Office, or if a person is employed in his or her first 90 Days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship, Training and Employer Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage on the wage, determination for the classification of work actually performed. In addition, any apprentice performing work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or Subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails

for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Office of Apprenticeship, Training and Employer Labor Services, or a state apprenticeship agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- b. Trainees: Except as provided in 29 C.F.R. §5.16, trainees shall not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the Site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate, who is not registered and participating in a training plan approved by the employment and training administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the employment and training administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- c. Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under 29 C.F.R. Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order No. 11246, as amended 29 C.F.R. Part 30.
- d. Helpers: Helpers will be permitted to work on a project if the helper classification is specified on an applicable wage determination or is approved pursuant to the conformance procedure set forth in 29 C.F.R. §5.5(a)(1)(ii). The allowable ratio of helpers to journeyman employed by the Contractor or Subcontractor on the job site shall not be greater than two helpers for every three journeymen (in other words, not more than 40 percent of the total number of journeymen and helpers in each Contractor's or in each Subcontractor's own work force employed on the job site.) Any worker listed on a payroll at a helper wage rate, who is not a helper as defined in 29 C.F.R. §5.2(n)(4), shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any helper performing work on the job site in excess of the ratio permitted shall be paid not less than the applicable journeyman's (or laborer's, where appropriate) wage rate on the wage determination for the work actually performed.

COMPLIANCE WITH COPELAND ACT REQUIREMENTS:

THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF 29 CFR PART 3, WHICH ARE INCORPORATED BY REFERENCE IN THIS CONTRACT. IN ADDITION, THE CONTRACTOR AGREES TO COMPLY WITH SECTION 1 OF THE COPELAND "ANTI-KICKBACK ACT," 18 U.S.C. § 874 THAT PROHIBITS ANYONE FROM INDUCING, BY ANY MEANS, ANY PERSON EMPLOYED ON CONSTRUCTION, PROSECUTION, COMPLETION OR REPAIR OF A FEDERALLY ASSISTED BUILDING OR WORK, TO GIVE UP ANY PART OF HIS OR HER COMPENSATION TO WHICH HE OR SHE IS ENTITLED. CONTRACTOR FURTHER AGREES TO COMPLY WITH SECTION 2 OF THE ACT, 40 U.S.C. §3145, AS AMENDED, AND IMPLEMENTING

DOL REGULATIONS, "CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDINGS OR PUBLIC WORKS FINANCED IN WHOLE OR IN PART, BY LOANS OR GRANTS FROM THE UNITED STATES." CONTRACTOR AGREES TO COMPLY WITH 29 C.F.R. PART 3 WHICH IMPOSES RECORD KEEPING REQUIREMENTS FOR ALL SUCH CONTRACTS IN EXCESS OF \$2,000.

F. Subcontracts:

The Contractor shall insert the clause in section E above (Compliance with Copeland Act requirements) in all subcontracts, and require that subcontractors insert the clause in any and all of their subcontracts, at any tier. In addition, the Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

G. Contract Termination:

Debarment. A breach of the Contract clauses in 29 C.F.R. §5.5 may be grounds for termination of the Contract, and for debarment as a Contractor or a Subcontractor as provided in 29 C.F.R. §5.1

H. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and related Acts contained in 29 C.F.R. Parts 1, 3, and 5 are incorporated herein by reference.

I. Disputes Concerning Labor Standards:

Disputes arising out of the Labor Standards provisions of this Contract shall not be subject to Section 00730, DISPUTE RESOLUTION, of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. Parts 5, 6, and 7. Disputes within the meaning of this Section include disputes between the Contractor (or any of its Subcontractors) and the Contracting Agency, the U.S. Department of Labor, or the employees or their representatives.

J. Certification of Eligibility:

1. By entering into this agreement or a third party contract financed under this agreement the Contractor certifies that neither it (nor he nor she) nor any person or firm that has an interest in the Contractor's firm is a person or firm ineligible to be awarded government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 C.F.R. §5.12(a)(1).
2. No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 C.F.R. §5.12(a)(1).
3. The penalty for making false statement is prescribed in the U.S. Criminal code, 18 U.S.C.1001.

00768 WALSH-HEALEY PUBLIC CONTRACTS ACT

A. If this Contract is for the manufacture or furnishing of materials, supplies, articles, or equipment in an amount, which exceeds or may exceed \$10,000 and is subject to the Walsh-Healey Public Contracts Act, as amended (41 U.S.C. §§35-45), the following terms and conditions apply:

1. All stipulations required by the Act and regulations issued by the Secretary of Labor (41 CFR Part 50) are incorporated by reference. These stipulations are subject to all applicable rulings and interpretations of the U.S. Secretary of Labor that are now, or may be hereafter, be in effect.
2. All employees whose work relates to this Contract shall be paid not less than the minimum wage prescribed by regulations issued by the U.S. Secretary of Labor (41 CFR 50-202.2). Learners, student learners, apprentices, and certain handicapped workers may be employed

at less than the prescribed minimum wage (see 41 CFR §50-202.3) to the same extent that such employment is permitted under Section 14 of the Fair Labor Standards Act (41 U.S.C. §40).

00769 NOTICE TO THE AUTHORITY OF LABOR DISPUTES

- A.** Whenever the Contractor has knowledge that an actual or potential labor dispute is delaying or threatens to delay the timely performance of this Contract, the Contractor shall immediately give notice thereof in accordance with Section 01330, SUBMITTAL PROCEDURES, including all relevant information with respect thereto, to the Contracting Officer Representative.
- B.** The Contractor agrees to insert the substance of this Section 00769, NOTICE TO THE AUTHORITY OF LABOR DISPUTES, in all Subcontracts hereunder as to which a labor dispute may delay the timely performance of this Contract; except that each such Subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor shall immediately notify its next higher tier Subcontractor, or the Contractor, as the case may be, of all relevant information with respect to such dispute.

00770 CONVICT LABOR

- A.** Except as provided in clause A(1), the Contractor shall not employ, in the performance of this Contract, any person undergoing a sentence of imprisonment imposed by any court of the Federal Government, a state, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam or the U.S. Virgin Islands.
 - 1. The Contractor is not prohibited from employing persons:
 - a) On parole or probation to work at paid employment during the term of their sentence;
 - b) Who have been pardoned or who have served their terms; or
 - c) Confined for violation of the laws of the Federal Government, the states, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, or the U.S. Virgin Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if:
 - 1) The worker is paid or is in an approved work or training program on a voluntary basis.
 - 2) Representatives of the local union's central bodies or similar labor union organizations have been consulted;
 - 3. Such paid employment will not result in the displacement of employed workers, or be applied in skills, crafts, or trades where there is a surplus of available gainful labor in the locality, or impair existing contracts or services;
 - 4. The rates of pay and other conditions of employment will not be less than those paid or provided for work of a similar nature in the locality where the work is being performed; and
 - 5. The Attorney General of the United States has certified that the work-release laws or regulations of the jurisdiction involved are in conformity with the requirements of Executive Order 11755, as amended by Executive Orders 12608 and 12943.

00771 FEDERAL, STATE, AND LOCAL TAXES

- A.** Except as otherwise provided in this Contract, the Contract Price includes all applicable Federal, State, and local taxes and duties.

- B.** Nevertheless, with respect to any Federal excise tax or duty on the transactions or property covered by this Contract, if a statute, court decision, written ruling, or regulation takes effect after the Contract date and results in the following:
1. The Contractor being required to pay or bear the burden of any such Federal excise tax or duty or increase in the rate thereof, which would not otherwise have been payable on such transactions or property, the Contract Price shall be increased by the amount of such tax or duty or rate increase, provided the Contractor warrants in writing in accordance with Section 01330, SUBMITTAL PROCEDURES, that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the Contract Price as a contingency reserve or otherwise; or
 2. The Contractor not being required to pay or bear the burden of, or in its obtaining a refund or drawback of, any such Federal excise tax or duty which would otherwise have been payable on such transactions or property or which was the basis of an increase in the Contract price, the Contract Price shall be decreased by the amount of the relief, refund, or drawback, or that amount of the relief, refund, or drawback, or that amount that shall be paid to the Authority, as directed by the Contracting Officer Representative. The Contract Price shall be similarly decreased if the Contractor, through its fault or negligence or its failure to follow instructions of the Contracting Officer Representative, is required to pay or bear the burden of, or does not obtain a refund or drawback or, any such Federal excise tax or duty.
- C.** Paragraph B above shall not be applicable to Social Security taxes or to any other employment tax.
- D.** No adjustment of less than \$250 shall be made in the Contract Price pursuant to Paragraph B above.
- E.** As used in Paragraph B above, the term "Contract date" means the date set for Proposal opening, except if this is a negotiated Contract, the date that the Contractor submits its Best and Final Offer. As to additional supplies or services procured by modification to this Contract, the term Contract date means the date of such Modification.
- F.** Unless there does not exist any reasonable basis to sustain an exemption, the Contracting Officer Representative, upon the request of the Contractor in accordance with Section 01330, SUBMITTAL PROCEDURES, shall, without further liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax; provided that, evidence appropriate to establish exemption from and Federal excise tax or duty, which may give rise to either increase or decrease in the Contract Price will be furnished only at the discretion of the Contracting Officer Representative.
- G.** The Contractor shall promptly notify the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, of matters, which will result in either an increase or decrease in the Contract Price, and shall take action with respect thereto as directed by the Contracting Officer Representative. The Authority shall be entitled to a reduction in the Contract price reflecting such amount and a refund of monies paid related to such taxes, plus applicable interest.

00772 ADDITIONAL BOND SECURITY

For information on Additional Bond Security, see Section 00613, PERFORMANCE AND PAYMENT BONDS (Additional Bond Security).

00773 PATENT AND COPYRIGHT INDEMNITY

- A.** In addition to any other indemnification provided in this Contract, the Contractor shall indemnify the Authority and its Board members, agents and employees against liability, including costs, for infringement of any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. §181) arising out of the manufacture or delivery of supplies, the performance of services, or the construction, alteration, modification, or repair of real property under this Contract. If the Contractor is not the

original equipment manufacturer (OEM) for a manufactured product, it will ensure that the patent holder provides indemnity to the Authority under this clause. This indemnity shall not apply unless the Contractor is informed as soon as practicable by the Authority of the suit or action alleging such infringement, and is given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply to:

1. An infringement resulting from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner or performance of the Contract not normally used by the Contractor.
2. An infringement resulting from addition to, or change in, such supplies or components furnished or construction work performed that was made subsequent to delivery or performance by the Contractor; or
3. A claimed infringement that is unreasonably settled without the consent of the Contractor, unless required by final decree of a court of competent jurisdiction.

00774 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT

- A. The Contractor shall report to the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this Contract once the Contractor is notified thereof.
- B. In the event of any action, Claim, or suit against the Authority on account of any alleged patent or copyright infringement arising out of or related to the performance of this Contract or out of the use of any supplies furnished or work or services performed hereunder, the Contractor shall furnish to the Authority in accordance with Section 01330, SUBMITTAL PROCEDURES, when requested by the Contracting Officer Representative, all evidence and information in possession of the Contractor pertaining to such action, suit, or Claim. Such evidence and information shall be furnished at the expense of the Authority except where the Contractor has agreed to defend, indemnify, or hold harmless the Authority. This Section shall be included in all Subcontracts.
- C. The Contractor shall include the substance of this clause, including this paragraph, in all subcontracts that are expected to exceed the simplified acquisition threshold.

00775 AUTHORITY RIGHTS IN TECHNICAL DATA – LIMITED

- A. All, designs, Design Drawings, Design Specifications, Samples, processes (including Computer Software), laboratory testing analyses and reports, notes, As-Built Drawings produced during and after completion of construction and other work produced in the performance of this Contract, or in the contemplation or implementation thereof shall be and remain the sole property of the Authority and may be used on any other work without additional cost to the Authority. Any re-use of design services shall be at the Authority's sole risk and with respect thereto, the Contractor agrees not to assert any rights or to establish any claim under the design patent or copyright laws and not to publish or reproduce such matter in whole or in part or in any manner or form, or authorize others so to do, without the written consent of the Authority until such time as the Authority may have released such matter to the public. Further, with respect to any design or process, which the Authority desires to protect by applying for and prosecuting a design patent application, or otherwise, the Contractor agrees to furnish the Authority such duly executed instruments and other papers (prepared by the Authority) as are deemed necessary to vest in the Authority the rights granted it pursuant to this Section. The Contractor, for a period of 3 years after completion of the Project or task, agrees to furnish and to provide access to the originals or copies of all such materials on the request of the Authority.
- B. Rights in Technical Data:

1. The Authority shall have the right to use, duplicate, or disclose Technical Data, which includes, without limitation, computer software and other items listed below, in whole or in part, in any manner and for any purpose whatsoever, and to have or permit others to do so:
 - a) All manuals, instructional materials prepared for installation, operation, maintenance or training purposes;
 - b) Technical Data pertaining to end items, components or processes, which were prepared for the purpose of identifying sources, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements ("form, fit and function" data; e.g., specification control drawings, catalog sheets, outline drawing; except that for computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithm, process, formulae, and flow charts of the software);
 - c) Other technical data, which has been, or is normally furnished without restriction by the Contractor or Subcontractor;
 - d) Other specifically described technical data, which the parties have agreed will be furnished without restriction.
 - e) All computer software regardless of whether it is technical data as defined in this article, including the source code, algorithms, processes, formulae, and flow charts, that the Contractor developed or materially modified for the Authority or for which the Authority is required by Federal law or regulation to provide a royalty-free, irrevocable and nonexclusive license to the Federal government.
- C. The Authority shall have the right to use, duplicate, or disclose technical data other than that defined in Paragraph B.1.a) above, in whole or in part, with the express limitation that such technical data shall not, without the written permission of the party furnishing such technical data, be:
 1. Released or disclosed in whole or in part outside the Authority;
 2. Used in whole or in part by the Authority for manufacture; or
 3. Used by a party other than the Authority except for emergency repair or overhaul work only, by or for the Authority where the item or process concerned is not otherwise reasonably available to enable timely performance of the Work; provided, that the release or disclosure thereof outside the Authority shall be made subject to a prohibition against further use, release, or disclosure.
- D. Technical Data provided in accordance with the provisions of Paragraph B.1.b) above shall be identified by a legend, which suitably recites the aforesaid limitation. Nothing herein shall impair the right of the Authority to use similar or identical data acquired from other sources.
- E. Material covered by copyright:
 - a. The Contractor agrees to and does hereby grant to the Authority, and to its Board members, agents and employees acting within the scope of their official duties, a royalty-free, nonexclusive and irrevocable license throughout the world for the Authority's purposes to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others so to do, all technical data now or hereafter covered by copyright.
 - b. No such copyrighted matter shall be included in technical data furnished hereunder without the written permission of the copyright owner for the Authority to use such copyrighted matter in the manner above described.

- c. The Contractor shall report to the Authority promptly and in reasonable written detail each notice or claim of copyright infringement it receives regarding any technical data delivered hereunder.
- F. Relation to patents: Nothing contained in this article shall imply a license to the Authority under any patent, or be construed as affecting the scope of any license or other right otherwise granted to the Authority under any patent.
- G. Any dispute under this article shall be subject to the "Disputes" article of this contract.
- H. The Contracting Officer may retain from payment up to ten percent (10%) of the Contract price until final delivery and acceptance of the technical data defined in this Article and as required to be furnished by the Contract.

RIGHTS IN TECHNICAL DATA – UNLIMITED

- A. The term Technical Data as used in this Section means technical writing, Computer Software, sound recordings, pictorial reproductions, drawings, or other graphic representations and works of a technical nature, whether or not copyrighted, which are specified to be delivered pursuant to this Contract in accordance with Section 01330, SUBMITTAL PROCEDURES, and Section 01775, CLOSEOUT. The term does not include financial reports, cost analyses, and other information incidental to Contract administration. Computer Software as used in this Section means computer programs, computer databases, and documentation thereof.
- B. Where any item is purchased as a separate line item in this Contract, that purchase includes all integral parts of that item, including any computer software, source code, algorithms, processes, formulae, and flow charts. The Authority has full rights to use, duplicate or disclose any or all parts of the item, including computer software, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so. Should disclosure of the computer software be required only under this paragraph, then the Contracting Officer may waive the provisions of this paragraph if he or she certifies in writing that the item is commercially available from multiple sources and will be fully compatible with existing Authority property.
- C. The Authority or its designated representative shall have the right to use, duplicate or disclose technical data, including computer software, in whole or in part, in any manner and for any purpose whatsoever, and to have or permit others to do so that is contained in or derived from:
 - (1) Any manuals, instructional materials prepared for installation, operation, maintenance or training purposes;
 - 2) Technical data pertaining to end items, components or processes that were prepared for the purpose of identifying sources, sizes, configurations, mating and attachment characteristics, functional characteristics and performance requirements ("form, fit and function" data such as , specification control drawings, catalog sheets, and outline drawings. Except for the computer software, it means data identifying sources, functional characteristics, and performance requirements, but specifically excludes the source code, algorithms, processes, formulae, and flow charts of the software.);
 - 3) Other technical data that the Contractor or subcontractor, normally furnishes without restriction;
 - 4) Other specifically described technical data that the parties have agreed will be furnished without restriction;
 - 5) All computer software regardless of whether it is technical data as defined in this article, including the source code, algorithms, processes, formulae, and flow charts, that the Contractor developed or materially modified for the Authority or for which the Authority is required by Federal law or regulation to provide a royalty-free, irrevocable and nonexclusive license to the Federal government.

- D. The Authority shall have the right to use, duplicate, or disclose technical data other than as defined in paragraph (a), in whole or in part. Such technical data shall not, without the written permission of the party furnishing such technical data, be:
- (1) Released or disclosed, in whole or in part, outside of the Authority,
 - (2) Used, in whole or in part, by the Authority for manufacturing, or
 - (3) Used by a party other than the Authority except for: (i) emergency repair or overhaul, (ii) where the item or process concerned is not otherwise reasonably available to the Authority to enable timely performance of this work, or (iii) administration of this Contract or the inspection of any products produced under it, where the third party has a written contract with the Authority to perform these efforts. In all cases described in this subsection, the release or disclosure outside of the Authority shall be subject to a nondisclosure agreement.
- E. Technical data provided in accordance with paragraph (c) shall be identified with a legend that suitably recites this limitation. This article shall not impair the Authority's right to use similar or identical data acquired from other sources.
- F. Where any item is purchased as a separate line item in this Contract, that purchase includes all integral parts of that item, including any computer software, source code, algorithms, processes, formulae, and flow charts. The Authority has full rights to use, duplicate or disclose any or all parts of the item, including computer software, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so. Should disclosure of the computer software be required only under this paragraph, then the Contracting Officer may waive the provisions of this paragraph if he or she certifies in writing that the item is commercially available from multiple sources and will be fully compatible with existing Authority property.
- G. Material covered by copyright:
1. The Contractor agrees to and does hereby grant to the Authority, and to its Board members, agents, and employees acting within the scope of their official duties, a royalty-free, nonexclusive, and irrevocable license throughout the world for Authority purposes to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others so to do, all Technical Data and computer software now or hereafter covered by copyright.
 2. No such copyrighted matter shall be included in Technical Data or computer software furnished hereunder without the written permission of the copyright owner for the Authority to use such copyrighted matter in the manner above described.
 3. The Contractor shall report to the Authority promptly, and in reasonable written detail, each notice or claim of copyright infringement received by the Contractor with respect to any Technical Data delivered hereunder.
- H. Relation to patents: Nothing contained in this Section shall imply a license to the Authority under any patent, or be construed as affecting the scope of any license or other right otherwise granted to the Authority under any patent.
- I. Any dispute under this Section shall be subject to Section 00730, DISPUTE RESOLUTION.
- J. Notwithstanding any other payment provision in this Contract, the Contracting Officer may retain from payment up to ten percent (10%) of the Contract price until final delivery and acceptance of the technical data defined in this Section and as required to be furnished by the IFB Documents.

00776 TECHNICAL DATA - WITHHOLDING OF PAYMENT

- A.** If technical data, specified to be delivered under this Contract, is not delivered within the time specified by this Contract or is deficient upon delivery (including having restrictive markings not specifically authorized by this Contract), the Authority may until such data is accepted by the Authority, withhold payment to the Contractor of ten percent (10%) of the total Contract Price or amount unless a lesser withholding is specified in the Contract. Payments will not be withheld nor any other action taken pursuant to this Paragraph when the Contractor's failure to make timely delivery or to deliver such data without deficiencies arises out of or is beyond the control and without the fault or negligence of the Contractor.
- B.** After payments total ninety percent (90%) of the total Contract Price or amount and if all technical data specified to be delivered under this Contract has not been accepted, the Authority may withhold from further payment, in addition to other withholdings specified elsewhere, such sum as it considers appropriate, not exceeding ten percent (10%) of the total Contract Price or amount unless a lesser withholding limit is specified in the Contract.
- C.** The withholding of any amount or subsequent payment to the Contractor shall not be construed as a waiver of any rights accruing to the Authority under this Contract.

00777 INDEMNIFICATION AND INSURANCE REQUIREMENTS

A. Indemnification:

- 1. Contractor shall indemnify, defend, and hold harmless the Authority, its Board members, employees, and agents from all liabilities, obligations, damages, penalties, claims, costs, charges and expenses (including reasonable attorney's fees), of whatsoever kind and nature for injury, including personal injury or death of any person or persons, and for loss or damage to any property, including the property of the Contractor and the Authority, occurring in connection with, or in any way arising out of the use, occupancy and performance of the Work and any acts in connection with activities to be performed under this Contract, unless the loss or damage is due to the sole negligence of the Authority. Nothing in the preceding sentence shall be deemed to relieve Contractor from ultimate liability for any obligation of Contractor under this Contract.
- 2. Contractor shall indemnify, defend, and hold harmless the Authority, its Board members, employees, and agents against any and all claims, liabilities, losses, demands, damages, penalties, costs, charges, remedial costs, environmental claims, fees or other expenses including attorney's fees related to, arising from, or attributable to any effluent or other hazardous waste, residue, contaminated soil, or other similar material discharged from, removed from, or introduced on, about, or under the job Site. The foregoing indemnity does not apply to loss or damage due to preexisting conditions, whether known or unknown.
- 3. If any action or proceeding relating to the indemnification is brought against the Authority, then upon written notice from the Authority to the Contractor, the Contractor shall, at its own expense, resist or defend such action or proceeding by counsel approved by the Authority in writing. No approval of counsel shall be required where the cause of action is resisted or defended by counsel of any insurance carrier obligated to resist or defend the same. The Authority reserves the right to use its own counsel under this indemnity at Contractor's sole cost and expense.
- 4. Contractor understands and agrees that it is Contractor's responsibility to provide indemnification to the Authority pursuant to this Section. The provision of insurance, while anticipated to provide a funding source for this indemnification, is in addition to any indemnification requirements and the failure of Contractor's insurance to fully fund any indemnification shall not relieve the Contractor of any obligation assumed under this indemnification.

- B. The Contractor shall provide the Authority with evidence of its Contractor's insurance coverage for the exposures listed in Section 00877 INDEMINICATION AND INSURANCE REQUIREMENTS..

00778 LIQUIDATED DAMAGES

- A. The Contractor understands that if it fails to complete portions or all of the Work as described in Section 00724, PERIOD OF PERFORMANCE AND PROJECT SCHEDULE, the Authority will suffer damages, which have been estimated and are specified in Section 00878, LIQUIDATED DAMAGES.
- B. The Contractor agrees that if it does not complete the Work within the specified Contract Performance Time, then the Contractor shall pay to the Authority as liquidated damages, pursuant to Section 00727, TERMINATION FOR DEFAULT, DAMAGES FOR DELAY, AND TIME EXTENSIONS, the sums per Day as separate damages for each specified completion requirement. Milestones are as defined in Section 00724, PERIOD OF PERFORMANCE AND PROJECT SCHEDULE.

00779 NOT USED

00780 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

- A. This Contract, to the extent that it is of a character specified in the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 327-333), is subject to the following provisions and to all other applicable provisions and exceptions of such Act and the regulations of the Secretary of Labor thereunder:

1. **Pursuant to Section 102 (Overtime):**

- a. Overtime requirements: Neither the Contractor nor any Subcontractor contracting for any part of the Contract Work, which may require or involve the employment of laborers, mechanics, apprentices, trainees, watchmen, and guards shall require or permit any laborer, mechanic apprentice, trainee, watchman, or guard in any work week in which he or she is employed on such work to work in excess of 40 hours in such work week on work subject to the provisions of the Contract Work Hours and Safety Standards Act, unless such laborer, mechanic, apprentice, trainee, watchman, or guard receives compensation at a rate not less than 1-1/2 times his or her basic rate of pay for all such hours worked in excess of 40 hours in such work week.
- b. Violation, liability for unpaid wages, and liquidated damages. In the event of any violation of the provisions of Paragraph A above, the Contractor and any Subcontractor responsible therefor shall be liable to any affected employee for unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the Authority for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, apprentice, trainee, watchman, or guard employed in violation of the provisions of Paragraph A.1.a in the sum of 10 dollars for each Day on which such employee was required or permitted to be employed on such work in excess of his or her standard work week of 40 hours without payment of the overtime wages required by Paragraph A.1.a.
- c. Withholding for unpaid wages and liquidated damages: The Contracting Officer may withhold from the Contractor, from any moneys payable on account of work performed by the Contractor or Subcontractor, such sums as the Contracting Officer determines to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the provisions of Paragraph A.1.b
- d. Subcontracts: The Contractor shall insert the clauses set forth in the section in all Subcontracts and shall require their inclusion in all Subcontracts of any tier. ***The Contractor shall be responsible for compliance by any and all subcontractors at every tier.***

- e. Records: The Contractor shall maintain payroll records containing the information specified in 29 CFR § 516.2(a). Such records shall be preserved for 3 years from completion of this Contract.
- f. **Pursuant to Section 107 (OSHA):**
 - a. The Contractor agrees to comply with section 107 of the Contract Work Hours and Safety Standards Act, 40 U.S.C. section 333, and applicable DOL regulations, " Safety and Health Regulations for Construction " 29 C.F.R. Part 1926. Among other things, the Contractor agrees that it will not require any laborer or mechanic to work in unsanitary, hazardous, or dangerous surroundings or working conditions.
 - b. Subcontracts: The Contractor also agrees to include the requirements of this section in each subcontract. The term "subcontract" under this section is considered to refer to a person who agrees to perform any part of the labor or material requirements of a contract for construction, alteration or repair. A person who undertakes to perform a portion of a contract involving the furnishing of supplies or materials will be considered a "subcontractor" under this section if the work in question involves the performance of construction work and is to be performed: (1) directly on or near the construction site, or (2) by the employer for the specific project on a customized basis. Thus, a supplier of materials which will become an integral part of the construction is a "subcontractor" if the supplier fabricates or assembles the goods or materials in question specifically for the construction project and the work involved may be said to be construction activity. If the goods or materials in question are ordinarily sold to other customers from regular inventory, the supplier is not a "subcontractor." The requirements of this section do not apply to contracts or subcontracts for the purchase of supplies or materials or articles normally available on the open market.

00781 EQUITABLE ADJUSTMENT FOR MINOR CONTRACT MODIFICATIONS

- A. Where the Contracting Officer and Contractor agree to a net additional or deductive amount of direct costs for a Modification to this Contract made pursuant to articles of this Contract titled CHANGES, DIFFERING SITE CONDITIONS, or VALUE ENGINEERING INCENTIVE, which amount does not exceed \$100,000 and further agree to an adjustment in Contract Performance Time resulting from said Modification which increases or decreases the completion date 10 Days or less, the equitable adjustment in Contract Price shall consist of the following:
 - 1. Direct costs as agreed to by the Contracting Officer and Contractor.
 - 2. Job Office Overhead costs, the sum of which shall be limited to a maximum of 10 percent of direct labor costs, including fringe benefits, but excluding FICA, FUTA, and State Unemployment Insurance (SUI); 10 percent of direct material costs; 5 percent of direct equipment costs (small tools, defined as equipment less than \$1,000 in acquisition costs, are included and computed at 5 percent of direct base labor wages.); 5 percent of Subcontract costs.
 - 3. Home Office General and Administrative (G&A) costs, the sum of which shall be limited to a maximum of 3 percent of the direct costs plus job office overhead costs computed as above.
 - 4. Profit will be determined in accordance with the guidelines specified in the Section 00748, CHANGES.
- B. In using the above rates, the following shall apply:
 - 1. Payroll Tax (FICA, FUTA, and SUI) amounts are added immediately after direct and indirect costs are totaled.
 - 2. Subcontractors' indirect costs and profit shall be computed in the same manner as above.
 - 3. Indirect costs shall not be duplicated in direct costs.

4. When the change in Contract Performance Time is increased, the change in Contract Price for direct and indirect costs computed by application of the above rates includes costs of impact and extended performance due to the time extension and no further consideration of costs arising from the specific Modification and cited Pending Change Orders (PCOs) will be given.
5. Bond will be allowed at actual cost without markup.

00782 DRUG AND ALCOHOL TESTING (FOR SAFETY SENSITIVE FUNCTIONS ONLY) – FTA and the Authority

- 1 Contractors who perform safety sensitive functions shall be subject to compliance with a drug and alcohol testing program according to federal guidelines published in FTA regulations and WMATA Drug and Alcohol Program Policy. The Contractor agrees to establish and implement a drug and alcohol testing program that complies with 49 C.F.R. Parts 40 and 655 and WMATA Drug and Alcohol Program Policy 7.7.3/5, produce any documentation necessary to establish its compliance with these regulations, and policy and permit any authorized representative of the U.S. Department of Transportation or its operating administrations, applicable state oversight agency, or the Authority to inspect the facilities and records associated with the implementation of the drug and alcohol testing program as required under 49 C.F.R. Part 655 and WMATA policy and review the testing process. The Contractor further agrees as follows:
- 2 To certify its compliance with 49 C.F.R. Parts 40 and 655 and to submit an annual Management Information System (MIS) report, as required by federal regulations, to WMATA's Medical Compliance Monitor (MCM) and the Contracting Officer before February 15th of each year. To certify compliance, the Contractor shall use the "Alcohol and Controlled Substances Testing" certification contained in the "Annual List of Certifications and Assurances for Federal Transit Administration Grants and Cooperative Agreements," that is published annually in the Federal Register.
3. To submit to the MCM and the Contracting Officer before February 15th of each year, a copy of the Policy Statement developed to implement its drug and alcohol testing program.
4. To provide to the MCM and the Contracting Officer before February 15th of each year the following:
 - a. Employee and supervisor training documentation;
 - b. The name and location of the collection site(s), laboratory(ies), Medical Review Officer(s), Breath Alcohol Technician(s), Collector(s), and Substance Abuse Professional(s); and a description of their random selection drug and alcohol testing process.
5. The Contractor further agrees to submit quarterly reports summarizing program compliance and test results to the MCM by the 15th of the month following the end of each quarter.

00783 NO FEDERAL GOVERNMENT OBLIGATIONS TO THIRD-PARTIES BY USE OF A DISCLAIMER

- A. The Authority and the Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of this Contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to the Authority, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.
- B. The Contractor agrees to include this clause in each Subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

00784 PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

- A. The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U. S. C. §3801 et seq. and U. S. DOT regulations, "Program Fraud Civil

Remedies," 49 C.F. R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies and affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this Contract Work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

- B. The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U. S. C. §5307, the Government reserves the right to impose the penalties of 18 U. S. C. §1001 and 49 U. S. C. §5307 (n)(1) on the Contractor, to the extent the Federal Government deems appropriate.
- C. The Contractor agrees to include this clause in each Subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

00785 FEDERAL CHANGES

- A. The Contractor shall at all times comply with all applicable FTA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference in the Agreement (Form FTA Master Agreement (MA) (23) dated October 1, 2016) between the Authority and FTA, as they may be amended or promulgated from time to time during the term of this Contract. The FTA Master Agreement can be located on FTA's web page at <https://www.transit.dot.gov/funding/grantee-resources/sample-fta-agreements/fta-master-agreement-fiscal-year-2017>. Contractor's failure to comply with any of these provisions shall constitute a material breach of this Contract.
- B. The Contractor agrees to include this clause in each Subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

00786 INCORPORATION OF FTA TERMS

- A. The preceding provisions include, in part, certain Standard Terms and Conditions required by the U.S. Department of Transportation (DOT), whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F and FTA Master Agreement (23) October 1, 2016 or any revisions thereto, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all DOT or FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any Authority requests, which would cause the Authority to be in violation of the FTA terms and conditions.
- B. The Contractor agrees to include this clause in each Subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

00787 ENERGY CONSERVATION

- A. The Contractor agrees to comply with mandatory standards and policies relating to the energy efficiency, which are contained in the applicable state energy conservation plan issued in compliance with the National Energy Policy and Conservation Act. 42 U.S.C. §6321, *et. Seq.*
- B. The Contractor agrees to include the requirements of this clause in all Subcontracts under this Contract.

00788 GOVERNMENT-WIDE DEBARMENT AND SUSPENSION

- A. The Contractor is bound by its certification contained in its offer to the Authority that the Contractor and none of its principals or affiliates are excluded or disqualified from federal contracting. The certification is a material representation of fact, relied upon by the Authority in entering into this Contract. If it is later determined that the Contractor knowingly rendered an erroneous certification, in addition to remedies available to the Authority, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The Contractor agrees to comply with the requirements of 2 C.F.R, part 180, subpart C as adopted and supplemented by U.S. DOT regulations at 2 C.F.R, part 1200 "Non-procurement Suspension and Debarment," including any amendments thereto, Executive Orders Nos. 12549 and 12689 "Debarment and Suspension" 31 U.S.C. § 6101 note, and other applicable federal laws, regulations or guidance regarding participation with debarred or suspended Contractors throughout the term of this Contract.
- B. The Contractor agrees to include this clause in all Subcontracts at all tiers under this Contract requiring lower tier Contractors to comply with federal suspension and debarment requirements, and review the System for Award Management (SAM) at www.sam.gov in order to comply with U.S. DOT regulations at 2 C.F.R, part 1200 prior to awarding any subcontract under this Contract.

00789 SURVIVAL

Any provision expressly set forth as surviving the expiration or termination of this Contract shall be deemed to survive any such expiration or termination.

00790 CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

- A. This Contract shall be deemed to be executed in the District of Columbia, regardless of the domicile of the Contractor and shall be governed by and construed in accordance with the laws of the District of Columbia except to the extent, if any, superseded by Federal law.
- B. The parties agree that any and all claims asserted by or against the Authority arising hereunder or related hereto shall be heard and determined either in the courts of the United States located in the District of Columbia, the State of Maryland or the Commonwealth of Virginia or in the courts of the District of Columbia, State of Maryland or Commonwealth of Virginia that maintain jurisdiction over such claims and where venue properly resides.

00791 WHISTLEBLOWER PROTECTION – FEDERAL

- A. The Contractor and its subcontractors shall encourage their employees and independent Contractors to report information without fear of actual or threatened discrimination, retaliation or reprisal that they in good faith reasonably believe is evidence of gross mismanagement; gross misuse or waste of public resources or funds; fraud; violation of law; abuse of authority in connection with the conduct of WMATA operations or contracts; or a substantial and specific danger to health, security or safety. The Contractor and its subcontractors shall notify their employees that they may make reports under this clause to:
 - 1. WMATA's Office of Inspector General (OIG), in person, in writing, through the OIG Hotline (888-234-2374) or email wmata-oig-hotline@verizon.net or by any other reasonable means;
 - 2. WMATA's Metro Transit Police Department (MTPD), in person, by telephone (202-962-2121) or by any other reasonable means, or to the OIG, if the information constitutes a potential violation of criminal law;
 - 3. WMATA's Chief Safety Officer, in person, in writing, through the SAFE Hotline (202-249-7233) or email safety@wmata.com, or by any other reasonable means; or
 - 4. Any other official, office or agency within WMATA or outside WMATA that the employee or independent Contractor reasonably believes has the authority to act on the matter.

- B. The Contractor, its employees, independent Contractors and subcontractors shall cooperate with any inquiry or review by an authorized official of WMATA, or by the federal government or any other governmental entity with jurisdiction over WMATA, regarding a matter that would constitute a report under paragraph (a) or a violation of this or any whistleblower provision of this Contract, and with any enforcement or judicial proceeding arising from such inquiry or review.
- C. The Contractor and its subcontractors shall not interfere with or deny the right of any employee or independent Contractor of either the Contractor or any of its subcontractors to make a report under clause paragraph (B). The Contractor and its subcontractors shall not recommend, take or threaten to take any action having a negative or adverse impact on any employee or independent Contractor of either the Contractor or any of its subcontractors because he or she:
 - a. made or is perceived to have made a report under paragraph A;
 - b. sought a remedy under applicable law after making a report under paragraph A;
 - c. participated in or cooperated with an inquiry or review by an authorized official of WMATA, or by the federal government or any other governmental entity with jurisdiction over WMATA, regarding a matter that would constitute a report under paragraph A or a violation of this or any whistleblower provision of this Contract, or with an enforcement or judicial proceeding arising from such inquiry or review;
 - d. refused to obey an order that would violate law; or
 - e. refused to work or authorize work when a hazardous safety or security condition presents an imminent danger of death or serious injury, there was no reasonable alternative to refusal, there was not sufficient time to eliminate the danger in absence of refusal and the individual, where possible, notified the Contractor or subcontractor of the condition and of his or her intent not to perform or authorize work.
- D. The Contractor shall include, or shall cause to be included, the substance of this clause, including this paragraph D, in its subcontracts at all tiers.
- E. The Contractor and its subcontractors shall comply with the National Transit Systems Security Act (NTSSA) 6 U.S.C. §1142, which prohibits discharging, demoting, suspending, reprimanding or in any other way discriminating against an employee as a reprisal for the employee lawfully and in good faith:
 - a. reporting a hazardous safety or security condition;
 - b. refusing to work when a hazardous safety or security condition presents an imminent danger of death or serious injury, there is no reasonable alternative to refusal, there is not sufficient time to eliminate the danger in absence of refusal and the individual, where possible, has notified the Contractor or subcontractor of the condition and of his or her intent to not perform work;
 - c. refusing to authorize the use of any safety or security related equipment, track or structures, if the individual is responsible for their inspection or repair and reasonably believes they are in a hazardous safety or security condition, there is no reasonable alternative to refusal, there is not sufficient time to eliminate the danger in absence of refusal and the individual, where possible, has notified the Contractor or subcontractor of the condition and of his or her intent not to authorize use of hazardous equipment or infrastructure unless corrected;
 - d. providing information for or directly assisting in an investigation of conduct that the individual reasonably believes to be in violation of federal law regarding safety, security or fraud, waste or abuse of funds intended for safety or security;

- e. refusing to violate or assist in violation of federal public transportation safety or security law;
 - f. cooperating with a safety or security investigation by the U.S. Secretary of Transportation, U.S. Secretary of Homeland Security or the National Transportation Safety Board;
 - g. furnishing information to law enforcement agencies relating to an accident or incident resulting in damage to property, injury or death; or
 - h. filing a complaint under the NTSSA (6 U.S.C. §1142), or testifying regarding such complaint.
- F. The Contractor shall notify the Authority of any instance of reports or refusal under this clause.
- G. The enforcement, filing and investigation of complaints, and remedies under this clause shall be governed by the NTSSA (6 U.S.C. §1142), applicable federal regulations and federal law.
- H. This clause shall be interpreted in accordance with the NTSSA (6 U.S.C. §1142). If any provision is found to be in conflict with the NTSSA, the NTSSA shall govern.
- I. The Contractor shall include, or shall cause to be included, this clause, including this sub-clause, in its subcontracts at all tiers.

00792 WORKPLACE VIOLENCE – ZERO TOLERANCE

Pursuant to Metro Policy/Instruction 7.8.3, all Metro Contractors must: (1) establish zero tolerance for acts of workplace violence for their employees and those of subcontractors at any tier, and (2) not retaliate against any of their employees or independent Contractors for cooperating with investigations.

00793 ADDITIONAL FEDERAL REGULATIONS AND CLAUSES

A. Lobbying

1. The Contractor is bound by its certification contained in its Offer to the Authority regarding the use of federal or non-federal funds to influence, or attempt to influence any Federal officer or employee, member of Congress or employee of Congress regarding the award, execution, continuation, or any similar action of any Federal grant or other activities as defined in 31 U.S.C. §1352, 49 CFR Part 19, or 49 C.F.R. Part 20. The Contractor agrees to comply with this requirement throughout the term of the Contract.
2. The Contractor agrees that it will comply with 31 U.S.C. § 1352, as amended, U.S. DOT regulations “New Restrictions on Lobbying” 49 C.F.R, Part 20, to the extent consistent with 31 U.S.C. § 1352, as amended and other applicable federal laws, regulations and guidance prohibiting the use of federal funds for any activity concerning legislation or appropriations designed to influence the U.S. Congress or a state legislature unless an exception exists in current federal law.
3. The Contractor agrees to include these requirements in all Subcontracts at all tiers under this Contract

B. Clean Air Act

1. The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42 U. S. C. §§ 7401 et seq. The Contractor agrees to report each violation to the Authority and understands and agrees that the Authority will, in turn, report each violation as required to FTA and the appropriate EPA Regional Office.
2. The Contractor will comply with U.S. EPA Regulations “Control of Air Pollution from Mobile Sources,” 40 C.F.R. Part 85; “Control of Emissions from New and In-Use Highway Vehicles and Engines,” 40 C.F.R. Part 86; “Fuel Economy and Greenhouse Gas Exhaust Emissions of Motor Vehicles,” 40 C.F.R. Part 600, as well as any applicable State Implementation Plans

(SIP), and EPA regulations “Conformity to State or Federal Implementation Plans of Transportation Plans, Programs and Projects Developed, Funded or Approved Under Title 23 U.S.C. or Federal Transit Laws” 40 C.F.R. Part 93, along with other applicable federal regulations.

3. The Contractor also agrees to include these requirements in each Subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FTA.

C. Clean Water Act

1. The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Water Act, as amended, 33 U. S. C. 1251 et seq. The Contractor agrees to report each violation to the Authority and understands and agrees that the Authority will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.
2. The Contractor will protect underground sources of drinking water in compliance with the Safe Drinking Water Act of 1974, as amended, 42 U.S.C. §§300 (f)-(j).
3. The Contractor will comply with the notice of violating facility provisions in section 508 of the Clean Water Act, as amended, 33 U.S.C. § 1368.
4. The Contractor will facilitate compliance with Executive Order 11738, “Providing for Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants or Loans,” 42 U.S.C. §7606 note.
5. The Contractor also agrees to include these requirements in each Subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FTA.

D. Cargo Preference Requirements

The Contractor agrees to the following:

- a) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping equipment, materials, or commodities pursuant to this Contract to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.
- b) To furnish within 20 working days following the date of loading for shipments originating within the United States, or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, “on-board” commercial ocean bill-of-lading in English for each shipment of cargo described in Paragraph D.a) above to WMATA (through the Contractor in the case of a Subcontractor’s bills-of-lading) and to the Office of Cargo Preference, Maritime Administration (MAR-590), 400 Seventh Street SW, Washington, DC 20590.
- c) To include these requirements in all Subcontracts issued pursuant to this Contract when the Subcontract may involve the transport of equipment, material, or commodities by ocean liner.

E. Fly America

The Contractor agrees to comply with 49 U. S. C. §40118 (the “Fly America” Act) in accordance with the General Services Administration’s regulations at 41 CFR § 301-10, which provide that recipients and sub-recipients of Federal funds and their Contractors are required to use U. S. Flag carriers for U. S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service

by a U. S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements.

1. The Contractor agrees to include the requirements of this Paragraph in all Subcontracts that may involve international air transportation.

F. Buy America

The Buy America Act requirements apply to the following types of contracts: construction contracts, the acquisition of goods or rolling stock valued at more than \$150,000

1. The Contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. §661.7. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.
2. The Contractor is responsible for flowing down these requirements to subcontractors at every tier. The dollar threshold only applies to the prime contract. All subcontracts thereunder are subject the Buy America Act Requirements.
3. A bidder must submit to WMATA the appropriate Buy America Act certification with all offers on FTA funded contracts, except those subject to a general waiver. Bids that are not accompanied by the appropriate Buy America Act certification must be rejected as non-responsive. This requirement does not apply to lower tier subcontractors.

G. Contracts Involving Federal Privacy Act Requirements

The following requirements apply to the Contractor and its employees that administer any system of records on behalf of the Federal Government under any contract:

1. The Contractor agrees to comply with, and assures the compliance of its employees with, the information restrictions and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the underlying contract.
2. The Contractor also agrees to include these requirements in each Subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

H. Recovered Material/Recycled Products

1. The Contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA) as amended (42 U. S. C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.
2. The Contractor also agrees to include these requirements in each Subcontract financed in whole or in part with Federal assistance provided by FTA.

I. Seismic Safety

The Contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of

Transportation Seismic Safety Regulations 49 C.F.R. Part 41 and will certify to compliance to the extent required by the regulation. The Contractor also agrees to ensure that all work performed under this Contract including work performed by a Subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the Project.

J. Seat Belt Use Policy

The Contractor agrees to comply with terms of Executive Order No. 13043 "Increasing Seat Belt Use in the United States" and is encouraged to include those requirements in each Subcontract awarded for work relating to this Contract.

K. Americans with Disabilities Act Accessibility – FTA

- (1) The Contractor agrees that it will operate public transportation services in compliance with 42 U.S.C. § 12101 *et seq.*; DOT regulations, "Transportation Services for Individuals with Disabilities (ADA)" using facilities and equipment that comply with 49 C.F.R. Part 37; and Joint ATBCB/DOT regulations, "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 36 C.F.R. Part 1192 and 49 C.F.R. Part 38. Private entities must comply with the requirements of 49 C.F.R. Part 37 applicable to public entities with which they contract to provide public transportation services.
- (2) Facilities to be used in public transportation service must comply with 42 U.S.C. § 12101 *et seq.*; DOT regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 C.F.R. Part 37; and Joint ATBCB/DOT regulations, "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 36 C.F.R. Part 1192 and 49 C.F.R. Part 38.

L. Mandatory Disclosure

1. The Contractor shall timely disclose, in writing, to WMATA's Office of the Inspector General (OIG), with a copy to the Contracting Officer, whenever, in connection with the award, performance, or closeout of this Contract or any subcontract hereunder, the Contractor has credible evidence that a principal, employee, agent, or subcontractor of the Contractor has committed—
 - a. A violation of federal criminal law involving fraud, conflict of interest, bribery, or gratuity violations found in Title 18 of the United States Code; or
 - b. A violation of the civil False Claims Act (31 U.S.C. §§ 3729-3733).
2. WMATA, to the extent permitted by law and regulation, will safeguard and treat information obtained pursuant to the Contractor disclosure as confidential where the information has been marked "confidential" or "proprietary" by the company. To the extent permitted by the law and regulation, such information will not be released by WMATA to the public pursuant to a Public Access to Records (PARP) request. WMATA may transfer documents provided by the Contractor to any department or agency within the state, federal or local government, if the information relates to matters within the organization's jurisdiction.
3. If the violation relates to an order against a government-wide acquisition contract, a multi-agency contract, a multiple-award schedule contract such as the Federal Supply Schedule, or any other procurement instrument intended for use by multiple agencies, the Contractor shall notify the OIG of the ordering agency and the OIG of the agency responsible for the basic contract.

M. National Intelligent Transportation Systems Architecture And Standards – FTA

- 1 The Contractor agrees to conform to the National Intelligent Transportation Systems (ITS) Architecture requirements of 23 U.S.C. § 517(d), as amended by MAP-21, unless it obtains an exemption from those requirements;

2. The Contractor agrees to follow:
 - a. FTA Notice, "FTA National ITS Architecture Policy on Transit Projects," 66 Fed. Reg. 1455, January 8, 2001, and
 - b. All other applicable Federal guidance, and
- 3 The Contractor agrees to Flow this provision down to all applicable subcontracts.

N. Veterans Preference

As provided by 49 U.S.C. §5325(k), to the extent practicable, The Contractor will:

- a. Give a hiring preference to veterans, as defined in 5 U.S.C. §2108, who have the skills and abilities required to perform construction work required under a third party contract in connection with a capital project supported with federal assistance appropriated or made available for 49 U.S.C. chapter 53, and
- b. Will not require an employer to give a preference to any veteran over an equally qualified applicant who is a member of any racial or ethnic minority, female, and individual with a disability, or former employee.

O. Notification of Federal Participation

This Project is being funded in whole or part with Federal Funds.

P. Access to Records and Reports

1. The Contractor agrees to provide the Authority, the FTA Administrator, the Comptroller General of the United States, or any of their authorized representatives, access to any books, documents, papers and records of the Contractor, which are directly pertinent to this Contract for the purposes of making audits, examinations, excerpts, and transcriptions. The Contractor also agrees, pursuant to 49 C.F.R. §633.17 to provide the FTA Administrator or its authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U. S. C. §5302(a)1, which is receiving federal financial assistance through the programs described at 49 U. S. C. §§5307, 5309 or 5311.
2. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
3. Contractor agrees to maintain all books, records, accounts and reports required under this Contract for a period of not less than 3 years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of Claims arising from the performance of this Contract, in which case the Contractor agrees to maintain same until the Authority, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives have disposed of all such litigation, appeals, Claims, or exceptions related thereto.
4. The Contractor further agrees to include in all its Subcontracts hereunder, a provision to the effect that the Subcontractor agrees that the Contracting Officer, and the Comptroller General of the United States and the United States Secretary of Transportation if applicable, or their duly authorized representatives, shall until the expiration of 3 years after Final Payment under this Contract, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Subcontractor involving transactions related to the Subcontract, for the purpose of making audit, examination, excerpts, and transcription. The term "Subcontract," as used in this Section, excludes:
 - a. Purchase Orders not exceeding \$150,000 and,

- b. Subcontracts or Purchase Orders for public utility services at rates established from standard costs applicable to the public.

Q. No Government Obligation to Third Parties

- 1. The Authority and the Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of this Contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to the Authority, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.
- 2. The Contractor agrees to include this clause in each Subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

REQUESTS FOR RECORDS

The Washington Metropolitan Area Transit Authority (WMATA), in the regular course of business, may receive from the public, including prospective vendors and bidders, requests for records on a variety of topics. It is WMATA's policy to make official agency records, including electronic records, available to the public, unless specifically prohibited by WMATA's policy or applicable laws.

- (a) "Records" means any existing writings, drawings, maps, recordings, tapes, film, microfilm, correspondence, forms, cards, photographs, optical disks, photo copies, and records stored by computer (electronic records) that are made or received by WMATA in connection with a public contract. A record does not include uncirculated personal notes, papers, electronic records and any other records that were created and retained solely as work papers for personal use of the Contracting Officer, Contract Administrator or other WMATA employee.
- (b) WMATA's contracting process allows for the release/posting of certain information concerning this Contract after its award. This includes the name of the successful bidder and the amount of the award. This information is available on WMATA's website under "Business with Metro" or directly from the Contract Administrator.
- (c) Upon WMATA's request, the successful bidder shall be required to provide a redacted copy of its bid with confidential and proprietary information redacted.
- (d) After the award is announced, the winning proposal may be subject to release under WMATA's Public Access to Records Policy (PARP).
- (e) When WMATA determines that a bid will be of wide public interest, WMATA will post the redacted bid on its website. When WMATA receives three (3) or more requests for a successful bid, WMATA will post it on its website.
- (f) Requests for Records that are not made available during the procurement process will be submitted in accordance with the PARP. Requests must be in writing and sent by mail to the Office of General Counsel, Washington Metropolitan Area Transit Authority, 600 Fifth Street, NW, Washington, D.C. 20001, or by electronic mail at parpprivreq@wmata.com or by facsimile to the attention of the PARP Administrator at (202) 962-2550. If a request for records is sent directly from the requestor to a Contract Administrator, department, or independent office, that entity shall immediately forward the request to the PARP Administrator in the Office of General Counsel. If records are subject to a PARP request, a member of the PARP team will contact the company to begin the PARP document review process, which includes providing detailed written justifications for any information for which exemptions are claimed.

- (g) Neither WMATA's bidding process nor the PARP process generally allow for the release of information that would cause competitive harm to the bidders, other organizations, WMATA's employees, or interests. Information that will be withheld includes the following:
- (1) The names of unsuccessful bidders;
 - (2) The bids of unsuccessful bidders;
 - (3) Personal information (this does not include education and qualifications which are released) about the successful bidder or its employees that is not available to the public on the website of the successful bidder;
 - (4) Unit price details of the successful bid (this does not include the bottom line price, which is released);
 - (5) The names of the vendors who file a protest to the solicitation or its award;
 - (6) The written adjudication of any protests;
 - (7) Personal information concerning WMATA's employees; and
 - (8) Trade secrets and confidential commercial or financial information obtained from a bidder.
- (h) If your company's records are subject to a PARP request (i.e., if it is the successful bidder), a broad claim of confidentiality for the entire bid is rarely acceptable, and will likely be rejected during the PARP process. Therefore, WMATA suggests that you narrowly identify your confidential/proprietary information based on the following guidance:
- (i) Information that may be withheld/redacted: Detailed pricing except bottom line offer amounts;
- (j) Public information subject to release:
- (1) Any information on your company's website;
 - (2) Publicly known information (even if not on your company's website);
 - (3) General company background;
 - (4) Mere compliance with IFB requirements; and
 - (5) Anything standard to the industry.

TITLE AND RISK OF LOSS

- (a) Unless this Contract specifically provides for earlier passage of title to deliverables (including documents, reports, and data) or other items resulting from this Contract, title shall pass to the Authority upon acceptance, regardless of when or where the Authority takes physical possession. Risk of loss, theft, destruction of, or damage to, such deliverables or other items remains with the Contractor, until the transfer of title or at the time when the Authority takes physical possession, whichever is later.
- (b) In the event of loss or damage to any deliverable or other item of work, prior to the time when the Authority takes physical possession, the Contractor agrees to repair or replace it as soon as reasonably possible to restore the item to the same condition that pre-existed the loss or damage, in accordance with all requirements of this Contract, without cost to the Authority. Nothing contained herein shall be deemed to require the Contractor's repair or replacement of any loss or damage caused solely by the Authority's acts or omissions.

SET-OFF

The Authority has common law, equitable and statutory rights to set-off. These rights shall include, but are not limited to, the Authority's right to set-off any monies due to the Contractor under this Contract, by any amounts due and owing to the Authority with regard to, any Contract with the Authority, plus any amounts due and owing to the Authority for any other reason including, without limitation, tax delinquencies, fee delinquencies or monetary penalties relative thereto. The Authority shall exercise its set-off rights in accordance with applicable

law and practices including, in cases of set-off pursuant to an audit, the finalization of such audit by the Authority, its representatives, or the Federal Government.

SENSITIVE SECURITY INFORMATION

The Contractor must protect, and take measures to assure that its subcontractors at each tier protect, "sensitive information" made available during the course of administering an Authority contract or subcontract in accordance with 49 U.S.C. Section 40119(b) and implementing DOT regulations, "Protection of Sensitive Security Information," 49 CFR Part 15, and with 49 U.S.C. Section 114(s) and implementing Department of Homeland Security regulations, "Protection of Sensitive Security Information," 49 CFR Part 1520.

LAWS AND REGULATIONS

The Contractor shall be responsible to comply with any applicable State of Maryland, Commonwealth of Virginia, District of Columbia, Federal and local laws and regulations governing the services and/or supplies to be provided under this Contract. Further, the Contractor shall be responsible to obtain, at its own cost and expense, any and all licenses/permits required to transact business in any political jurisdictions where work will be performed.

METRIC SYSTEM

To the extent the Federal Government directs, the Contractor agrees to use the metric system of measurement in its Contract activities, in accordance with the Metric Conversion Act, as amended by the Omnibus Trade and Competitiveness Act, 15 U.S.C. § 205 (a) *et. seq.*; Executive Order No. 12770, "Metric Usage in Federal Government Programs," 15 U.S.C. § 205(a) note; and applicable U.S. DOT or FTA regulations in accordance with applicable Federal directives. As practicable and feasible, the Contractor agrees to supply products and services with dimensions expressed in the metric system of measurement. Metric usage shall not be required to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms.

CONTRACTOR PERSONNEL

- (a) The Authority may direct the replacement of the Contractor's employees reasonably deemed to be unsuitable by the Contracting Officer, or whose continued participation in the work is deemed contrary to the best interests of the Authority. Except in circumstances deemed exigent by the Contracting Officer, the reason for replacement will be discussed between the Contractor and the Authority before a replacement directive is issued. Upon receipt of a written replacement directive from the Authority specifying the date by which the replacement must occur, the Contractor shall proceed with the replacement and shall do so in a manner that minimizes, to the greatest extent practicable, any impact upon the Contract.
- (b) Contractor personnel required to work on WMATA's property must obtain a WMATA vendors' badge and successfully complete the mandatory safety training that must be renewed yearly. The Contractor must advise its affected personnel that, to obtain a vendor's badge, Contractor will perform a background check.

PUBLIC COMMUNICATION

The Contractor shall not issue communications to the media, place advertisements, nor publicize through any means the services, goods or construction that it is providing to WMATA under this Contract, without prior written consent of the Contracting Officer. The Contractor shall not publish, in print or online, any communications products such as newsletters, press releases, blogs or other communications without the Contracting Officer's prior, written consent. Approval of any such requests shall be at the Contracting Officer's sole discretion.

ALL NECESSARY FEDERAL PROVISIONS DEEMED INCLUDED- FTA

It is the intent of the parties that each and every provision of law required to be inserted in this Contract should be and is hereby inserted herein.

RIGHTS IN DATA AND COPYRIGHTS — FTA

- (a) The term "subject data" used in this article means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under this Contract. The term includes graphic or pictorial delineation in media such as drawings or photographs; text in specifications or related performance or design-type documents; machine forms such as magnetic tape, or computer memory printouts; and information retained in computer memory. Examples include, but are not limited to: computer software, engineering drawings and associated lists; specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information. The term "subject data" does not include financial reports, cost analyses, and similar information incidental to Contract administration.
- (b) The following restrictions apply to all subject data first produced in the performance of this contract:
 - (1) Except for its or WMATA's own internal use, the Contractor may not publish or reproduce subject data in whole or in part, or in any manner or form, nor may the Contractor authorize others to do so, without the written consent of the U.S. Government, until such time as the Government may have either released or approved the release of such data to the public. This restriction on publication, does not apply to agreements with academic institutions;
 - (2) In accordance with 49 C.F.R. § 18.34 and 49 C.F.R. § 19.36, the Federal Government reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, the following subject data for its purposes:
 - (i) Any subject data developed under this contract whether or not a copyright has been obtained; and
 - (ii) Any rights of copyright to which the contractor purchases ownership with Federal assistance.
- (c) When the Federal Transit Administration (FTA) provides financial assistance for a planning, research, development, or a demonstration project, it is FTA's general intention to increase mass transportation knowledge, rather than limit the benefits to participants in the project. Therefore, unless FTA determines otherwise, the Contractor agrees that, in addition to the rights set forth in subsection (b)(2) of this article, FTA may make available to any FTA recipient, sub-recipient, third party contractor, or third party subcontractor, either FTA's license in the copyright to the subject data derived under this Contract or a copy of the subject data first produced under this Contract. If this Contract is not completed for any reason whatsoever, all data developed under this Contract shall become subject data as defined in subsection (a) and shall be delivered as the Federal Government may direct.
- (d) Unless prohibited by state law, the Contractor agrees to indemnify, save, and hold harmless WMATA and the Federal Government, their officers, agents, and employees acting within the scope of their official duties against any liability, including costs and expenses, resulting from the Contractor's willful or intentional violation of proprietary rights, copyrights, or right of privacy, arising out of the publication, translation, reproduction, delivery, use, or disposition of any data furnished under this Contract. The Contractor shall not be required to indemnify WMATA and the Federal Government for any such liability arising out of the wrongful acts of their employees or agents.
- (e) Nothing contained in this article shall imply a license to WMATA or the Federal Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to WMATA or the Federal Government under any patent.
- (f) The requirements of paragraphs (b) and (c), do not apply to material furnished by the Authority to the Contractor and incorporated in the work carried out under the contract provided that the Contractor identifies the incorporated material at the time of delivery of the work.
- (g) Any dispute arising under this article shall be subject to the "Disputes" article of this Contract.

- (h) Notwithstanding any other payment provision in this Contract, the Contracting Officer may retain from payments due and owing the Contractor up to 10 percent (10 %) of the contract price until final delivery and acceptance of the subject data defined in this article and as required to be furnished by the Price Schedule or the Contract's specifications.

RETAINAGE

[PLEASE CHOOSE ONE]

- (a) *Alternate Security in lieu of Retainage.* The parties agree that retainage of any amounts based on a percentage of the work completed (or as a line item tied to completion of the work) is duplicative and unnecessary if either: (i) a performance bond is in place for the project, or (ii) Contractor posts alternative security in the form of a bond or letter of credit in the amount agreed upon retainage based on Contract price. Thus, if either of the above exists, no provision of this Contract shall serve to deny Contractor's entitlement to full payment for work performed with no amounts withheld or deducted for retainage.
- (b) *Final Payment Only Retainage.* All amounts withheld from Contractor as retainage, based on a percentage of the work completed, or as a line item tied to the completion of the work shall be retained solely out of the Contractor's final payment. Payment of any fund withheld from Contractor's final payment shall be released to Contractor within thirty (30) days after completion of Contractor's Work and Closeout Release.
- (c) *No Retainage.* No provision of this Contract shall serve to deny Contractor's entitlement to full payment for properly performed work or suitably stored materials. No amounts shall be withheld from any payment request submitted by Contractor based on percentage of the work performed during the period of performance and no amounts shall be assigned to the line items, other than as assigned by Contractor in its payment requests.

PAYMENT DEDUCTIONS - NONCOMPLIANCE WITH DBE REQUIREMENTS- FTA

- (a) For Federally funded contracts that exceed \$150,000 and to which the Disadvantage Business Enterprise (DBE) Requirements (Appendix B) apply, the failure to perform in accordance with requirements of Appendix B may result in a partial or full suspension of payment, including progress payments, if applicable.
- (b) If the Contractor is found to be in noncompliance with the DBE requirements of Appendix B, the progress of the work shall also be deemed to be unsatisfactory, and an amount equal to the DBE participation in the Contract shall be retained from payment (or progress payments, if any) made to the Contractor.
- (c) If the contract value is over \$150,000, the prime contractor will be responsible for submitting a monthly report of the status of its DBE subcontractors as outlined in Appendix B to the Contracting Officer.
- (d) If the Contractor fails to submit the required monthly DBE reports, the Contracting Officer may suspend payment (or progress payments) until such time as the monthly reports are submitted and accepted by the Authority.

BONDING FOR CONSTRUCTION PROJECTS EXCEEDING \$150,000 – FTA

The Contractor agrees to comply with applicable bonding requirements as follows:

- (a) *Proposal Security.* A proposal bond must be issued by a fully qualified surety company acceptable to WMATA and listed as a company currently authorized under 31 C.F.R. Part 223 as possessing a Certificate of Authority as described thereunder.
- (b) *Rights Reserved.* In submitting its offer, it is understood and agreed by offeror that the right is reserved by WMATA to reject any and all offers, or part of any offer. It is also understood and agreed that if the offeror refuses or is unable to enter into this Contract, or refuses or is unable to furnish adequate and acceptable performance bonds and labor and material payments bonds, or refuses or is unable to furnish

adequate and acceptable insurance, it shall forfeit its security to the extent of WMATA's damages occasioned by such withdrawal, or refusal, or inability to enter into an agreement, or provide adequate security therefore.

It is further understood and agreed that to the extent that the defaulting offeror's proposal bond, certified check, cashier's check, treasurer's check, and/or official bank check (excluding any income generated thereby that was retained by WMATA) shall prove inadequate to fully compensate WMATA for the damages occasioned by default, then the offeror agrees to indemnify WMATA and pay over to WMATA the difference between the proposal security and WMATA's total damages, so as to make WMATA whole.

- (c) *Performance and Payment Bonding Requirements (Construction)*. The Contractor shall be required to obtain performance and payment bonds as follows:
- (1) *Performance bonds*. The penal amount of performance bonds shall be one hundred percent (100%) of the original Contract price, unless WMATA determines that a lesser amount would be adequate for its protection.
 - (2) WMATA may require additional performance bond protection when the Contract price is increased. The increase in protection shall generally equal one hundred percent (100%) of the increase in Contract price. WMATA may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.
- (d) *Payment bonds*. The penal amount of the payment bonds shall equal:
- (1) Fifty percent (50%) of the Contract price, if it is not more than \$1,000,000.
 - (2) Forty percent (40%) of the Contract price, if it is more than \$1,000,000, but not more than \$5,000,000; or
 - (3) Two and one half million (\$2,500,000), if the Contract price is more than \$5,000,000.
- (a) If the original Contract price is \$5,000,000 or less, WMATA may require additional protection, if the Contract price is increased.

CRIMINAL BACKGROUND CHECK REQUIREMENT

- (a) Pursuant to Metro Policy Instruction 7. 2.3/2, "Criminal Background Checks," (a copy is attached), the Contractor shall have the sole responsibility for, and shall assure, adequate criminal background screenings on a routine basis for all persons that the Contractor considers for work under this Contract, if the person would have access to WMATA's customers, the general public, WMATA's property, or WMATA's information. In conducting these screenings, the Contractor shall take due regard for the nature of the person's job, with particular regard for the person's exposure to and interaction with WMATA's customers and the general public. Screenings should be job related for the position in question and consistent with business necessity. The Contractor shall not place or otherwise engage any person to work under this Contract, who has not passed a criminal background check, if that person would have access to WMATA's customers, property, or information or if the person would interact with the general public on WMATA's behalf. This includes all Contractor personnel who will work on WMATA's premises, who will be denied Contractors' access badges, unless and until adequate criminal background screenings are performed. At the end of each calendar quarter, the Contractor shall certify to the Contracting Officer, its compliance with this criminal background screening requirement. All persons required to be screened, which includes all Contractor personnel who require a Contractors' badge to access a WMATA facility shall pass the Contractor's criminal background screening before working on this Contract, and before being issued a Contractors' access badge.
- (b) The Contractor shall indemnify and hold WMATA harmless from any and all claims, demands, damages, costs and expenses, including attorneys' fees and other costs and expenses associated with any claims, demands, requests for relief, and/or other liabilities arising out of or resulting from the Contractor's criminal background screening obligations and processes.

END OF SECTION

SECTION 00800 SUPPLEMENTARY CONDITIONS

This Section includes Modifications to the Section 00700, GENERAL CONDITIONS, for requirements unique to a specific project and is hereby incorporated into the General Conditions by reference. This Section 00800, SUPPLEMENTARY CONDITIONS, which specifies modifications to the General Conditions, shall be read in conjunction with Section 00700, GENERAL CONDITIONS, and which will be cited in Section 00700, GENERAL CONDITIONS, using the same last two digits of the Section number; i.e., a modification to Section 00724, COMMENCING THE WORK, is indicated as Section 00824, COMMENCING THE WORK.

00806 PERMITS AND RESPONSIBILITIES

Modify Section 00706, PERMITS AND RESPONSIBILITIES, to add the following Paragraph:

- C. Contractor shall obtain all necessary permits from Utilities and Jurisdictional Authorities as needed.

00810 WORK BY CONTRACTOR

Modify Section 00710, WORK BY CONTRACTOR, to delete Paragraph A. and substitute the following Paragraph:

- A. The Contractor shall perform, with its own organization, work equivalent to at least **40%** of the value for the construction work.

00824 PERIOD OF PERFORMANCE AND PROJECT SCHEDULE

Modify Section 00724, PERIOD OF PERFORMANCE AND PROJECT SCHEDULE, to delete Paragraph A and substitute the following Paragraph and subparagraphs:

- A. The Contractor shall perform, complete, and advance all Work under this Contract in accordance with the schedule set out:
 - 1. Final Work Completion:
 - a. The Contractor shall complete the contract, including the punch list, the final cleanup, and receipt of all deliverable within **two hundred ten (210) calendar days** after the issuance of Notice to Proceed (NTP).

00830 DISPUTE RESOLUTION

Modify Section 00730, DISPUTE RESOLUTION, to add the following Paragraphs and subparagraphs:

- C. Disputes Review Board and Procedures

Disputes Review Board (DRB) shall be established within 60 Days after the Contract Award has been issued to the Contractor. The DRB shall consist of one member selected by the Authority, one

member selected by the Contractor, and a third member, who shall be the chairperson, selected by the first two members. The selection of qualified DRB members shall be made in accordance with the following rules and procedures.

a. Rules and Procedures

- (1) All DRB members shall have substantial experience with the type of construction involved in the Contract and in the interpretation of construction Contract Documents. The goal in selecting the chairperson is to complement the experience of the first two members, thus furnishing technical as well as administrative expertise that will facilitate the DRB's operations.
- (2) The specific qualifications and requirements for membership on the DRB shall be as follows:
 - (a) The candidate member shall have commensurate formal/technical education and experience in one or more of the fields of construction, engineering, or architecture.
 - (b) Except for payment of services as a DRB member, excluding fee-based consulting services on other projects, or for roles identical or similar to DRB membership, [1] no voting DRB member shall have a) employment with, an ownership interest in, or existing business or financial relationship with, any party to the Contract including designers and other consultants; or b) a financial interest in the Contract.
 - (c) During the term of membership on the DRB, no discussion of or agreement for employment after the Contract is completed shall occur or be made between any DRB member and any party to the Contract.
- (3) Before their appointments are made, the first two DRB candidate members shall submit complete disclosure statements for review and Acceptance by the Contracting Officer and the Contractor. Each statement shall include [1] resume of experience and education; [2] a detailed description of all past, present, and planned future relationship(s) to the Authority's Rail Capital Construction Program or with any party involved in the Contract, including any fee-based consulting services on any other projects; and [3] certification that the prospective member meets the qualifications set forth above. The chairperson shall supply such a disclosure statement to the first two DRB members and to the Contracting Officer and the Contractor before his or her appointment as chairperson is approved and finalized.

b. Selection of Members

- (1) The Contracting Officer and the Contractor shall provide the name and qualifications of their selected member to each other for their concurrence. The Contracting Officer and the Contractor shall provide their approval or rejection of the proposed individuals within 10 Days after receipt of each other's list of nominees. These two individuals shall be the first two members of the DRB.
- (2) The third member of the DRB shall be an impartial and qualified chairperson who shall be selected and mutually agreed upon by the first two members within 15 Days after the first two members' appointments are finalized. If the two designated DRB members cannot agree on a chairperson within the 15-Day period, the chairperson shall be selected within 10 Days thereafter by mutual agreement of the Contracting Officer and the Contractor.
- (3) The Contracting Officer and the Contractor shall negotiate with each of the three members of the DRB on the terms and conditions of salary and reimbursable costs for travel, conference facilities, clerical services, mailings, and copying. All costs are to be paid from the Contract allowance set forth in Section 00434, BID SCHEDULE. If the agreed cost exceeds the allowance specified in Section 00434, BID SCHEDULE, the Authority will pay for 100 percent of the cost over that amount.

- (a) Fees for each member of the DRB shall be commercially reasonable and shall be no greater than the fees charged to the DRB member's most favored customer for similar work. Except under extraordinary circumstances, the hourly fee (excluding travel, per diem, and reimbursable items) shall not be greater than \$300 for each DRB member. For hours in excess of 8 hours per Day, the fee shall be a maximum of 50 percent of the agreed hourly fee. Billing procedures and the fees for travel, per diem, and reimbursable items shall be prudent and consistent with practices given most favored customers.
 - (4) Each voting DRB member shall be appointed for the life of the Contract. Forty-five Days prior to the yearly anniversary of the appointment of the chairperson, the Contracting Officer and the Contractor shall review the performance of the DRB, individually and as a group. Either the Contracting Officer or the Contractor may elect to replace any voting member of the DRB, except that in the case of the chairperson, both the Contracting Officer and the Contractor must agree on replacement. Action to appoint a replacement must start immediately and follow the same procedure as for initial appointment, except that the appointment must be made prior to the yearly anniversary date of the appointment of the chairperson.
 - (5) If an election by either party to replace a member is not made in a timely manner, the DRB shall continue for another 12-month period before any replacement is made. If a member of the DRB cannot continue or voluntarily seeks to leave the DRB, the new member shall be appointed in the same manner in which the original appointment had been made.
 - (6) Any DRB member to be replaced shall, in conjunction with the remaining DRB members, complete consideration of any dispute pending before the DRB at the time the decision to replace is made. The DRB shall make appropriate rules to handle such disputes during the transition period. In the case of an incapacitated member, or of a member who voluntarily leaves the DRB, all disputes will be put in abeyance until the replacement DRB member has been appointed.
- c. Operation of Board
- (1) The DRB shall formulate its own rules of operation, which shall be provided in writing to the Contracting Officer Representative and the Contractor. The entire process may be kept flexible, and any portion of the process may be changed to adapt to individual circumstances presented by a particular dispute. The DRB may initiate on its own or in consultation with the Contracting Officer Representative and the Contractor new rules or modifications to existing rules, whenever the DRB deems it appropriate.
 - (2) The DRB members shall keep abreast of construction developments and the progress of the Work. The Contracting Officer Representative and the Contractor shall copy the DRB on periodic progress reports that have been jointly signed by the Contracting Officer Representative and the Contractor or special written progress reports no less often than once a month.
 - (3) The DRB shall visit the job-site at least once each quarter and at such other times as significant construction events dictate. The frequency and scheduling of site visits shall be as agreed to among the Contracting Officer Representative, the Contractor, and the DRB. At regularly scheduled site visits, the DRB shall review all active segments of the Work in the company of the Contracting Officer Representative and the Contractor's representative. The Site visit shall include a meeting attended by representatives of both the Authority and the Contractor.
- d. Hearing Procedures

- (1) DRB hearings shall be conducted at the job-site, the Authority offices, or in the Washington D. C. Metropolitan Area.
- (2) The DRB may request the Contracting Officer Representative and the Contractor to produce documents and exchange documents prior to any hearing. The DRB may also request the Contracting Officer Representative and the Contractor to produce documents and witnesses at a hearing. Either party's failure to comply with the DRB's request may be taken into consideration by the DRB in reaching a decision.
- (3) The DRB has the authority to conduct hearings and reach decisions in the manner the DRB deems most appropriate. The DRB has the authority to impose appropriate rules and procedures for the conduct of its hearings. However, such rules and procedures should be informal and, except for the conduct of an orderly hearing, should not exclude any member from the Authority's or Contractor's teams.
- (4) The DRB chairperson shall be responsible for directing the course of the hearings. The DRB shall follow its own rules of presentation and shall not be bound by the judicial rules of evidence. Documents and testimony concerning the dispute shall be presented in the order, manner, and degree of detail the DRB deems most efficient and probative. Each party shall be allowed to make a brief initial presentation and to rebut any factual assertion by another party until the DRB determines that all aspects of the dispute have been covered adequately. The DRB may limit the presentation of any documents or testimony the DRB deems not relevant or redundant. In rare circumstances, the DRB chairperson may require that the testimony of certain or all individuals be given under oath. The DRB chairperson shall administer the oath.

e. Findings and Recommendations

- (1) The DRB shall meet in private at the conclusion of the dispute hearing. All deliberations by the DRB shall be kept confidential except for the findings and recommendations. The DRB shall make a concerted effort to reach a unanimous decision. The DRB shall base its findings and recommendations on the Contract provisions and documents, law, statutes, and regulations deemed by the DRB to be applicable, considering all facts and circumstances of the dispute. The DRB's findings and recommendations shall be set forth in the following format:

DISPUTES REVIEW BOARD FINDINGS AND RECOMMENDATIONS

I. INTRODUCTION

This Article shall contain the following information:

Name, Number, and Notice-to-Proceed Date of Contract

Dispute Title and Specific Number

Dispute Hearing Conclusion Date and Location

Attachment Number(s) or Exhibits, if any

General Scope of the Contract

General Contract Background information, as appropriate to facilitate the parties' understanding

II. STATEMENT OF DISPUTE

This Article shall include a description of the dispute(s) presented by claimant and counter-claimant. It should set forth each element of the relief requested (e.g., adjustment to Contract time and price) and the basis of each claim and difference advanced by the parties. In general, this Article should be a brief summation of the

dispute and the basis for bringing forward the dispute and the basis on which the initial claim was denied.

III. FINDINGS AND ANALYSIS

This Article shall include the DRB's findings on (a) each element of the entitlement constituting an adjustment in Contract Price, (b) each element of time constituting an adjustment in Contract Performance Time, and (c) each element of any other relief requested by the parties. This Article shall provide the analysis of and justification for the following Article IV, RECOMMENDATIONS, and shall include references to all contractual, statutory, or other applicable authority supporting the DRB's findings. This Article shall also address the DRB's conclusion as to the relative merits of each party's position. Nothing in the foregoing shall be construed as the DRB being expected to produce a legal brief or detailed estimate of cost and time. However, this Article shall be detailed enough to provide both parties with sufficient information to act on the DRB's recommendation(s) contained in the following Article IV.

IV. RECOMMENDATION(S)

This Article shall contain the DRB's specific recommendation(s) for resolution of the dispute. The recommendation(s) shall be consistent with the findings and analysis in Article III, FINDINGS AND ANALYSIS.

V. DISSENTING OPINION

This Article shall contain dissent to the findings and recommendations, in whole or in part. The dissenter shall be identified. Dissents shall explain the dissenting member's reasons for disagreeing with the findings and recommendations, in whole or in part, made by the majority of the DRB.

- (2) Within 60 Days after the close of the hearing, the DRB shall issue draft findings and recommendations to the Authority and the Contractor. Within 14 Days after receipt of the draft findings and recommendations, each party shall independently notify the DRB in writing of calculations or other errors or omissions in the draft. Within 14 Days after receipt of the parties' responses to the draft, the DRB shall forward its final findings and recommendations to the Authority and the Contractor simultaneously.

f. Administrative Closing

- (1) Either party may reject the recommendation(s) of the DRB issued pursuant to Paragraph C.1 herein all or in part in the resolution of a dispute or disputes. If the Contractor rejects the DRB recommendation, the Contractor shall request a final decision of the Contracting Officer pursuant to Section 00730, DISPUTE RESOLUTION. The request for a final decision shall be accompanied by a full explanation as to basis for the rejection of the DRB recommendation(s). In the event of a rejection by the Authority, the Contracting Officer will support the basis of the rejection by findings of fact, which will provide a full explanation for the basis of rejection, subject only to appeal as provided by Section 00730, DISPUTE RESOLUTION.

00833 AUTHORITY-FURNISHED PROPERTY

Modify Section 00733, AUTHORITY-FURNISHED PROPERTY, to delete Paragraphs A through D and substitute the following Paragraph:

- A. The Authority will not furnish property, personal or otherwise, through the terms of this Contract. The Contractor is required to purchase or lease any property needed for, but not limited to, laydown, storage, or employee parking in its obligations to comply with the Project requirements.

00841 CONSIDERATION AND BASIS OF PAYMENT

Modify Section 00741, CONSIDERATION AND BASIS OF PAYMENT, in its entirety, and substitute the following:

- A. In consideration of its undertaking under this Contract, the Contractor will be paid the sums set forth in this Contract, which shall constitute complete payment for all work and services required to be performed under this Contract and for all expenditures, which may be made and expenses incurred. The basis of payment will be the Contract Price, as shown on Section 00510, CONSTRUCTION CONTRACT FORM, and which shall constitute complete compensation for performance of all work required by the Contract.
- B. Standby costs for delayed or cancelled Site access: In the event the Contractor is delayed in the performance of the Work due to Authority delayed or cancelled Site access, the following basis of payment shall apply:
 - 1. The "Hours of Work" is the period during which the Contractor has use of the work area. The "Hours of Work" will exclude the periods required by the Authority to safely secure the work area before the start of the "Hours of Work" and to restore the work area to an operational state after completion of the "Hours of Work".
 - 2. Delay will be measured relative to "Hours of Work" only. The "Hours of Work" shall be determined based upon weekly coordination between the Contracting Officer Representative (COR) and the Contractor.
 - 3. Delays caused by actions of the Authority may occur at the start of the "Hours of Work", during the "Hours of Work", or at the end of the "Hours of Work."
 - a. A delay at the start of the "Hours of Work" occurs when the Authority does not grant access to the work area by the scheduled start time. A delay at the start of the "Hours of Work" will be measured from the scheduled start of the "Hours of Work" until the time the Contractor is granted access to the work area.
 - b. A delay during the "Hours of Work" occurs when the Authority requests the Contractor to vacate the work area and the Contractor is later allowed to return to the work area. A delay during the "Hours of Work" will begin when the Contractor is directed to stop work to vacate the work area and will end when the Contractor returns to the work area and resumes work.
 - c. A delay at the end of the "Hours of Work" occurs when the Authority requests the Contractor to vacate the work area early. A delay at the end of the "Hours of Work" will be measured from the time the Contractor is directed to vacate the work area until the scheduled end of the "Hours of Work".
 - 4. The Contractor will be compensated for the direct labor costs incurred for the aggregate of delays that exceed 30 minutes relative to the "Hours of Work". For payment purposes, delays will be rounded upwards and downwards to the nearest 30 minutes provided the Contractor remains mobilized until granted access or until the Contractor elects to cancel the work, or the Contracting Officer Representative cancels access for the period. However if the Contractor elects to cancel work due to a lack of time remaining in the "Hours of Work" period to complete the planned work element, as verified by the Period of Delay form, the Contractor will be compensated for the aggregate of delays that exceed 30 minutes rounded to the nearest 30 minutes from the time access was cancelled to the scheduled end of the "Hours of Work" period.
 - 5. When access to the work area is cancelled by the Contracting Officer Representative with less notice than noted below, the Authority will pay standby cost of not more than the scheduled "Hours of Work" period or 4 hours, whichever is less. However, if Contractor is able to reassign the work crew to other work, regardless of the time of the notice given by the Contracting Officer Representative, no payment will be made.

- a. Weeknights: Five hours before the planned start time of the scheduled "Hours of Work."
 - b. Weekends: Twenty-four hours before the planned start time of the scheduled "Hours of Work."
6. No payment will be made in those cases where:
- a. A delay at the start of the "Hours of Work" is less than 1 hour and the Authority grants access but the Contractor elects to cancel work, except that payment for delay cost will be made in accordance with Paragraph B.4 above if the scheduled "Hours of Work" period is 3 hours or less.
 - b. A delay at the start of the "Hours of Work" is less than 1 hour and the Authority grants access and the Contractor proceeds working and then elects to cease working and leaves the worksite prior to the scheduled end of the "Hours of Work".
7. Prior to the completion of each shift, the Contractor and the Contracting Officer Representative or designee shall sign a Period of Delay form, which shall document the work start and completion times, the duration of the delay, the reason for the delay, the reason for the Contractor leaving the Site prior to the scheduled end of the "Hours of Work" period, and the names of the crew members present, including foremen, but excluding salaried supervision. The Contractor shall not be entitled to compensation for equipment, overhead, profit or extended overhead costs under this Section. This Section does not prohibit the Contractor from seeking an equitable adjustment for equipment costs under other sections of the Contract and access delays may provide a basis to grant a non-compensable extension to the Period of Performance. Certified payrolls shall establish the hourly rates of the crewmembers. All requests for payment for delay costs shall be submitted to the Contracting Officer Representative with the next progress payment or within 30 Days, whichever is longer. The Contractor waives any right to delay costs where the delays are not documented prior to the completion of the shift and the request for payment is not submitted to the Contracting Officer Representative with the next progress payment or within 30 Days, whichever is longer. Compensation for Access delays are not reimbursable costs under the FTA grant that funds this Contract. Thus, they are not chargeable to the contract.
8. If the Contractor is not ready to start work at the start of the "Hours of Work" or does not return the work area to the Authority on time at the end of the "Hours of Work," the Contractor shall compensate the Authority for the Authority's staff and other Authority direct costs for supporting the non-revenue or Revenue Service Adjustment event.

Notification Cancellation	Occurrence	Requirement	Terms of Payment
Week Night	COR cancels full shift	The COR notifies Contractor 5 hours or more before the planned start	No delay payment due
Week Night	COR cancels full shift	The COR notifies Contractor Less than 5 hours before the Planned start	Pay 4 hours ¹
Weekend Single Track/Shutdown	COR cancels full shift or the full weekend of work	The COR notifies Contractor 24 hours or more before the planned start	No delay payment due
Weekend Single Track/Shutdown	COR cancels full shift or the full weekend of work	The COR notifies Contractor less than 24 hours before the planned start	Pay 4 hours ¹

¹No payment will be made if the Contractor is able to reassign the work crew to other work.

Hours of Work	Actual Hours Worked	Contractor	Terms of Payment
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Delayed Start 2215 to 0400 Delay less than 30 minutes	Contractor is on Site ready to work Works until the end of the Hours of Work	No delay payment due. (Same for a mid shift or end delay less than 30 minutes)
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Delayed Start 2235 to 0400 Delay 35 minutes	Contractor is on Site Ready to work Works until the end of the Hours of Work	Pay 30 minutes delay (Same for a mid shift or end delay)
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Delayed Start 2235 to 0430 Delay 35 minutes	Contractor is on Site Ready to work Able to work beyond the end of the Hours of Work	Pay 30 minutes delay (Same for a mid shift delay)
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Start Delayed 35 minutes to 2235	Contractor is on Site ready to work Contractor elects not to go to work	Under 1 hour delay; no payment due
Weeknight Non-Revenue Hours of Work: 0100 to 0400 (Weeknight Nonrevenue Similar)	Start Delayed 35 minutes to 0135	Contractor is on Site Ready to work Contractor elects not to go to work since Remaining time does not allow completion of work element	Pay 2 hours and 30 minutes delay
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Start Delayed 35 minutes to 0135	Contractor is on Site Ready to work Contractor elects not to go to work since Remaining time does Not allow completion of Work element	Pay 2 hours and 30 minutes delay
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Start Delayed 65 minutes to 2305	Contractor is on Site Ready to work Contractor elects not to go to work	Over 1 hour delay; pay 5 hours and 30 minutes delay
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight)	Start delay / End delay 2225 to 0345 Start delay 25 minutes End delay 15 minutes	Contractor is on Site Ready to work Works during time permitted	Pay 30 minutes delay

Nonrevenue Similar)	Total delay 40 minutes		
Weeknight Early Out Hours of Work: 2200 to 0400 (Weeknight Nonrevenue Similar)	Delay during "Hours of Work" 2330 to 0035 Start delay 0 minutes End delay 0 minutes Total delay 65 minutes	Contractor is on Site Ready to work Works during time permitted	Over 1 hour delay; pay 60 minutes delay
Weekend Hours of Work: Fri 2200 to Mon 0400	Delay during "Hour of Work" Sat 0200 to Mon 0300 Start delay 4.25 hours End delay 1.25 hours Total delay 5.5 hours	Contractor is on Site Ready to work Works during time permitted	Pay 5 hours and 30 minutes delay
Weeknight Early Out Hours of Work: 2200 to 0400	Start delayed to 0200 hours then COR Cancels access	Contractor is on site Ready to work	Pay 5 hours and 30 minutes delay
Weeknight Nonrevenue Hours of Work: 0100 to 0400	Start delayed to 0245, then COR cancels access	Contractor is on Site Ready to work	Pay 2 hours and 30 minutes delay
Weekend Hours of Work: Friday 2200 to Monday 0400	Delay Friday 2200 to Saturday 0630. First Shift cancelled at 0230 Work begins at 0630.	Contractor 1 st shift is on Site ready to work Until shift cancelled at 0230	Pay 8 hours delay

00844 METHOD OF PAYMENT

Modify Section 00744, METHOD OF PAYMENT, to add Paragraphs M and N:

- M. As a condition of Final Payment, in addition to the retainage specified in Section 00744, Method of Payment, \$40,000 will be withheld until approved As-built Project Schedule is delivered to the Contracting Officer Representative and is determined to be complete and accurate.
- N. As a condition of Final Payment, in addition to the retainage specified in this Section, \$50,000 will be withheld until Operation and Maintenance Training is complete and accepted.

00865 DISADVANTAGED BUSINESS ENTERPRISE

Modify Section 00765, DISADVANTAGED BUSINESS ENTERPRISE, to delete Paragraph B and substitute the following:

- B. The goal of DBE participation established for this Contract is **26** percent of the Contract Price.

00875 AUTHORITY RIGHTS IN TECHNICAL DATA – LIMITED

Delete Section 00775, AUTHORITY RIGHTS IN TECHNICAL DATA – LIMITED in its entirety.

00877 INDEMNIFICATION AND INSURANCE REQUIREMENTS

Delete Section 00777, INDEMNIFICATION AND INSURANCE REQUIREMENTS in its entirety and substitute the following:

A Indemnification

- a. Contractor shall indemnify, defend and hold harmless the Authority, its Board members, employees and agents, from all liabilities, obligations, damages, penalties, claims, costs, charges and expenses (including reasonable attorney's fees), of whatsoever kind and nature for injury, including personal injury or death of any person or persons, and for loss or damage to any property, including the property of the Contractor and the Authority, occurring in connection with, or in any way arising out of the use, occupancy and performance of the work and/or any acts in connection with activities to be performed under this contract, unless the loss or damage is due to the sole negligence of the Authority. Nothing in the preceding sentence shall be deemed to relieve Contractor from ultimate liability for any obligation of Contractor under this Contract.
- b. Contractor shall indemnify, defend and hold harmless the Authority, its Board members, employees and agents, against any and all claims, liabilities, losses, demands, damages, penalties, costs, charges, remedial costs, environmental claims, fees or other expenses including attorneys' fees, related to, arising from or attributable to any effluent or other hazardous waste, residue, contaminated soil or other similar material discharged from, removed from, or introduced on, about or under the job site. The foregoing indemnity does not apply to loss or damage due to preexisting conditions, whether known or unknown.
- c. If any action or proceeding relating to the indemnification brought against the Authority, then upon written notice from the Authority to the Contractor, the Contractor shall, at the its own expense, resist or defend such action or proceeding by counsel approved by the Authority in writing. No approval of counsel shall be required where the cause of action is resisted or defended by counsel of any insurance carrier obligated to resist or defend the same. The Authority reserves the right to use its own counsel under this indemnity at Contractor's sole cost and expense.
- d. Contractor understands and agrees that it is Contractor's responsibility to provide indemnification to the Authority pursuant to this Section. The provision of insurance, while anticipated to provide a funding source for this indemnification, is in addition to any indemnification requirements and the failure of Contractor's insurance to fully fund any indemnification shall not relieve the Contractor of any obligation assumed under this indemnification.

EXHIBIT A

RE: FQ18102 - Replacement of Chillers and Cooling Tower Accessories at Eight Metro-Rail Stations. DC, MD, and VA

I. MINIMUM REQUIRED INSURANCE: MINIMUM LIMITS OF INSURANCE

INSURANCE TYPE	LIMITS	BASIS
Workers' Compensation	Statutory	
Employers' Liability	\$500,000	Each Accident
	\$500,000	Disease Policy Limit
	\$500,000	Disease Each Employee
Commercial General Liability		
	\$5,000,000	Each Occurrence Limit
	\$10,000,000	General Aggregate Limit
	\$5,000,000	Products-Completed Operations Limit
Business Auto Liability		
	\$5,000,000	Combined Single Limit

Railroad Protective Liability Insurance (RPL)		
	\$5,000,000	Each Occurrence Limit
	\$10,000,000	Aggregate Limit

Installation Floater or Equivalent Insurance		
	Replacement Cost	Each Claim

II. MINIMUM REQUIRED INSURANCE: MINIMUM INSURANCE COVERAGES AND COVERAGE PROVISIONS

- 1) Contractor is required to maintain the prescribed insurance outlined in this Exhibit A during the entire period of performance under this contract. A Notice to Proceed (NTP) will not be issued until all required insurance has been accepted by WMATA.
- 2) The prescribed insurance coverage and limits of insurance are minimum required coverages and limits. Contractor is encouraged, at its sole cost and expense, to purchase any additional insurance coverages and or limits of insurance that Contractor deems prudent and necessary to manage risk in the completion of this contract.
- 3) Upon written request from WMATA, contractor shall provide copies of any requested insurance policies, including applicable endorsements, within five (5) business days of such request.
- 4) Receipt, review or communications regarding certificates of insurance (COI), insurance policies, endorsements, or other materials utilized to document compliance with these Minimum Insurance Requirements does not constitute acceptance by WMATA.
- 5) Insurance companies must be acceptable to WMATA and must have an A. M. Best rating of at least A-VII.
- 6) Unless otherwise noted, "Claims Made" insurance policies are not acceptable.
- 7) Any insurance policy utilizing a Self-Insured Retention (SIR) requires written approval from WMATA.
- 8) Contractor must incorporate these Minimum Insurance Requirements into contract requirements for all subcontractors at every tier. Contractor, at its sole peril, may amend these Minimum Insurance Requirements for its subcontractors, but doing so does not relieve Contractor from its respective liability to WMATA.
- 9) Compliance with these Minimum Insurance Requirements does not relieve Contractor from Contractor's respective liability to WMATA, even if that liability exceeds the Minimum Insurance Requirements.

III. COVERAGE-SPECIFIC REQUIREMENTS

Commercial General Liability Insurance

- 1) Commercial General Liability insurance (CGL) shall be written on ISO Occurrence Form CG0001 (12/04) or its equivalent. Equivalency determinations shall be made in WMATA's sole and unreviewable discretion.
- 2) Required minimum limits of coverage may be achieved through a combination of the CGL coverage form and an Umbrella/Excess Liability coverage form(s), provided that the Umbrella/Excess Liability coverage form(s) provides the same or broader coverage than the prescribed CGL coverage form.
- 3) Policies shall be endorsed with Additional Insured Endorsements in compliance with the "Additional Insured" Section below.
- 4) Policies shall be endorsed with a Waiver of Subrogation Endorsements in compliance with the Waiver of Subrogation" section below.

- 5) The definition of "Insured Contract" shall be modified to provide coverage for any contracts involving construction or demolition operations that are within 50 feet of a railroad, and sidetrack agreements. Evidence of this modification shall be provided to WMATA along with all other required documents.
- 6) Defense Costs (Allocated Loss Adjustment Expenses) must be included and outside of the policy limits for all primary liability and Umbrella/Excess Liability policies.

Business Automobile Liability

- 1) Business Automobile Liability insurance shall be written on ISO Business Auto Coverage Form CA 00 01 03 06, or its equivalent. Equivalency determination shall be made in WMATA's sole and unreviewable discretion.
- 2) Policies shall be endorsed with Additional Insured Endorsements in compliance with the "Additional Insured" Section below.
- 3) Policies shall be endorsed with a Waiver of Subrogation Endorsements in compliance with the Waiver of Subrogation" section below.
- 4) Business Auto Liability minimum Combined Single Limit requirements may be obtained through the combination of a primary business auto liability policy and an Umbrella/Excess Liability policy provided that the Umbrella/Excess Liability policy complies with items 2 and 3 above.
- 5) MCS-90 Endorsements are required for work involving the transportation or disposal of any hazardous material or waste off of the jobsite. If the MCS-90 Endorsement is required, minimum auto liability limits of \$5,000,000 per occurrence are also required as is form CA 99 48, with broadened coverage for pollution liability.
- 6) Non-Owned Disposal Site (NODS) Endorsements will provide coverage for the Contractor's legal liability arising out of pollution conditions at designated non-owned disposal sites.

Railroad Protective Liability

Railroad Protective Liability Insurance is required for any work within 50 feet of WMATA railroad tracks or work within WMATA rail stations.

- 1) The Railroad Protective Liability (RRP) policy must be on a policy form and with an insurance company that is acceptable to WMATA.
- 2) WMATA shall be the Named Insured.
- 3) The original RRP policy shall be sent to WMATA at following address:

Washington Metropolitan Area Transit Authority
Office of Insurance, Room 8F
600 Fifth Street, NW
Washington, DC 20001

WMATA Blanket RRP Program Option

WMATA may offer to waive the requirement for the Contractor to procure RRP if 1) the work qualifies for coverage under WMATA's blanket RRP program, and 2) the Contractor prepays the RRP premium which shall be determined by the rate schedule promulgated by the insurer in effect as of the effective date of this Contract.

Installation Floater or Equivalent Insurance

This insurance shall cover the equipment being installed until its acceptance by WMATA on an all-risk completed value form with limits sufficient to cover the replacement cost of the equipment being installed and any resulting permanent structures, installations, equipment, machinery, and fixtures while in the course of construction, reconstruction, renovation, erection, installation, or assembly. Coverage shall apply while equipment to be installed is onsite or off-site.

Said policy shall remain in force until the construction is completed and accepted. The policy shall name WMATA as an Additional Named Insured and Loss Payee as its interest may appear. The endorsement adding the Authority should state that the First Named Insured is solely responsible for premium payment.

IV. OTHER

Additional Insured

- 1) Contractor and subcontractors at every tier are required to add WMATA and WMATA's Board of Directors as additional insured on all required insurance including excess liability policies, with the exception of Workers' Compensation and Professional Liability insurance policies.
- 2) Coverage provided to an Additional Insured shall be primary and non-contributory to any other insurance available to the Additional Insureds, including coverage afforded to WMATA as an additional insured by subcontractors, and from other third parties.
- 3) Coverage provided to any Additional Insured shall be for claims arising out of both ongoing operations and products and completed operations hazards.
- 4) Coverage available to any Additional Insured under the products and completed operations hazards can only be limited to the applicable statute of repose in the jurisdiction(s) where the contract's scope of work takes place.
- 5) Commercial General Liability and Umbrella/Excess Liability forms must provide defense coverage for additional insureds. The Additional Insured Endorsement shall provide coverage for Ongoing as well as Products and Completed Operations with no limitation on when claims can be made.

Waiver of Subrogation

Contractor and subcontractors at every tier are required to have all insurance policies except Professional Liability endorsed to waive the respective insurance company's rights of recovery against WMATA, and the WMATA Board of Directors.

- 1) Waiver shall be provided on endorsements that are acceptable to WMATA.

Certificate of Insurance (COI)

Contractor shall provide WMATA an ACORD Certificate of Insurance (COI) and copies of all required endorsements as evidence that the insurance requirements of this Section have been satisfied. Certificates of Insurance shall be sent to WMATA.

The Certificate Holder box should read:

Washington Metropolitan Area Transit Authority
Office of Insurance, Room 8F
600 Fifth Street, NW
Washington, DC 20001

Additionally:

- 1) Proposed material modifications to required insurance, including notice of cancellation, must be received by WMATA in writing at least 30 days prior to the effective date of such change or cancellation.
- 2) WMATA's receipt of copies of any COI, policy endorsements or policies does not relieve Contractor of the obligation to remain in compliance with the requirements of this Section at all times. Contractor's failure to comply with these insurance requirements shall constitute a material breach of this Contract.
- 3) Receipt of the COI does not constitute acceptance of the insurance outlined above.

WMATA BLANKET RAILROAD PROTECTIVE LIABILITY INSURANCE PROGRAM APPLICATION FORM

Contractor/Permittee shall complete this form, sign and return to RISK, Attn: Joy Forrest jforrest@wmata.com (202-962-1221). Applicant will be advised if project can be covered under the WMATA RRP program and the cost. If coverage is desired under the WMATA program, an invoice will be sent to the applicant. (If application is for a LAND PERMIT, please attach a copy to the permit application).

1) Contractor/Permittee and Address	
2) Job Description	
3) Unique Job Characteristics (e.g., tunneling, blasting)	
4) Est. # Days/Months/Years on Metro Property	
5) Total Project Term	
6) Project Solely for the Benefit of Metro? (Yes/No)	
7) Joint Development Project? (Yes/No)	
8) Adjacent Construction Project (i.e., no benefit to Metro)? (Yes/No)	
9) Are WMATA Employees other than flagmen/supervisors and/or protective type personnel doing any work on this project? (Yes/No)	
10) If Yes to #9 above: a. Advise # of RR employees b. Who are these RR employees (job title, role, etc.) c. Provide a description of the work being performed by these RR employees d. Advise the dollar value of the work being performed by these RR employees (labor/mat'ls/equip.)	
11) Contract/PR/PO/PCN Number (If already assigned)	
12) Job Location (i.e., address, station name, mile markers)	
13) Total Contract Value	
14) RRP Limit Required (to be completed by RISK)	
15) Dollar value of work within 50' of WMATA Railroad Property	
16) WMATA Dept. Contact/Phone Number	
17) RRP Waiver Fee (to be completed by RISK)	

Signature of authorized Contractor/ Permittee representative:

_____ Date: _____

Printed Name/Title: _____

00878 LIQUIDATED DAMAGES

Delete Section 00778, LIQUIDATED DAMAGES in its entirety and substitute the following:

- (a) Time is of the essence to this Contract. In the event of a delay under this Contract beyond the period of performance or beyond the period to which such time may be extended by the Contracting Officer, the Authority shall be paid damages for such delay. Since the amount of such damages and the loss to the Authority will be extremely difficult to ascertain, it is hereby expressly agreed that such damages will be liquidated and paid as follows:
- (b) The work to be performed under this Contract shall be commenced at a time established in the written Notice-to-Proceed. The Contractor agrees that all work included in this Contract shall be complete in its entirety in **TWO HUNDRED TEN (210) CALENDAR DAYS**. The liquidated damages for each and every day (per day), of unexcused delay, the sum of **One thousand eight hundred (\$1,800.00)** that is hereby agreed upon not as a penalty, but as liquidated damages.
- (c) The Authority shall have the right to deduct such liquidated damages from any monies due or which may become due to the Contractor under this Contract. If the amount that becomes due is less than liquidated damages due to the Authority, the Contractor shall pay the difference upon the Contracting Officer's demand.
- (d) See Section 00724, PERIOD OF PERFORMANCE AND PROJECT SCHEDULE, for Project Milestone(s).

00894 PARTNERING

Modify Section 00700, GENERAL CONDITIONS, to add the following Sections:

00794 PARTNERING

- A. Authority Partnering Policy: The Authority intends to encourage development of a cohesive partnership with the Contractor, the Designer, principal Subcontractors, and Suppliers for effective and efficient completion of this Contract. This partnership shall strive to draw on the strengths of each organization in an effort to achieve a quality project done right the first time, and completed on-schedule, within the budget. This partnership shall be bilateral in make-up and participation of the parties is required. The partnering workshop(s) shall be conducted by a professional facilitator at an off-site location convenient to the Project within 45 Days of Contract award. Follow-up workshops shall be conducted on a quarterly basis during the course of the Contract as agreed to between the Contractor and the Authority.
 - 1. The establishment of a partnership charter on this Project will not change the legal relationship of the parties to the Contract or relieve either party from any terms of the Contract.
 - 2. All costs associated with initiating and maintaining this partnership, outside of participant's salaries and travel and travel-related costs, will be agreed to by both parties and will be shared. The Authority will reimburse the Contractor 50 percent of the incurred cost up to the allowance specified on the Notes to Bidders in Section 00434, BID SCHEDULE. If the agreed cost exceeds the allowance specified on the Notes to Bidders in Section 00434, BID SCHEDULE, the Authority will reimburse the Contractor 100 percent of the cost over that amount.
 - 3. Partnership Goals:
 - a. For the Contractor and the Authority to work together proactively through a cohesive partnership with the objective to build a quality product on time, at a satisfactory cost to the Authority, with a satisfactory profit to the Contractor (fostering a win-win relationship);
 - b. To establish and maintain an atmosphere of trust with timely, positive, and ongoing communications;
 - c. To reach a mutual understanding on how the construction project will be managed;

- d. To resolve disputes at the lowest working level possible; and,
- e. To avoid confrontation and disputes among the parties.

00895 AVAILABILITY OF FUNDS FOR THE NEXT FISCAL YEAR.

- A. Funds are not presently available for performance under this Contract beyond the fiscal year, which ends **June 30, 2019**. The Authority's obligation for performance of this Contract beyond that date is contingent upon the availability of funds from which payment for Contract purposes can be made. No legal liability on the part of the Authority for any payment may arise for performance under this Contract until funds are made available to the Contracting Officer for performance and until the Contractor receives notice of availability, to be confirmed in writing, by the Contracting Officer. Any option exercised by the Authority, which will be performed in whole or in part in a subsequent fiscal year, is subject to availability of funds in the subsequent fiscal year and will be governed by the terms of this Section.

00896 LIVING WAGE

- A. This Contract is subject to the Authority's Living Wage Policy and implementing regulations. The Living Wage provision is required in all contracts for services (including construction) awarded in an amount that exceeds \$150,000 in a 12-month period.
 - 1. The Authority Living Wage Rate is \$13.85 per hour, and may be reduced by the Contractor's per-employee cost for health insurance.
 - 2. The Contractor shall:
 - a. Pay, at a minimum, the Authority Living Wage Rate, effective during the time the work is performed, to all employees who perform work under this contract, except as otherwise provided in paragraph (d) below;
 - b. Include the Living Wage clause in all Subcontractors that exceed \$15,000 in a 12-month period awarded under this Contract;
 - c. Maintain payroll records, in accordance with the retention and examination of records requirements in the General Conditions, and shall include a similar provision in affected Subcontracts that requires the Subcontractor to maintain its payroll records for the same length of time; and
 - d. Submit records with each monthly invoice supporting payment of the Living Wage Rate.
 - 3. The Contractor shall not split or subdivide a contract, pay an employee through a third party, or treat an employee as a Subcontractor or independent contractor to avoid compliance with the Living Wage provisions.
 - 4. Exemptions to the Living Wage provisions include:
 - a. Contracts and agreements with higher negotiated wage rates;
 - b. Contracts that are subject to higher wage rates required by federal law or collective bargaining agreements (e.g., Davis Bacon);
 - c. Contracts or agreements for regulated utilities;
 - d. Emergency services to prevent or respond to a disaster or imminent threat to public health and safety; and
 - e. Contractors who employ fewer than ten employees.
 - 5. The Authority may adjust the Living Wage rate effective in January of each year. The adjustment will reflect the average Living Wage Rate among Metro's Compact Jurisdictions with Living Wage provisions. If after Contract award the Living Wage Rate increases, the Contractor is entitled to an equitable adjustment to the rate in the amount of the increase for employees who are affected by the escalated wage.

6. Failure to comply with the Authority's Living Wage provisions shall result in the Authority's right to exercise available Contract remedies, including Contract termination or debarment from future contracts.

00897 NOTIFICATION OF FEDERAL PARTICIPATION

- A. This Project is being funded in whole or part with Federal Funds.

00898 COMMUNITY OUTREACH

- A. The Authority will establish a program of public contact for conducting effective relationships with communities and businesses in proximity to the construction areas. Do not initiate contact with the public without Contracting Officer Representative approval.
- B. The Authority will contact those residents and business owners who might be affected by the construction and identify and give contact information for the Authority's representative on the worksite with responsibility for community outreach.
- C. Contractor shall designate an on-Site, community outreach liaison with 24-hour, on-call availability for the duration of the Contract. Community outreach liaison duties include:
 1. Staying informed of problems caused by the construction.
 2. Assisting the Authority in notifying adjacent owners of upcoming work
 3. Preparing and posting advance notice signs as necessary to inform public and surrounding businesses of upcoming construction activities.
 4. Assisting the Authority in responding to complaints
 5. Attending public outreach meetings, as necessary: Meetings can include regular construction information meetings, quarterly open houses, media inquiries, tours, ground breaking, and other milestone events.
 6. Accommodating Site tours: Tours shall be arranged through the Contracting Officer Representative.

APPENDIX A



OneBadge Request Form

Contractor Information:

First Name:	<input type="text"/>	Middle Name:	<input type="text"/>
Last Name:	<input type="text"/>	Name Suffix:	<input type="text"/>
Date of Birth:	<input type="text"/>	National ID:	<input type="text"/>
Address Line 1: <input type="text"/>			
Address Line 2: <input type="text"/>			
City:	<input type="text"/>	State:	<input type="text"/>
		Zip:	<input type="text"/>
Phone: (Home or Cell)	<input type="text"/>		

Job Information:

Job Effective Date: (Start Date)	<input type="text"/>	Expected Job End Date: (Contract End Date)	<input type="text"/>
Department ID: (5-digit Code)	<input type="text"/>	Location Code:	<input type="text"/>
Reports To Position Number: (COTR)	<input type="text"/>	Reports To Empl ID:	<input type="text"/>

Use this information to enter into PeopleSoft HCM:

[Main Menu](#) > [Manager Self Service](#) > [Job and Personal Information](#) > [Add Template-Based Hire](#)

or email to: HRSharedServices@wmata.com

HRIM

10/2/17
Version 1.0

Criminal Background Screening FAQs

- 1. Are WMATA contractors now responsible for conducting and providing WMATA, evidence that a criminal background screening was performed?**

Yes. The contractor shall contract with, or otherwise engage, a reputable third-party vendor to conduct the required criminal background screenings.

- 2. How should I select a reputable third-party vendor to conduct the required criminal background screenings?**

You should choose a criminal background screening company that is capable of meeting standards of WMATA policies.

- 3. Will WMATA contractors be provided an equitable adjustment for conducting their own criminal background screenings?**

Yes. We will be providing equitable adjustment, however the Contractor must submit a claim for the equitable adjustment and the Contracting Officer will review and/or negotiate the claim and ultimately modify the contract if need be.

- 4. If WMATA no longer conducts criminal background screenings for its contractors, what substantiation is required to be provided when the contractor employee is onboarded?**

The Criminal Background Screening Certification.

- 5. Are WMATA contractors required to provide the completed and signed Criminal Background Screening Certification quarterly?**

Yes. At the end of each calendar quarter, the contractor shall certify to the contracting officer's technical representative (COTR) the contractor's compliance with the criminal background screening requirement and confirm that all persons required to be screened, passed the contractor's criminal background screening before being permitted to work on WMATA's premises or otherwise have access to WMATA's customers, property, or confidential information.

- 6. Must the contractors provide the results of the criminal background screening in order to receive the OneBadge?**

No. The Criminal Background Screening Certification should be forwarded to the Contracting Officer and Contracting Officer's Technical Representative. Additionally, a OneBadge Request Form must be completed for each employee. The contractor shall not place any person on or engage any person under the contract with WMATA who will be working on WMATA's premises, or otherwise have access to WMATA customers, property, or confidential information, unless that person passes the contractor's criminal background screening.

- 7. Does the Criminal Background Screening Certification (Quarterly) need to be submitted for each contractor working on WMATA's premises, or should one form per quarter be submitted for the contracting firm?**

One (1) Criminal Background Screening Certification form should be submitted by the contracting firm each calendar quarter. At the end of each calendar quarter, the contractor shall certify to the contracting officer or contracting officer's technical representative (COTR) the contractor's compliance with the criminal background screening requirement and confirm that all persons

required to be screened passed the contractor's criminal background screening before working on the WMATA contract.

8. **Are WMATA contractors expected to conduct a criminal background screening on its employees and subcontractors every quarter or just certify the criminal background screening was conducted and passed via the Criminal Background Screening Certification (Quarterly) form?**

Contractors are not required to conduct a criminal background check every quarter. They are to certify that a screening was conducted and the employee passed. The background check relied upon for the certification has to be no older than one year.

9. **Is the criminal background screening process retroactive or is this a new process?**

Although WMATA has always conducted criminal background screenings on its employees and contractors, the OneBadge process for contractors is new and became effective October 2, 2017. WMATA is no longer conducting background screenings for contractors.

10. **Does an existing contractor's badge need to be renewed?**

No. The new policy only pertains to new or expired badges.

11. **What should I do if I do not know how to construct criminal background check screening policies and procedures?**

Contractors may use WMATA's Criminal Background Checks, Policy/Instruction 7.2.3/1 as a guide.

12. **If a subcontractor works on multiple contracts, for more than one Prime, which Prime is responsible for certifying the subcontractor?**

All prime contractors are responsible for certifying any subcontractors on any project.

13. **Where staff currently working on WMATA property had previously had a criminal background check performed by WMATA, but their badge needs to be renewed, does the contractor employee need a new background check to be performed by the contractor?**

Yes. A criminal background check needs to be conducted at the time of badge renewal.

14. **Does the prime have to sign off for subcontractors or does each subcontractor validate their own staff with no involvement from the prime?**

It is the responsibility of the Prime to ensure their subcontractors are in compliance with the criminal background policy.

15. **What if I lose my OneBadge?**

WMATA's lost badge policy and process will remain the same as it is now. You can replace your lost badge at the ID Office for \$5 after the first loss and \$25 for any subsequent loss.

16. **Whom do I contact if my badge does not work?**

If you have a problem with your badge, please notify a OneBadge team member as soon as you can at an exchange location or at ITAPPS_OneBadgeSupport@wmata.com.

APPENDIX B

ATTACHMENT A

***NOTICE OF REQUIREMENTS
FOR
DISADVANTAGED BUSINESS ENTERPRISE (DBE)***

May 2015

~Applies only if proposal price is \$500,000 or more for a construction contract or \$150,000 or more for a supply and service contract.

~APPENDIX B~

DISADVANTAGED BUSINESS ENTERPRISE (DBE)

1. DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENT:

- A. The DBE requirements of the Authority's DBE Program Plan apply to this contract. Accordingly, the Contractor shall carry out the requirements of the Authority's DBE Program Plan and this Appendix in the award and administration of this U.S. Department of Transportation (US DOT) assisted contract.

2. POLICY:

- A. It is the policy of the Authority (WMATA), the Federal Transit Administration (FTA) and the US DOT that Disadvantaged Business Enterprises (DBEs) shall compete fairly to receive and participate in performing federally assisted contracts, including contracts and subcontracts at any tier. It is further the policy of the Authority, the FTA and the US DOT that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts. The Contractor hereby agrees to carry out this policy in the award and administration of subcontracts to the fullest extent possible consistent with efficient Contract performance.

3. CONTRACT GOAL:

- A. If the bidder is not a DBE, the bidder agrees that the DBE goal for this Contract shall be met by subcontractors or by joint ventures with DBEs. The goal set forth for this Contract is __% of the final Contract price, including amendment and modification. The amount of DBE participation will be determined by the dollar value of the work performed and/or supplies furnished by DBE firms as compared to the total value of all work performed and/or supplies furnished under this Contract. The Contractor shall have met this goal if the Contractor's DBE participation meets or exceeds this goal.
- B. In cases where work is added to the Contract by modification such that additional DBE participation is necessary to meet this goal, the Contractor shall increase the participation of one or more firms listed on the "Schedule of DBE Participation" or submit additional DBE certified firms to meet the goal. In cases where work is deleted from the Contract, the goal shall be applicable to the new Contract amount. The Contractor shall be permitted to meet the goal by revising its DBE participation, provided, however, that the revision shall not result in DBE participation that is less than the original goal.

4. DEFINITIONS:

- A. **Appendix B.** The Notice of Requirements for Disadvantaged Business Enterprise, which when attached to a solicitation, implements the DBE requirements of the Authority's DBE Program Plan in the award and administration of federally funded Authority contracts.
- B. **Certified DBE.** means a for-profit small business concern (a) that is at least fifty one percent (51%) owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which fifty one percent (51%) of the stock is owned by one

- or more such individuals; (b) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it; and (c) whose eligibility is evidenced by a current WMATA Certification letter, a D.C. Department of Transportation Certification letter, or a certification letter issued by the Metropolitan Washington Unified Certification Program (MWUCP).
- C. **Contractor.** One who participates, through a contract or subcontract (at any tier), in a US DOT assisted highway, transit or airport program.
- D. **DC DOT.** The District of Columbia Department of Transportation.
- F. **Good Faith Efforts.** Efforts to achieve a DBE goal or other requirements of the Authority's DBE Program Plan which by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the goal program requirement.
- G. **Joint Venture.** An association of a DBE firm and one (1) or more other firms to carry out a single, for-profit business enterprise, for which the parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and shares in the capital contribution, control, management, risks, and profits of the joint venture commensurate with its ownership interest.
- H. **Metropolitan Washington Unified Certification Program (MWUCP).** A unified certification program mandated by 49 C.F.R. §26.81 between two Federal transit recipients (WMATA and the D.C. Department of Transportation). The agreement became effective January 2005.
- I. **Pre-certification.** A requirement under 49 C.F.R. §26.81(c) that all certifications by the MWUCP be made final before the due date for bids or offers on a contract on which a firm seeks to participate as a DBE.
- J. **Race-conscious.** A measure or program that is focused specifically on assisting only DBEs, including women-owned DBEs.
- K. **Race-neutral.** A measure or program that is, or can be, used to assist all small businesses. For the purposes of the DBE program, race-neutral includes gender-neutrality.
- L. **Small Business Concern.** With respect to firms seeking to participate as DBEs in US DOT assisted contracts, a small business concern as defined pursuant to Section 3 of the Small Business Act and Small Business Administration implementing regulations (13 C.F.R. Part 121) that also does not exceed the cap on average annual gross receipts specified in 49 CFR § 26.65(b).
- M. **Socially and Economically Disadvantaged Individual.** Any individual who is a citizen (or other lawfully admitted permanent resident) of the United States and who the Authority finds to be a socially and economically disadvantaged individual on a case-by-case basis, and any individual in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged.
- (1) Black Americans, which includes persons having origins in any of the Black racial groups of Africa;

- (2) Hispanic Americans, which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
 - (3) Native Americans, which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
 - (4) Asian-Pacific Americans, which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the North Marianas Islands, Macao, Fiji, Tonga, Kiribati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong;
 - (5) Subcontinent Asian Americans, which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
 - (6) Women; and
 - (7) Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.
- N. US DOT Assisted Contract. Any contract between the Authority and a contractor (at any tier) funded in whole or in part with US DOT financial assistance, including letters of credit or loan guarantees.
- O. Unified Certification Program (UCP). The program mandated by 49 C.F.R. § 26.81(a), which requires all U. S. DOT recipients of Federal financial assistance to participate in a statewide certification program by March 2002.
- P. WMATA. Washington Metropolitan Area Transit Authority, the transit system (rail and bus) serving the metropolitan Washington area, including parts of Virginia and Maryland.

5. HOW DBE PARTICIPATION IS COUNTED TOWARDS THE CONTRACT GOAL:

DBE participation shall be counted towards meeting the DBE goal in accordance with the following:

- A. When a DBE participates in a contract, only the value of the work actually performed by the DBE is counted towards the DBE goal.
- (1) This amount includes the entire amount of that portion of a construction contract that is performed by the DBE's own forces. This amount includes the cost of supplies and materials obtained by the DBE for the work of the contract, including supplies purchased or equipment leased by the DBE (except supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate).
 - (2) This amount includes the entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the

performance of the contract, towards the DBE goal, provided the fee is reasonable and not excessive as compared with fees customarily allowed for similar services.

- (3) When a DBE subcontracts part of its work under the contract to another firm, the value of the subcontract work may be counted towards the DBE goal only if the DBE's subcontractor is itself a DBE. Work that a DBE subcontracts to a non-DBE firm does not count towards the DBE goal.
- B. When a DBE performs as a participant in a joint venture, the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that a DBE performs with its own forces towards the DBE goal may be counted.
- C. Expenditures to a DBE contractor towards the DBE goal may be counted only if the DBE is performing a commercially useful function on that contract.
- (1) A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, the Authority will consider the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and other relevant factors.
 - (2) A DBE does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation.
 - (3) If a DBE does not perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own work force, or if the DBE subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work, the Authority will presume that the DBE is not performing a commercially useful function.
- D. The following factors will be used by the Authority in determining whether a DBE trucking company is performing a commercial useful function:
- (1) The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible for on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting the DBE goal.
 - (2) The DBE must itself own and operate at least one fully licensed, insured and operational truck used on the contract.
 - (3) The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers, it employs.

- (4) The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
 - (5) The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
 - (6) The lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the terms of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.
- E. The following factors will be used to count expenditures with DBEs for materials or supplies towards the DBE goal:
- (1) If the materials or supplies are obtained from a DBE manufacturer, one hundred percent (100%) of the cost of the materials or supplies will be counted towards the DBE goal. A manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the contract.
 - (2) If the materials or supplies are purchased from a DBE regular dealer, sixty percent (60%) of the cost of the materials or supplies will be counted towards the DBE goal. A regular dealer is a firm that owns, operates or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating, or maintaining a place of business as provided in this paragraph if this person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by long-term lease agreement and not on an ad hoc or contract-by-contract basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this paragraph.
 - (3) With respect to materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer, the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials and supplies required on a job site, may be counted towards the DBE goal, provided the fees are reasonable and are not excessive as compared to fees customarily allowed for similar services. The cost of the materials and supplies themselves may not be counted towards the DBE goal.

- F. All DBE firms must be pre-certified. Participation by a firm that is not currently Authority certified as a DBE at the time of bid opening, does not count towards the DBE goal. All DBE firms must be in compliance with 49 CFR, Part 26.
- G. The dollar value of work performed under this Contract by a firm that MWUCP decertifies as a DBE does not count towards the DBE goal.
- H. The participation of a DBE subcontractor does not count towards the Contractor's DBE goal, until the amount being counted towards the goal has been paid to the DBE.

6. BIDS AND REQUIREMENTS (WITH THE BID):

The bidder shall submit the following with its bid. Any bidder who fails to complete and return this information with its bid shall be deemed to be not responsive and may be ineligible for Contract award. Bidders that fail to meet the DBE goal above and fail to demonstrate "good faith efforts" to justify waiver of the DBE goal (See paragraph 6.C. below) shall be deemed to be not responsive and will be ineligible for Contract award.

- A. Completed "Schedule of DBE Participation" (Attachment B-1) sufficient to meet the above goal. If the bidder is a DBE firm and intends to satisfy the appropriate DBE requirement with its own firm, it must indicate in the Schedule the area of work and percentage it will perform to satisfy the goal. All offerors must attach current WMATA, DC DOT or MWUCP certification letters for each DBE listed on the Schedule.
- B. Executed "Letters of Intent to Perform as a Subcontractor/Joint Venture" (Attachment B-2). If the bidder is not a DBE or intends to satisfy the requirements through other DBE firms, then it must attach these letters from each certified DBE listed on the Schedule.
- C. Justification for grant of relief (Appendix B waiver of DBE goal). If in the submittal of its bid, the bidder fails to meet the DBE goal above, the bidder has the burden of furnishing sufficient documentation with its bid of its "good faith efforts" to justify a grant of relief (waiver) from the goal or portion of the goal. Such justification shall be in the form of a detailed report. The following is a list of actions that shall be considered as part of the bidder's good faith efforts to obtain DBE participation. This list is neither a mandatory checklist nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases:
 - (1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the Contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The offeror must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
 - (2) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goal will be achieved. This includes, where appropriate, breaking out Contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.

- (3) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- (4) Negotiating in good faith with interested DBEs. It is the offeror's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work. "DBE Unavailability Certifications" (Attachment B-3) shall be completed as appropriate.
- (5) An offeror using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as the Contract goal into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the Contract with its own organization does not relieve the offeror of the responsibility to make good faith efforts. Prime contractors are not, however, required to accept higher quotes from DBEs, if the price difference is excessive or unreasonable.
- (6) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the Contractor's efforts to meet the project goal.
- (7) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.
- (8) Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- (9) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs.

7. BID REQUIREMENTS (APPARENT LOW BIDDER):

The bidder shall submit the following items within ten (10) calendar days after notification that they are the apparent low bidder:

- A. A copy of a current WMATA, D.C. DOT or MWUCP certification letter(s) shall be attached to the DBE Schedule of Participation to evidence DBE pre-certification.

- B. DBE Manufacturer's Affidavit, if applicable, must be submitted in order to receive one hundred percent (100%) of the allowable credit for expenditures to DBE manufacturers/suppliers (Attachment B-4). By submission of this affidavit, the bidder certifies this it is satisfied that the manufacturer meets the requirements of 49 CFR Part 26.
- C. Schedule B Information for Determining Joint Venture Eligibility, if applicable (Attachment B-5, pgs. 1-4). Submittal shall be signed by all parties, dated and notarized.
- D. Copy of Joint Venture Agreement, if applicable. Submittal shall be signed by all parties, dated and notarized.
- E. Certification letter of the DBE regular dealer/supplier, if applicable. If the bidder wants to receive the maximum allowable credit for its expenditures for material(s) or supplies required under this Contract, from DBE regular dealers/suppliers, the DBE must submit a signed and notarized statement on their letterhead, stating that it is a regular dealer of the material(s) or supplies. By submission of this statement, the bidder certifies that it is satisfied that the subcontractor is a regular dealer/supplier that meets the requirements of 49 CFR Part 26.
- F. For design-build contracts, if a DBE goal is specified in the DBE GOAL/ REQUIREMENTS, the bidder shall submit, with its initial bid, a list of DBE-certified firms that it intends to enter into subcontract agreements with for this Contract. If no goal is specified in the solicitation and the bidder still intends to utilize DBEs in the performance of this Contract, the offeror shall submit with its initial bid a list of those DBE-certified firms. The documentation requirements of the solicitation shall be completed and submitted at the time of bid opening for any Contract in which a DBE goal is applicable or for any Contract in which there was no goal established, but the offeror identified DBE-certified firms that it intended to enter into subcontract agreements with in its initial bid. Any bidder who fails to complete and return the following information, if applicable, with its bid may be deemed to be not responsible and may be ineligible for Contract award. Offerors that fail to meet the DBE goal, if any, specified in the solicitation and fail to demonstrate a good faith effort and/or to justify waiver of the DBE goal, may be deemed to be not responsible and may be ineligible for contract award.

8. CONTRACT ADMINISTRATION REQUIREMENTS:

The following requirements apply after Contract award:

- A. The Contractor shall include the following provision in each subcontract it awards in support of the DBE goal:

"The Contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of US DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, that may result in termination of this Contract or such other remedy as the Authority deems appropriate."
- B. (1) The Contractor shall monitor the performance of, collect and report data on DBE participation to the WMATA's DBE Office on the attached "Prompt Payment Report-Prime Contractor's Report" (Attachment B-6) which shall be submitted monthly with each payment request. Failure to submit these reports may result in suspension of Contract payments. The Contractor shall certify with each payment request that payment has been or will be made to all subcontractors due payment, within ten (10) days after receipt of payment from the Authority

for work by that subcontractor. The Contractor shall inform the COR or COTR, with its payment request, of any situation where scheduled subcontractor payments have not been made and the reason therefore.

(2) The Contractor shall require each subcontractor to complete and forward to the DBE Liaison Officer on a monthly basis a "Prompt Payment Report-Subcontractor's Report" (Attachment B-7). The subcontractor shall certify that payment has been received.

C. The Contractor shall have a continuing obligation to maintain a schedule for participation by DBE contractor(s) to meet its goal set forth above in this Appendix. The Contractor shall not have work performed nor the materials or supplies furnished by any individual or firm other than those named in the "Schedule of DBE Participation." If at any time, the Contractor believes or has reason to believe that it needs to obtain a substitute for a DBE contractor named in the "Schedule of DBE Participation", the Contractor shall, within ten (10) days, notify the Contracting Officer and the DBE office of that fact in writing. Situations which may warrant substitution for a DBE firm include, but are not limited to the following:

- (1) Evidence of change in ownership or circumstances regarding the firm's status as a DBE.
- (2) Death or physical disability, if the named subcontractor or DBE partner of the joint venture is an individual.
- (3) Dissolution, if a corporation or partnership.
- (4) Bankruptcy of the subcontractor, subject to applicable bankruptcy law, and only instances where the bankruptcy affects the Contractor's ability to perform.
- (5) Inability to furnish a reasonable performance or payment bond, if required.
- (6) Inability to obtain, or loss of, a license necessary for the performance of the particular category of work.
- (7) Failure or inability to comply with a requirement of law applicable to contractors and subcontractors on a construction, alteration or repair project.
- (8) Failure or refusal to execute the subcontract in accordance with the terms of an offer submitted to the Contractor prior to the Contractor's submission of its offer, but only where the Contracting Officer or other delegated Authority representative can ascertain with reasonable certainty the terms of such offer. In the absence of any other factors, such a failure or refusal will be considered an unusual situation only if the offeror obtained, prior to bidding/proposing, an enforcement commitment from the subcontractor involved.
- (9) Failure to comply with the terms and conditions of this Contract or those of its subcontract or joint venture agreement.

Within thirty (30) days thereafter, the Contractor shall, if necessary to achieve the Appendix B goal, make every reasonable effort to subcontract the same or other work equivalent in value to other certified DBE firms. The Contractor must have the prior, written approval of the Contracting Officer and the DBE Office before substitution of a DBE subcontractor, regardless

of the reason for substitution. Failure to obtain the Authority's approval could result in the Contractor's suspension or debarment.

- D. The Contractor shall forward copies of all subcontracts to the DBE Office at the time of their execution.
- E. If the Contracting Officer or other delegated Authority representative determines that the Contractor has failed to comply with this Appendix B, he/she will notify the Contractor of such noncompliance and the action to be taken. The Contractor shall, after receipt of such notice, take corrective action. If the Contractor fails or refuses to comply promptly, the Contracting Officer or other delegated Authority representative may issue a "stop work order" stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop work order shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor. When the Authority proceeds with such formal actions, it has the burden of proving that the Contractor has not met the requirements of this Appendix. The Contractor's failure to meet its Appendix B goal shall shift the burden to it to show that it has met the good faith requirements of this Appendix. After exhausting all of its administrative and legal remedies, if the Contractor is found to have failed to exert a "good faith effort" to involve DBEs in the work, the Authority may suspend or debar the Contractor.
- F. The Contractor agrees to cooperate in any studies or surveys as may be conducted by the Authority which are necessary to determine the extent of the Contractor's compliance with this Appendix.
- G. The Contractor shall keep records and documents for two (2) years following performance of this Contract to indicate compliance with this Appendix. These records and documents, or copies thereof, shall be made available at reasonable times and places for inspection by any authorized representative of the Authority and will be submitted upon request, together with any other compliance information that such representative may require.
- H. If the Authority, FTA or the US DOT has reason to believe that any person or firm has willfully and knowingly provided incorrect information or made false statements regarding the DBE Program, the matter shall be referred to the WMATA's DBE office, and WMATA's Office of Inspector General (OIG).
- I. Failure by the Contractor to carry out the requirements of this Appendix is a material breach of this Contract, that may result in the termination of this Contract or such other remedy as the Authority deems appropriate.

SUMMARY OF SUBMITTALS

With the Bid:

1. Completed "Schedule of DBE Participation" (Attachment B-1) with current certification letters attached for each listed DBE.
2. Executed "Letters of Intent to Perform as a Subcontractor/Joint Venture" (Attachment B-2).
3. Justification for grant of relief (waiver of DBE goal), if applicable. Include completed "DBE Unavailability Certifications" (Attachment B-3) as appropriate.

Bid Requirements (Apparent Low Bidder)

1. All DBEs must submit copies of their current WMATA or D.C. DOT certification letters or a certification letter issued by the MWUCP.
2. A DBE Manufacturer's Affidavit, if applicable, must be submitted in order to receive one hundred percent (100%) of the allowable credit for expenditures to DBE manufacturers/suppliers (Attachment B-4).
3. Schedule B Information for Determining Joint Venture Eligibility, if applicable (Attachment B-5, pgs. 1, 2, 3, 4).
4. Copy of Joint Venture Agreement, if applicable.
5. Certification letter of the DBE regular dealer/supplier, if applicable.

After Contract Award

1. "Prompt Payment Report-Prime Contractor's Report" Attachment B-6) – submitted monthly.
2. "Prompt Payment Report-Subcontractor's Report" (Attachment B-7) - submitted monthly.
3. Request to substitute DBE contractor (see paragraph 8.C.) – submitted as required.
4. Copies of subcontracts-submitted at the time of their execution.

SUBMIT WITH BID
SCHEDULE OF DBE PARTICIPATION

Contract No. _____

Project Name _____

Name of Bidder

The bidder shall complete this Schedule by identifying only those DBE firms, (with scope of work and price) who have agreed to perform work on this Contract. The prices shall be at an amount that is at least the DBE percentage goal for the total Contract. The offeror agrees to enter into a formal agreement with the DBE firm(s) listed for the work, at an amount equal to, or greater than, the prices listed in this Schedule, subject to award of a Contract with the Authority. If the total amount is less than the DBE percentage goal, a justification for waiver of DBE goal shall be attached to this Schedule.

Name of DBE Subcontractor	Address	Type of Work(Electrical, Paving, Etc.) and Contract Items or Parts Thereof to be Performed and Work Hours Involved	Agreed Price
Subtotal \$ DBE Subcontractors			
Name of DBE Prime Contractor	Address	Type of Work (Electrical, Paving, Etc.) and Contract Items or Parts Thereof to be Performed and Work Hours Involved	Agreed Price
Subtotal \$ DBE Prime Contractor			
TOTAL \$ ALL DBE CONTRACTORS		TOTAL	

Signature of Contractor' Representative

Title

Date



23.26a (Rev 02/12)

Contract Number: _____

Project Name: _____

**LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR/JOINT VENTURE
(ALL ITEMS MUST BE COMPLETED)**

TO: _____
(Name of Offeror)

The undersigned intends to perform work in connection with the above projects as (check one):

____ An individual ____ A corporation ____ A partnership ____ A joint venture

Specify in detail particular work items or parts thereof to be performed:

at the following price: \$ _____

Please indicate ____ % of the dollar value of the subcontract that will be awarded to non-DBE contractors, if applicable. The undersigned will enter into a formal agreement with you for the above work upon your execution of a contract with the Authority.

Name of DBE Subcontractor/Joint Venture

Phone Number

Address

WMATA Vendor ID #/DBE Cert. #

Signature & Title

Date

The following is to be completed by the Prime Contractor. A copy of this letter must be returned to the DBE subcontractor to indicate acceptance.

To: _____
(Name of DBE)

You have projected your interest and intent for such work, and the undersigned is projecting completion of such work as follows:

WORK ITEMS	PROJECTED DBE COMMENCEMENT DATE	PROJECTED DBE COMPLETION DATE
_____	_____	_____

(Date)

(Name of Prime Contractor & Acceptance Signature)

SUBMIT WITH BID

DBE UNAVAILABILITY CERTIFICATION

I, _____, _____, of _____
(Name) (Title) (Bidder)

certify that on _____ I contacted the following DBE contractor(s) to obtain offer(s) for work
(Date)

items to be performed on Contract Number _____

DBE Contractor	Work Items Sought	Form of Bid Sought (i.e., Unit Price, Materials and Labor Only, Etc.
_____	_____	_____

To the best of my knowledge and belief, said DBE contractors were unavailable (exclusive of unavailability due to lack of agreement on price) for work on this project, or unable to prepare a bid, for the following reason(s):

Signature: _____ Date: _____

_____ was offered an opportunity to submit a bid on the above
(Name of DBE Contractor)

identified work on _____ by _____
(Date) (Source)

The above statement is true and accurate account of why I did not submit an offer on this project.

(Signature of DBE Contractor)

(Title)

M

23.25 (Rev 10/99)

DBE Certification Instructions

Important Notice

If you do not have a current, official letter of certification from WMATA, D.C. DOT or MWUCP, you are not pre-certified and are therefore not eligible to participate as a Disadvantaged Business Enterprise on the bid.

For those who wish to access the MWUCP certification application, it may be found on the internet at the following address:

https://www.wmata.com/business/disadvantaged_business_enterprise. Go to "Procurement and Contracting", click on "Disadvantaged Business Enterprise", then click on "DBE Application for Certification".

49 CFR Part 26 gives Metropolitan Washington Unified Certification Program (MWUCP) ninety (90) days in which to process a complete DBE application. In order to become certified and participate in the MWUCP, you must comply with the procedures that follow. Certification must be final before the due date for bids or offers on a contract on which a firm seeks to participate as a DBE.

Instructions

49 C.F.R. § 26.81(d) of the Certification Procedures requires a firm to be certified as a DBE in its "home state," where its principal place of business is located, in order to become certified outside such "home state". Therefore, you must attach to the MWUCP application, a copy of a valid DBE Certification letter from your home state's Department of Transportation. In addition, submit the pertinent documents for your company listed below. The application should be completed in full and NOTARIZED.

General (All firms must submit these documents.)

- Current (unaudited) Financial Statements;
- Prior three (3) years Federal Tax Returns;
- Resume of Principal(s) and Key Personnel;
- Third Party Agreements, such as Rental and Management Agreements;
- Licenses to Do Business;
- Personal Net Worth (PNW) Statement;
- Statement of Disadvantage;
- No Change Affidavit or Notice of Change (where applicable).

Corporations

- Articles of Incorporation;
- By-Laws;
- Copies of any Stock Options;
- Copies of Stock Certifications of Each Holder;
- Copies of Stockholders' Voting Rights;
- Record of First Organizational Meeting.

Partnerships

- Partnership Agreement

Proprietorships

IRS Employer ID Number
WMATA Vendor ID#

Limited Liability Companies

Operating Agreement with any amendments;
Certificate of Formation, U.S. Income Tax Returns.

Change of Status Review

On or before each certification anniversary date, you must submit a No Change Statement attesting that there have been no changes in the firm's circumstances affecting its ability to meet the eligibility requirements of 49 CFR Part 26 or WMATA's DBE Program Plan. Firms with changed circumstances must submit a Notice Regarding Change for review by the DBE Office. A review of these changes shall be made to determine if the firm is in compliance with the 49 CFR Part 26.

Affidavit Enclosure

NOTE: When completing MWUCP Application, complete all information blocks. Type "N/A" if item does not apply to you or your firm.

DBE MANUFACTURER'S AFFIDAVIT

I hereby declare and affirm that I am _____ (Title)
and duly authorized representative of _____ (Name of Company),
a _____ owned and controlled enterprise
whose address is _____

I further declare and affirm that company employees (persons not on the payroll of and/or performing the same tasks for disadvantaged owned business having any interest in the affiant's business) operate the following company equipment relative to the manufacturing process:

Equipment

Type	Function	Model	Age	Make
------	----------	-------	-----	------

Number of employees involved in the manufacturing process: _____

The undersigned swears that the foregoing statements are true and correct and fully understands that WMATA may rely on these statements in determining whether a WMATA prime contractor purchasing goods from the undersigned's manufacturing concern is entitled to a 100% credit of such purchases towards its DBE goal. The undersigned further understands that any material misrepresentation will be grounds for initiating action under Federal or state laws concerning false statements.

_____ Signature of Affiant	_____ Printed Name
-------------------------------	-----------------------

Date: _____ State: _____ County: _____

On this _____ day of _____, 19____,

before me appeared _____
(Name)

to me personally known, who, being duly sworn, did execute the foregoing Affidavit, and did state that he or she was properly authorized by _____
(Name of Firm)

to execute the Affidavit and did so as his or her free act and deed.

(Seal) Sworn and subscribed before me _____
(Notary Public)

Commission Expires: _____

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M

Information for Determining Joint Venture Eligibility

Page 1

.....
Name and address of Joint Venture:

Contact Person: _____ Telephone: _____

Have you attached a copy of the Joint Venture agreement? ☐ Yes ☐ No

NOTE: Affidavit will not be processed without a copy of the Joint Venture agreement.

.....
Name and address of Joint Venture partner: _____

Contact Person: _____ Telephone: _____

Status of firm: ☐ DBE. ☐ Non-Minority.

Does firm have current WMATA, D.C. DOT or MWUCP DBE certification? ☐ Yes ☐ No

.....
Name and address of Joint Venture partner: _____

Contact Person: _____ Telephone: _____

Status of firm: ☐ DBE. ☐ Non-Minority.

Does firm have current WMATA, D.C. DOT or MWUCP DBE certification? ☐ Yes ☐ No

.....
Describe the nature of the Joint Venture's business:

Describe the role in the Joint Venture of each partner listed above:

Describe the experience and business qualifications of each partner in the Joint Venture listed above:

.....

Information for Determining Joint Venture Eligibility

Page 2

Indicate the percentage of ownership in the Joint Venture for each Joint Venture partner, indicating dollar amounts wherever applicable.

Name of Partner	Percentage of Ownership	Profit and Loss Sharing	Capital Contributions including Equipment	Other Agreements
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTALS:

Identify by name, title, race, sex and company affiliation those individuals responsible for the management control of and participation in this contract:

1. Financial decisions, such as payroll, insurance, surety and/or bonding requirements:

Name: _____ Race: _____

Title: _____ Sex: ☐ Male ☐ Female

Company affiliation: _____

2. Management decisions, such as estimating, marketing and sales, hiring and firing, purchasing supplies:

Name: _____ Race: _____

Title: _____ Sex: ☐ Male ☐ Female

Company affiliation: _____

3. Supervision of field operations:

Name: _____ Race: _____

Title: _____ Sex: ☐ Male ☐ Female

Company affiliation: _____



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Information for Determining Joint Venture Eligibility

Page 3

.....

The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operations of our following named Joint Venture:

and the intended participation by each Joint Venturer in the undertaking. Further, the undersigned covenant and agree to provide the Authority current, complete and accurate information regarding actual Joint Venture work and the payment thereof and any proposed changes in any of the Joint Venture arrangements and to permit the audit and examination of the books, records and files of the Joint Venture, or those of each Joint Venturer relevant to the Joint Venture, by authorized representatives of the Authority or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal and State laws concerning false statements.

It is recognized and acknowledged that the Authority's DBE Program shall have access to the information provided herein above for the purpose of establishing eligibility and authenticity of the minority/woman-owned status of the Joint Venture.

It is understood that trade secrets and information privileged by law, as well as commercial, financial, geological and geophysical data furnished will be protected.

(NAME OF FIRM)

(NAME OF SECOND FIRM)

(SIGNATURE OF AFFIANT)

(SIGNATURE OF AFFIANT)

(PRINT NAME)

(PRINT NAME)

(TITLE)

(TITLE)

(DATE)

(DATE)

.....

23.29 (10/99)

M

Information for Determining Joint Venture Eligibility

Page 4

.....
Date: _____ State: _____ County: _____

On this _____ day of _____, 19_____,

before me appeared _____
(Name)

to me personally known, who, being duly sworn, did execute the foregoing Affidavit, and did state that he or she was properly authorized by _____
(Name of Firm)

to execute the Affidavit and did so as his or her free act and deed.

(Seal) Sworn and subscribed before me _____
(Notary Public)

Commission Expires: _____

.....
Date: _____ State: _____ County: _____

On this _____ day of _____, 19_____,

before me appeared _____
(Name)

to me personally known, who, being duly sworn, did execute the foregoing Affidavit, and did state that he or she was properly authorized by _____
(Name of Firm)

to execute the Affidavit and did so as his or her free act and deed.

(Seal) Sworn and subscribed before me _____
(Notary Public)

Commission Expires: _____



23.06c (Rev 10/99)

Washington Metropolitan Area Transit Authority

**DISADVANTAGED BUSINESS ENTERPRISE (DBE)
MONTHLY PROMPT PAYMENT REPORT**

PRIME – CONTRACTOR'S REPORT

This report is required to be submitted to the Office of Procurement, DBE Branch 600 5th Street, NW, Suite 3C, Washington, DC 20001, pursuant to the requirements of WMATA's DBE Program Plan and §26.29 of 49 CFR Part 26.

Contract No.: _____ Reporting Period: _____

Name of Prime Contractor: _____ DBE – Yes or No _____

Prime Contract Amount: _____ Total Received this Reporting Period: _____ Total Received to Date: _____
DBE Goal _____

Name of Sub-Contractor	DBE (Y/N)	Description of Work	Date of Contract Awarded	Amount of Sub-Contractor Award	Amount Paid This Reporting Period	Cumulative Paid To Sub-Contractor	% of Physical Work Complete
TOTAL							

I certify the information furnished with respect to DBE subcontractor performance correct to the best of my knowledge and represents a current status of the prime contractor with the DBE subcontractors for the designated period covered by this report. Further, those subcontractors, due payment pursuant to the terms of their subcontracts will be paid within ten days after receipt of payment from WMATA.

By: _____

Title: _____ Date: _____

Contract No.: FQ18102
Date: April 2018

Washington Metropolitan Area Transit Authority
IFB No.: FQ18102/KKB

Washington Metropolitan Area Transit Authority

**DISADVANTAGED BUSINESS ENTERPRISE (DBE)
MONTHLY PROMPT PAYMENT REPORT**

SUBCONTRACTOR'S REPORT

This report is required to be submitted to WMATA's DBE Office, 600 5th Street, NW, Suite 3C, Washington, DC 20001, pursuant to the requirements of WMATA's DBE Program Plan and 49 C.F.R. §26.29.

Contract No.: _____ Reporting Period: _____

Name of Subcontractor: _____ DBE – Yes or No _____

Subcontractor Contract Amount: _____ Total Received this Reporting Period: _____ Total Received to Date: _____

Name of Sub-Contractor	DBE (Y/N)	Description of Work	Date of Contract Awarded	Amount of Sub-Contractor Award	Amount Paid This Reporting Period	Cumulative Paid To Sub-Contractor	% of Physical Work Complete
TOTAL							

I certify the information furnished with respect to DBE subcontractor performance correct to the best of my knowledge and represents a current status for the designated period covered by this report. Further, those contractors, due payment pursuant to the terms of their subcontracts will be paid within ten days after receipt of payment from the Contractor.

By: _____ Title: _____ Date: _____

APPENDIX C

AUTHORITY INDEX OF DRAWINGS

APPENDIX C – Authority INDEX OF DRAWINGS
See Specifications Section 2, Special Conditions-Index of Drawings

T_{HIS}
P_{AGE}
I_{NTENTIONALLY}
L_{EFT}
B_{LANK}

APPENDIX D

WAGE RATES

All on site work to be performed at the BUILDING
Rates

NOTICE: In accordance with 29 CFR, Part 1, the contractor will be required to pay wages which are not less than those established by the final Wage Determination Decision contained in the solicitation.

General Decision Number: DC180002 03/23/2018 DC2

Superseded General Decision Number: DC20170002

State: District of Columbia

Construction Type: Building

County: District of Columbia Statewide.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above – mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	01/12/2018
2	02/09/2018
3	03/23/2018

ASBE0024-007 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	\$ 35.13	16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

ASBE0024-008 10/01/2017

	Rates	Fringes
ASBESTOS WORKER: HAZARDOUS MATERIAL HANDLER	\$ 22.81	7.34

Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems

ASBE0024-014 10/01/2017

	Rates	Fringes
FIRESTOPPER	\$ 28.01	7.78

Includes the application of materials or devices within or around penetrations and openings in all rated wall or floor assemblies, in order to prevent the passage of fire, smoke or other gases. The application includes all components involved in creating the rated barrier at perimeter slab edges and exterior cavities, the head of gypsum board or concrete walls, joints between rated wall or floor components, sealing of penetrating items and blank openings.

BRDC0001-002 04/30/2017

	Rates	Fringes
BRICKLAYER	\$ 30.91	10.24

CARP0177-003 05/01/2017

	Rates	Fringes
CARPENTER, Includes Drywall Hanging, Form Work, and Soft Floor Laying-Carpet	\$ 28.36	11.53

* CARP0179-001 05/01/2017

	Rates	Fringes
PILEDRIVERMAN	\$ 29.94	10.95

CARP0219-001 05/01/2017

	Rates	Fringes
MILLWRIGHT	\$ 32.49	11.23

ELEC0026-016 11/06/2017

	Rates	Fringes
ELECTRICIAN, Includes Installation of HVAC/Temperature Controls	\$ 45.15	17.15

ELEC0026-017 09/05/2016

	Rates	Fringes
ELECTRICAL INSTALLER (Sound & Communication Systems)	\$ 27.55	10.20

SCOPE OF WORK: Includes low voltage construction, installation, maintenance and removal of teledata facilities (voice, data and video) including outside plant, telephone and data inside wire, interconnect, terminal equipment, central offices, PABX, fiber optic cable and equipment, railroad communications, micro waves, VSAT, bypass, CATV, WAN (Wide area networks), LAN (Local area networks) and ISDN (Integrated systems digital network).

WORK EXCLUDED: The installation of computer systems in industrial applications such as assembly lines, robotics and computer controller manufacturing systems. The installation of conduit and/or raceways shall be installed by Inside Wiremen. On sites where there is no Inside Wireman employed, the Teledata Technician may install raceway or conduit not greater than 10 feet. Fire alarm work is excluded on all new construction sites or wherever the fire alarm system is installed in conduit. All HVAC control work.

ELEV0010-001 01/01/2018

	Rates	Fringes
ELEVATOR MECHANIC	\$ 44.12	32.645+a+b

- a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day and the Friday after Thanksgiving.

- b. VACATIONS: Employer contributes 8% of basic hourly rate for 5 years or more of service; 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

IRON0005-011 06/01/2017

	Rates	Fringes
IRONWORKER, STRUCTURAL AND ORNAMENTAL	\$ 31.15	20.63

LABO0011-009 06/01/2017

	Rates	Fringes
LABORER: Skilled	\$ 23.42	8.04

FOOTNOTE: Potmen, power tool operator, small machine operator, signalmen, laser beam operator, waterproofer, open caisson, test pit, underpinning, pier hole and ditches, ladders and all work associated with lagging that is not expressly stated, strippers, operator of hand derricks, vibrator operators, pipe layers, or tile layers, operators of jackhammers, paving breakers, spaders or any machine that does the same general type of work, carpenter tenders, scaffold builders, operators of towmasters, scootcretes, buggymobiles and other machines of similar character, operators of tampers and rammers and other machines that do the same general type of work, whether powered by air, electric or gasoline, builders of trestle scaffolds over one tier high and sand blasters, power and chain saw operators used in clearing, installers of well points, wagon drill operators, acetylene burners and licensed powdermen, stake jumper, demolition.

MARB0002-004 04/30/2017

	Rates	Fringes
MARBLE/STONE MASON	\$ 36.91	16.55

INCLUDING pointing, caulking and cleaning of All types of masonry, brick, stone and cement EXCEPT pointing, caulking, cleaning of existing masonry, brick, stone and cement (restoration work)

MARB0003-006 04/30/2017

	Rates	Fringes
TERRAZZO WORKER/SETTER	\$ 27.44	11.44

MARB0003-007 04/30/2017

	Rates	Fringes
TERRAZZO FINISHER	\$ 22.51	10.50

MARB0003-008 04/30/2017

	Rates	Fringes
TILE SETTER	\$ 27.44	11.44

MARB0003-009 04/30/2017

	Rates	Fringes
TILE FINISHER	\$ 22.51	10.50

PAIN0051-014 06/01/2017

	Rates	Fringes
GLAZIER		
Glazing Contracts \$2 million and under	\$ 25.74	11.55
Glazing Contracts over \$2 million	\$ 29.87	11.55

PAIN0051-015 06/01/2017

	Rates	Fringes
PAINTER		
Brush, Roller, Spray and Drywall Finisher	\$ 25.06	9.66

PLAS0891-005 07/01/2016

	Rates	Fringes
PLASTERER	\$ 28.83	6.05

PLAS0891-006 02/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	\$ 28.15	10.58

PLAS0891-007 08/01/2016

	Rates	Fringes
FIREPROOFER		
Handler	\$ 16.50	4.89
Mixer/Pump	\$ 18.50	4.89
Sprayer	\$ 23.00	4.89

Spraying of all Fireproofing materials. Hand application of Fireproofing materials. This includes wet or dry, hard or soft. Intumescent fireproofing and refraction work, including, but not limited to, all steel beams, columns, metal decks, vessels, floors, roofs, where ever fireproofing is required. Plus any installation of thermal and acoustical insulation. All that encompasses setting up for Fireproofing, and taken down. Removal of fireproofing materials and protection. Mixing of all materials either by hand or machine following manufactures standards.

PLUM0005-010 08/01/2017

	Rates	Fringes
PLUMBER	\$ 41.67	17.60+a

- a. PAID HOLIDAYS: Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving, Christmas Day, New Year's Day, Martin Luther King's Birthday, Memorial Day and the Fourth of July.

PLUM0602-008 08/01/2017

	Rates	Fringes
PIPEFITTER, Includes HVAC Pipe Installation	\$ 40.69	21.07+a

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving and Christmas Day.

ROOF0030-016 05/01/2016

	Rates	Fringes
ROOFER	\$ 28.75	11.74

SFDC0669-002 04/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	\$ 34.40	19.24

SHEE0100-015 07/01/2017

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation)	\$ 40.27	18.74+a

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day

SUDC2009-003 05/19/2009

	Rates	Fringes
LABORER: Common or General	\$ 13.04	2.80
LABORER: Mason Tender - Cement/Concrete	\$ 15.40	2.85
LABORER: Mason Tender for pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking and cleaning of new or replacement masonry, brick, stone and cement	\$ 11.67	

POINTER, CAULKER, CLEANER, Includes pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking, cleaning of new or replacement masonry, brick, stone or cement	\$ 18.88
--	----------

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees

must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

General Decision Number: MD180057 03/23/2018 MD57

Superseded General Decision Number: MD20170057

State: Maryland

Construction Type: Building

County: Montgomery County in Maryland.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above – mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	01/12/2018
2	02/09/2018
3	02/23/2018
4	03/23/2018

ASBE0024-007 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	\$ 35.13	16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

ASBE0024-010 10/01/2017

	Rates	Fringes
ASBESTOS WORKER: HAZARDOUS MATERIAL HANDLER (Removal of hazardous material from ceilings, floors, mechanical systems, and walls)	\$ 22.81	7.34

* BRMD0001-006 04/30/2017

	Rates	Fringes
TILE SETTER	\$ 27.44	11.44

* BRMD0001-009 04/30/2017

	Rates	Fringes
TILE FINISHER	\$ 22.51	10.50

* BRMD0001-011 04/30/2017

	Rates	Fringes
BRICKLAYER (Excluding Pointing, Caulking and Cleaning)	\$ 30.91	10.24

* BRMD0001-012 04/30/2017

	Rates	Fringes
MASON – STONE	\$ 36.91	16.55

CARP0177-011 01/01/2018

	Rates	Fringes
CARPENTER (Including Acoustical Ceiling Installation, Drywall Hanging, Metal Stud Installation and Form Work)	\$ 28.46	11.53

CARP0219-001 05/01/2017

	Rates	Fringes
MILLWRIGHT	\$ 32.49	11.23

ELEC0026-021 09/05/2016

	Rates	Fringes
ELECTRICIAN (Communication and Sound Equipment)	\$ 27.55	10.20

ELEC0026-022 11/06/2017

	Rates	Fringes
ELECTRICIAN (Including low voltage wiring for and installation of alarms, HVAC controls)	\$ 45.15	17.15+a

- a. PAID HOLIDAYS: New Year's Day, Inauguration Day, Martin Luther King Jr.'s Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the day after Thanksgiving Day and Christmas Day.

ELEV0010-001 01/01/2018

	Rates	Fringes
ELEVATOR MECHANIC	\$ 44.12	32.645+a+b

- a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day and the Friday after Thanksgiving.
- b. VACATIONS: Employer contributes 8% of basic hourly rate for 5 years or more of service; 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

ENGI0077-018 05/01/2017

	Rates	Fringes
OPERATOR: Bulldozer	\$ 30.56	8.95+a
OPERATOR: Loader Front End Loaders 3 1/2 cubic yards and above	\$ 30.56	8.95+a
Front End Loaders Below 3 1/2 cubic yards	\$ 30.56	8.95+a

a. PAID HOLIDAYS: New Year's Day, Inaugural Day, Decoration Day, Independence Day, Labor Day, Martin Luther King's Birthday, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving and Christmas Day.

IRON0005-011 06/01/2017

	Rates	Fringes
IRONWORKER, STRUCTURAL AND ORNAMENTAL	\$ 31.15	20.63

LABO0657-017 06/01/2015

	Rates	Fringes
LABORER: Mason Tender - Cement/Concrete	\$ 22.63	7.31
LABORER: Pipelayer	\$ 22.63	7.31

PAIN0051-014 06/01/2017

	Rates	Fringes
GLAZIER Glazing Contracts \$2 million and under	\$ 25.74	11.55
Glazing Contracts over \$2million	\$ 29.87	11.55

PAIN0051-019 06/01/2017

	Rates	Fringes
PAINTER Brush, Roller, Spray and Drywall Finisher/Taper	\$ 25.06	9.66
Industrial	\$ 30.90	10.49

PLAS0891-005 07/01/2016

	Rates	Fringes
PLASTERER	\$ 28.83	6.05

PLAS0891-006 02/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	\$ 28.15	10.58

PLAS0891-008 08/01/2016

	Rates	Fringes
PLASTERER (Fireproofing Including Sprayer, Mixer, and Handler)		
Handler	\$ 16.50	4.89
Mixer/Pump	\$ 18.50	4.89
Sprayer	\$ 23.00	4.89

PLUM0005-010 08/01/2017

	Rates	Fringes
PLUMBER	\$ 41.67	17.60+aa. PAID

HOLIDAYS: Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving, Christmas Day, New Year's Day, Martin Luther King's Birthday, Memorial Day and the Fourth of July.

PLUM0602-011 08/01/2017

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe and System Installation)	\$ 40.69	21.07+a
a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving and Christmas Day.		

ROOF0030-016 05/01/2016		
ROOFER	\$ 28.75	11.74

SFMD0669-001 04/01/2017		
SPRINKLER FITTER (Fire Sprinklers)	\$ 34.40	19.24

SHEE0100-015 07/01/2017		
SHEET METAL WORKER (Including HVAC Duct Installation)	\$ 40.27	18.74+a
a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day		

SUMD2010-091 08/04/2010		
	Rates	Fringes
LABORER Common or General	\$ 14.15	2.30
Grade Checker	\$ 16.00	2.90
Landscape	\$ 9.23	
Mason Tender – Brick	\$ 13.00	0.00
Mason Tender – Stone	\$ 14.03	0.00
Mason Tender for Pointing, Caulking and Cleaning	\$ 13.21	
Mortar Mixer	\$ 16.61	9.08
POINTER, CAULKER, CLEANER, Includes pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking, cleaning of new or replacement masonry, brick, stone or cement	\$ 19.19	0.00
POWER EQUIPMENT OPERATOR:		
Asphalt Roller	\$ 21.35	5.38
Backhoe	\$ 19.82	5.02
Bobcat/Skid Loader	\$ 18.05	8.78
Boom	\$ 21.44	8.29
Crane	\$ 20.95	6.18
Excavator	\$ 20.00	0.00
Forklift	\$ 16.00	5.12
Gradall	\$ 20.50	8.42
Grader/Blade	\$ 14.50	5.18
Paver	\$ 17.47	6.36
Roller excluding Asphalt	\$ 17.60	3.88
TERRAZZO WORKER/SETTER	\$ 19.94	6.54

TRUCK DRIVER

Dump Truck	\$ 15.90	1.12
Tractor Haul Truck	\$ 17.87	9.98

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

END OF SECTION

General Decision Number: VA180013 03/23/2018 VA13

Superseded General Decision Number: VA20170013

State: Virginia

Construction Type: Building

County: Arlington County in Virginia. Includes the independent city of Alexandria*

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.35 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are

subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number

0

1

Publication Date

01/05/2018

03/23/2018

* ASBE0024-006 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR – MECHANICAL (Duct, Pipe & Mechanical System Insulation)	\$ 35.13	16.22

* ASBE0024-009 10/01/2017

	Rates	Fringes
FIRESTOPPER	\$ 28.01	7.78

Includes the application of materials or devices within or around penetrations and openings in all rated wall or floor assemblies, in order to prevent the passage of fire, smoke or other gases. The application includes all components involved in creating the rated barrier at perimeter slab edges and exterior cavities, the head of gypsum board or concrete walls, joints between rated wall or floor components, sealing of penetrating items and blank openings.

BOIL0045-003 01/01/2017

	Rates	Fringes
BOILERMAKER	\$ 32.72	25.26

BRDC0001-005 04/30/2017

		Rates	Fringes
TILE FINISHER		\$ 22.51	10.50
BRVA0001-008	04/30/2017		
BRICKLAYER		\$ 30.91	10.24
BRVA0001-009	04/30/2017		
MASON – STONE		\$ 36.91	16.55
ELEC0026-003	11/06/2017		
ELECTRICIAN (Includes Low Voltage Wiring and Installation of and Sound and Communication Systems)		\$ 45.15	17.15
IRON0005-010	06/01/2017		
IRONWORKER		\$ 31.15	20.63
PAIN0051-034	06/01/2017		
GLAZIER		\$ 25.74	11.55
PAIN0051-035	06/01/2017		
PAINTER Brush, Roller and Spray		\$ 25.06	9.66
PAIN0051-036	06/01/2017		
DRYWALL FINISHER/TAPER		\$ 25.06	9.66
PLUM0005-014	08/01/2017		
PLUMBER		\$ 41.67	17.60+a

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving and Christmas Day.

PLUM0602-016 08/01/2017

	Rates	Fringes
PIPEFITTER (Includes HVAC Pipe, Unit and Temperature Controls Installations)	\$ 40.69	21.07+a

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving and Christmas Day.

SFVA0669-006 01/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	\$ 33.40	19.52

SHEE0100-004 07/01/2016

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation)	\$ 40.27	17.24+a

- a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day

SUVA2013-025 01/11/2016

	Rates	Fringes
BRICK POINTER/CAULKER/CLEANER	\$ 19.68	0.00
CARPENTER, Includes Acoustical Ceiling Installation, Drywall Hanging, and Form Work	\$ 23.36	5.20
CEMENT MASON/CONCRETE FINISHER	\$ 21.94	3.36
FLOOR LAYER: SOFT FLOORS	\$ 18.75	0.00
IRONWORKER, REINFORCING	\$ 27.46	8.71
LABORER: Common or General, including brick mason tending and cement mason tending	\$ 15.55	2.44
LABORER: Pipelayer.	\$ 16.81	4.26
OPERATOR: Backhoe/Excavator/Trackhoe	\$ 23.50	4.50
OPERATOR: Bobcat/Skid Steer/Skid Loader	\$ 18.95	4.03
OPERATOR: Bulldozer	\$ 21.99	4.98

OPERATOR: Crane	\$ 30.45	4.14
OPERATOR: Forklift	\$ 21.56	7.57
OPERATOR: Loader	\$ 22.26	3.57
OPERATOR: Roller	\$ 16.25	4.88
ROOFER	\$ 15.83	3.06
TILE FINISHER	\$ 23.40	0.00
TILE SETTER	\$ 27.80	10.25
TRUCK DRIVER: Dump Truck	\$ 19.22	2.58
WATERPROOFER	\$ 21.75	1.57

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
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U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

- 4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Washington Metropolitan Area Transit Authority



**Replacement of Chillers and
Cooling Tower Accessories at
Eight Metro-Rail Stations
DC, MD, and VA**

**Department of Design and Construction
Services**

Office of Infrastructure Renewal Program Group

Contract No.: FQ18102

**DIVISION 01
SPECIFICATIONS**

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01723	Protection of Adjacent Construction	
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01114A	MSDS Review Request Form	
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01250A	Form C-113 Daily Report – Labor, Materials and Equipment	Not Used
01775A	Sample Preventive Maintenance Instruction (PMI)	Not Used
01775A	Asset Database Template	Not Used

END OF SECTION

**SECTION 01110
SUMMARY OF WORK**

PART 1 – GENERAL

1.01 SUMMARY

- A. The Work includes constructing the Project as indicated in the Contract Documents.
- B. The completed Project will result in the completion of construction, testing, and commissioning of the following Authority facilities:
- C. Contractor shall be responsible for all permits and inspections. Contractor shall comply with Federal and jurisdictional requirements and codes pertaining to this Project. Contractor shall also comply with all safety requirements and permits required by WMATA.
- D. The general scope of this project shall include furnishing and installation of the chillers, cooling tower accessories, refrigerant leak detection systems and chilled/ condenser water system accessories at CWPA1 Farragut North (A02), CWPA5 Bethesda (A09), CWPA6 Medical Center (A10), CWPD2 Federal Center SW (D04), CWPE3 Columbia Heights (E04), CWPG2 Capitol Heights (G02), CWPK1 Clarendon (K02) and CWPK2 Ballston (K04) chiller plant locations. The Contractor shall furnish all labor, tools, permits, coordination, materials, transportation, and other items necessary to satisfactorily complete this Project as written in the Specifications and as indicated on the contract drawing. Refer to Specification Section 01000 Scope of Work for detailed requirements for each chiller plant.
- E. The Project shall function as an integral part of and be fully compatible with the existing WMATA system.

1.02 DAYS/HOURS OF WORK

- A. The standard work week for the Contract will be 5 consecutive 8-hour days Monday-Friday, with the work scheduled between 6:00am to 2:30pm or as defined in Section 01141, ACCESS TO SITE.

Station	Area	Sub Area	Workdays	Work Hours	Notes
–Farragut North, Bethesda, Columbia Heights	Metrorail Station	Chiller room	Monday - Friday	6 am – 2:30 pm	
		Roof/Mechanical Penthouse	Monday - Friday	6 am – 2:30 pm	
	Streets/Ground Level	Platform/mezzanine or Service Rooms	As approved by COR	As approved by COR for Non-Revenue hours	For work train service or de-energizing any electrical Panels
Medical Center, Federal Center	Metrorail Station	Service Rooms	Monday - Friday	6 am – 2:30 pm	
	Streets/Ground Level		As approved by COR	As approved by COR	

	Metro Station	Platform/mezzanine	As approved by COR	Non- Revenue hours	De- energizing any electrical Panels
–Capitol Heights, Clarendon, Ballston	Chiller Plant		Monday – Friday	6 am – 2:30 pm	
	Streets/Ground Level		As approved by COR	As approved by COR	De- energizing any electrical Panels

- A. Provide Contracting Officer Representative 7 Days advance notice prior to changing shift hours and 48 hours advance notice for planned work shifts outside the established work week and work day.

1.02 LOCATION

- A. The Projects are located in Northern Virginia, Maryland and Washington, D.C. .

1.03 SITE LOGISTICS

- A. Access to the construction Site shall be as follows. Egress from the Site shall be as below.

1. Farragut North, Columbia Heights, Clarendon and Ballston

- The Chiller and major materials must be removed and delivered utilizing the ground and under-ground vent shaft entrance to the Chiller plant. Refer to contract drawings G-004 and G-005 for cooling tower location for respective chiller plants.
- All Chiller, Cooling Tower and material movements that require street closures and maintenance of traffic shall be coordinated with the appropriate State and Local authorities.
- Contractor activities shall not restrict Metrorail operations or public access.
- Bethesda, Medical Center, Federal Center, Capitol Heights: The Chillers and related items are located outside of the station. Equipment access is by a vault with hatch on grade at a nearest proximity. Capitol Heights Chiller plant is accessible on grade level.
- Refer to contract drawings G-004 and G-005 for cooling tower location for respective chiller plants..
- All Chiller, Cooling Tower and material movements that require street closures and maintenance of traffic shall be coordinated with the appropriate State and Local authorities.
- Contractor activities shall not restrict Metrorail operations or public access.

2. Construction equipment and materials will not be staged within Authority Right-of Way.

3. Construction operations will be required to be staged in area designated by the COR.

4. Staging shall be prohibited in the areas not designated by the COR for construction.

B. Parking

1. WMATA will not provide parking.

C. Constraints on Construction

1. Work Sequence

- a. Construction shall be completed in the following Phases

- (1) Phase 1: CWPA1 Farragut North (A02), CWPA5 Bethesda (A09), CWPA6 Medical Center (A10), CWPDP2 Federal Center SW (D04), CWPE3 Columbia Heights (04), CWPG2 Capital Heights (G02), CWPK1 Clarendon (K02) and CWPK2 Ballston (K04)

2. Special Events

- a. Minimize risks to the public during special community events that are located in close proximity to the Project Site.
 - b. Construction activities shall be coordinated with the event/arena and the Authority when working to reduce construction impacts during events.
 - c. Maintain a Special Community Event List in coordination with the Authority for the duration of the Contract. The list shall identify local special holidays, parades, festivals, and other similar events that are within the proximity of the Project construction area and operations. The list shall include the following information:

- (1) Name and general description of the event

- (2) Date, time of day, and duration

- (3) Location(s)

D. Work performed by Others:

1. Coordinate with COR

E. Coordination of Work with Others: Coordinate Work through the Contracting Officer Representative (COR) with the following:

1. Utilities and jurisdictional authorities affected by or having jurisdiction over the Project.
2. Other Contracting Officer Representatives, Authority consultants, and contractors associated with adjacent projects.

F. Survey Work: Perform as needed to execute the Project as specified in Section 1721, LAYOUT OF WORK AND FIELD ENGINEERING.

G. Design Completion: Perform or furnish design professional services for specified elements of the Project. Perform the design services in accordance with the specifications and requirements of the Contract and in accordance with professional standards of skill, care, and diligence adhered to by firms recognized for their expertise, experience, and knowledge in performing these services. The Contractor shall be responsible for the professional quality, technical accuracy, completeness, and coordination of the services. Design professional services shall be performed by a registered Professional Engineer licensed to practice engineering in all jurisdictions where the specified elements of the Project will be constructed.

H. Permits: Contractor shall obtain all additional permits from Utilities and Jurisdictional Authorities as needed. (refer to Section 00806, PERMITS AND RESPONSIBILITIES).

1. The Contractor shall, without additional expense to the Authority, be responsible for obtaining necessary licenses, permits not provided by the Authority, and easements and for complying with applicable International, Federal, State, local, or municipal laws, codes, or regulations in connection with the prosecution of the Work.
- I. Safety: Establish and manage Project safety in accordance with Section 01114, SAFETY/ ENVIRONMENTAL REQUIREMENTS and safety and security certification in accordance with Section 01115, SAFETY AND SECURITY CERTIFICATION.
- J. Quality: Establish and manage a Quality System in accordance with Section 01470, QUALITY MANAGEMENT SYSTEM.
- K. Testing and Systems Integration Testing
 1. Establish and perform component testing as specified in various specification sections and in accordance with Section 01470, QUALITY MANAGEMENT SYSTEM. Develop a Systems Integration Testing Plan and perform and manage Systems Integration testing for the project in accordance with Section 01113, SYSTEMS INTEGRATION TESTING.
 2. Provide and manage the services of an independent testing agency that shall conduct material testing.
 3. The independent testing agency and independent inspectors may be provided through a single entity.
- L. As-Built Documents: Maintain a hard copy drawing and specification record of as-built conditions during construction phase, and provide As-Built Drawings and As-Built Specifications at the completion of the Project in accordance with Section 01775, CLOSEOUT.
- M. Demonstration and Training: Demonstrate equipment and systems and provide training to WMATA staff as indicated in Section 01820, DEMONSTRATION AND TRAINING.
- N. Salvaging of Materials and Equipment
 1. Maintain property control records for materials or equipment to be salvaged. The Contractor shall be responsible for the storage and protection of salvaged materials and equipment and shall replace salvage materials and equipment, which are broken or damaged during salvage operations as the result of negligence or while in the Contractor's care.
 2. Salvaged material not specified for reuse shall become the property of the Contractor and shall be removed from the Site.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01111
CONTRACTOR KEY STAFF

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies key staff that forms the Contractor's team and identifies their basic functions.

1.02 REFERENCES

- A. United States Green Building Council (USGBC)
 - 1. Leadership in Environmental Engineering and Design (LEED)
 - a. New Construction and Major Renovation
- B. Registrar Accreditation Board of the American Society for Quality (RABASQ)
- C. Occupational Safety and Health Association (OSHA)
 - 1. Construction Safety Training
 - 2. First Aid/CPR/Blood Borne Pathogens Training

1.03 SUBMITTALS

- A. Submit the following within 10 Days of Award in accordance with Section 01330, SUBMITTAL PROCEDURES:
 - 1. Evidence of qualifications and experience of Key Staff.

1.04 CONTRACTOR

- A. The Contractor shall responsible for constructing the Project and for furnishing and managing the services of Subcontractors and vendors, to perform all manufacture, fabrication, installation, and construction to complete the Project in accordance with the Contract Documents, all applicable jurisdictional codes and regulations, the approved Quality Management System; the approved Safety Plan; the approved Systems Integration Testing Plan, and environmental and other applicable requirements to achieve Acceptance in accordance with the approved Project Schedule.
- B. All personnel involved in the performance of construction work shall be experienced and qualified to perform their trade, and all construction work shall be performed in a skilled and workmanlike manner.
- C. Individuals holding these key staff positions shall not be changed without written Authority approval for substitutions of key staff.
- D. Key Staff
 - 1. Construction Project Manager
 - a. Shall have a minimum of 15 years experience in managing complex multi-discipline heavy construction projects and a minimum of 10 years managing the construction of projects of a similar type and financial magnitude in the rapid transit industry.
 - b. Responsible for managing construction of all facets of the Project and has overall responsibility for its successful and timely completion.

- c. Supervises the Key Staff, shall be the sole point of contact with the Contracting Officer Representative, shall be responsible for coordinating with outside agencies as required, shall be responsible for managing cost and maintaining schedule of the Project, shall be responsible for ensuring that QA/QC and Safety guidelines are followed, and shall be responsible for testing, commissioning, and close-out of the Project. Responsibilities include but are not limited to acquiring construction permits not furnished by the Authority; managing Subcontractors, independent testing companies, fabricators and Suppliers; development, management, and implementation of Project Schedule; preparation, submittal, and management of construction submittals; maintaining as-built documentation; and coordinating with outside agencies and Utility companies on construction related matters. The Construction Manager is responsible to ensure that construction is based on the Contract Documents and that all applicable codes and standards are complied with.

2. Construction General Superintendent

- a. Shall have a minimum of 15 years' experience in complex multi-discipline heavy construction, a minimum of 10 years in rapid transit industry, and a minimum of 5 years in a supervisory capacity supervising projects of a similar type and financial magnitude.
- b. Responsible for oversight of day-to-day construction at the Site.
- c. Responsibilities include but are not limited to supervising construction activity, overseeing coordination between Subcontractors, coordinating with Quality Manager and Safety Manager in the implementation of project Quality and Safety plans, and ensuring that construction is based on current Shop Drawings and Working Drawings. The Construction General Superintendent is also responsible for maintaining as-built documentation.

3. Safety Superintendent

- a. Shall have a minimum of 10 years experience in heavy industry construction safety practices and with a minimum of 5 years in rapid transit construction in operating conditions, and shall have completed OSHA Construction Safety Training and First Aid/CPR/Blood Borne Pathogens Training. Shall be a Certified Safety Professional (CSP).
- b. Responsible for development of a construction safety plan.
- c. Shall be a full time member of the Contractor and devotes full time to worksite safety in implementing, enforcing, and maintaining the safety program for the Contractor and Subcontractor forces. The Safety Superintendent shall have no duty other than safety supervision of persons, equipment, and property affected by Contract work.
- d. Shall have specialized training and experience in construction safety supervision and have a thorough knowledge of all OSHA regulations. The Safety Superintendent shall have the ability to develop and conduct safety-training courses. The Safety Superintendent shall be familiar with industrial hygiene equipment and testing as required for the protection of all personnel and the public

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01113
SYSTEMS INTEGRATION TESTING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies systems integration testing requirements for the Project.
- B. The purpose of this Contract is for the Authority to receive a complete and fully tested system that functions efficiently as a part of the overall WMATA System and within the local community.
- C. The WMATA System includes train, bus, paratransit, and support facilities as necessary for operations.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01330, SUBMITTAL PROCEDURES, and as noted below for Contracting Officer Representative's Approval:
 - 1. Integrated System Test Plan: Within 120 Days of NTP and updated monthly thereafter.
 - 2. Integrated system test procedures: 60 Days before use.
 - 3. Authority notification of testing: Within 15 Days of testing.
 - 4. Test results: Within 10 Days of completion of test.
 - 5. Operations procedures: 60 Days prior to operations training.
 - 6. Certificates of compliance: Before Acceptance

1.03 PROCESS REQUIREMENTS

- A. The systems integration testing effort shall:
 - 1. Define methods to demonstrate interface compatibility through tests or other approved verification methods.
 - 2. Assure that reliability, availability, maintainability, and safety requirements are propagated through all systems and system components so as to meet the overall availability, dependability, and safety criteria set out in this Contract.

1.04 INTEGRATED SYSTEM TEST PLAN

- A. Prepare Integrated System Test Plan that delineates the specific integrated system tests required. These tests will directly involve Authority personnel. Revise, update, and submit this plan for Approval monthly.
- B. The Integrated System Test Plan shall include the following:
 - 1. Matrix of all systems testing required by the Contract Documents that shall be performed by Contractor, Suppliers, or Subcontractors
 - 2. Samples of test reports that shall meet the minimum requirements called for in the applicable test standards or specifications
 - 3. Coordination of on-Site and off-Site testing

4. Compliance with Authority notification requirements for planned tests and inspections
- C. Prepare integrated system test procedures in compliance with the Integrated Systems Test Plan and include the following information:
 1. System to be tested
 2. Specification Section, Article, and Paragraph relative to test
 3. Applicable standard
 4. Type of test (e.g. total system, sub-system, factory)
 5. Test equipment required
 6. Qualifications required to perform test
 7. Step-by-step procedures for the test and parameters to be tested
 8. Test frequency
 9. Test data sheets or test report forms
 10. Responsibility for test performance
 11. Completion status
 12. Means of tracking and recording corrective actions being taken to assure compliance with the Contract Documents

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION

3.01 INTEGRATED SYSTEMS TESTING PREREQUISITES

- A. A prerequisite to integrated system testing shall be that all component testing has been satisfactorily completed and that system installation is complete and ready for system integration testing.

3.02 INTEGRATED SYSTEM TESTING

- A. Provide integrated system testing to assure that system components interface properly. Appropriately test all interfaces and certify that the interfaces work properly and meet all Contract requirements. Create test procedures and test data sheets that fully exercise the interface and prove that the interface performs its intended function.
- B. The Contracting Officer Representative has the right to reject any integrated system test procedure or require additional integrated system tests if, in the Contracting Officer Representative's sole opinion, the proposed test does not adequately exercise or demonstrate the performance of the interface.
- C. Notify the Contracting Officer Representative in advance of each test. All test results shall be submitted to the Contracting Officer Representative.

3.03 PERFORMANCE DEMONSTRATION

- A. Integrated system testing shall culminate in system Performance Demonstration that shall simulate all operations and shall exercise all systems and system components as specified in Section 01820, DEMONSTRATION AND TESTING.

3.04 MONITORING AND AUDIT

- A. The Authority shall have the right to monitor and audit the systems integration testing process. Facilitate these audits by providing information and arranging for the Authority's auditors to have access to all relevant records.
- B. In addition, Authority reserves the right to witness all interface and systems integration tests. Notify the Contracting Officer Representative of each upcoming test. The Authority reserves the right to direct supplemental testing of a component, element, subsystem, or system in the interest of verifying achievement of specified performance levels, at no cost to the Authority.

END OF SECTION

SECTION 01114
SAFETY/ENVIRONMENTAL REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes construction safety and security and environmental safety requirements for the Project including WMATA's Safety Awareness Program.

1.02 REFERENCES

- A. WMATA Construction Safety and Environmental Manual (CSEM)
- B. ANSI/ISEA 107 - American National Standard for High-Visibility Safety Apparel
- C. Occupational Safety and Health Association (OSHA)
 - 1. 29 CFR §1910
 - 2. 29 CFR §1926
 - 3. 49 CFR §172
 - 4. 49 CFR §390-397
- D. U.S. Army Corps of Engineers - Safety Manual EM-385-1-1
- E. National Commission for the Certification of Crane Operators
- F. Resource Conservation and Recovery Act (RCRA) of 1976 and amendments
- G. Metrorail Safety Rules and Procedures Handbook (MSRPH) - SOP No. 19
- H. WMATA, Office of Rail Transportation Maintenance Operations Control, Administrative Procedure OAP 200-33, Site Specific Work Plan (SSWP)

1.03 QUALITY ASSURANCE

- A. Safety Superintendent: As specified in Section 01111, CONTRACTOR KEY STAFF
- B. First Aid Attendant
 - 1. Shall have current First Aid and CPR certification. A resume, certifications, and evidence of training shall be submitted documenting education and experience.
 - 2. Shall be trained in Blood-borne Pathogens in accordance with CFR §1910.1030.

1.04 SUBMITTALS

- A. Submit to the Contracting Officer Representative for approval in accordance with Section 01330, SUBMITTAL PROCEDURES, 60 Days prior to commencing construction, unless noted otherwise:
1. Documentation and Certifications of Safety Superintendent's and First Aid Attendant's, as applicable, experience in construction safety
 2. Contractor's Organizational Health and Safety Program Plan that includes OSHA required plans listed below that are applicable to the Work
 - a. Site-specific Emergency Response Plan
 - b. Site-specific Temporary Fire Protection System Plan
 - c. Site-specific Waste Water Discharge Plan if wastewater is generated
 - d. Site-specific Pollution Control Program
 - e. Site-specific Dust and Debris Control Plan
 - f. Site-Specific Work Plans for all work that will be performed in the right-of-way and operational ancillary rooms within the station
 - g. Site-specific Fall Protection Plan
 - h. Bloodborne Pathogens Exposure Control Plan
 - i. Hearing Conservation Program if employees are exposed to continuous noise in excess of the OSHA Action Level
 - j. Respiratory Protection Program if employees are exposed to dust (including crystalline silica) or other toxic atmospheres in excess of the OSHA permissible exposure limits. If a respiratory program is required, provide documentation of training, medical clearance for respirator use, and respirator fit testing.
 - k. Hot Work Program
 - l. Lockout Tagout Program
 - m. Confined Space Program
 3. Job Hazard Analysis submitted prior to each element of construction.
 4. Documentation to show that all Confined Space entrants and attendants are trained in Confined Space Entry, including hands-on-training or Confined Space Awareness, as applicable, and possess applicable licenses and certifications.
 5. Site-specific Confined Space Permits at least 48 hours before entry.
 6. Identity of all materials or chemicals to be used on Authority property (including welding rods), material safety data sheets (MSDSs) for these products, and a brief explanation of how they will be used and if wastes will be generated. Submit MSDS Review Request Forms prior to the use these materials or chemicals.
 7. CCO certificates before crane operators work on the Site.
- B. Submit to the Contracting Officer Representative for information in accordance with Section 01330, SUBMITTAL PROCEDURES, 60 Days prior to commencing construction, unless noted otherwise:

1. Certificates of Insurance for pollution liability coverage, if applicable, in accordance with Section 00877, INDEMNIFICATION AND INSURANCE REQUIREMENTS, for Contractor or Subcontractors performing work involving hazardous materials, hazardous substances, hazardous wastes, or contaminated soil or water.
2. Results of noise monitoring, air monitoring, and soil, water or waste sampling submitted weekly during work activities.
3. Documentation of medical surveillance submitted monthly.
4. Identity of equipment that may generate toxic atmospheres such as gasoline or diesel-powered generators, welding, and cutting equipment
5. Documentation of licenses and certificates required for lead or asbestos abatement, UST removal, or installation, OSHA's Hazardous Waste Operations and Emergency Response Standard (HAZWOPER), or other work requiring licensing or certification such as welding.
6. Documentation of licenses, certificates, and U.S. EPA identification numbers required for transportation of hazardous materials, hazardous substances, or hazardous wastes.
7. Documentation of licenses, permits, and certificates required for disposal of hazardous wastes including the name and address of the waste disposal facility where hazardous waste materials are to be disposed.
8. Certification of Crane Operators Certificate before the crane operator works on the Site.
9. Identification of air monitoring devices that will be used to monitor air quality at the Work Site. Provide copies of most recent manufacturer calibration and all Design-Builder field calibration checks.

1.05 SAFETY REQUIREMENTS

- A. The Contractor shall be responsible for ensuring compliance with the most stringent provisions of the applicable occupational safety and health statutes and regulations of the District of Columbia, State of Maryland, Commonwealth of Virginia or political subdivision in which the work is being performed, and the Department of Labor OSHA standards. In addition, the Contractor must comply with the following documents: the WMATA Construction Safety and Environmental Manual; the WMATA System Safety Program Plan; the Metrorail Safety Rules and Procedures Handbook (for contracts in which work is performed on, or interfaces with the Metrorail System); and the Department Bus Service Employee Handbook (for contracts in which work is performed on, or interfaces with the Metrobus System or facilities); Consolidated Plan prepared by WMATA for each Bus Division and Rail Yard in order to minimize the potential for pollutant discharge to the environment; the National Institute for Occupational Safety and Health (NIOSH) guidelines; the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines; the American National Standards Institute (ANSI) guidelines; and the U.S. Army Corps of Engineers Safety and Health Requirements Manual. The contractor shall also be responsible for compliance with applicable National Fire Protection Association (NFPA) Standards 13, 14, 24, 25 and 130. Further, the Contractor shall ensure that all methods of performing the work do not involve danger to the personnel employed thereon, the public, or private property, whether or not these methods are cited or indicated in the Contract documents. Should charges of violation of any of the above be issued to the Contractor in the course of the work, a copy of each charge shall be immediately forwarded to WMATA's Representative.
- B. The Contractor shall employ and assign to the work Safety Superintendent(s) and a separate certified First Aid Attendant, based on the contract need. At the site of the work, a first aid station shall be established and fully equipped to meet the needs of the anticipated work force. In no event shall work at the site be performed until the approved Safety Superintendent and First Aid Attendant are on duty at the site. WMATA's Representative in coordination with the Department of

System Safety & Risk Protection (SARP) will determine the needed coverage for Safety Superintendent(s) and First Aid Attendant per following two categories:

Category II. - The Safety Superintendent may be the project foreman or an employee who is on-site at all times while work is being performed, and who has the added duty of supervising the safety of persons, equipment, and property affected by contract work. The need for separate First Aid Attendant coverage will be determined by WMATA's Representative.

Any selected Safety Superintendent shall have specialized training and experience in construction safety supervision and have a thorough knowledge of all OSHA regulations. Safety Superintendent shall have the ability to develop and conduct safety training courses. Safety Superintendent shall be familiar with industrial hygiene equipment and testing as required for the protection of all personnel and the public. The Safety Superintendent and First Aid Attendant shall be responsible for First Aid and CPR at the site and must have current First Aid and CPR certificates. Employees expected to render First Aid or CPR must be trained in Blood borne Pathogens in accordance with 29 CFR *1910.1030. If, at any time, the work site is without the services of an approved Safety Superintendent and First Aid Attendant for a period of 15 calendar days or more, the work may be closed down at the discretion of WMATA's Representative. The Safety Superintendent must be acceptable to WMATA's Representative and his/her performance will be reviewed and documented by WMATA's Representative on a continuing basis. If the Safety Superintendent's effectiveness is below standard, the Contractor shall provide immediate replacement at the WMATA Representative's direction. Once employed, the Safety Superintendent shall not be changed without permission of WMATA's Representative. A resume must be submitted documenting the education and experience of the individuals assigned to perform the duties of Safety Superintendent.

- C. The Contractor shall submit a construction safety plan to WMATA's Representative for review prior to commencement of work. The Contractor shall, within five days after receipt of Notice to Proceed (NTP), submit through WMATA's Representative to the Department of System Safety & Risk Protection, a request for the Authority to schedule and conduct safety instructions at the earliest possible time for all Contractor personnel who will be engaged in the performance of Contract work on or above or under the right-of-way. The Authority will schedule and conduct for all of the Contractor's work force, an eight-hour long course of instruction related to work on the Authority's Rail Operating System. The Contractor shall not perform work at the Contract site(s) on or above or under the right-of-way, until all personnel of the contract work force have attended the Right-of-Way training as specified and have been furnished evidence of attendance. The Contractor shall follow all applicable RAIL Operational Rules: Department of Operations Administrative Procedures (OAPs), Standard Operating Procedures (SOPs), Metrorail Safety Rules and Procedures Handbook, and General and Special Orders while working in the operational railroad system. For any work within Start-Up limits all contractor's personnel shall receive WMATA Start-up Lockout/Tagout training prior to commencing the work. Copies of training documents through WMATA's Representative shall be forwarded to the Department of System Safety & Risk Protection prior to work. The Contractor shall conduct Tool Box Safety Talk meetings each night before starting work and submit the Tool Box forms each month. The Contractor shall complete Construction Safety Survey forms for each work week (template issued by WMATA).

Upon completion of a project but before the start of the revenue service, system operation or before the re-starting the operation of the renovated system or facility, the Department of System Safety & Risk Protection in coordination with WMATA's Representative will conduct the System Safety Certification to certify that all practical steps have been taken to optimize the operational safety of WMATA. The System Safety Certification Program will be conducted in accordance with the Authority's System Safety Program Plan, section 3.3.5, System Safety Certification; and System Safety Rules and Procedure Manual, section 2.2/0, Safety Certification Program. The Contractor shall conduct Tool Box Safety Talk meetings each night before starting work and submit the Tool Box forms each month. The Contractor shall complete Construction Safety Survey forms for each work week (template issued by WMATA).

- D. The jurisdictional Fire Marshals prohibit the use of oxygen-acetylene welding/cutting equipment or flammable materials anywhere in the Metrorail system during revenue hours. After each work shift, all flammable materials must be removed from the Metrorail system. The storage of hazardous and flammable materials (including such items as rags, mops, paper towels, or other combustible materials contaminated with hazardous or flammable products) on WMATA property, is restricted. Contractors seeking to store hazardous or flammable materials on WMATA property must request permission from WMATA's Representative. It may not always be possible to grant permission to store hazardous or flammable materials on WMATA property. If permission is granted, the Contractor must store the materials in compliance with the jurisdictional codes and regulations. In addition, a copy of the material safety data sheets (MSDSs) for each specific chemical and the quantity of each chemical to be stored on the site shall be provided to WMATA's Representative. The Contractor shall acquire permits for use of hazardous materials as required by the jurisdictional Fire Marshal.
- E. Contractors must submit MSDSs for ALL chemicals to be used on Authority property to WMATA's Representative along with a brief description of how and where they will be used, and if wastes will be generated. The MSDSs will be reviewed by WMATA's Department of System Safety & Risk Protection (SARP) and if approved, the materials can be used in the system. If they are rejected, the contractor must identify a substitute that will meet SARP's criteria for approval in addition to WMATA's Representative criteria for performance. The MSDSs must be recent (preferably less than 3 years old) and comply with the OSHA Hazard Communication Standard

29 CFR *1910.1200. The Contractor is responsible for complying with the requirements of the MSDSs.

- F. The use of explosives for the performance of Contract work will not be permitted without written authorization from WMATA's Representative.
- G. Prior to performing any work on or above or under the right-of-way, arrangements shall be made through WMATA's Representative for access rights and power outage in accordance with WMATA SOPs No. 19, No. 28 and No. 33 contained in the Metrorail Safety Rules and Procedures Handbook and with OAPs No. 100-9 and No. 200-10. All special requests for access, single tracking, power outages, escorts, and other Authority support shall be submitted in writing through WMATA's Representative to the appropriate RAIL officials within the time frame as set forth in the HOURS OF WORK Article of these Special Conditions.
- H. For any work within confined spaces, the Contractor and all Subcontractors shall comply with all OSHA, state and local jurisdictional rules and regulations for confined spaces. As a minimum, the Contractor shall follow 29 CFR *1910.146 for all permit confined space work on Authority property, including construction. A detailed site specific Confined Space Program shall be submitted to WMATA for review for all work requiring entry into permit confined spaces as defined by 29 CFR *1910.146. No work shall be performed in any area considered to be a permit confined space until the Contractor's Confined Space Program is reviewed by WMATA. Prior to the initial entry into any confined space (permit or non-permit), the Contractor shall coordinate entry with WMATA's Representative and take air quality readings to establish base readings and conditions. At a minimum, oxygen, lower explosive limit, carbon monoxide, and hydrogen sulfide, shall be measured. Measurement of additional parameters may be required depending on the location of the space and potential for atmospheric hazards related to contamination or work activities. These results shall be provided to WMATA's Representative for recording purposes and will determine if atmospheric hazards exist which would classify the space as a permit- required confined space. Continuous and follow-up monitoring of air quality shall meet OSHA requirements, and all subsequent results shall be provided to WMATA's Representative.
1. Prior to the start of any work involving non-permit confined spaces, the Contractor shall submit to WMATA's Representative a copy of the following:

- a. Written Job Hazard Analysis for any work to be performed in the confined space, including MSDSs for chemicals to be used in the space.
 - b. Written Emergency Response Plan which identifies emergency responders for rescue operations.
 - c. Written plan for a temporary Fire Protection System for use during the term of the Contract, which shall be subject to approval by WMATA's Representative. This plan shall include provisions for Fire Protection Systems and Equipment as required by OSHA, Safety and Health Regulations for Construction, 29 CFR 1926, Subpart F - Fire Protection and Prevention, and applicable NFPA Standards.
 - d. Identification of air monitoring devices that will be used to monitor air quality at the work site. Provide copies of most recent manufacturer calibration and all Contractor field calibration checks. As a minimum, WMATA requires field calibration checks on air monitoring instruments, each day (or shift) before use. As a minimum, the field calibration check information must include the date, time, calibration check data, and the printed name and signature of the person performing the calibration check.
 - e. Documentation to show that all personnel working in or near **non-permit** confined spaces are trained in Confined Space Awareness.
2. Prior to the start of any work involving permit-required confined spaces, the Contractor shall submit to WMATA's Representative a copy of the following:
- a. Written Job Hazard Analysis for any work to be performed in the confined space, including MSDSs for chemicals to be used in the space.
 - b. Written site specific Confined Space Program.
 - c. Confined space permit for applicable space. Each permit is valid for a maximum of 24 hours. (Submit to WMATA's Representative at least 48 hours before entry.)
 - d. Written Respiratory Protection Program.
 - e. Written Emergency Response Plan which identifies emergency responders for rescue operations.
 - f. Written plan for a temporary Fire Protection System for use during the term of the Contract, which shall be subject to approval by WMATA. This plan shall include provisions for Fire Protection Systems and Equipment as required by OSHA, Safety and Health Regulations for Construction, 29 CFR 1926, Subpart F - Fire Protection and Prevention. Contractor shall ensure that work activities do not adversely impact existing fire protection system(s) i.e., sprinklers, stand pipes, portable extinguisher, etc.
 - g. Identification of air monitoring devices that will be used to monitor air quality at the work site. Provide copies of most recent manufacturer calibration and all Contractor field calibration checks. As a minimum, WMATA requires field calibration checks on air monitoring instruments, each day (or shift) before use. As a minimum, the field calibration check information must include the date, time, calibration check data, and the printed name and signature of the person performing the calibration check.
 - h. Documentation to show that all Confined Space entrants and attendants are trained in Confined Space Entry, including hands-on-training. Documentation to show that all personnel working near the permit-required confined spaces (no entry) are trained in Confined Space Awareness.

- i. Documentation to show that all personnel required to wear respiratory protection have received respiratory protection training, have been fit tested for the respirators they are required to wear (applies to tight fitting respirators) and have been medically evaluated to verify that they have no health problem that would interfere with their safe use of a respirator.
- j. A warning sign to identify the work site as a permit-required confined space requiring authorization to enter.
- k. The Contractor is required to notify the state of Maryland at least 24 hours prior to entering permit-required confined spaces located in the state of Maryland. The Contractor will be given a log number by the State which they must provide to WMATA's Representative.
- l. Contractor must provide a Job Hazard Analysis prior to the start of each phase of work.
- J. Work clothing consists of long pants, shirts with long or short sleeves, sturdy work boots, and appropriate personal protective equipment. Jewelry that hangs, loose clothing or clothing with non-detachable hoods, drawstrings, or anything that can become entangled in machinery, shall not be worn on the work site if machinery is in use on the work site. Personal protective equipment such as hard hats and footwear shall meet the requirements of 29 CFR ' 1910.135 and ' 1910.136. Athletic-type footwear shall not be worn on WMATA work sites.
- K. Smoking is prohibited in the Metrorail system, at WMATA facilities, and in WMATA vehicles. WMATA's Representative, will select a designated smoking area outside the system and/or facilities and Contractor employees will be informed of its location. Contractor personnel found smoking in un-designated areas on WMATA property or in the Metrorail system will be subject to removal from WMATA property. The Contractor's Safety Superintendent shall be responsible for ensuring compliance.
- L. The OSHA standard for sanitation, 29CFR & 1910.141, shall be followed. Prior to starting work, the contractor should furnish for the contractor's staff, necessary toilet convenience secluded from public view. They should be kept in a clean and sanitary condition and should comply with the requirements and regulations of the area in which the work is being performed. Potable drinking water shall be provided with individual cups and sanitary conditions for the water dispenser shall be maintained. A common drinking cup and other common utensils are prohibited.
- M. Contractor and Subcontractor employees shall cooperate with representatives of the Authority and federal, state, and local regulatory agencies during site inspections or investigations. Inspection and investigation activities do not involve directing of Contractor's work, but may involve interviews with Contractor and Subcontractor personnel. CAPM, ENSV and SARP will notify WMATA's Representative of any operation that is not in compliance with federal, state, or local health and safety or environmental regulations or WMATA policy and procedures, and that may require the Contractor or Subcontractor to stop work on a specific task or operation.
- N. For any work at heights above six feet, the Contractor must submit a detailed, site-specific Fall Protection Plan. The Contractor must comply with the most stringent OSHA requirements for Walking-Working Surfaces (29 CFR Part 1910 Subpart D), Scaffolds (29CFR Part 1926, Subpart L), and Fall Protection 29 CFR Part 1926, Subpart M.
- O. The Contractor and all Subcontractors shall comply with 29 CFR ' 1910.95, *Occupational Noise Exposure* for all work on Authority property, including construction. This standard requires that employees exposed to continuous noise in excess of the OSHA Action Level, participate in a Hearing Conservation Program. Instruments used for noise measurements must be appropriate for the type of noise being measured (impact/impulse or continuous).

- P. If the work involves removal of paints or coatings, the Contractor must test the paint or coatings to determine if they contain heavy metals such as lead that require special handling and disposal considerations. As a minimum, testing should be conducted for the eight Resource Conversation and Recovery Act (RCRA) of 1976 and amendments metals (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium). If any of these are present, the components will require special handling and disposal to prevent exposure to workers, patrons, the community, and the environment.

The Contractor and/or Subcontractor performing lead-based paint abatement, removal, or control, must have all licenses and accreditations required by the jurisdiction in which the work is performed. Jurisdictions that do not have their own state lead plans fall under the auspices of the Environmental Protection Agency (EPA). The Contractor and Subcontractor employees are required to have medical monitoring to meet the requirements of 29 CFR 1910.1025 and 1926.62. As a minimum, medical monitoring shall consist of biological monitoring for lead and zinc protoporphyrin and shall include a physician's medical determination. As a minimum, biological monitoring shall be conducted immediately prior to working on a WMATA property where the employee may be exposed to lead, and immediately upon completion of this work. The Contractor and Subcontractor employees shall receive training for lead workers and supervisors as required by the jurisdictional regulations. Documentation shall be provided to WMATA's Representative prior to commencement of work. All documentation shall be authentic and verifiable. All materials must be handled and disposed of in compliance with the jurisdictional regulations. MSDSs for replacement paints/coatings must be reviewed by WMATA prior to use on WMATA property.

- Q. If the work involves removal of insulation, flooring, cove base, mastic, ceiling tile, roofing materials, or any other material that is suspected of containing asbestos, the Contractor must have the materials sampled and analyzed to determine if they contain asbestos. If the Contractor and/or Subcontractor will be handling or removing asbestos-containing materials, the Contractor and/or Subcontractor must have all licenses and accreditations required by the jurisdiction in which the work is performed. The Contractor and Subcontractor employees are required to have medical monitoring to meet the requirements of 29 CFR 1910.1001 and 1926.1101. The Contractor and Subcontractor employees shall receive training for asbestos workers and supervisors as required by the jurisdictional regulations. Documentation shall be provided to WMATA's Representative prior to commencement of work. All documentation shall be authentic and verifiable. All materials must be handled and disposed of in compliance with the jurisdictional regulations. All replacement materials shall be free of asbestos.

Contractors shall follow the WMATA Technical Specification for Asbestos Removal.

- R. Contractor and Subcontractor employees shall not be exposed to asphalt fumes in excess of the National Institute for Occupational Safety and Health (NIOSH) recommended ceiling limit of 5 milligrams of asphalt fumes per cubic meter of air (5 mg/m^3), in any 15 minute period. NIOSH provides recommendations for control of asphalt fumes.
- S. Work that generates visible dust requires submission of a Dust and Debris Control Plan to prevent exposure of employees, patrons, and the community to dust including crystalline silica dust. Be prepared to submit air monitoring data to demonstrate effectiveness of dust control measures. If dust cannot be controlled, submit Respiratory Protection Program in compliance with 29 CFR 1926.103 or 29 CFR 1910.134, and be prepared to submit evidence of air monitoring, training documentation, medical clearance for respirator use, and respirator fit tests for tight-fitting respirators.
- T. The Contractor shall ensure that the level of exhaust emissions from equipment such as air compressors and generators, are within acceptable limits to comply with clean air regulations and that workers are not exposed to exhaust fumes or gases (carbon monoxide,

sulfur dioxide, nitrogen oxides, hydrogen sulfide, aldehydes) in excess of the most stringent of occupational exposure limits.

- U. The Contractor shall submit a Waste Water Discharge Plan that describes how the Contractor will treat and release waste water generated by activities at the work site, for all work that generates waste water. Contractor shall also comply with Consolidated Plan prepared by WMATA for Bus Divisions and Rail Yards.
- V. For abrasive blasting activities, the Contractor must submit MSDSs for abrasives to WMATA's Representative prior to abrasive blasting activities. Only abrasives containing less than 1 percent crystalline silica shall be used for abrasive blasting.
- W. For hot work activities, the Contractor and Subcontractors shall provide documentation on certification for personnel who perform welding on WMATA property. Ventilation in accordance with OSHA regulations, shall be provided for hot work such as welding, cutting, or brazing.
- X. At the site of the work, a First Aid Kit shall be provided and fully equipped to meet the needs of the anticipated work force. Employees expected to render First Aid or CPR must have the proper current certifications and be trained in Blood-borne Pathogens in accordance with 29 CFR ' 1910.1030.
- Y. The contractor shall be responsible for all subcontractors, suppliers and other persons working under the contractor's direction to comply with all requirements as noted above and herein, and shall disseminate these requirements to those personnel. Contractors and Subcontractors shall ensure that their personnel complete safety training by WMATA on the rules and procedures for working on the right-of-way before starting such work.
- Z. The Contractor shall immediately report all accidents and incidents (including near misses) that occur during the performance of the work, to WMATA's Representative.
- AA. Work shall not be performed in any area in use by the public, unless specifically required by the Contract or directed in writing by WMATA's Representative. The Contractor shall give at least 48 hours' notice to WMATA's Representative before beginning such work.
- BB. In cases where the movement of motorized equipment is necessary, flag persons shall be provided to warn and direct personnel and patrons away from the area of travel. Flag persons must be certified as trained in proper flagging techniques and Contractor employees involved in traffic control and devices must be certified as trained in traffic management as required by the State or local jurisdiction. Certification must be documented. WMATA's Representative shall be notified before using heavy equipment in or near stations and their entrances, building entrances, bus bays, sidewalks, etc. Under no circumstances shall motorized equipment be left unattended with the motor idling. Always remove keys from motorized equipment not in use. Provide proper blocks as necessary to prevent running away of any equipment.
- CC. When it is necessary to maintain use of work areas involving stations, sidewalks, elevators, platforms, bus shelters, vehicular roadways, building entrances, corridors, etc., the Contractor shall protect the area with guardrails, substantial barricades, temporary fences, overhead protection, and temporary partitions as deemed necessary by WMATA's Representative. Under no circumstances will yellow or orange tape strung between barricades, or the like, be acceptable as a substantial barricade. Open manholes, access openings or other breaks in the normal walking surface shall be isolated from personnel and the public using barricades.
- DD. Sidewalks, entrances, platforms, mezzanines or any other location where personnel or the public traverses, shall always be kept clear of obstruction, tools, ladders, work debris, excavation materials, etc. When necessary, temporary sidewalks, or pathways shall be

provided for pedestrian traffic. Temporary sidewalks or pathways shall be free of tripping hazards and protected by proper guardrails and barricades. Temporary means of egress and access shall be marked for easy recognition. If work is required above sidewalks or pathways, substantial overhead protection shall be provided. Protected walkways shall be approved by WMATA's Representative.

EE. Appropriate warning signs and instructional safety signs shall be conspicuously posted in all areas involving construction activities. Work involving electrical systems or equipment in or near the area to which personnel or the public have access shall be isolated using barricades, partitions, etc. Exposed, live circuits shall not be left accessible to personnel or the public or left dangling overhead. Before completion of the work, the Contractor shall:

1. Ensure that all wiring is insulated and properly positioned.
2. Verify grounding, bonding, or both, of all metallic conduit, wiring or electrical equipment that is in the areas of contractual effort, and to which the public can make contact.
3. Notify WMATA's Representative immediately in those instances where verification cannot be made.
4. Contractor's personnel working near the platform edge or in the right-of-way shall wear reflective safety vests with the tear-away feature, to identify them to passing trains, as directed by SARP at the right-of-way safety training required in this Section. The safety vests shall comply with the ANSI/ISEA 107-1999 guideline entitled *American National Standard for High-Visibility Safety Apparel*. All of the Contractor's personnel are required to attend safety training provided by SARP before starting work near the platform edge or in the right-of-way.

FF. Use of Cranes and Derricks:

- 1 General Safety Requirements. Comply with the following:
 - [1] 29 CFR ' 1910.180 through ' 1910.189.
 - [2] 29 CFR ' 1926.550 through ' 1926.556
 - [3] U.S. Army Corps of Engineers, Safety Manual EM-385-1-1.
2. No part of any Crane or Derrick Boom shall swing over WMATA patrons, tracks or stations without a WMATA Representative-approved shield or approved procedure.
3. Placement of Crane or Derrick shall be coordinated with WMATA's Representative.
4. Rights for use of the Crane or Derrick affecting Metrorail Operations are granted through SOPs No. 19 and 33 of the Metrorail Safety Rules and Procedures Handbook.
5. A supervisory or a red tag power outage is required. Exceptions may be granted on an individual basis after a review and approval by the Authority.
6. Hardhat requirements are enforced.
7. "Swing Stop" requirements may be instituted based on the hazards involved.
8. Use of Cranes and Derricks over common corridor railroads and highways is under the rules of the affected common corridor railroad or highway owner.

- GG. All site visits for visitors and tours shall be coordinated through WMATA's Representative in accordance with the WMATA Construction Safety and Environmental Manual.

ENVIRONMENTAL SAFETY REQUIREMENTS

- HH. The Contractors and Subcontractors shall be responsible for complying with the most stringent of federal, state, or local environmental regulations for air, water, land, and waste in order to maintain the safety and health of employees, WMATA patrons, and the community.
- II. If the work task requires specialized licenses for example "lead or asbestos abatement contractor's license", Contractors and Subcontractors shall be required to show evidence of such registration prior to commencement of work. If the work requires specialized training for example lead or asbestos training, Contractors and Subcontractors shall be required to show evidence that their employees have received such training prior to commencement of work.
- JJ. If the work requires transportation of hazardous materials or hazardous substances, Contractors and Subcontractors are required to provide evidence of Department of Transportation General Awareness Driver's Training in compliance with 49 CFR '172 and Commercial Driver's License in compliance with 49 CFR '390-397, prior to commencement of work.
- KK. All hazardous materials and hazardous substances, must be stored in performance Oriented Packaging' in compliance with 49 CFR ' 178, Subpart L.
- LL. If the work requires disposal of hazardous wastes, disposal must be to a Treatment/Storage/Disposal facility with a Part B Permit and the waste hauler must have a state or local license and U.S. EPA identification number. The Contractors and Subcontractors shall be required to provide evidence of all applicable licenses and permits along with the name and address of the waste disposal facility where hazardous waste materials are to be disposed, prior to commencement of work.
- MM. If the work involves response to spills of hazardous materials, hazardous substances or hazardous wastes, the Contractor or Subcontractor personnel shall have appropriate training that complies with 29 CFR ' 1910.120.

NN. CONTRACTOR'S SAFETY SUBMITTALS.

On-site work activities shall not begin until the appropriate submittals are provided to WMATA by the prime Contractor and the Subcontractor performing the work shall submit the following documentation.

1. Job Hazard Analysis (prior to each phase of work).
2. Site-specific Emergency Response Plan.
3. Site-specific Temporary Fire Protection System Plan.
4. Documentation of Safety Superintendent's experience in construction safety.
5. Experience Modification Rating for the last 2 years.
6. Accident/illness rates for lost time accidents/illnesses over the last 2 years.

7. Record of federal, state, or local violations of environmental and occupational safety and health regulations for the last 2 years.
8. Organizational Health and Safety Program including OSHA required programs applicable to the work and site. For work and sites not addressed in the original Organizational Health and Safety Program, addenda may be added when the work and sites are identified, however, the addenda must be submitted to WMATA's Representative for review prior to the commencement of specified work.
9. Site-specific Waste Water Discharge Plan (if waste water is generated).
10. Site-specific Pollution Control Program.
11. Site-specific Dust and Debris Control Plan.
12. Blood-borne Pathogens Exposure Control Plan.
13. Hearing Conservation Program if employees are exposed to continuous noise in excess of the OSHA Action Level.
14. Respiratory Protection Program if employees are exposed to dust (including crystalline silica) or other toxic atmospheres in excess of the OSHA permissible exposure limits. If a respiratory program is required, the Contractor also must provide documentation of training, medical clearance for respirator use and respirator fit testing.
15. Hot Work Program.
16. Lockout Tagout Program.
17. Site-specific Confined Space Program.
18. Documentation of applicable training, licenses, certifications, including First Aid and CPR certificates and Blood-borne Pathogens training.
19. Identity of all materials or chemicals the Contractor will use on Authority property (including welding rods), material safety data sheets (MSDSs) for these products, and a brief explanation of how they will be used and if any wastes will be generated.
20. Identity of equipment that may generate toxic atmospheres such as gasoline or diesel-powered generators, welding and cutting equipment.
21. Documentation of licenses and certificates required for lead or asbestos abatement or other work requiring licensing or certification such as welding.
22. Certificate of Insurance, including pollution liability coverage, endorsed to WMATA is required for Contractors or subcontractors performing work involving hazardous materials, hazardous substances, hazardous wastes, or contaminated soil or water.
23. Results of sampling (paint, soil, water, or other materials) required for determining pre-work conditions and the presence of existing contamination.
24. Baseline biological monitoring for lead exposure (within the month prior to work on WMATA property that may involve exposure to lead).

The following submittals are required **at least weekly** after work activities have commenced on the site:

25. Notification of medical surveillance results that exceed action levels for all Contractor and Subcontractor employees working on this project.
26. Notification of all medical removals or restricted duty assignments of Contractor and Subcontractor employees working on this project.
27. Periodic noise monitoring, air monitoring, personal exposure data, equipment emissions, and breathing air quality, as applicable.
28. Records of daily field calibration checks for monitoring equipment.
29. Results of laboratory analysis for any additional sampling (paint, soil, water, or other materials) conducted during the project. SARP will request the following documentation be submitted by the Contractor upon completion of work:
30. Results of laboratory analysis for any sampling (paint, soil, water, or other materials) collected after completion of activities at each site.
31. Documentation of final medical surveillance results. The samples are to be collected upon completion of work on this project and before employees start work on any other projects.

HAZARDOUS MATERIALS SUBMITTALS

The following documentation shall be provided to WMATA prior to transport or disposal of hazardous materials or substances:

1. Documentation of licenses, certificates, and U.S. EPA identification numbers required for transportation of hazardous materials, hazardous substances, or hazardous wastes.
2. Documentation of licenses, permits, and certificates required for disposal of hazardous wastes including the name and address of the waste disposal facility where hazardous waste materials are to be disposed.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01115
SAFETY AND SECURITY CERTIFICATION (WAIVED BY SAFE)

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the process used to certify that the WMATA system complies with the specified safety and security requirements.

1.02 REFERENCES

- A. Federal Transit Administration
 - 1. Handbook of Transit Safety and Security Certification
 - 2. Guideline 5800.1 - Safety and Security Management Guide for Major Capital Projects
- B. Transportation Safety Institute
- C. WMATA Safety and Security Certification Program Plan

1.03 JOB CONDITIONS

- A. The Certifiable Items List (CIL) that shall be completed by the Contractor throughout the Period of Performance of this Contract is provided as an attachment to this Specification Section. The design related entries in the CIL have been completed by the Authority. A sample CIL with all entries completed is also attached to this Specification Section.

1.04 SUBMITTALS

- A. Submit the following documents for approval in accordance with Section 01330, SUBMITTAL PROCEDURES:
 - 1. Safety and Security Certification Management Plan (SSCMP) within 60 Days of NTP.
 - 2. Updated CIL for construction and testing every 60 Days for the duration of the Contract.
 - 3. If design changes are proposed by Contractor, updated CIL submitted with each Contractor proposed design change.
 - 4. If design changes are proposed by Contractor, updated Hazard and Vulnerability Resolution and Tracking System submitted with each Contractor proposed design change.
 - 5. If design changes are proposed by Contractor, updated Hazard Analysis and Threat Vulnerability Assessment submitted with each Contractor proposed design change.
 - 6. Final CIL for construction and testing component and Certification Report for construction and testing component in accordance with FTA Guideline 5800.1, Safety and Security Management Guidance for Major Capital Projects. Include design component of CIL and Certification Report if design changes were proposed by the Contractor and Approved by the Authority.

1.05 QUALITY

- A. Contractor's Certification Program Representative shall have, within the last 3 years, completed a recognized certification training course provided by Federal Transportation Administration (FTA), Transportation Safety Institute (TSI), or other recognized Safety and Security Certification Training Agency.

1.06 GENERAL

- A. The purpose of the Safety and Security Certification program is to ensure that:
1. Design changes proposed by Contractor, construction, fabrication, installation, testing, and commissioning of all safety critical facility and system elements have been evaluated for compliance with the safety and security requirements, including applicable codes and standards, and to verify their readiness for operational use.
 2. WMATA's rail and bus facilities and systems are operationally safe and secure for customers, employees, and the public.
- B. The objective is to achieve an acceptable level of safety and security risk through a systematic approach to safety hazard and security vulnerability management through adherence with the design criteria, compliance with technical specifications, and testing verification.

1.07 SECURITY AND SAFETY CERTIFICATION PROCESS

- A. Participate in the WMATA Safety and Security Certification Program Plan for the duration of the Contract as follows:
1. Contractor's Certification Program Representative shall manage and oversee compliance with the WMATA Safety and Security Certification Program Plan requirements.
 2. Participate in working groups with Authority Safety, Security, and Project Staff to establish the certification status of the items on the CIL.
 3. Identify certifiable items for Contractor proposed design changes and complete development of the Authority provided CIL to address all Contract specific items requiring safety and security certification based on the construction and testing plan, and input from the working group.
 4. Identify the safety and security design criteria, technical specifications, and testing requirements, including applicable codes and standards, for each certifiable item on the CIL that resulted from a Contractor proposed design change.
 5. Demonstrate that the design complies with the identified safety and security requirements for those items on the CIL that resulted from a Contractor proposed design change.
 6. Demonstrate that the construction, fabrication, and installation comply with the safety and security requirements for those items on the CIL.
 7. Demonstrate through testing the compliance with the safety and security requirements for those items on the CIL.
 8. If changes are proposed to the design, identify and categorize project hazards by their potential severity and probability of occurrence. Analyze each hazard for its potential impact to the Project.
 9. If changes are proposed to the design, evaluate project for susceptibility to potential threats and identify design corrective actions that can reduce or mitigate the risk of serious consequences from a security incident. Analyze each identified threat for its potential impact to the Project.
 10. Provide and update a tracking system for all hazards and threat vulnerabilities identified as a result of Contractor proposed design changes.
 11. Maintain a document management system within the Authority's Project Management Software System (PMSS) that enables the retrieval of verification documentation that demonstrates compliance with the safety and security requirements in construction, fabrication, installation, and testing for each item in the CIL. Verification documentation may consist of drawings,

reports, fabrication approvals, inspection, test results, certificates, or other supporting documents.

12. Complete the construction/installation, and testing sections of the CIL as compliance is achieved and provide the required CIL verification documentation to WMATA as the construction and testing progresses.
13. Prepare construction and testing component of Certification Report and include design component if design changes were proposed by the Contractor and Approved by the Authority.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 CERTIFICATION PROGRAM REPRESENTATIVE

- A. Appoint a Certification Program Representative with the qualifications noted in this Section to lead and coordinate the certification process.

3.02 SAFETY AND CERTIFICATION PROGRAM WORKSHOPS

- A. Conduct Safety and Security workshops on a monthly basis for the duration of the Contract.

3.03 CIL AND FINAL REPORT

- A. Prepare, update and complete CIL throughout the Period of Performance of the Contract and prepare final CIL and Certification Report prior to Acceptance of the Project.

END OF SECTION

SECTION 01116
IDENTIFICATION AND SECURITY

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes identification and security requirements for work on Authority Property.

1.02 DEFINITIONS

- A. Authority Property: Includes the Authority's Rail and Bus Operating System and Authority administrative facilities, whether under construction or being rehabilitated.

1.03 SUBMITTALS

- A. Forms necessary to initiate background check process, including color copy of the front and back of Contractor personnel's Driver License or other accepted form of identification.

1.04 PRE-EMPLOYMENT CRIMINAL BACKGROUND CHECK

- A. Background checks are conducted to promote a safe work environment and to protect our company's most important assets: the people we serve and the people with whom we serve. This enables WMATA management to make prudent decisions and maintain a high quality workforce. Contractor employees who successfully complete the background checks are eligible to enter WMATA property once they are issued a Contractor badge. Contractor employees who do not authorize background checks or whose background checks are unsatisfactory will not be granted Contractor badges or access to WMATA property. The records generated by these background checks that contain private information will not be disclosed unless disclosure is required under the PARP/Privacy Policies.

1.05 IDENTIFICATION AND SECURITY CHECKS

- A. All employees of the Contractor and its Subcontractors working on WMATA projects shall prominently display an identification badge issued by the Authority.
- B. Contractor Photo ID Badges: Individuals requiring the Contractor photo ID badges are subject to the following identification and security checks
 1. Provide valid and current photo identification, such as a State-issued Driver's License, State-issued Identification Card, U.S. Passport, or identification from the Immigration and Naturalization Service, such as a Permit to Work or a Permanent Residence Card (Green Card).
 2. The individual's identification may be matched against the FBI Watch List and security clearance.
 3. The photo identification will be matched against the Contractor's list of employees authorized to work on a particular job.

1.06 NON-CONFORMANCE

- A. In the event any employee of the Contractor or its Subcontractors fails to adhere to the requirements of this Section, the employee or Subcontractor will be removed from the job until non-conformance is corrected. Such removal will not be grounds for any time extension or additional compensation.

1.07 ADMINISTRATION

- A. Contractor Photo ID Badge:

1. A Contractor Photo ID badge will be required if the individual will be present on Authority Property. Issuance of the Contractor Photo ID badge will require the individual to schedule and report to the Authority's Jackson Graham Building at 600 Fifth Street, NW, Washington DC for processing.
2. Contractor Photo ID badge takes approximately 14 Days to obtain unless personnel have lived outside of the United States within the last year, in which case the background checking process will require additional time to complete.
3. It will be the Contractor's responsibility to immediately notify the Contracting Officer Representative if a worker loses his or her Contractor Photo ID badge. A fee will be charged for each lost badge.
4. All Contractor Photo ID badges shall be returned to the Contracting Officer Representative when they are no longer needed.
5. Contractor Photo ID badges shall be renewed on an annual basis.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01141
ACCESS TO SITE

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies requirements for gaining access to Site and describes work hours the Contractor will be allowed in WMATA Trackway and Operating Facilities.

1.02 DEFINITIONS:

- A. Non-Revenue Hours of Work – When the Authority is not operating revenue service trains and the track is made available to the Contractor.
- B. Revenue Service Adjustment (RSA) Hours of Work – There are two service conditions:
 - 1. Single tracking when a single track is made available to the Contractor to work while the Authority operates trains in both directions on the opposite track.
 - 2. Shutdowns when both tracks of a section of line are made available to the Contractor to work.

1.03 IDENTIFICATION CARDS

- A. All Contractor personnel needing access to trackway or WMATA operating facilities must have WMATA Safety Certification badges. Additionally, Contractor shall provide its personnel, visiting or working at the Site, with Contractor Photo ID Badges. Both badges shall be displayed in a prominent manner on each person while engaged in the Work. Access to the Site will be granted only to properly accredited representatives of the Contractor and its Subcontractors when they have completed the required WMATA safety certification and training and received Photo ID Badges.

1.04 HOURS OF WORK

- A. Work such hours per shift, with or without overtime, as many shifts per day and as many days per week as necessary to complete the various parts of the Work and the entire Work within the dates specified and within the restrictions listed below.
- B. Work within WMATA trackway, on station platforms and within WMATA operating facilities affecting revenue service shall be carried out during non-revenue hours and/or Revenue Service Adjustment (RSA) hours and under the oversight of WMATA escorts.
- C. Coordinate and schedule all work with the Contracting Officer Representative to ensure that the Contractor's activities do not interfere with the operation of or access to the Authority's facilities.
- D. Typical working hours for work not requiring access to track or other Authority facilities that require escorts for access are 0700 to 1600.
- E. Project Schedule, as required in Section 01322, CONTRACT PROGRESS REPORTING, shall include a detailed construction-phasing plan based on the Hours of Work commitments by the Authority. If the phasing plan requires RSA hours, these shall be identified by the Contractor in the Project Schedule by calendar quarter within which they will occur.
- F. There are Federal Holidays that occur on Monday's throughout the year creating a 3-day weekend. In addition to the Hours of Work indicated in Article 1.04G herein, on holiday weekends listed below, single track RSAs will be permitted between 2200 Friday and 0400 Tuesday and complete shutdown RSAs will be permitted between 0300 Saturday and 0400 Tuesday.
 - 1. Martin Luther King Day

2. President's Day
 3. Memorial Day
 4. Columbus Day
 5. Labor Day
- G. The Hours of Work associated with non-revenue and the frequency that these Hours of Work will be available to the Contractor are noted below. Also included are specific dates for the first year of construction, which shall be incorporated into the Project Schedule by the Contractor as required work dates.
1. Non-revenue (0200 to 0700) – Sunday morning
 2. Non-revenue (0100 to 0400) – Monday – Friday mornings
 3. Non-revenue (0200 to 0600) – Saturday morning
- H. RSAs will not be permitted during the following periods in any calendar year:
1. March 12 through April 21
 2. The first Saturday of June (Race for the Cure)
 3. The week containing July 4 including the preceding and succeeding weekends.
 4. The 4th Sunday of October (Marine Corps Marathon)
 5. Thanksgiving eve through the following Monday
 6. Christmas eve and Christmas day
 7. New Year 's Eve and New Year's day
- I. Many times during a calendar year there are large events scheduled in the Washington DC area that require special attention by WMATA. These events are typically scheduled no sooner than 90 Days in advance of their occurrence. Plan no more than three such events in any calendar year. WMATA will notify the Contractor of the scheduling of these events as soon as they become known. If the event conflicts with a scheduled RSA, then the Contractor RSAs will need to be advanced or delayed 1 week unless there is conflict with the black-out periods listed above.
- J. There shall be no RSAs starting prior to 0100 on nights of regularly scheduled sporting events such as baseball, basketball, hockey, or soccer.
- K. Emergencies, excluding Acts of God, arise during the course of Metrorail operations that could cause the cancellation of a scheduled RSA. Anticipate no more than four cancellations within a calendar year. If an emergency occurs, then the Contractor RSAs will need to be delayed 1 week unless that conflicts with the black-out periods listed above.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01180
PROJECT UTILITY INTERFACE

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the Contractor's responsibilities regarding interface with Utility companies and agencies.

1.02 SUBMITTALS

- A. Submit sets of drawings and specifications to those Utilities and agencies affected by construction as required. Provide the Contracting Officer Representative with an electronic copy of all transmittal letters and other communications and replies thereto as each is sent to or received from a Utility or agency.
- B. Complete list of affected Utilities and agencies to the Contracting Officer Representative:
- C. Shop Drawings for utility connections and special facilities developed during construction.

1.03 UTILITIES AND AGENCIES

- A. Comply with the requirements of each Utility and agency.
- B. The Utilities and agencies listed hereinafter may not be all inclusive. Recommend additional agencies/utility companies as appropriate. Determine all affected Utilities including but not limited to the following agencies or their successor agencies and submit complete list to the Contracting Officer Representative:
 - 1. Verizon
 - 2. Washington Gas
 - 3. PEPCO
 - 4. WSSC
 - 5. Comcast
 - 6. Cox Cable
 - 7. Plantation Pipeline Company
 - 8. Other identified utility owner (cable, fuel lines, etc.) whose facility will be affected by the construction

PART 2 – PRODUCTS

2.01 APPROVED PRODUCTS

- A. All products to be utilized on any utility shall be as approved by that Utility.

PART 3 – EXECUTION

3.01 DESIGN, CONSTRUCTION, AND MAINTENANCE OF UTILITY FACILITIES

- A. All work performed by the Contractor on any utility, if any, shall be performed in accordance with the requirements of that Utility and the full knowledge of the Contracting Officer Representative.
- B. Contract Drawings indicate where Utilities will self-perform design, construction, and maintenance of their facilities in relation to this Contract. Coordinate the schedule and the interface for the Work of the Contract with the work done by Utility.
- C. Provide the Utilities with detailed Shop Drawings for utility connections and special facilities during construction.

END OF SECTION

SECTION 01250
CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies procedures for making Contract Modifications.

1.02 GENERAL

- A. Out-of-Scope Items. Specific approval must be received from the Contracting Officer Representative prior to doing work, which may be considered to be outside the Scope of Work and for which additional reimbursement may be requested in accordance with the General Conditions.
- B. Requests for additional work may be initiated by the Authority. Claims for an increase in Contract Price shall be thoroughly documented as specified in the General Conditions and directed to the Contracting Officer Representative who, upon Approval, will issue a Modification stating the amount of the increase in fee.
- C. Should the Contractor be excused from the provision of certain services identified in this Scope of Work, the Contractor will be requested to give a credit to the Authority. The offer for the credit shall be documented and directed to the Contracting Officer Representative who, upon Approval at the appropriate level, will issue a Modification.

1.03 TIME AND MATERIALS WORK FOR THE CONSTRUCTION EFFORT

- A. In the event equitable adjustment cannot be agreed to in a timely manner, the Authority reserves the right to order work on a time and materials basis as specified in the General Conditions. When work is ordered under this Section, notwithstanding the provisions of other Sections, compensation for the Work shall be determined as hereinafter provided and shall constitute the total compensation to be paid for the changes to the Work. The methods, labor, materials, and equipment used in the performance of such work shall be subject to the Approval of the Authority.
- B. Work performed by or for the Contractor: labor, materials, services, and equipment shall be furnished by the Contractor or by a Subcontractor or by others on behalf of the Contractor. The Contractor will be paid therefor as hereinafter provided, except where agreement has been reached to pay in accordance with Article 1.03C. below.
1. Labor: The cost of labor used in performing the work, whether the employer is the Contractor, Subcontractor, or other forces, will be the sum of the following:
- a. The gross actual wages paid including income tax withholding but not including any employer payments to or on behalf of workmen for health and welfare, pension, vacation, insurance, and similar purposes.
- b. To the actual gross wages, as defined in Article 1.03B.1.a above, will be applied a percentage based upon current applicable labor rates concerning payments made to or on behalf of workmen other than actual wages, which percentage shall constitute full compensation for all payments other than actual gross wages as defined in Article 1.03B.1.a above and subsistence and travel allowance as specified in Article 1.03B.1.c below. The Contractor shall compute a separate percentage for each craft or a composite percentage for all crafts, if so approved by the Authority. All computed percentages shall be submitted to the Contracting Officer Representative for Approval within 30 Days after start of construction work or as

directed by the Contracting Officer Representative prior to time and materials work being performed.

- c. Subsistence and travel allowance paid to such workmen if required by collective bargaining agreements. The charges for labor shall include all classifications through foremen when engaged in the actual and direct performance of the Work. They shall not include charges for such overhead personnel as assistant superintendents, superintendents, office personnel, timekeepers, and maintenance mechanics.
2. Materials: The cost of materials required for the accomplishment of the Work will be delivered cost to the purchaser, whether Contractor, Subcontractor, or other forces, from the Supplier thereof, except as the following are applicable:
 - a. If a cash or trade discount by the actual supplier is offered or available to the purchaser, it shall be credited to the Authority notwithstanding the fact that such discount may not have been taken.
 - b. If materials are procured by the purchaser by any method, which is not a direct purchase from and a direct billing by the actual supplier to such purchaser, the cost of such materials, including handling, shall be deemed to be the price to the actual Supplier as determined by the Contracting Officer Representative.
 - c. If the materials are obtained from a supply or source owned wholly or in part by the purchaser, payment therefor will not exceed the price paid by the purchaser for similar materials furnished from said source on Contract items or the current wholesale price for such materials delivered to the job Site, whichever price is lower.
 - d. The cost of such materials shall not exceed the lowest current wholesale price at which such materials are available in the quantities concerned, delivered to the job Site, less any discount as provided in Article 1.03B.2.a above.
 - e. If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof, the cost shall then be determined in accordance with Article 1.03B.2.d above.
 - f. The Contractor will not be compensated for indirect costs and profit on Authority-furnished materials.
3. Equipment: The Contractor will be paid for the use of equipment in accordance with the Contract. The Contractor shall furnish all data, which might assist the Authority in the establishment of such rates.
 - a. Operators of equipment will be paid under Article 1.03B.1 above.
 - b. Small tools (defined as equipment less than \$2,000 in acquisition costs) are computed at a maximum of 5 percent of direct base labor wages.
4. Subcontracts: The cost for Subcontract work at any tier will be the actual cost to the Contractor/Subcontractor for work performed by a Subcontractor as computed in accordance with Articles 1.03B.1 through 1.03B.3 above. For the purposes of this Article, Subcontractor is defined as an individual, partnership, corporation, association, joint venture, or any combination thereof, who contracts with the Contractor to perform work or labor or render service on or about the work. The term Subcontractor shall not include those who supply materials only. When work paid for on a time and materials basis is performed by forces other than the Contractor's organization, the Contractor shall reach agreement with such other forces as to the distribution of the payment made by the Authority for such work, and no additional payment therefore will be made by the Authority by reason of performance of the Work by a Subcontractor or by others.

5. To the totals, completed as indicated in Articles 1.03B.1 through 1.03B.4, shall be added field office overhead as follows:
 - a. If the costs determined above do not exceed \$100,000 and the adjustment in time for Contract performance is 10 Days or less, the markup shall be computed in accordance with Article 1.04 below.
 - b. In all other cases, the most recent audited daily field office overhead rate will be used.
6. Home Office General and Administrative (G&A) costs will be determined using the most recent audited rate at the time the work was accomplished. A fixed rate of 3 percent will be used in the absence of an audited rate.
7. Profit will be negotiated as provided in Article 1.07 below.
8. A percentage for Contractor's bond, not to exceed 1 percent, may be added.
- C. Special items of work: If the Contracting Officer Representative and the Contractor, by agreement, determine that either: an item of time and materials work does not represent a significant portion of the total Contract Price, or such item of work cannot be performed by the forces of the Contractor or the forces of any of its Subcontractors, or it is not in accordance with the established practice of the industry involved to keep the records, which the procedure outlined in Article 1.03B above would require, charges for such special time and materials work item may be made on the basis of invoices for such work without complete itemization of labor, materials, and equipment rental costs. To such invoiced price, less a credit to the Authority for any cash or trade discount offered or available, whether or not such discount may have been taken, will be added a negotiated amount not to exceed 5 percent of the discounted price, in lieu of the negotiated lump sum not to exceed the percentages provided for in Article 1.03B above.
- D. Records: The Contractor shall maintain its separate records in such a manner as to provide a clear distinction between the direct costs of work paid for on a time and materials basis and the cost of other operations.
 1. The Contractor shall prepare, and furnish to the Contracting Officer Representative one electronic copy of report sheets of each day's work paid for on a time and materials basis the day after such work was performed. The daily report sheet shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, Subcontractor, or other forces, except for charges described in Article 1.03C above. The daily report sheet shall provide names or identifications and classifications of workmen, the hours worked, and the size, type, and identification number of equipment, and hours operated.
 2. Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily report sheets, or if not available, they shall be submitted with subsequent daily report sheets. Should said vendor's invoices not be submitted within 60 Days after the date of delivery of the material or 15 Days after acceptance of the Work, whichever comes first, the Authority reserves the right to establish the cost of such materials at the lowest current wholesale prices at which such materials are available in the quantities concerned delivered to the location of the Work less any discounts provided in Article 1.03B.2.a above.
 3. Said daily report sheets shall be signed by the Contractor or its authorized agent.
 4. The Contracting Officer Representative will compare the Authority's records with the Contractor's daily report sheets, make any necessary adjustment, and compile the costs of work paid for on a time and materials basis on daily time and materials work report forms furnished by the Authority. When these daily reports are agreed upon and signed

by both parties, they shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on a later audit. The use of any specific Authority form, such as the Daily Report – Labor, Materials, & Equipment Form C-113, to segregate change order costs does not, in and of itself, invoke the provisions of this Article 1.03 or other provision of this Contract.

- E. Payment: Payment as provided in Articles 1.03B and 1.03C above shall constitute full compensation to the Contractor for performance of work paid for on a time and materials basis and no additional compensation will be allowed therefore.

1.04 EQUITABLE ADJUSTMENT FOR MINOR CONTRACT MODIFICATIONS FOR THE CONSTRUCTION EFFORT

- A. When the Authority and Contractor agree to an additive or deductive amount for a Modification to this Contract made pursuant to this Contract when the fair and reasonable price in aggregate amount does not exceed \$100,000, and further agree to an adjustment in the time for Period of Performance resulting from said Modification, which increases or decreases the completion date 10 or less Days, the equitable adjustment in Contract amount shall consist of the sum of the following:
1. Direct labor, material, and equipment costs as agreed to by the Authority and Contractor (small tools, defined as equipment less than \$2,000 in acquisition costs, are included in equipment costs and computed at a maximum of 5 percent of direct base labor wages.)
 2. Job Office Overhead costs, the sum of which shall be limited to a maximum of 10 percent of direct labor costs, including fringe benefits, but excluding FICA, FUTA, and State Unemployment Insurance (SUI); a maximum of 10 percent of direct material costs; a maximum of 5 percent of direct equipment costs (including small tools); and a maximum of 5 percent of Subcontract costs.
 3. Home Office General and Administrative (G&A) costs are computed using the most recent audited rate or a fixed rate of 3 percent in the absence of an audited rate.
 4. Profit will be determined in accordance with the guidelines specified in Article 1.06 below.
- B. In using the above rates, the following shall apply:
1. Payroll Tax (FICA, FUTA, and SUI) amounts are added immediately after direct and indirect costs are totaled.
 2. Subcontractors' indirect costs and profit shall be computed in the same manner as above.
 3. Indirect costs shall not be duplicated in direct costs.
 4. When the Period of Performance is increased, the change in Contract amount for direct and indirect costs computed by application of the above rates includes costs of impact and extended performance due to the time extension and no further consideration of costs arising from the specific Modification and cited pending change orders (PCOs) will be given. The Contractor will not receive both a percentage and a daily rate markup for job office overhead costs when a time extension to the Period of Performance is recognized.
 5. Bond costs will be allowed at actual cost without markup.
- C. Equipment rates shall be determined from prior Authority audits. In the absence of audited rates for equipment owned or controlled by the Contractor, hourly rates shall be computed in the same fashion as described in Article 1.07D.

1.05 COST OR PRICING DATA

- A. The Contractor shall submit to the Contracting Officer Representative, either actually or by specific identification in writing an electronic copy of cost or pricing data under the conditions described in this Paragraph and certify that, to the best of the Contractor's knowledge and belief, the cost or pricing data submitted is accurate, complete, and current as of the date of execution, which date shall be as close as possible to the date of agreement on the negotiated price of the Contract Modification. The cost or pricing data shall be submitted at the time the Contractor submits its proposal for the pricing of any Modification to this Contract, whether or not cost or pricing data was required in connection with the initial pricing of the Contract, when the Modification involves aggregate increases or decreases in costs plus applicable profits expected to exceed \$100,000, or less at the discretion of the Authority Representative.
- B. The submittal of certified cost or pricing data will not be required if the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The Contractor agrees that the terms "adequate price competition" and "established catalog or market prices of commercial items sold in substantial quantities to the general public" will be determined by the Authority in accordance with the guidelines as set forth in Subpart 15.8 of the Federal Acquisition Regulations (48 CFR 15.8).
- C. Cost or pricing data consists of all facts existing up to the time of agreement on price, which prudent buyers and sellers would reasonably expect to have a significant effect on the price negotiations for the Modification. The definition of cost or pricing data embraces more than historical accounting data; it also includes, where applicable, such factors as Subcontractor, Supplier, and vendor quotations, nonrecurring costs, changes in construction methods, unit cost trends such as those associated with labor efficiency and any management decisions which could reasonably be expected to have a significant bearing on costs under the proposed Modification and the Contract Work. Cost or pricing data consists of all facts, which can reasonably be expected to contribute to sound estimates of future costs as well as to the validity of costs already incurred. Cost or pricing data, being factual, is that type of information, which can be verified. Because the certificate pertains to cost or pricing data, it does not make representations as to the accuracy of the Contractor's judgment on the estimated portion of future costs or projections. The certificate does, however, apply to the data upon which the Contractor's judgment is based.

1.06 CONTRACT MODIFICATIONS, REQUIREMENTS FOR PROPOSALS, PRICE BREAKDOWN, NEGOTIATION OF PROFIT

- A. The Contractor, in connection with any proposal it makes for a Contract Modification as specified in Section 00750, ACCOUNTING AND RECORD KEEPING, shall furnish a price breakdown, itemized as required by the Contracting Officer Representative. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, Subcontract, and overhead costs, as well as profit, and shall cover all work involved in the Modification, whether such work was deleted, added, or changed. Any amount claimed for Subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification therefore shall also be furnished. The original and one electronic copy of the proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Contracting Officer Representative.

- B. Where profit is negotiated as an element of price, with either the Contractor or Subcontractor, a reasonable profit will be negotiated for each Modification by using the following procedure as a guide:

1. Breakdown:

Factor	Rate	Weight	Value
Degree of risk	20		
Relative difficulty of work	15		
Size of job	15		
Period of performance	15		
Contractor's investment	5		
Assistance by Authority	5		
Subcontracting	25		
TOTAL	100%		

2. Based on the circumstances of each Modification, each of the above factors shall be weighted from 0.03 to 0.12 as indicated below. The value shall be obtained by multiplying the rate by the weight. From the value column when totaled the fair and reasonable profit can be determined under the circumstances of the particular Modification.
- Degree of risk: Where the modified work involves no risk or the degree of risk is very small, the weighting should be 0.03. As the degree of risk increases, the weighting should be increased up to a maximum of 0.12. Lump sum items will have generally a higher weighted value than unit price items for which quantities are provided. Other things to consider: The portion of the Work to be done by Subcontractors, nature of work, where work is to be performed, reasonableness of negotiated costs, amount of labor included in costs, and whether the negotiation is before or after performance of work.
 - Relative difficulty of work: If the modified work is most difficult and complex, the weighting should be 0.12 and should be proportionately reduced to 0.03 on the simplest of jobs. This factor is tied in to some extent with the degree of risk. Things to consider: The nature of the Work, by whom it is to be done, the location, and the time schedule.
 - Size of job: All modified work not in excess of \$100,000 shall be weighted at 0.12. Work estimated between \$100,000 and \$5,000,000 shall be proportionately weighted from 0.12 to 0.05. Work from \$5,000,000 to \$10,000,000 shall be weighted at 0.04, and work in excess of \$10,000,000 at 0.03.
 - Period of performance: Modifications providing for an extension of time in excess of 30 Days shall be weighted at 0.12. Jobs of lesser duration shall be proportionately weighted to a minimum of 0.03 for jobs not to exceed 1 Day. No weight will be granted for this factor where there is no extension of the Period of Performance or interim dates due to work under this Modification.
 - Contractor's investment: Should be weighted from 0.03 to 0.12 on the basis of below average, average, and above average. Things to consider: Amount of

Subcontracting, mobilization payment item, Authority-furnished property, and method of making progress payments.

- f. Assistance by Authority: Should be weighted from 0.12 to 0.03 on the basis of average to above average. Things to consider: Use of Authority-owned property, equipment and facilities, and expediting assistance.
 - g. Subcontracting: Should be weighted inversely proportional to the amount of Subcontracting. Where 80 percent or more of the Work is to be Subcontracted, the weighting should be 0.03, and such weighting proportionately increased to 0.12 where all the work is performed by the Contractor's own forces.
- 3. When considered necessary because of very unusual circumstances or local conditions, the range of weight may be increased to an upper limit of 0.15 if supported by adequate justification and Approved by the Authority.
- 4. When negotiations between the Contracting Officer or the Contracting Officer Representative and the Contractor are joined to determine an equitable adjustment for a Modification of this Contract, the Contractor shall encourage involved Subcontractor(s) to be present and to present their cost data and to participate in the resolution of a fair and equitable adjustment. In any event, if after reasonable effort, a negotiated settlement cannot be reached between the Contracting Officer or the Contracting Officer Representative and the Contractor and the Subcontractor(s) involved, then at the request of the Subcontractor(s) concerned, the Contracting Officer or the Contracting Officer Representative may process Part 1 of a two-part Modification to cover the direct costs only, as agreed upon or, if not agreed upon, as determined unilaterally by the Contracting Officer or the Contracting Officer Representative. Subcontractor(s) requests for a Part 1 Modification shall be submitted to the Contractor, and the Contractor shall forward such requests promptly to the Contracting Officer Representative. Any payments received by the Contractor under this procedure shall be passed along within 10 Days thereafter to the Subcontractor concerned.
- C. Change orders: When the Contracting Officer directs a change in accordance with the provisions of this Contract, the Contractor shall identify in its proposal for equitable adjustment the network activities that precede and follow the change order work activities. If the change order work activities are performed concurrently with existing network activities, those concurrent network activities shall be identified. If the change order work activities restrain network activities, those restraints shall be identified.

1.07 PAYMENT FOR USE OF EQUIPMENT

- A. The following methods of determination of equipment costs shall apply to all adjustments to Contract Prices arising under the provisions of the Contract except for Section 00728, TERMINATION FOR CONVENIENCE OF THE AUTHORITY, provisions thereunder.
- B. Allowable ownership and operating expense for construction plant and equipment in sound workable condition, owned by the Contractor, Joint Venture, Partnership, organizations under common control, and any equipment under lease purchase or sale-lease back agreements, will be paid for at hourly rates applicable to the Period of Performance, published in the Rental Rate Blue Book for Construction Equipment (Blue Book) by PRIMEDIA Information, Inc., by applying the following formula: the Regular Hourly Rate shall be 75 percent of the sum of the monthly rate (area adjustment map not used) divided by 176 and the estimated operating cost per hour. Regular Hourly Rate shall be full compensation for equipment ownership and operating expenses and shall include the cost of fuel, oil, lubricants, supplies, spare parts, repairs and maintenance, major overhauls, mechanics and servicing labor, depreciation, storage, insurance, interest, taxes, record keeping, and all incidentals. The cost of equipment operators is not included. For forward pricing, the Blue Book rates in effect at the time of negotiations shall apply. For retrospective pricing, the Blue Book rates in effect at the time

the work was performed shall apply. Manufacturers ratings and manufacturer-approved modifications shall be used to classify equipment for the determination of the Regular Hourly Rate. The hourly rates are calculated as shown in the following example:

	Regular Hourly Rate	Multi-shift Hourly Rate	Standby Hourly Rate
Monthly Rental Cost	\$6,070.00	\$6,070.00	\$6,070.00
Divided by Hours	176	176	176
Hourly Rental Cost	\$34.49	\$34.49	\$34.49
Hourly Operating Cost	18.20	18.20	18.20
Subtotal	52.69	52.69	52.69
Adjustment	75%	75%	75%
Regular Hourly Rate	39.52	39.52	39.52
Status	100%	60%	40%
Payment Rate	\$39.52	\$23.71	\$15.81

1. For Contractor owned equipment as identified in Article 1.07B, the first 8 hours, or fraction thereof, usage in any one day shall be paid for at the Regular Hourly Rate, and any additional time in excess of 8 hours, shall be considered to be an additional shift, or fraction thereof, and shall be paid for at 60 percent of the Regular Hourly Rate. Standby time, if authorized by the Contracting Officer Representative, will be paid for at 40 percent of the Regular Hourly Rate. Standby time shall be limited to the regular 8-hour shift and shall not exceed 40 hours in a week. Any usage time less than 30 minutes shall be considered to be 1/2 hour.
2. For third-party rented equipment, the Authority will accept rental rates actually paid and substantiated by certified reproduced copies of invoices or bills. Such invoices or bills shall indicate the amount of operating expenses and operator wages and fringes, if any, included in the rental rate. In no case shall the bare rental rate per hour (operating expense, and operator wages and fringes not included) exceed the appropriate Regular Hourly Rate. Where required, the operating costs per hour will be agreed upon between the Contractor and the Authority using operating costs per hour from the Blue Book for the same or similar equipment
3. When approved by the Contracting Officer Representative, use of equipment not listed in the Blue Book will be permitted. An equitable hourly rate for such equipment will be established by the Contracting Officer Representative based on Contractor furnished cost data and basic information concerning the equipment. Information required to determine rates includes, but is not limited to, manufacturer, year, size, model, serial number, capacity, and weight. This information shall be furnished to the Contracting Officer

Representative prior to the use of the equipment. Authority shall be granted audit access to verify information related to or pursuant to this Section.

4. The Regular Hourly Rate does not include "move-in" and "move-out" costs.
 5. These equipment rates shall apply to equipment in sound workable condition. The equipment shall be of approved size and capacity to provide normal output or production required for the work to be done. Equipment not meeting these requirements may be used only with the Contracting Officer Representative's approval and at agreed, reduced rates. Usage time or standby time will not be allowed while equipment is inoperative due to breakdown, and such equipment shall be removed from the jobsite at the direction of the Contracting Officer Representative.
- C. Items of equipment with an acquisition cost of \$2,000 or less shall be considered as small tools.
- D. Equipment costs that are paid under the equipment use rate shall not be duplicated in the Contractor's other direct or indirect costs.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01312
PROJECT MEETINGS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Project meetings.
- B. During the term of this Contract, attend meetings and conferences with officials of the Authority, governmental agencies, and others interested in the Work as may be directed by the Contracting Officer Representative. Meeting minutes, prepared by either the Contractor or the Contracting Officer Representative as specified herein, shall state the place and time of the meeting, the names and identification of those present, a brief description of the matters discussed, and the agreements reached.
- C. Meetings shall be held in the Project office or at other locations in the Washington Metropolitan Area, as needed. Contractor and other concerned parties attending these meetings shall each be represented by persons thoroughly familiar with and authorized to conclude matters relating to the Work described in the Contract Documents.

1.02 PRE-CONSTRUCTION MEETINGS

- A. Conduct pre-construction meetings at the Site prior to the start of construction activities that require special coordination for those activities that are deemed to require a separate meeting because of the technical nature of the installation.
- B. The Contractor's Key Staff, Subcontractors, representatives of manufacturers and fabricators involved in or affected by the installation, coordination, or integration with their materials and installations that have preceded or will follow and the Authority, the Contracting Officer Representative, and other representatives of the Authority shall attend the meeting.
- C. Notify the Authority in advance of the date, time, location, and topics for review and discussion at each pre-construction meeting. Ensure that other attendees are properly notified. Topics that may require pre-construction meetings include, but are not limited to the following:
 - 1. Installation of equipment or systems
 - 2. Items that require connection to existing Authority equipment or systems as applicable
 - 3. Other pre-installation meetings as may be called by the Contractor or the Contracting Officer Representative
- D. Agenda discussion items for the meeting may include, but are not limited to, the following:
 - 1. Safety
 - 2. QA/QC
 - 3. ADAAG compliance
 - 4. LEED Compliance
 - 5. Temporary facilities
 - 6. Space and access limitations

7. Shop Drawings, Working Drawings, Product Data, Quality Control Samples, Certifications, and Documentation
 8. Purchases and deliveries
 9. Manufacturers' recommendations
 10. Inspection and testing requirements
 11. Required performance results
 12. Recording requirements
 13. Possible conflicts and compatibility problems
 14. Weather limitations
- E. Work shall not proceed if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of work and schedule a follow-up meeting with the Authority at the earliest date.
- F. Record meeting minutes and distribute copies to everyone in attendance and to others affected by decisions or actions resulting therefrom.

1.03 PROGRESS MEETINGS

- A. Conduct progress meetings weekly at regularly scheduled times convenient for all parties involved. Progress meetings are in addition to specific meetings held for other purposes, such as coordination and pre-construction meetings. A Three-Week Work Plan will be developed by the Contractor prior to the start of the meeting as specified in Section 01322, PROGRESS REPORTING, and will be discussed during the planning portion of the agenda. Additionally, discussions will address administrative and technical issues of concern, determining resolutions, and development of deadlines for resolution within allowable time frames.
- B. Determine, together with the Contracting Officer Representative, who should attend the meeting in addition to the Contracting Officer Representative, other representatives of the Authority, the Contractor's Key Staff, and those Subcontractors, Suppliers, or other entities critical to the current progress or involved in planning, coordination, or performance of future activities that are part of the Work.
- C. Contracting Officer Representative will publish an agenda prior to each meeting and will distribute copies to Contractor. Agenda items may include:
1. Review of minutes of the previous progress meeting
 2. Contractor's construction schedule and construction sequence
 3. Safety, including discussions of hazards and risks
 4. QA/QC, including discussion of Non-Compliance Notices
 5. ADAAG compliance
 6. LEED Compliance
 7. Temporary facilities and services
 8. Site utilization, Site access needs and Hours of Work issues

9. Testing and systems integration testing
 10. Updated submittals list and submittal priorities
 11. Requests for Information
 12. Documentation of information for payment requests
 13. Pending Change Orders and Modifications
 14. Resource allocation
 15. Off-Site fabrication problems
 16. Purchases and deliveries
 17. Housekeeping
- D. The Contracting Officer Representative will record meeting minutes and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting. Meeting minutes will document issues of significance including submittals, schedules, quality assurance/quality control, safety, problems encountered, and the assignment of responsibilities for future action.

1.04 PROGRESS AND QUALITY STATUS REPORT REVIEWS

- A. A preliminary progress and quality status report meeting will be held on a monthly basis prior to the submittal of the Contractor's final Monthly Progress Report and associated documents. The purposes of the meeting are to review and determine the status of each activity in relation to the Contractor's draft Monthly Progress Report and any deficiencies based on the Quality System as specified in Section 01470, QUALITY MANAGEMENT SYSTEM, in order to develop an informal agreement on the monthly progress payment request.
- B. The meetings shall be attended by the Contractor's Key Personnel, the Contracting Officer Representative, and other representatives of the Authority.
- C. The Monthly Progress Report and associated documents, as specified in Section 01322, CONTRACT PROGRESS REPORTING, shall be updated on a monthly basis. Job progress shall specifically include actual start and completion dates for all activities completed during the reporting period, actual start dates and percent complete for activities started but not completed during the reporting period, estimated start dates for activities scheduled to start during the next period, approved changes in durations of activities, and separate tabulation of monthly earnings including a cumulative tabulation of monthly earnings to date. In computing the monthly earnings, no value will be allowed for partially completed activities.
- D. Update the Monthly Progress Report and associated documents to incorporate all changes agreed to during the preliminary progress and quality status report meeting. A formal progress and quality status report meeting will be held prior to the submittal of the Contractor's progress payment request. The purpose of the meeting is to review and develop a formal joint agreement on the Monthly Progress Report, job progress, pay items, and quality certification. This meeting shall be held 5 working days after the preliminary progress and quality status report meeting.
- E. Submit the approved Monthly Progress Report and the progress payment request in accordance with Section 00744, METHOD OF PAYMENT.

1.05 CHANGE MEETINGS

- A. Separate meetings will be held in the Washington Metropolitan Area by either the Authority or the Contractor, on an ad hoc basis, to discuss and resolve change order issues as they arise during the course of construction.
- B. This meeting shall be attended by the Contractor's Key Staff, Contracting Officer Representative, and those Subcontractors, Suppliers, or other entities critical to the resolution of any open issues. The parties shall each be represented by persons thoroughly familiar with and authorized to conclude matters relating to the Work described in the Contract Documents.
- C. The Contracting Officer Representative will record meeting minutes and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01321 CONSTRUCTION PHOTOGRAPHS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes procedural requirements for photographic documentation, including digital images and video recordings.

1.02 SUBMITTALS

- A. Make submittals in accordance with Section 01330, SUBMITTAL PROCEDURES, and as described in Section 01322, CONTRACT PROGRESS REPORTING.
- B. Key Plan: Submit key plan 30 Days prior to start of construction. If vantage points are altered, submit key plan updates with corresponding photographic documentation submittal.
- C. Digital Still Photographs: Submit with record of photographs indicating name of photographer, identification of vantage point, date of photograph and electronic file name. Submit the following types of still photographs:
 - 1. Pre-Construction Photographs: Submit 30 Days prior to start of construction.
 - 2. Monthly Construction Photographs: Submit every 30 Days.
 - 3. Subject-specific construction photographs such as, but not limited to still photos showing potential change, non-conformance, quality, and property damage, and LEED-required photo documentation.
 - 4. Completion of Construction Photographs: Submit within 30 Days of Notice of Substantial Completion.
- D. Digital Video Recordings: Submit with a record of the contents of each segment of the video recording identifying name of photographer, location, time of day, viewing direction, traveling direction, and starting and ending points. Submit the following types of video recordings:
- E. Pre-Construction Video Recording: Submit 30 Days prior to start of construction.
 - 1. Monthly Video Recordings: Submit every 30 Days.
- F. Photographer and Videographer Information: Submit a complete list of photographer names and contact information within 30 Days of Notice to Proceed.
- G. Usage Rights Documentation: Obtain and transfer copyright usage rights from photographers to the Authority for unlimited reproduction of photographic documentation within 30 Days of Notice to Proceed.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Photographer Qualifications: Professional photographer experienced in construction photography for a minimum of 3 years.
 - 2. Videographer Qualification: A professional firm experienced in audio-video documentation for construction or similar documentary projects for a minimum of 3 years.

PART 2 – PRODUCTS

2.01 KEY PLAN

- A. Indicate project site with notation of vantage points marked for location and direction of each still photograph and video recording.
- B. Include location and type and model of still and video camera(s).
- C. Include description of vantage point indicating location, direction (by compass point), and elevation.

2.02 STILL PHOTOGRAPHS

- A. Camera Specifications: Provide digital camera with sensor resolution of a minimum of 8 megapixels for producing color digital photographs.
- B. Format:
 1. Set camera to produce a digital stamp of the current date and time on each image.
 2. Provide required images in .JPG format.
 3. Digital photographic files shall be capable of producing standard commercial quality photographs, 8 inches by 10 inches in size.
 4. Identification:
 5. Electronically label each still photograph with the following information on the bottom left corner:

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

Project: _____ Contract No.: _____

Contractor _____

Photograph No. _____ Date: _____

Description: _____

2.03 DIGITAL VIDEO RECORDINGS

1. Camera Specifications: Provide digital video camera for producing color digital video images and meeting the following requirements: Capable of producing NTSC 1080 lines/60 fields
 2. Resolution in the Y channel shall contain a minimum of 500 TV lines at center, utilizing no less than three charge-coupled-device (CCD) chips, each containing no less than 5 megapixels for optimum picture clarity
 3. Format: Set camera to produce a digital stamp of the current date and time on each video sequence containing the month, day, year, hours, minutes, and seconds.
 4. Provide high-resolution NTSC or agreed upon format.
- B. Identification: Electronically label video recordings with the following information: location, project name, and municipality. With each submittal, provide the following information:
1. Name of Project
 2. Contract Number

3. Name of Contractor
4. Video recording ID number
5. Date video recording was recorded
6. Description

PART 3 – EXECUTION

3.01 GENERAL

- A. All photographic and video documentation shall be captured digitally. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

3.02 STILL PHOTOGRAPH REQUIREMENTS

A. Preconstruction Photographs:

1. Provide pre-construction still photographs at each site.
2. Take sufficient overlapping still photographs to show existing conditions of adjacent properties before starting the Work.
3. No construction shall begin prior to Contracting Officer Representative review and approval of the pre-construction photographs of the construction area.
4. Take still photos at locations to be disturbed or likely to be affected by construction and at locations designated by the Contracting Officer Representative.

B. Monthly Construction Photographs: Take still photos of construction during the progress of the Work.

1. Take a minimum of twenty still construction photos at each site every 30 Days starting after the pre-construction digital survey and continuing until Substantial Completion is achieved.

C. Subject-specific Construction Photographs:

1. If there are any evident changes in conditions, non-conformance in the Work, or signs of potential damage to property or constructed project, take sufficient photographs to document the conditions and no less than ten still photographs.
2. The photographer shall provide scale to the area/condition, such as a tape measure to substantiate cracking.
3. Provide construction photos as required to demonstrate compliance with established LEED design goals, if applicable.

D. Final Completion Construction Photographs:

1. Take a minimum of twenty still photos at each site at Substantial Completion.

3.03 VIDEO RECORDING REQUIREMENTS

A. General:

1. Audio:

- a. Begin each recording with the name of videographer, Project name, Contract number, date and start time, location, and direction of travel.
 - b. End recording with date and time.
 - c. Narration: Describe scenes on video recording by audio narration. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 2. Video:
 - a. Set to continuously record: transparent digital information shall include the date and time of recording.
- B. Preconstruction Video Recordings:
1. Document the entire Project Site.
 - a. Include all surface features located within at least 300 feet of the construction site and accompany with appropriate audio description. Include all existing curbs, sidewalks, driveways, ditches, paved areas, landscaping, trees, culverts, headwalls, retaining walls and buildings.
 2. Duration: approximately 120 minutes.
- C. Monthly Construction Video Recordings: Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 30 minutes.

END OF SECTION

SECTION 01322
CONTRACT PROGRESS REPORTING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the requirements for reporting progress and the development and maintenance of schedules and work plans for both the design and construction of the Project.
- B. The Contractor shall carefully monitor the progress of the Work during design and construction and provide the Authority with Monthly Progress Reports detailing the progress of that work.
- C. The approved schedules shall be used by the Contractor to ensure adequate planning, scheduling, managing, and executing of the Work, and to enable the Authority to evaluate work progress and progress payments. These approved schedules shall not be revised without the prior approval or direction of the Contracting Officer Representative. Schedules shall include the following Initial 90-Day Schedule; Project Schedule; monthly updates of the Project Schedule; 90-Day Schedule; and Three-Week Work Plan.

1.02 REFERENCES

- A. Associated General Contractors Manual - Construction Planning and Scheduling.

1.03 SUBMITTALS

- A. Make the following submittals in accordance with Section 01330, SUBMITTAL PROCEDURES:
- B. Monthly Progress Status Report shall be submitted in electronic format in MS Word and Adobe (.PDF) and formatted to 8-1/2 by 11 inches or 11 by 17 inches in size.
- C. Schedule submittals including Initial 90-Day Schedule, Project Schedule and monthly updates, 90-Day Schedule, and Three Week Work Plan, shall be generated in Primavera Project Planner (P6) for Windows and formatted to 11 by 17 inches or 22 inches by 34 inches. Submit monthly in Primavera (.XER) and Adobe (.PDF) format and on paper media for the 90-Day Schedule or the Project Schedule, whichever is in use.
 - 1. CPM terminology, definitions, and conventions as required herein shall be consistent with the technical portions of the Associated General Contractors Manual titled Construction Planning and Scheduling.
 - 2. All schedules and reports shall be prepared and submitted in electronic format and labeled with the Contract Number, Project name, Contractor's name, data date, run date, and with any access codes or file designators listed.
- D. The Project Schedule submittal, all subsequent schedule updates, and time extension requests shall also include the following computer-generated reports:
 - 1. Successor Report: This report shall contain all activities shown on the graphic network diagram listed in ascending order of activity ID based on successor relationships.
 - 2. Predecessor Report: This report shall contain all activities shown on the graphic network diagram listed in descending order of activity ID based on their predecessor relationships.
 - 3. Float Report: This report shall contain all activities shown on the graphic network diagram listed in order of ascending total float values and, where float values are equal, in chronological order of the early start date.

4. Late Finish Report: This report shall contain all activities as shown on the graphic network diagram listed in chronological order of the late finish date.
- E. Contracting Officer Representative will review and return the Contractor's schedule submittal with comments according to the following schedule from the date of receipt:

Initial 90-Day Schedule	7 Days
90-Day Schedule	7 Days
Project Schedule	21 Days
Three-Week Work Plan	1 Day

1. The Contractor shall make all corrections to the schedule requested by the Contracting Officer Representative and resubmit the schedule for approval. If the Contractor does not agree with the Contracting Officer Representative's comments, the Contractor shall provide written notice of disagreement within 5 Days from the receipt of the Contracting Officer Representative's comments for the Project Schedule. Contracting Officer Representative's comments to the Initial 90-Day Schedule, Project Schedule, 90-Day Schedule, and Three-Week Work Plans with which the Contractor disagrees shall be resolved in a meeting held for that purpose.
- F. Resubmittals shall conform to the same requirements as original submittals.

1.04 MONTHLY PROGRESS REPORTS

- A. The Monthly Progress Reports shall include a narrative report, schedules, a Quality Compliance Certification and construction photographs as follows:
 1. A narrative description of work accomplished, work activities planned for the upcoming reporting period, problem areas and actions intended by the Contractor to mitigate the problem areas, work that is being performed out of sequence with accepted schedules, status of change orders, notices of potential Claims, status of submittals, and status of Contractor procurement items. Proposed minor logic changes shall be listed and described in the narrative. Include narrative of design progress each month until design is complete and Approved.
 2. Schedules including the Initial 90-Day Schedule, or the Project Schedule, or the Monthly Update of the Project Schedule as appropriate; 90-Day Schedule; and a Three-Week Work Plan. Schedules shall clearly identify the critical path(s).
 3. Cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish, and actual finish on a monthly and cumulative basis.
 4. Quality Compliance Certification as specified in Section 01470, QUALITY MANAGEMENT SYSTEM.
 5. A summary of meetings or conferences held or attended during the report period.
- B. A listing of actions or decisions required of the Authority with an indication of the date by which such action or decision is required to avoid any adverse impact on the schedule.
 1. Utility/Jurisdictional Authority coordination and approvals report. Include telephone conversations and dates of contact made with each Utility/Jurisdictional Authority.
 2. Construction photographs, as described in Section 01321, CONSTRUCTION PHOTOGRAPHS.

1.05 INITIAL 90-DAY SCHEDULE

- A. A cost loaded schedule covering the first 90 Days of the Contract shall be submitted within 20 working days following the date of the Notice of Award. The Initial 90-Day Schedule is the Contractor's plan for planning, managing, executing, and for recording completed work during the first 90-Day Days of the Project. All approved activities in the Initial 90-Day Schedule shall be incorporated into the Project Schedule.
- B. The schedule shall be time-scaled and may be submitted in either bar chart or Critical Path Method (CPM) format. The Initial 90-Day Schedule shall include the same requirements as the Project Schedule with the exception of information that is not reasonably available in the first 90- Days.
- C. Work items defined in the schedule shall not exceed 20 working days duration.
- D. The initial submittal shall be accompanied by a written narrative that describes the schedule and the approach to the Work that the Design-Builder intends to employ during the initial 90-Day period of the Contract.
- E. The Initial 90-Day Schedule will be used to process progress payments for the 90-Day period following NTP until the Project Schedule is Approved.

1.06 PROJECT SCHEDULE

- A. A cost loaded, calendar time-scaled CPM network diagram schedule covering the complete Period of Performance of the Project shall be submitted within 60 Days following the date of the Notice to Proceed. A Project Schedule, acceptable to the Contracting Officer Representative, shall be in place prior to the third progress payment request being submitted. The original logic of the Initial 90-Day Schedule shall be incorporated into the Project Schedule unless identified changes are submitted and approved by the Contracting Officer Representative.
- B. The schedule must meet all of the dates listed under Special Conditions Section 00824, PERIOD OF PERFORMANCE AND PROJECT SCHEDULE.
- C. The Project Schedule shall be prepared utilizing the Precedence Diagram Method (PDM) of CPM scheduling technique.
- D. The Project Schedule shall show clearly the sequence and interdependence of activities and shall list specifically:
 - 1. Interim milestone completion dates as specified and staging of the Work shall be prominently identified.
 - 2. Acquisition of permits, and Jurisdictional Authority and Utility approvals
 - 3. Submittals and Authority review of submittals
 - 4. Procurement, fabrication, delivery, installation, and testing of major materials and equipment
 - 5. Delivery of Authority-furnished equipment, if any
 - 6. Interfacing, coordination, and dependencies with preceding, concurrent, and follow-on contractors
 - 7. Work to be performed by other agencies, which affect the schedule
 - 8. Manpower, material, and equipment restrictions, if any
 - 9. Inspection of the Work including Punch List and Acceptance

10. The progressive delivery of Record Documents as major sections of the work are completed; for example completion of foundation piling or completion of underground utility work
11. Resources necessary to accomplish the Work for that activity including, but not limited to, specific equipment, manpower, and material requirements.
12. The costs of the work for each activity
13. The graphic network diagram shall be composed of two parts, a Table of Activity Data and a time-scaled graphic network diagram, and shall include the following:
 - a. A Table of Activity Data in columnar format with the pertinent data for each activity in the row corresponding to that activity's placement of schedule. The minimum required data are:
 - (1) Activity ID,
 - (2) Activity Description,
 - (3) Early Start date,
 - (4) Early Finish date,
 - (5) Late Start date,
 - (6) Late Finish date,
 - (7) Total Float,
 - (8) Planned Duration,
 - (9) Monetary value in whole dollars for that activity, labor-days applicable to each activity, and all lag/lead time
 - b. The Contracting Officer Representative may require additional data such as total shifts or other resource data.
 - c. An activity numbering system shall be utilized, which assigns a unique activity identification number to each activity. No two activities shall bear the same activity number or description.
 - d. Activity descriptions shall be brief but shall convey the scope of the work described. Unusual abbreviations shall be explained in a legend. If an activity includes work to be done by a Disadvantaged Business Enterprise (DBE), that fact shall be identified in the activity description by inclusion of an appropriate parenthetical entry (e.g., Install West Footing Reinforcing Steel (DBE1)) with DBE properly identified in the legend.
 - e. Percentages shall generally not be used in activity descriptions e.g., Pour West Footing (0 to 50 percent) is not acceptable.
 - f. A time-scaled graphic network diagram showing logical relationships and constraints formatted in accordance with the following requirements:
 - (1) A bar (node) representing the duration of each work activity scaled to the planned duration with arrows (relationship lines) defining predecessor and successor relationships. Each bar shall contain the following information positioned above, below, or adjacent to it in a consistent and legible manner:
 - (a) activity description;

- (b) abbreviated start and finish dates (the day of the month in which the event occurs),
 - (c) and the activity duration.
- (2) Lag time in whole Project units (e.g. working days) shall be displayed on each relationship line where it occurs. The use of lag must be minimized and restricted to only those situations where it is not possible to properly define the start or finish of an activity by the use of a normal Finish-to-Start, Start-to-Finish, Start-to-Start, or Finish-to-Finish relationship. Negative lag shall not be used.
14. Monetary value of each activity indicated in the Schedule shall be identified in the Table of Activity Data following the description. The allocation of monetary values assigned to activities shall be subject to approval and shall contain, as close as can reasonably be determined, all labor, equipment, material, and Subcontractor cost plus its proportional share of all indirect costs. The total of all values allocated to the individual work activities shall equal the total Contract value. Should the Contractor intend to deliver materials and receive payment under the delivered Materials on Site (MOS) provision of the Contract, with the approval of the Contracting Officer Representative, the following shall be incorporated into the schedule:
- a. A MOS delivery activity shall be incorporated into the schedule in logical sequence with the associated installation activity. The cost allocated to the installation activity shall be reduced by the approved MOS activity amount. The activity description shall contain the MOS designation and an MOS activity code shall be assigned.
 - b. The monetary value assigned to that MOS activity shall be arrived at by considering only those materials the monetary values of which are to be excluded from the monetary values of the installation activities to which they relate. The monetary value of the delivery activity shall equal the projected invoiced values of materials, as restricted above and in other relevant provisions of the Contract, to be delivered to the Site. The Contractor shall submit a separate, detailed breakdown of the projected total of all MOS activities.
- E. Individual schedule activities shall not exceed 20 working days duration, except certain procurement, delivery, or MOS activities, which may exceed 20 working days with the approval of the Contracting Officer Representative. Activities exceeding 20 working days duration shall be subdivided.
- F. Schedule activities shall be sufficiently described to include what is to be accomplished and of the activity sequence (i.e. group activities by category of work, work area, and responsibility). Activity durations shall be expressed in whole days. Work that is to be performed by Subcontract shall be clearly defined.
- G. The schedule diagram shall indicate a clearly defined critical path, which shall be prominently distinguished.
- H. A written narrative shall accompany the schedule submittal describing the Contractor's approach and methods for completion of the Work. The narrative shall be adequate for the Contracting Officer Representative to understand the schedule and specifically identify the use of lag time.
1. The supporting narrative shall include the following:
- a. A realistic approach to meeting the Contract completion date required by the Contract.
 - b. A discussion of the critical path and the most critical activities in meeting the required completion dates.
 - c. A listing of holidays and special non-working days planned during the Contract duration.

- d. A separate tabulation of estimated monthly and cumulative planned earnings. The monetary values shall be generally consistent with the proposal item breakdown.
- I. Submit the calendar(s) used to calculate the Project Schedule, including: (i) the proposed number of working days per week; (ii) the planned number of shifts per day; (iii) the number of hours per shift; and (iv) all non-working days.
- J. In addition to the Project Schedule, the Contractor shall submit for approval a summarized Project Schedule depicting the entire Project Schedule in graphical, time-scaled format that clearly identifies the Contractor's work areas, activities, and planned logic for completion of the Work. The summarized Project Schedule shall consist of hammocked activities or otherwise summary bars of logically-grouped activities, of approximately 300 to 500 activities total.
- K. A schedule showing the work completed in less than the Period of Performance, which is found practical and Approved by the Authority, shall be considered to have float. The float shall be the time between the scheduled completion of the Work and the Contract completion date. Float shall not be for the exclusive benefit of either the Authority or the Contractor. Float shall be a resource available to both parties.
- L. A schedule found to be impractical by the Contracting Officer Representative for any reason shall be revised by the Contractor and resubmitted.
- M. Upon Approval by the Authority, the Project Schedule shall be the baseline schedule used to monitor progress.

1.07 MONTHLY UPDATES OF THE PROJECT SCHEDULE

- A. At least once each month, the Contractor shall submit an updated Project Schedule showing the progress of the Work to date and anticipated activities to be worked on.
- B. The Project Schedule shall not be revised to include additional activities, deleted activities, revised activity durations, revised network logic, or any other changes to the schedule, without approval of the Contracting Officer Representative. Only actual progress, completion dates, and anticipated future progress shall be incorporated in a schedule update.
- C. If according to the current updated Project Schedule, the Contractor is 60 or more working days behind the Contract completion date of any milestone, or the schedule contains 60 or more working days of negative float, considering all granted time extensions, the Design-Builder shall submit a Recovery Schedule, showing a practical plan to complete the work within the Contract time. The Contractor shall execute some or all of the following remedial actions: (i) increase construction labor in such quantities and crafts as necessary to eliminate the backlog of work; (ii) increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment or any combination to eliminate the backlog of work. The Authority may withhold progress payments until a revised schedule, acceptable to the Contracting Officer Representative, is submitted by the Contractor.
- D. Any revisions to the planned sequence, activity durations, interdependency of activities and any other change to the schedule shall be submitted separately for review. Written notification and explanation for the proposed changes and separately revised Project Schedule and narrative reports shall accompany the submittal. Changes shall not be incorporated into the current schedule until the submittal has been accepted by the Contracting Officer Representative. The baseline Project Schedule, i.e., the current schedule excluding schedule changes, shall be submitted along with the proposed schedule changes for the Contracting Officer Representative's review and approval.

- E. Maintain the As-Built Project Schedule data according to the field records and submit to the Contracting Officer Representative on a monthly basis. In addition, retain all monthly schedule updates until the Work has been Accepted.
- F. After all Contract work items are complete, and as a condition of Final Payment, the Contractor shall submit three copies of an As-Built Project Schedule showing actual start and finish dates for all work activities and milestones, based on the accepted monthly updates. The schedule submittals shall be in tabular and in time-scaled PDM plot formats. See Section 00744, METHOD OF PAYMENT, for additional retainage to be withheld until the As-Built Project Schedule is delivered to the Contracting Officer Representative, is reviewed, and is determined to be complete and accurate.

1.08 90-DAY SCHEDULE

- A. A schedule depicting activities occurring in the upcoming 90-Day period in greater detail than specified in the Initial 90-Day and Project Schedules. The logic shall follow the logic of the approved Project Schedule.
- B. The schedule shall be time scaled and may be submitted in either bar chart or Critical Path Method (CPM) format.
- C. Activities shall be 10 Days or less duration with particular focus on design, procurement, and associated activities to be performed in this time frame.
- D. The 90-Day Schedule shall be updated and submitted monthly for review and approval by the Contracting-Officer Representative.

1.09 THREE-WEEK WORK PLAN

- A. A schedule in a calendar time-scaled bar chart format depicting the Contractor's intended work activities for the upcoming 3-week period shall be submitted on a weekly basis due on the first working day of each week. Each activity having 1-day duration shall be prominently noted.
- B. Deviations, including but not limited to sequences of work, timing, and durations of activities from the Initial 90-Day or Project Schedules shall be noted and explained in writing.
- C. The form of submittal may be formatted smaller than specified in Article 1.03 herein; however, the format shall not be less than 8-1/2 by 11 inches in size.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION

3.01 GENERAL

- A. Schedules shall represent a practical plan to complete the Work within the Period of Performance, and shall convey the Contractor's intent in the manner of prosecution and progress of the Work.
- B. The scheduling and executing of the Project Work in accordance with the schedule are the responsibility of the Contractor.
- C. The submittal of schedules shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract Documents and that the Work will be executed in the sequence and duration Indicated in the schedule.
- D. All schedule submittals are subject to review and acceptance by the Contracting Officer Representative. The Authority retains the right to withhold progress payments until the Contractor

submits a schedule, payment schedule, and updates acceptable to the Contracting Officer Representative.

- E. The approved Project Schedule will be used as the basis for progress payments to the Contractor. Payments will be made by the Contracting Officer Representative only for activities that are 100 percent complete.

3.02 PAYMENT

- A. Submittal Monthly Progress Report at least 5 working days prior to the submittal of a progress payment request. No progress payment request will be processed if there is not an agreed update in place.

3.03 PROJECT SCHEDULER

- A. To prepare the Project schedules, the Contractor shall engage the services of a full time scheduler who is skilled in the time and cost application of scheduling using PDM network techniques for heavy construction projects.
- B. The Contractor's scheduler may or may not be an independent consultant; however, the scheduler shall be available to the Contractor and Contracting Officer Representative to address schedule questions and shall attend all Periodic Progress Review and Schedule meetings convened by the Contracting Officer Representative.
- C. In the event that the Project scheduler is not found to be competent or to have sufficient relevant experience, WMATA will request that the Project scheduler be removed from the Project pursuant to Section 00709, PROJECT MANAGEMENT AND SUPERINTENDENCE AND KEY STAFF. In that event, the Contractor shall submit a new candidate for consideration within 10 Days.

3.04 REQUESTS FOR TIME EXTENSIONS

- A. The Contractor is responsible for submitting a written request for any extensions of Period of Performance within the time specified by the Contract. Requests not submitted in writing, without the required documentation, and not submitted within 30 Days will not be considered.
- B. The request shall include documentation with written justification for the extension of time, supporting evidence, and specific references to the Contract for which the basis of the request is being made.
- C. The request shall also include a calendar time-scaled CPM network schedule analysis and reports specified in Article 1.06 herein, depicting the time impact basis of the request with the affected areas prominently highlighted. The Project Schedule to be used in determining the time extension request shall be the current and accepted schedule at the time of the event.
- D. If the Contracting Officer Representative finds that the Contractor is entitled to an extension of time of any completion date under the provisions of the Contract, the Contracting Officer Representative's determination of the total number of Days extension will be based upon the current analysis of the currently approved Project Schedule and upon data relevant to the extension. Extensions of time for performance under any and all of the provisions of the Contract will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total float along the paths involved of the most critical path to Project completion.
- E. The Contractor shall submit a CPM fragnet with enough detail to depict the causes, duration, and logic relationship and impact of the current schedule activities. The quantum of delay impact on Contract completion or interim milestone(s) must be determined for time extension.
- F. Critical delays, i.e., delay, which may affect the activities on the current critical path, will be contemporaneously discussed and mutually agreed by all the parties involved. In case the quantum

of delays or impact cannot be resolved, the background, issues, work performed, as well as start and finish dates of delays shall be well-documented in chronological order. The Contracting Officer Representative's determination of merit for time extension(s) will be awarded after the Contracting Officer Representative finds entitlement to the Contractor's request and only after the alleged delays are demonstrated to impact the most critical path(s). Data furnished by the Contractor will be used as a basis in the findings of the Contracting Officer Representative.

- G. A complete As-Built Schedule, which has enough detail to depict delay and demonstrate cause-effect delay impact, shall be submitted at the end of the Project.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the general requirements and procedures for preparing and submitting design and construction documents to the Authority and Jurisdictional Authorities for approval or for information. The submittals shall consist of, but not be limited to design drawings, computations, and specifications; Shop Drawings; Working Drawings; product data; samples; documents, letters, certifications and reports; permit applications and Jurisdictional Authority approval documents; and other submittals.

1.02 DEFINITIONS

- A. Schedule of Required Submittals: A compendium of all required design and construction related submittals identified throughout the Contract Documents.
- B. Contract Document Submittal Log: A document indicating the status of all Required Submittals listed in the Schedule of Required Submittals.

1.03 SUBMITTAL SCHEDULE

- A. Provide a preliminary Schedule of Required Submittals, as described in Section 00720, SUBMITTALS, within 14 Days after the effective date of Notice to Proceed (NTP) for the Authority's review. The preliminary Schedule of Required Submittals shall be updated through discussions with the Authority during weekly progress meetings or through special meetings subsequent to initial Authority approval.
- B. Submit a Contract Document Submittal Log, as described in Section 00720, SUBMITTALS, within 30 Days after the effective date of NTP. The Contract Document Submittal Log, created in MS Excel or MS Access, shall consist of all submittals required by the Contract Documents. Populate the Contract Document Submittal Log with submittal data as the design and construction progresses. The Contract Document Submittal Log shall list all versions of a submittal, however only one version of a submittal may be in effect at any one time.
- C. Submit a final Schedule of Required Submittals within 60 Days after the effective date of NTP.
- D. Submittals made shall be arranged and maintained in a tabular format by specification Section as well as in chronological order by the dates required for construction. The log shall include:
 - 1. Scheduled date for initial Submittal, review, and "need" date for acceptance in order to fabricate and install, corresponding to the Project Schedule activity.
 - 2. Contract number, specification Section number and title
 - 3. Name of Subcontractor
 - 4. Type of Submittal (Shop Drawings, product data, samples, or other), description of the item, name of manufacturer, trade name, and model number
 - 5. Highlight submittals that are on the critical path and require expedited review to meet the schedule. Indicate lead time to the date of fabrication and installation.
 - 6. State if submitted for approval or information.

7. If a Submittal is a safety critical item based on the approved Certifiable Items List (CIL), include the "Item" number and "Section" (paragraph) number, as shown on the Certifiable Items List.
 8. Re-submittals: Reason for change
 9. Tested/Inspected By: Identify the entity performing the test
- E. The Contract Document Submittal Log shall be updated and submitted on a monthly basis.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Submit one electronic copy in the format specified, unless noted otherwise, through the Authority's Project Management Software System (PMSS). The Contracting Officer's Representative will return one electronic copy through the PMSS.
- B. Allow [21] Days for review of submissions and resubmissions.
- C. The Contracting Officer's Representative will discard submittals received from sources other than the Contractor.
- D. Prepare separate submittals for each item in a specification Section. Group them in the order listed, paragraph by paragraph, and package them together.
- E. Transmit submittals of related parts of the Work concurrently such that processing will not be delayed for coordination. Incomplete submittals will be returned to the Contractor with no action taken by the Authority.
- F. Place a permanent label or title block on each submittal item for identification.
 1. Indicate Project name and Contract number, the date of submission, reference to the specification Section article, and drawing number and detail to which the submittal applies.
 2. Indicate name of firm or entity that prepared each submittal.
 3. Provide a blank space approximately 5 by 5 inches, in the lower right corner of each drawing just above the title block, to record the Contractor's review and approval markings and action taken by the Contracting Officer Representative.
- G. All submittals shall be accompanied with a transmittal form containing the following minimum information.
 1. Project name and Contract number, the date of submission, Subcontractor, Supplier, manufacturer name, and submittal number
 2. Submittal purpose and description
 3. Reference to the specification Section, drawing number, and title
 4. Reference applicable standards, such as ASTM or Federal Specification numbers
 5. Location(s) where product is to be installed, as appropriate
 6. Identification of deviations from the Contract Documents
 7. Notation that Submittal is a safety critical item, if identified on the "Certifiable Items List"

1.05 MEETING MINUTES

- A. Prepare meeting minutes that are the responsibility of the Contractor immediately after each meeting. Submit draft copy to Contracting Officer Representative for review within 5 Days in MS Word format.
- B. Submit final meeting minutes in Adobe (.PDF) format 3 Days after receipt of Authority review.

1.06 SHOP DRAWINGS

- A. General:
 - 1. Submit Shop Drawings in AutoCAD and Adobe (.PDF) formats.
 - 2. Shop Drawings shall indicate all pertinent features of the products and the method of fabrication, connection, erection, or assembly with respect to the Work.
 - 3. The first drawings submitted by Contractor, Subcontractor, or vendor will be reviewed for conformance with this Section. Once accepted, use the drawing format as a standard for subsequent drawings.
- B. Dimensioning: Follow applicable dimensioning and tolerance practices as specified in ANSI/ASME Y14.5.
 - 1. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 2. Provide sufficient dimensions on drawings so that size, shape, and location may be determined without calculation.
 - 3. Show each dimension clearly so that only one interpretation is possible. Show each dimension for a feature once.
 - 4. Text must be legible on 11 by 17-inch prints.
 - 5. Include on the Shop Drawings details necessary for the installation, maintenance, and repair of all equipment provided.

1.07 WORKING DRAWINGS

- A. Submit Working Drawings in AutoCAD and Adobe (.PDF) formats.
- B. Working Drawings indicate the Contractor's plan for temporary structures that will not become part of the completed Project such as decking, temporary bulkheads, support of excavation, support of utilities, groundwater control systems, and forming and falsework for underpinning; and for such other work as may be required for construction.
- C. Working Drawings and calculations shall be signed and sealed by a professional engineer registered in the jurisdiction where the work will be performed and shall convey, or be accompanied by information sufficient to completely explain the structure, machine, or system described and its intended manner of use.

1.08 PRODUCT DATA

- A. Submit product data in Adobe (.PDF) format.
- B. If information must be specially prepared for a submittal because standard published data is not suitable for use, submit as Shop Drawings, not as product data.

- C. Modify manufacturers' standard drawings, catalog cuts, brochures, diagrams, schedules, performance charts, illustrations, calculations, printed installation, erection, application, and placing instructions, and other descriptive data to delete information that is not applicable to the Contract. Indicate dimensions, clearances, performance characteristics, capacities, wiring and piping diagrams, and controls. Supplement standard information with additional information applicable to this Contract.
- D. Submit product data concurrent with samples.

1.09 SAMPLES

- A. Submit samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittals and actual components as delivered and installed.
- B. Maintain sets of accepted samples at the Site, available for quality control comparisons throughout the course of construction activity. Sample sets may be used to determine conformance of construction associated with each set.
 - 1. Samples that may be incorporated into the Work are indicated in individual specification Sections. Samples not incorporated into the Work, or otherwise designated as the Authority's property, are the property of Contractor.
- C. Samples for Verification: Submit full-size units or samples of a size indicated, physically identical with material or the product proposed for use and that shows a full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
- D. Number of Samples: Submit [five] sets of Samples. The Contracting Officer Representative will retain [three] Sample sets; the remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1. Submit a single sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- E. If variations in color, pattern, texture, or other characteristics are inherent in the material or product represented by a sample, submit at least [three] sets of paired units that show approximate limits of variations.

1.10 CERTIFICATES AND CERTIFICATIONS

- A. Submit original certificates and certifications in MS Word and Adobe (.PDF) formats.
- B. Provide certificates and certifications that demonstrate proof of compliance with Contract specification requirements for products, materials, equipment, and systems.
- C. Authority Approval of a certification shall not be construed as relieving the Contractor from furnishing products that meet the specified design intent.

1.11 REPORTS

- A. Submit original reports, signed and sealed by a professional engineer in the jurisdiction that the Work is to be constructed, and any related drawings in MS Word, AutoCAD and Adobe (.PDF) formats.

- B. Provide reports that demonstrate proof of compliance with Contract specification requirements. The reports include manufactured products, materials, research, equipment, systems, and test reporting in the field or laboratory.
- C. Authority Approval of submitted reports shall not be construed as relieving the Contractor from furnishing products that meet the specified design intent.

1.12 DATA

- A. Submit data and any related drawings in MS Word, AutoCAD and PDF formats.
- B. Provide written and graphic information including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations that demonstrate proof of compliance with Contract specification requirements. Provide the name and version of software used for calculations.
- C. Authority Approval of submitted data shall not be construed as relieving the Contractor from furnishing products that meet the specified design intent.

1.13 CONSTRUCTION PHOTOGRAPHS AND VIDEO

- A. All still photographic documentation of the Work shall be provided by the Contractor in digital format.
- B. Video documentation recordings of the Work, accompanied with audio recording, shall be provided by the Contractor in digital format.
- C. For detailed submittal procedures see Section 01321, CONSTRUCTION PHOTOGRAPHS.

1.14 AS-BUILT DOCUMENTS

- A. Maintain a record set of drawings and specifications that reflect as-built conditions and that are annotated to show all changes incorporated as Work progresses.
- B. Submit As-Built Drawings in AutoCAD and bookmarked-by-discipline Adobe (.PDF) formats that can be plotted either as full-size or half-size drawings that are scalable.
- C. Submit approved As-Built Documents for the completed Work as specified in Section 01775, CLOSEOUT, as elements of the Work are completed and before the scheduled date of Substantial Completion.

1.15 CONTRACTOR'S REVIEW

- A. Review each submittal, including all those provided by Subcontractors and Suppliers of any tier, check for coordination with other Work and for compliance with the Contract Documents. Note inconsistencies with Contract Documents. Submittals shall bear the Contractor's approval stamp and initials of the reviewer before submitting to the Authority.
- B. Each submittal transmittal form shall be signed by the Contractor with a statement, "Having checked this submission, we certify that it conforms to the requirements of the Contract in all respects, except as otherwise indicated".
- C. Do not start work where submittals are required until submittal review is completed by the Authority and Approval, if required, has been received.
- D. Identify approval methods of the various jurisdictional authorities and obtain their approvals as required.

1.16 AUTHORITY'S REVIEW

- A. The Contracting Officer Representative shall receive construction submittals from the Contractor and will distribute them within the Authority for review.
 - 1. Shop Drawings, samples, and other submission reviews by the Authority will not include checking of dimensions for potential conflicts.
 - 2. Approval by the Authority of a specific item will not indicate Approval of an assembly of which the item is a component.
 - 3. Incomplete submittals will be returned for resubmission without review.
- B. Submittals that are reviewed by the Authority will be returned to the Contractor with one of the following approval codes:
 - 1. Code 1: Approved Without Condition or Comment.
 - 2. Code 2: Approved As Noted, Resubmittal Not Required. The Contractor shall comply with changes, conditions, or comments on the submittal.
 - 3. Code 3: Disapproved. The entire submittal is disapproved and shall be resubmitted.

1.17 RESUBMISSIONS, DISTRIBUTION, AND USE

- A. Make resubmissions in same form and number of copies as initial submittal. Note the date and content of previous submittal. Clearly indicate extent of revision.
- B. Furnish copies of final submittals to manufacturers, Subcontractors, Suppliers, fabricators, installers, Jurisdictional Authorities, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- C. Retain complete copies of submittals on Site.

1.18 RFI ADMINISTRATIVE REQUIREMENTS

- A. Submit one electronic copy on the RFI form provided by the Authority, through the Authority's Project Management Software System (PMSS). The Contracting Officer's Representative will return one electronic copy through the PMSS.
- B. Allow [7] Days for the review of each RFI.
- C. The Contracting Officer's Representative will discard RFIs received from sources other than the Contractor.
- D. All submittals shall be accompanied with a transmittal form containing the following minimum information.
 - 1. Project name and Contract number, the date of submission, and RFI number
 - 2. Clear statement of the question to be addressed by the Authority
 - 3. Reference to the specification Section, drawing number, and title that is the subject of the RFI

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01420
REFERENCES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section lists the reference standards cited in the Contract Documents, the organizations or Jurisdictional Authorities whose standards are cited, and common acronyms used in the Contract Documents.
- B. When reference is made to codes, regulations, reference standards, and specifications, the Work shall conform to the current edition as of the date of Award, unless it is superseded by Jurisdictional Authorities.

1.02 ABBREVIATIONS AND ACRONYMS

AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ABS	Acrylonitrile-Butadiene-Styrene
ac	Alternating Current
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
A/D	Analog to Digital
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AHA	American Hardboard Association
AHDGA	American Hot Dip Galvanized Association, Inc
AI	Asphalt Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association
AMTRAK	National Railroad Passenger Corporation
ANSI	American National Standards Institute (synonymous with USASI-ASA)
API	American Petroleum Institute
AREMA	American Railway Engineering and Maintenance of Way Association
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASTM	ASTM International
ATBCB	Architectural and Transportation Barriers Compliance Board
AT&T	American Telephone and Telegraph Company

AWG	American Wire Gauge (synonymous with Brown and Sharpe)
AWI	Architectural Woodwork Institute
AWWA	American Water Works Association
AWS	American Welding Society
AWPA	American Wood Preservers' Association
BG&E	Baltimore Gas and Electric Company
BIA	Brick Institute of America
BLS	Bureau of Labor Statistics
B&O	Baltimore & Ohio Railroad (Division of the CSX Transportation)
BOCA	Building Officials and Code Administrators International
BTU	British Thermal Unit
BTUH	British Thermal Units Per Hour
C	Celsius (Centigrade)
CAGI	Compressed Air and Gas Institute
CE	US Army, Corps of Engineers
cfm	Cubic Feet Per Minute
CISPI	Cast Iron Soil Pipe Institute
CMU	Concrete Masonry Unit
C&O	Chesapeake and Ohio Railroad (Division of the CSX Transportation)
CONRAIL	Consolidated Rail Corporation (formerly Penn Central)
CQCS	Contractor's Quality Control System
CRSI	Concrete Reinforcing Steel Institute
CSX	CSX Transportation (formerly Chessie System, B&O, C&O, and Chesapeake & Ohio)
CTI	Cooling Tower Institute
dB	Decibel(s)
dc	Direct Current
DFT	Dry Film Thickness
DILM	Ductile Iron Pipe, Cement-Lined and Coated, Mechanical Joint
DILP	Ductile Iron Pipe, Cement-Lined and Coated, Push-On-Joint
DPST	Double Pole, Single Throw
DTS	Data Transmission System
EPA	Environmental Protection Agency
EPR	Ethylene-Propylene-Rubber
F	Fahrenheit
FAA	Federal Aviation Administration
FCCCR	Foundation for Cross-Connection Control Research of the University of Southern California Engineering Center

FHWA	Federal Highway Administration
FM	Factory Mutual Associates
FS	Federal Specifications
FED STD	Federal Standard
FTA	Federal Transit Administration (formerly UMTA)
GPH	Gallons Per Hour
GSA	General Services Administration
HOA	HAND/OFF/AUTOMATIC
HP	Horsepower
HVAC	Heating, Ventilating and Air Conditioning
IBC;	International Building Code
ICEA	Insulated Cable Engineers Association
ICI	Industrial Coatings International
ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IPS	Iron Pipe Size
ISO	International Organization for Standardization
JGB	Jackson Graham Building 600 Fifth Street, N.W. Washington, D.C. 20001
kHz	Kilo Hertz
kV	Kilovolts
kVA	Kilovolts-amperes
kW	Kilowatts
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
mV	1,000 volts
mVA	1,000 volts-amperes
MCM	1,000 Circular Mils
MCP	Motor Circuit Protector
MDNR	Maryland Department of Natural Resources
METRO	Logo for the Washington Metropolitan Area Transit Authority
MNCPPC	Maryland-National Capitol Park and Planning Commission
MS	Military Specification
MSG	Manufacturers' Standard Gauge
MIL STD	Military Standard
MSHA	Maryland State Highway Administration
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry

MTPD	Metro Transit Police Department
MUTCD	Manual of Uniform Traffic Control Devices
MWAA	Metropolitan Washington Airports Authority
MWRA	Maryland Water Resources Administration (Part of MDNR)
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAVFAC	USN, Naval Facilities Engineering Command
NBGQA	National Building Granite Quarries Association
NBS	National Bureau of Standards
NC	Normally Closed
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NO	Normally Open
NPS	National Park Service
NTP	Notice to Proceed
NTIS	National Technical Information Service
OCCB	Operations Control Center Building 600 Fifth Street, N.W. Washington, D.C. 20001 (see JGB)
OD	Outside Diameter
OS&Y	Outside Stem and Yoke
OSHA	US Department of Labor, Occupational Safety and Health Administration
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PE	Polyethylene
PEI	Porcelain Enamel Institute
PEI	Petroleum Equipment Institute
PEPCO	Potomac Electric Power Company
PGFD	Prince Georges County, Fire Department
PGDPW&T	Prince Georges County, Department of Public Works and Transportation
PGSCD	Prince Georges County, Soil Conservation District
PPHM	Parts Per Hundred Million
PPM	Parts Per Million
psf	Pounds Per Square Foot

psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gauge
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
rms	Root Mean Square
rpm	Revolutions Per Minute
ROD	Revenue Operation Date
RQD	Rock Quality Designation
SDI	Steel Deck Institute or Steel Door Institute, depending upon context in which it occurs
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association
S1S	Smooth One Side
S2S	Smooth Both Sides
SJI	Steel Joist Institute
SPDT	Single Pole, Double Throw
SPST	Single Pole, Single Throw
SSPC	Steel Structures Painting Council
TBM	Tunnel Boring Machine
TCA	Tile Council of America
TGA	Thermogravimetric Analysis
UFAS	Uniform Federal Accessibility Standards
UL	Underwriters Laboratories, Incorporated
UMTA	Urban Mass Transit Administration
UPS	Unit Price Schedule or Uninterruptible Power System, depending upon context in which it occurs
USBR	US Bureau of Reclamation
USCG	US Coast Guard
USCS	US Commercial Standard
USDA/SCS	US Department of Agriculture - Soil Conservation Service
USDOT	US Department of Transportation
USGBC	US Green Building Council
USN/CD	US Navy, Chesapeake Division
USPS	US Product Standard
USSG	United States Standard Gauge
WAD	Washington Aqueduct Division (Element of U.S. Army C.E., Baltimore District)
WSSC	Washington Suburban Sanitary Commission
XLPE	Cross-Linked Polyethylene

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01470
QUALITY MANAGEMENT SYSTEM

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the Contractor's requirements to formalize a system that documents the structure, responsibilities, and procedures required to achieve effective quality management of the Work throughout the duration of the Contract.
- B. The Quality Management System shall be consistent with ISO 9001 standard. The Contractor is not required to be ISO certified, however, certain Suppliers and manufacturers shall be certified as required in these specifications.
- C. The Quality Management System shall include a Quality Plan, Inspection and Test Plans, and corresponding procedures and forms necessary to establish, document, maintain, and execute work that conforms to the Contract Documents.
- D. Inspection and Testing shall be performed by qualified staff and laboratories as specified herein.

1.02 REFERENCES

- A. Federal Transit Administration (FTA)
 - 1. FTA-PA-27-5194-12.1, Quality Management System Guidelines
- B. International Organization for Standardization (ISO)
 - 1. ISO 9001 – Quality Management Systems
 - 2. ISO 10013 – Guidelines for Quality Management System Documentation
- C. U.S. national standards maintained by the U.S. National Institute of Standards and Technology (NIST) and the U.S. Naval Observatory.

1.03 SUBMITTALS

- A. Make submittals in accordance with Section 01330, SUBMITTAL PROCEDURES, and as noted below. Submit plans, procedures, audit schedules and certifications for Approval. Remaining submittals are for information.
- B. Quality Plan: Contract-specific Quality Plan modeled after ISO 9001 within 30 Days of NTP and with each revision. As a minimum, the following quality elements shall be included in the Quality Plan.
 - 1. Management Responsibility
 - 2. Document Control
 - 3. Subcontracting and Purchasing
 - 4. Product Identification and Traceability
 - 5. Inspection and Testing
 - 6. Inspection Measuring and Test Equipment
 - 7. Inspection and Test Status

8. Nonconformance
9. Corrective Action
10. Quality Records
11. Quality Audits
12. Training
- C. Quality Procedures: Procedures for each of the quality elements in the Quality Plan within 10 Days of NTP.
- D. Inspection and Test Plans/Specific: Submit Work task or component specific Inspection and Test Plans a minimum 60 Days in advance of when the covered work is scheduled to begin.
- E. Quality Reports: Submit the following reports in accordance with the approved Quality Plan and Quality Procedures.
 1. Daily Quality Reports: Daily.
 2. Test Status Report: Monthly.
 3. Review and Disposition of Nonconforming Product: With each occurrence.
 4. Summary of Management Reviews: Monthly during the first 6 months after NTP and not less than quarterly thereafter.
 5. Proposed audit schedule within 60 Days of NTP.
 6. Report of audit results and completion of corrective actions within 30 Days of the completion of an Audit.
 7. Quality Compliance Certification with each Monthly Progress Report

1.04 QUALITY MANAGEMENT SYSTEM REQUIREMENTS

A. Quality Management System

1. The Quality Management System shall be updated to improve the system as necessary throughout the Period of Performance of the Contract to reflect changes determined to be necessary by Contractor management review, Contractor internal audit, and Authority audit. Each update of the Quality Management System requires Authority Approval.
2. During the Period of Performance, exercise positive control over all of the Work, including that of subconsultants, Subcontractors, fabricators, manufacturers, installers, and Suppliers in accordance with the Quality Plan and Quality Procedures described within the approved Contractor Quality Management System.
3. The execution of the Quality Management System shall be subject to Authority audit throughout the Period of Performance of the Contract.

B. Quality Plan

1. The Quality Plan shall include the signatures of the Officer(s) responsible for the Contractor entity indicating their approval of the Quality Management System.

2. Quality Manager
 - a. Shall have the qualifications specified in Section 01111, CONTRACTOR KEY STAFF.
 - b. Shall perform as the Contractor's Management Representative.
 - c. Is responsible for implementing the Quality Management System and shall have the authority to stop the Work.
3. Document Control: Current version of all documents shall be managed in the Authority's Project Management Software System (PMSS). The database shall be kept current throughout the Period of Performance of the Contract.
4. Subcontracting and Purchasing
 - a. Purchased material, equipment, and services shall be controlled to ensure that they are properly integrated into the Work.
 - b. Assure that Contractor's subconsultants, Suppliers, and Subcontractors satisfactorily demonstrate and document an adequate system for managing quality to the Contractor.
 - c. Provide adequate surveillance of subconsultants, Subcontractors, and Suppliers to assure conformance with the Quality Management System and specification requirements. This surveillance shall include inspection and audit of off-Site activities of Contractor's subconsultants, Subcontractors, and Suppliers.
5. Product Identification and Traceability: The Contractor 's Quality Management System shall include provisions to identify and provide traceability of products and materials where appropriate and as required in the Contract Specifications.
6. Inspection and Testing/General
 - a. Establish an Inspection and Test Plan that conforms to the Quality Management System and the Contract Specifications and that allows for tracking of actual performance of inspections and tests.
 - b. The Inspection and Test Plan shall incorporate elements of the Authority furnished Inspection Guidelines, Part 2, as needed to meet the requirements of the Quality Plan.
 - c. Testing laboratories shall be certified as required by the Contract Specifications.
 - d. The Inspection and Test Plan shall be designed to assure that testing is performed to demonstrate that components and systems perform satisfactorily in service. Testing shall be performed by qualified and experienced personnel, and using certified in accordance with approved test procedures. Tests shall incorporate acceptance limits defined by industry codes and standards or by the Issued for Construction Specifications; the more restrictive standard shall take precedence. All test results shall be documented and submitted to the Authority for review.
 - e. Provide the Authority 14 working days notice of tests except when greater notice is required in these specifications.
 - f. Include instructions necessary to implement source inspections; receiving inspections; inspection of work in progress; hold point inspections, and completion inspections.
 - g. Forms for recording test results and authorized approval signatures shall be used for all tests. Each test form shall identify the applicable specification Section, Article, and Paragraph.

- h. Subcontractors testing their own work shall be supervised and managed by the Contractor. The responsibility for testing and Subcontractor performance remains with the Contractor.
 - i. If tests or certifications conducted by the Authority disclose that work is not in conformance with the Contract Specifications, then the Authority will advise the Contractor as to the particular defects to be remedied. Upon correction of the defects, provide written notification to the Contracting Officer Representative, and additional testing or certification shall be conducted as necessary to result in a proven and certified system(s). Further, in the case of such non-conformance with the Contract Documents, provide details on the preventive action taken to avoid such non-conformance for remaining installations.
- 7. Inspection, Measuring, and Test Equipment: Ensure that test equipment used meets the specified requirements, and that the equipment and instruments are controlled, maintained, and calibrated by a nationally recognized certification entity/agency. Devices used to calibrate measuring and test equipment or other measurement standards shall be traceable to one or more of the following:
 - a. U.S. national standards maintained by the U.S. National Institute of Standards and Technology (NIST) and the U.S. Naval Observatory.
 - b. Fundamental or natural physical constants with values assigned or accepted by the U.S. NIST.
 - c. National standards of other countries, which are correlated, with U.S. national standards.
 - d. Comparison to consensus standards.
- 8. Inspection and Test Status: Require inspection and test schedules for the Authority's use in scheduling test witnessing and other quality assurance functions.
- 9. Review and Disposition of Nonconforming Product: The authority within the Contractor organization to review and provide disposition of nonconforming products shall be identified. The disposition of product that does not conform to the Contract Documents shall be subject to approval by the Contracting Officer Representative.
- 10. Corrective Action: Corrective action shall be established, documented, and maintained. These include the investigation of the root cause of nonconforming work and the corrective action needed to prevent recurrence, and analysis to detect and eliminate potential causes of nonconforming work.
- 11. Control of Quality Records
 - a. Quality records document results achieved (e.g. test data sheets, test reports, electronic test data, mill certifications, measurement verification sheets, batch tickets) or provide evidence of activities performed (e.g. inspection reports, photos or videos, checklists with sign-offs).
 - b. Establish and implement measures to identify, collect, index, file, and store. These procedures shall include a database to track and maintain control over all Quality Records generated by the Contract Work.
 - c. Quality records shall be legible, reproducible, identifiable with the item involved, and contain the date of origination and identity of the originator, verifier, and responsible supervisor.
 - d. Quality records generated by Subcontractors, Suppliers, fabricators, and test laboratories shall be traceable to the product being supplied or fabricated and shall be provided in advance of shipment or shall be shipped with the product.
 - e. Retain quality records for the duration required to meet statutory requirements.

12. Quality Audits

- a. Management reviews conducted by Contractor:
 - (1) Management reviews shall occur monthly during the first 6 months of the Contract and not less than quarterly thereafter.
 - (2) Written summaries of findings and major corrective actions shall be provided to the Contracting Officer Representative within 5 Days of completion of each review.
- b. Internal quality audits conducted by Contractor:
 - (1) Internal audits shall be performed at least quarterly.
 - (2) Deficiencies in the Quality Management System, the causes of deficiencies in the Quality Management System, and the status of corrective action and preventive action, when appropriate shall be recorded in the audit results.
 - (3) Audit results shall be provided to the Contracting Officer Representative within 14 Days of the audit with a plan for corrective and preventative action.
 - (4) Provide notification of completed corrective and preventative action.

13. Training: Establish, maintain, and provide the training needs for all personnel performing activities affecting quality. Refer to Section 01820, Demonstration and Training.

C. Inspection and Test Plans/Specific

- 1. As a minimum, Inspection Plans shall include the following information:
 - a. A matrix of all inspections required by the Contract Specifications to be performed by Contractor, Suppliers, or Subcontractors and their frequency.
 - b. Established hold points that require work stoppage until Authority action relative to that work activity is complete.
 - c. Established witness points that identify when Authority notification is required for a Contractor work activity.
 - d. Checklists to be utilized.
- 2. As a minimum, the Test Plans shall include the following information:
 - a. A matrix of all tests required by the Contract Specifications to be performed by Contractor, Suppliers, or Subcontractors.
 - b. Samples of test reports: the test reports shall meet the minimum requirements called for in the applicable test standards specified in the Contract Specifications.
 - c. Provisions for coordinating onsite and offsite testing.
 - d. Provisions for meeting the Authority notification criteria for planned tests and inspections specified to be witnessed by the Authority. Provide the Authority a minimum of 14 Days advance notice.
 - e. Description of test
 - f. Specification Section, Article, and Paragraph related to each test
 - g. Type of test

- h. Applicable standard
- i. Test frequency
- j. Responsibility for test performance
- k. Completion status
- l. Means of tracking and recording corrective actions being taken to assure compliance with the Issued for Construction Specifications.
- m. Means for recording test results.

D. QUALITY REPORTS

1. Daily Quality Reports: Daily quality reports shall summarize the construction activities to the Authority, record the inspections and tests completed and the results, and record deficiencies identified, during the previous 24 hours of work. These reports shall be provided to the Contracting Officer Representative daily.
2. Test Status Report: Track and report the status of testing. Revisions, updates, and additions the test status report shall be submitted to the Contracting Officer Representative at least monthly.
3. Quality Compliance Certification: As specified in Section 00744, METHOD OF PAYMENT, the Quality Manager's Quality Compliance Certification shall be provided with each Monthly Progress Report stating that application of the Quality Management System has demonstrated that the items requested for payment have been designed or constructed to meet the design requirements and have been inspected and tested as required to comply with the Contract Documents. Work for which satisfactory records for design, testing, inspection, or other quality elements are not available, will not qualify for payment.

1.05 AUTHORITY QUALITY OVERSIGHT

- A. The principal role of the Authority in the implementation of the Contractor Quality Program will be oversight of the effectiveness of the Contractor's Quality Management System including quality control and quality assurance activities. The Authority reserves the right to conduct inspection of all phases of design and construction by Authority field staff. Deficiencies discovered will be brought to the immediate attention of the Contractor including written follow-up notification.
- B. When the Authority determines that the approved Quality Management System or plans, or any portion or feature thereof, are not controlling work sufficiently for the Work to conform to the Contract Documents, Contractor shall take appropriate action to correct such deficiencies. The Contracting Officer Representative may stop the Work activities if the Quality Management System is not functioning properly due to lack of Contractor's staff or for any other Contract non-compliance.
- C. Notwithstanding the above, Authority inspection, testing, or other actions shall not constitute Acceptance of work, nor shall it relieve the Contractor of its contractual responsibilities.
- D. When Authority inspection is required, add to the purchasing document the following statement:

"Authority inspection is required prior to shipment from the plant. Upon receipt of this order, promptly notify the Contracting Officer Representative, in writing, so that appropriate planning for Authority inspection can be accomplished."

1.06 AUTHORITY AUDITS OF THE CONTRACTOR'S QUALITY MANAGEMENT SYSTEM

- A. At its sole discretion, the Authority may conduct audits, tests, and inspections in addition to those performed by the Contractor.

- B. There will be an ongoing review and evaluation of implementation of the Contractor's Quality Management System to verify that the Contractor is effectively controlling the quality of construction.
- C. Audits include audits of fabricators, Subcontractors, subconsultants, Suppliers, and third-party audits (i.e., ISO audits, trade organization certification audits, and audits required to maintain laboratory or testing accreditation).
- D. If the implementation of the Contractor's Quality Management System is determined to be ineffective by the Authority, the Authority, at its sole discretion, may withhold payment for any and all work it deems to be deficient or non-conforming to the Contract Documents. The Contractor will be expected to make whatever changes are necessary in the organization or in the Quality Management System to provide effective control of the quality of the Work.
- E. The Authority will perform audits to verify that the Contractor is effectively controlling the quality of the Work. The basis for the audits will be the Quality Management System and the Contract Documents.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01510
TEMPORARY UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies requirements for temporary utilities for use during construction.
- B. Temporary utilities required include but are not limited to:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Telephone service.
 - 4. Storm and sanitary sewer.

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI-A10 Series standards for Safety Requirements for Construction and Demolition
- B. National Electrical Contractors Association (NECA)
 - 1. NECA Electrical Design Library, Temporary Electrical Facilities
- C. National Electrical Manufacturers Association (NEMA)
- D. National Fire Protection Association (NFPA)
 - 1. NFPA 70, National Electrical Code
 - 2. NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations
- E. Occupational Safety and Health Administration (OSHA)
- F. Underwriters Laboratories (UL)

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01330, SUBMITTAL PROCEDURES, and with additional requirements as specified for each.
 - 1. Reports for tests, inspections, meter readings, and similar procedures performed for temporary utilities.
 - 2. Indicate the schedule for implementation and termination of each temporary utility as appropriate to the Authority as described in Section 01322, CONTRACT PROGRESS REPORTING.

1.04 QUALITY ASSURANCE

- A. Comply with industry standards and applicable laws and regulations of Jurisdictional Authorities including but not limited to:
 - 1. Building Code requirements.

2. Health and safety regulations.
 3. Utility company regulations.
 4. Police, Fire Department, and Rescue Squad rules.
 5. Environmental protection regulations.
- B. Comply with NFPA Code 241, ANSI-A10, and NECA Electrical Design Library, Temporary Electrical Facilities. For electrical service, comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.
- C. Arrange for the inspection and testing of each temporary utility before use, and coordinate all requirements for certifications and permits. The Contracting Officer Representative shall be notified sufficiently in advance, but with no less than 24 hours notice, so as to be present at all planned inspections and onsite activities.

1.05 PROJECT CONDITIONS

- A. Incorporate into the Project Schedule dates for implementation and termination of each temporary utility. At the earliest practicable time and when acceptable to the Authority, change over from use of temporary service to use of the permanent service.
- B. Keep temporary services and facilities clean and neat in appearance. Temporary utilities shall operate in a safe and efficient manner. Take all necessary fire prevention measures and shall ensure that utilities are not overloaded or permitted to interfere with progress of the Work. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the Site.
- C. Determine temporary utility services requirements and shall make arrangements with utility companies and governmental agencies to obtain such services.
- D. Provide temporary electrical service of sufficient capacity to serve the temporary requirements during the life of the Contract. The source of temporary power for testing may be the temporary service, portable generator, or other approved system, which will deliver power at the voltage and other characteristics required to accomplish testing as specified. Circuits and construction for temporary systems shall suit the needs of the Work and comply with NEC and the codes and regulations of the Jurisdictional Authorities.
- E. Temporary services shall be furnished, installed, connected, and maintained by the Contractor as approved by the Contracting Officer Representative. Prior to completion of the Work, the Contractor shall remove all temporary services and restore affected areas as approved.
- F. Shop drawings for all temporary utility and electrical services shall be submitted for approval. Power supply shall be of such quantity and type required to perform the Work. Maximum primary voltage shall be 600 volts, unless otherwise approved. Lighting equipment shall be of the type and quantity needed to provide illumination of all project areas. Materials for and installation of temporary services shall comply with OSHA requirements.

1.06 ACCESS TO FIRE HYDRANTS AND FIRE ALARM BOXES

- A. Whenever the Work is being carried out, free access must be given to each fire hydrant, fire alarm box and standpipe; when required, hydrants shall be extended by suitable tubes or piping to an accessible point as approved and to the satisfaction of the jurisdictional fire department. Obstructions shall not be piled at any time or placed within 10 feet of any fire hydrant or fire alarm box and, where materials are placed in the vicinity of a fire hydrant or fire alarm box and to such height as to prevent the same from being readily seen, the position of such hydrants or fire alarm boxes shall be indicated by suitable signs and lights, both day and night.

- B. Safeguard, maintain, and protect the wires, cables, ducts, manholes, posts, and poles, signals, and alarm boxes of fire departments. Do not cause interruption to the fire department fire alarm telegraph service, and in case of accident, shall promptly notify the fire department. No fire department wire, cable, duct, manhole, post or pole, signal, or fire alarm box shall be disturbed, except in the presence of a representative of the Bureau of Fire Alarm Telegraph. In case such wire, cable, duct, manhole, post or pole, signal, or fire alarm box is disturbed, the Contractor shall immediately notify the Contracting Officer Representative, and it shall be restored immediately to its original condition.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01550
MAINTENANCE OF TRAFFIC, ACCESS, AND PARKING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes requirements for maintenance of existing pedestrian and vehicular traffic onsite and offsite; construction sequence, and staging; maintaining access to and from the Site including construction areas, haul routes, and temporary roads with traffic control; and for Contractor parking.

1.02 REFERENCES

- A. Manual of Uniform Traffic Control Devices (MUTCD)

1.03 SUBMITTALS

- A. Submit the following Working Drawings in accordance with Section 01330, SUBMITTAL PROCEDURES, for Jurisdictional Authority approval such that approval is obtained 30 Days prior to start of the work. Submit to Authority for Approval prior to Jurisdictional Authority review.

- 1. Maintenance of Traffic Plan

- B. Submit the following shop drawings in accordance with Section 01330, SUBMITTAL PROCEDURES, for Jurisdictional Authority approval such that approval is obtained prior to start of the work. Submit to Authority for Approval prior to Jurisdictional Authority review.

- 1. Plan showing locations of access points to fire hydrants and fire alarm boxes
 - 2. Plan showing locations of staging, working, storage, and lay down areas

1.04 MAINTENANCE OF TRAFFIC

- A. Maintain traffic and erect and maintain traffic control devices in accordance with the applicable MUTCD, and as required by the Jurisdictional Authority of the area where the Work is to be performed, including, but not limited to, the following for each construction sequence and maintenance of traffic stage:

- 1. Temporary directional and electrical warning and detour signs
 - 2. Temporary barricades
 - 3. Temporary lighting, overhead warning lights, flashing lights, and lanterns
 - 4. Temporary paving and striping

- B. Traffic control signs: Traffic control signs shall be standard signs of the Jurisdictional Authority. Each change in location of traffic shall be adequately posted with a minimum of two signs mounted on barricades or standard posts. All signing shall be constructed, maintained, and removed in accordance with the requirements of the latest published standard of the Jurisdictional Authority.

- C. Striping: Provide all necessary temporary striping required in connection with all temporary street work. Remove or obliterate existing or temporary pavement markings whenever vehicular traffic is moved to newly available pavement areas or to different traffic patterns.

- D. Redirecting traffic: Obtain approval from Jurisdictional Authority for channeling and shifting of traffic lanes as well as barricading of traffic in connection with this work.

- E. Temporary closing: Prior to the temporary closing to traffic of part of any public street, sidewalk, or other access or prior to changing traffic patterns from those existing, obtain approval from the appropriate Jurisdictional Authority. Deviations from this shall be for a bona fide emergency only and as approved by the Jurisdictional Authority.
- F. Contractor's surface operations: Schedule surface operations so as not to be working intermittently throughout the area. Excavation or construction activities shall be carefully scheduled and vigorously pursued to completion as required to permit opening of street areas to traffic as soon as possible without unnecessary delays.
- G. Temporary walkways: In areas where the removal of existing sidewalks is necessary, access to adjacent businesses, entrances and properties shall be maintained by temporary walkways having a width of not less than [6] feet.
- H. Intersections: Intersections shall be excavated and decked in stages as shown on Working Drawings and as approved by the Jurisdictional Authority. Construction shall be so staged that the required number of traffic lanes on each street shall be provided at all times during these operations. Upon completion of decking, traffic in all intersections shall be fully maintained.
- I. Temporary pavement and patching: Construct, maintain, and remove temporary pavement and patching required to safely and expeditiously handle vehicular and pedestrian traffic within or adjacent to the Site. The temporary pavement composition and patch shall conform to the requirements of the Jurisdictional Authority. Construction, maintenance, and removal required by the Contractor's operations off the Site shall be included under this Section.
- J. Contractor access to Station areas: Pedestrian traffic must be maintained at all times in Station areas. Contractor access routes to the platform shall be as directed, and all access to the Work sites shall be arranged through the Contracting Officer Representative. The Contractor shall familiarize itself with the Station layout. Use of the Station escalators by Contractor personnel is expressly prohibited. The combination of Contractor personnel and miscellaneous material loads shall conform to the load restrictions of Station elevators.
- K. The use of staging, working, storage, and lay down areas must be as approved by the Contracting Officer Representative and the Jurisdictional Authority.
- L. Jurisdictional Authority maintenance of traffic approval must be obtained at least 30 Days prior to the time public traffic pattern closures and changes are to be made and Authority maintenance of traffic Approval must be obtained 60 Days prior to start of construction on Authority property.

1.05 CONSTRUCTION SEQUENCE AND STAGING

- A. All work under this Contract shall be performed in accordance with the approved detailed plan of the Work following a logical sequence developed by the Contractor.
- B. The Contractor's particular attention is directed to the fact that both vehicular and pedestrian traffic must be maintained on the existing roads adjacent to the Site at all times for the duration of the Contract.
- C. Structures constructed underground by cut-and-cover methods require the Contractor to provide temporary decking as specified in Section 01530, TEMPORARY DECKING, over open excavations for the maintenance of vehicular and pedestrian traffic. In order that disruptions to traffic may be kept to a minimum, perform the decking operations, the utility work, and the subsequent paving and restoration operations in stages.
- D. A method of staging and requirements pertaining to the number of traffic lanes to be provided during rush hours and non-rush hours, shifting of traffic lanes, the use of working, storage and laydown areas, and other requirements pertaining to the maintenance of traffic as previously specified shall be developed by the Contractor as part of this Contract.

- E. The sequence in which the various stages are to be performed shall be under the control of the Contractor, provided that stage work within the limits of one stage is completed before work in another stage is commenced; and provided that all other requirements pertaining to maintenance of traffic are approved by the Jurisdictional Authority. No work shall be started prior to approval.

1.06 ACCESS TO ADJACENT PROPERTY

- A. Conduct construction operations in such a manner as to cause as little inconvenience as possible to owners of property affected by such operations. Convenient access to all property from roads and highways along line of work shall be maintained. When access to adjacent properties is temporarily cut off due to the Contractor's operations, render every assistance to provide access to the property and the transfer of commodities, including refuse, to and from the property.

1.07 ACCESS TO FIRE HYDRANTS AND FIRE ALARM BOXES

- A. Refer to Section 01510, TEMPORARY UTILITIES, for access to fire hydrants and fire alarm boxes.

1.08 CONTRACTOR'S PERSONNEL AND CONTRACTOR'S SUBCONTRACTORS PARKING

- A. Parking facilities for the Contractor's personnel and that of Subcontractors shall be the Contractor's responsibility, unless space is made available by the Authority. The storage/laydown and work facilities provided by the Authority, if any, shall not be used for parking by the Contractor or Contractor personnel.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01560
TEMPORARY BARRIERS AND ENCLOSURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes requirements for temporary barriers and enclosures. This Section also includes facilities for protection of occupants entering or exiting spaces during construction.

1.02 GENERAL

- A. Wherever necessary, shown or specified, erect and maintain signs, fences, barricades and pedestrian bridges for the protection of public travel, the work site, adjoining property and adjoining public places.
- B. Take positive measures to prevent entry into the Site of the Work and storage areas by children, animals, and unauthorized adults and vehicles.
- C. Appropriate warning signs and instructional safety signs as specified in Section 01580, PROJECT SIGNS, shall be conspicuously posted in all areas involving construction activities. Furnish signs and attach to, as applicable, the protective devices enclosing the Contractor's work, access, operating, and platform storage and site storage/laydown areas as applicable; pedestrian sidewalks, streets, and parking lots adjacent to the work area; and excavations and openings. The storage/laydown areas as designated by the Authority, if any, and as specified in Section 01520, TEMPORARY CONSTRUCTION FACILITIES, shall be fenced and signage shall be provided to prevent unauthorized entry. Stored materials shall be bundled or tied down by the Contractor.
- D. Protective devices shall be in accordance with codes and regulations of Jurisdictional Authorities.
- E. All work pertaining to this Section shall meet ADAAG requirements.

1.03 SUBMITTALS

- A. Submit the following Shop Drawings in accordance with Section 01330, SUBMITTAL PROCEDURES.
 - 1. Location and fence material of fencing for pedestrian access areas.

1.04 TEMPORARY FENCES

- A. Provide temporary fencing within the construction area to fence off pedestrian sidewalks, streets and parking areas from operating, access and work areas and Site storage/laydown areas.
- B. Temporary fences shall be substantially constructed in a neat appearance.
- C. Working Area Wooden Fencing
 - 1. Provide 6-foot high temporary working area wooden fencing as shown or as directed and as specified. Working area wooden fencing shall serve two purposes: to protect pedestrian access areas from hazardous construction activities, and to enclose the Contractor's work, access, storage, and operating areas.
 - 2. The location of fence for pedestrian access areas adjacent to the Work area and for enclosing Contractor's work areas shall be as specified and consistent with the Contractor's approved Working Drawings for maintenance of traffic plans.

D. Working Area Chain-link Fencing

1. Provide 6-foot high temporary working area chain-link fencing as specified to fence off storage area from operating areas, and if necessary, to fence off pedestrian access areas.
2. The location of fence for pedestrian access areas adjacent to the Work area and to the storage areas shall be as specified and consistent with the Contractor's approved Working Drawings for maintenance of traffic plans.

E. Trackway Plastic Safety Fencing

1. Provide 4-foot high temporary plastic safety fencing between tracks in Authority rail yards and other non-revenue track areas to isolate workers from active tracks.

1.05 TREE AND PLANT PROTECTION

- A. Protect trees and plants not slated to be removed or replaced from construction activities.

1.06 PROTECTION OF UTILITIES

- A. Protect existing utilities.

1.07 PROTECTION OF EXISTING STRUCTURES AND IMPROVEMENTS

- A. Protect Existing Structures and Improvements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Barricades shall be substantial in character, neat in appearance, and of approved size and arrangement.
- B. Barricade materials shall be as approved. Lumber for barriers as applicable and working area wooden fencing shall be exterior grade, treated to be fire-retardant, pressure impregnated with resin salt as approved. Exterior latex paint for barriers and working area wooden fencing shall be as specified in Section 09920, FIELD PAINTING. Color shall be as approved by the Contracting Officer Representative. Provide necessary fencing hardware, locks, gates and all other incidentals as approved.
- C. All chain-link fencing shall be anti-climbing type, with plastic inserts, barbed wire (where indicated), and as specified in Section 02820, FENCING.
- D. Temporary fencing on Authority property between adjacent tracks: Plastic safety fencing, orange in color, supported by oak stakes embedded a minimum of two feet below subgrade.
- E. Warning signage shall be as specified in Section 01580, PROJECT SIGNS.
- F. Structural lumber for decking shall be as specified in Section 01530, TEMPORARY CONSTRUCTION.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. As removal of pavement and sidewalk progresses as applicable and furnish and install barricades in accordance with requirements of the Jurisdictional Authorities. During the prosecution of the Work, barricade or close excavations and openings in floors, walls, and other parts of the structures and excavations while such openings are not in regular use as applicable. Barricade or close such

openings before Acceptance of the Work. Barricades shall be anchored to the ground on all sides of excavations. Work involving electrical systems or equipment in or near the area to which personnel or the public have access shall be isolated using barricades.

- B. Flashing yellow lights shall be mounted and maintained on barricades at maximum intervals of 25 feet.
- C. Fabricate and erect in accordance with local requirements pedestrian barriers as applicable and working area wooden fencing with a stud framework and a covering of tightly fitted plywood sheets. Paint with two coats of exterior latex paint. Install hardware, locks, gates, and all other incidentals. Furnish and install wooden fence along sides of decked areas for pedestrian walkways as applicable where such walkways are adjacent to open areas, staging/storage areas, and other areas used by the Contractor.
- D. Erect chain-link fencing consisting of a post-and-rail framework with chain-link fabric; install hardware, locks, gates, and all other incidentals; and insert plastic inserts into the chain link fence.
- E. Along sides of decked areas for pedestrian walkways as applicable, where such walkways are adjacent to vehicular traffic, install concrete barriers as shown on approved maintenance of traffic plan.
- F. Erect, fabricate, attach, and maintain safety warning and other signs.
- G. Protect existing vegetation, structures, utilities, and improvements.
- H. Provide maintenance for all barricades, barriers, temporary fences, pedestrian bridges, signage, and existing vegetation, structures, utilities, and improvements protection as applicable for the duration of the Contract. Immediately prior to completion of the Contract, completely remove the items and restore the area.

END OF SECTION

SECTION 01570
TEMPORARY CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes security, site, environmental, construction noise, vibration, pollution abatement, use of explosives, controls and management of historical and scientific specimens, required to allow construction to proceed.

1.02 REFERENCES

- A. U.S. Code, Title 42 (The Public Health and Welfare):
 - 1. Chapter 15B (Air Pollution Control), Section 1857, et seq., as amended by Pub. L. 91-604)
 - 2. U.S. Code, Title 33 (Navigation and Navigable Waters):
 - 3. Chapter 26 (Water Pollution Prevention and Control), Section 308 (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500)
- B. Society of Automotive Engineers, Inc., SAE J366b and SAE J952b

1.03 SUBMITTALS

- A. Submit the following for approval 60 Days prior to start of construction in accordance with Section 01330, SUBMITTAL PROCEDURES, and with the additional requirements as specified for each:
 - 1. All necessary Working Drawings, specifications, permits, and certifications necessary to comply with local Jurisdictional Authority's erosion and sediment control statues, ordinances, and requirements including, but not limited to current DC Standards and Specifications for Soil Erosion and Sediment Control (DC E&S).
 - 2. Required evidence that the governing air pollution criteria will be met. These criteria and related documents will be retained by the Authority for on-Site examination by FTA as applicable.
 - 3. Program for pollution control prior to beginning operations
 - 4. Proposed haul routes.
 - 5. Plan indicating monitoring locations, including the timing of monitoring measurements to be taken at the construction Site boundaries and at nearby residential, commercial, and industrial property lines.
 - 6. Report articles of historical or scientific value.

1.04 SITE SECURITY

- A. Watchmen: Employ watchmen in adequate numbers to safeguard the Site during non-working hours, night-shift operations, and holidays. If the Authority at any time determines the staff insufficient or incompetent, personnel increases or replacements shall be provided immediately at no additional cost to the Authority.

1.05 EROSION AND SEDIMENT CONTROL

- A. Erosion and sediment materials: No erosion or sediment materials shall be allowed to enter natural or man-made water or sewage removal systems. Erosion materials from excavations, borrow areas, or stockpiled fill shall be contained within the Site. Develop methods to control waste and erosion including such means as filtration, settlement, and manual removal.
- B. Comply with and provide all necessary drawings, specifications, permits, and certifications necessary to comply with local Jurisdictional Authority's erosion and sediment control statutes, ordinances, and requirements including, but not limited to current DC Standards and Specifications for Soil Erosion and Sediment Control (DC E&S).

1.06 POLLUTION ABATEMENT

- A. Conduct operations in a manner to minimize pollution of the environment surrounding the area of work. Specific controls shall be applied as follows:
 - 1. Material transport: Trucks leaving the Site and entering paved public streets shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. Trucks arriving and leaving the Site with materials shall be loaded so as to prevent dropping materials and debris on the streets. Trucks carrying dirt from the Site shall have their loads covered to minimize fugitive dust. Maintain a suitable vehicle cleaning installation and inspection installation with permanent crew for this purpose. Spills of materials in public areas shall be removed immediately.
 - 2. Waste materials: No waste materials shall be allowed to enter natural or man-made water or sewage removal systems. Develop methods to control waste including such means as filtration, settlement, and manual removal.
 - 3. Burning: No burning of waste will be allowed without written permission from the Authority. When permission is granted, burning shall be conducted in accordance with the regulations of the Jurisdictional Authority. Submit request to the affected jurisdiction for approval.
 - 4. Dust control: By water sprinkling or by other approved methods, continuously control dust generated by construction operations.
 - 5. Noise control: Refer to Article 1.08 below.
 - 6. Submit evidence that the governing air pollution criteria will be met. These criteria and related documents will be retained by the Authority for on-Site examination by FTA as applicable.
 - 7. Submit a program for pollution control that is in compliance with the Air Act and the Water Act prior to beginning operations.
 - 8. Clean air and water:
 - a. The Contractor agrees as follows:
 - (1) To comply with all the requirements of Section 114 of the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Pub. L. 91-604) and Section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500), respectively, relating to inspection, monitoring, entry, reports and information, as well as other requirements specified in Section 114 and Section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued there under before the award of this Contract.
 - (2) That no portion of the Work required by this Contract will be performed in a Facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this Contract was awarded unless and until the EPA eliminates the name of such Facility or Facilities from such listing.

- (3) To use its best management practices to comply with clean air standards and clean water standards at the Facility in which or Site on which the Work is being performed.

b. The terms used in this Article have the following meanings:

- (1) The term Air Act means the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub. L. 91-604).
- (2) The term Water Act means Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub. L. 92-500).
- (3) The term Clean Air Standards means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions or other requirements which are contained in, issued under or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in Section 110(d) of the Clean Air Act (42 U.S.C. 1857c-5(d)), an approved implementation procedure or plan under Section 111(c) or Section 111(d), respectively, of the Air Act (42 U.S.C. 1857c-6(c) or (d)), or an approved implementation procedure under Section 112(d) of the Air Act (42 U.S.C. 1857c-7(d)).
- (4) The term Clean Water Standards means any enforceable limitation, control, condition, prohibition, standard or other requirement, which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the EPA or by a State under an approved program, as authorized by Section 402 of the Water Act (33 U.S.C. 1342), or by local government to ensure compliance with pretreatment regulations as required by Section 307 of the Water Act (33 U.S.C. 1317).
- (5) The term compliance means compliance with Clean Air or Water Standards. Compliance shall also mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the EPA or an air or water pollution control agency in accordance with the requirements of the Air Act or Water Act and regulations issued pursuant thereto.
- (6) The term Facility means any building, plant, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by Contractor or Subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant installation, or structure, the entire location or site shall be deemed to be a Facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent Facilities are co-located in one geographical area.

1.07 ENVIRONMENTAL CONTROL

- A. Maintain temperature and humidity to protect the Work in progress and in place, as well as permanent equipment and materials, stored and installed, against damage from heat, cold, and dampness and take such steps as necessary to protect such work from other adverse conditions.

1.08 CONSTRUCTION NOISE CONTROL

- A. Noise control: Take every action possible to minimize the noise caused by construction operations. When required by Jurisdictional Authorities, noise producing work shall be performed in less sensitive hours of the day or week as directed. Noise produced by the Work shall be maintained at or below the decibel levels specified and within the periods specified.

1. Protection of the public and employees:

- a. Noise abatement measures and precautions shall be taken in order to reduce exposure to noise. Permissible noise exposure shall be calculated in accordance with the procedures established under the Walsh-Healy Public Contracts Act. Sound levels for public noise exposure due to construction will be measured at the property line of adjacent residential, commercial, or industrial property or at the property line of the public right-of-way, or 50 feet from the noise source, whichever is greatest, when work is in progress in the public right-of-way, while construction work is in progress. Employee noise exposure levels shall be measured at the employees' normal workstation. In either case sound levels shall not exceed the following:

Exposure per Day (hours)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
1/2	110
1/4 or less	115

- b. Above-ground, repetitive, high-level impact noise will be permitted only between 8:00 AM and 9:00 PM. Repetitive impact noises in the receiving property shall not exceed the following dB limitations:

Duration of Impact Noise	Commercial or Residential Zone	Industrial Zone
More than 12 minutes in any hour	70	77
Less than 30 seconds in any hour	85	92
Less than 3 minutes in any hour	80	87
Less than 12 minutes of any hour	75	82

- c. In underground or tunnel construction work, where the above requirements may not be obtained, provide individual auditory protection.
2. Noise restrictions at affected property: In addition to the provisions of Article 1.02A.1 above, sound level for noise due to construction activities shall be monitored at the property line of property affected acoustically by the Contractor's operations and plant. Sound levels for noise from equipment shall be measured at the property line on the A-weighting network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, measurements may be taken 3 to 6 feet in front of any building face.
- a. Construction equipment: Sound levels for unscheduled, intermittent, short-term noise from equipment shall not exceed the following dBA levels:

(1) Residential Property

- (a) Daily, 7:00 AM to 9:00 PM: 75 dBA

- (b) Daily, 9:00 PM to 10:00 PM: 55 dBA
 - (c) Daily, 10:00 PM to 7:00 AM: 50 dBA
- (2) Business, Industrial, and Commercial Property:
 - (a) Daily, including Sundays and Legal Holidays, 7:00 AM to 9:00 PM: 82 dBA
 - (b) Daily, including Sundays and Legal Holidays, 9:00 PM to 7:00 AM: 62 dBA
- b. Mobile equipment in the public right-of-way: Truck or other powered equipment, which moves off the Site in the public right-of-way and that produces a maximum sound level exceeding the following limits when moving in the public right-of-way shall not be used on this Contract. The sound level limits specified are referenced to a distance of 50 feet from the equipment. Sound levels shall be measured in conformity with the Standards and Recommended Practices established by the Society of Automotive Engineers, Inc., including the latest revisions to SAE J366b and SAE J952b.
 - (1) Mobile construction and industrial machinery as defined in Article 1.08A.3 below:
 - (a) Sound Level Limits
 - (i) Manufactured before July 1, 1975: 90 dBA
 - (ii) Manufactured after July 1, 1975: 80 dBA
 - (iii) Manufactured after July 1, 1982: 77 dBA
 - (2) Trucks:
 - (a) Sound Level Limits
 - (i) Manufactured before July 1, 1975: 88 dBA
 - (ii) Manufactured after July 1, 1975: 83 dBA
 - (iii) Manufactured after July 1, 1982: 80 dBA
- c. Noise abatement measures: Provide such equipment and sound-deadening devices and take such noise abatement measures that are necessary to comply with the requirements of this Contract, consisting of, but not limited to the following:
 - (1) Shields or other physical barriers to restrict the transmission of noise.
 - (2) Soundproof housings or enclosures for noise-producing machinery.
 - (3) Efficient silencers on air intakes for equipment.
 - (4) Efficient intake and exhaust mufflers on internal combustion engines.
 - (5) Lining of hoppers and storage bins with sound-deadening material.
 - (6) Conducting truck loading, unloading and hauling operations so that noise is kept to a minimum.
 - (7) Routing of construction equipment and vehicles carrying spoil, concrete, or other materials over streets that will cause the least disturbance to residents in the vicinity of the Work. The Contracting Officer Representative shall be informed in writing in accordance with Section 01330, SUBMITTAL PROCEDURES, of the proposed haul routes prior to the Contractor's securing a permit from the local government.

- (8) Siting of stationary equipment shall be subject to Approval in accordance with Section 01520, TEMPORARY CONSTRUCTION FACILITIES.
3. Definitions: The following definitions shall be used in differentiating mobile equipment from stationary equipment:
- a. Mobile construction equipment: Any motorized vehicle powered by an internal combustion engine or electric drive, which is capable of being operated as a vehicle either on the construction Site or in the public right-of-way.
 - (1) Construction equipment is mobile equipment any time it is operated in an automotive mode when performing construction tasks. Such equipment includes compactors, paving machines, front-end loaders, back hoes, scrapers, pavers, ditchers, and trucks.
 - (2) Some construction equipment while in transit may have the characteristic of mobile equipment, but for the purposes of this definition are not to be so considered. Such equipment includes generators, power shovels, cranes, pile drivers, drilling rigs, concrete mixers, pumps, trash compactors, bar benders, and other similar truck-mounted devices.
 - b. Stationary construction equipment: Any device, tool, or other mechanical system powered by an internal combustion engine, pneumatic engine, or electric motor, which does not employ any of the above power sources for automotive propulsion for more than 10 minutes out of every working hour while engaged in construction tasks. Examples of such equipment include truck-mounted compressors, generators, power shovels, pile drivers, cranes, drilling rigs, concrete mixers, pumps, trash compactors, bar benders, augers, and other similar truck-mounted devices.

1.09 CONSTRUCTION VIBRATION CONTROL

- A. Do not cause or permit, beyond the property line of a source, vibration of sufficient intensity to cause another person to be aware of the vibration by such direct means as sensation of touch or visual observation of moving objects. The observer shall be located at or within the property line of the receiving property when vibration determinations are made. Prepare and submit in accordance with Section 01330, SUBMITTAL PROCEDURES, a plan indicating monitoring locations, including the timing of monitoring measurements to be taken at the construction Site boundaries and at nearby residential, commercial, and industrial property lines. Comply with vibration limitation requirements of environmental reports, if provided.

1.10 EXPLOSIVES

- A. The use of explosives for the performance of Contract work will not be permitted.

1.11 HISTORICAL AND SCIENTIFIC SPECIMENS

- A. Articles of historical or scientific value, including, but not limited to, coins, fossils, and articles of antiquity, which may be uncovered by the Contractor during the progress of the Work, shall become the property of the Authority. Work in the area where discovered shall cease, and such findings shall be reported immediately to the Contracting Officer Representative in accordance with Section 01330, SUBMITTAL PROCEDURES, who will determine the method of removal, where necessary, and the final disposition thereof.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01580
PROJECT SIGNS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the requirements for Project signs that will be required at the Site during the construction of the Project.

1.02 PROJECT IDENTIFICATION SIGNS

- A. Furnish Authority Project identification signs in the locations at the Site selected by the Contracting Officer Representative.
- B. Sign size, content, lettering, and format for the large permanent-mount WMATA sign shall be as directed by the Authority and shall be shown on the Contractor's Working Drawings.
 - 1. Refer to Contract Drawings for signage details.
- C. Signs shall be installed 20 Days after Notice to Proceed is given, shall be maintained during the Work, and shall be removed upon the completion of the Project.

1.03 WARNING SIGNS AND INSTRUCTIONAL SAFETY SIGNS

- A. Provide "No Trespassing" signs, load limit on decking, and other warning and instructional safety aluminum signs with minimum 2-inch high Helvetica Medium style lettering and mount at locations on fencing/barriers/barricades/pedestrian bridges and on other areas as directed. Sign panel size and thickness shall be as directed. Mount the signs with stainless-steel cap screws with hex nuts and lock washers.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01610
BASIC PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in construction of the Project.
- B. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section 01630, PRODUCT SUBSTITUTION PROCEDURES.

1.02 DEFINITIONS

- A. As used herein, the term brand name includes identification of products by make and model. If items called for in the Contract Documents have been identified by a brand name or equal description, such identification is intended to be descriptive, but not restrictive, and is to indicate the quality and characteristics of products that will be satisfactory. Contract Specifications identifying equal products including products of the brand name manufacturer other than the one described by brand name as specified in Section 01630, PRODUCT SUBSTITUTION PROCEDURES, will be considered if such products are clearly identified and are determined by the Designer and the Authority to meet fully the salient characteristics of the products specified in the Contract Documents.

1.03 SUBMITTALS

- A. Submit for review an initial product list with 30 Days of NTP in accordance with Section 01330, SUBMITTAL PROCEDURES. A written explanation for omissions of data and for known variations from Contract requirements shall be included.
- B. Submit for review and Approval a completed product list including a written explanation for omissions of data and for variations from Contract requirements within 30 Days after date of commencement of the construction work. Authority will notify Contractor of acceptance or rejection of the documentation within 21 Days of receipt of the submittal.
- C. Authority Acceptance of the product list does not constitute a waiver of the requirement that products comply with the Contract Documents.

1.04 QUALITY ASSURANCE

- A. Provide products of the same kind from a single source.
- B. Except for required labels and operating data, the manufacturer's or producer's nameplates or trademarks shall not be attached or imprinted on exposed surfaces.
 - 1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service connected or power-operated equipment. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer
 - b. Model and serial number
 - c. Capacity

- d. Speed
- e. Ratings

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All products shall be delivered, stored, and handled in accordance with the manufacturer's recommendations so as to prevent damage, deterioration, loss, or invalidation of the manufacturer's warranty.
- B. Schedule delivery to minimize long-term storage at the Site and to prevent overcrowding of construction storage and staging areas.
- C. Coordinate the time of delivery with the installation schedule to ensure that hazardous, easily damaged, or those items sensitive to deterioration, theft, and other losses are stored for a minimum holding period.
- D. Products shall be delivered to the Site in the manufacturer's original sealed container or other appropriate packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Products shall be inspected upon delivery by the Contractor to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected. Documentation noting the time, date, and manner of delivery shall be maintained by the Contractor. A statement attesting to the inspection of the products at time of delivery shall be included in the documentation signed by the Contractor's authorized representative.
- F. Products shall be stored at the Site in a manner that will facilitate inspection and measurement of quantity or counting of units. Heavy materials shall be stored in a manner that will not damage supporting construction. Products subject to damage by the elements shall be stored under cover in weather-tight enclosures with ventilation adequate to prevent condensation. Temperature and humidity shall be maintained within range required by manufacturer's instructions.

PART 2 – PRODUCTS

2.01 PRODUCT SELECTION

- A. Provide products that comply with the Contract Documents. All products to be installed in the Work shall be undamaged and, unless otherwise permitted, unused at the time of installation. Products shall include all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and suitable for the intended use.
- B. Unless otherwise specified, provide standard products of the type that have been produced and used successfully in similar situations on other Authority projects of a similar nature.
- C. Procedures governing product selection include:
 - 1. Where only a single product or manufacturer is named and the notation "no substitution is permitted" is included in the specification, provide the product indicated. No substitutions will be permitted.
 - 2. Where two or more products or manufacturers are named followed by the notation "no substitutions are permitted" is included in the specification, provide one of the products indicated. No substitutions will be permitted.
 - 3. Where the Contract Documents list products or manufacturers that are available and acceptable for incorporation into the Work, accompanied by the term ...or equal or ...or approved equal, the Contractor may propose any available product that complies with Contract requirements.

Comply with the requirement of Section 01630, PRODUCT SUBSTITUTION PROCEDURES, to obtain approval for use of an unnamed product.

4. Where the Contract Documents list the salient features that explicitly describe a product or assembly and a brand name is not included, provide a product or assembly that provides the listed features and otherwise complies with the Contract requirements.
5. Where the Contract Documents explicitly require compliance with performance requirements, and the product complies with those requirements based on the manufacturer's recommended use of the product for the application indicated in the Contract Drawings (as evidenced in published product literature, or by the manufacturer's certification of performance), the Contractor may submit the product for incorporation into the Work.
6. Where the Contract Documents require only compliance with an imposed code, standard, or regulation, the Contractor may select a product that complies with the standards, codes, or regulations specified.
7. Visual Matching: Where specifications require matching an established item, the Authority's decision will be final on whether a proposed product matches satisfactorily. Where no product is available that adequately matches adjacent products or complies with the other specified requirements, comply with provisions of Section 01630, PRODUCT SUBSTITUTION PROCEDURES, for selection of an alternate product.
8. Where specified product requirements include the phrase ...as selected from manufacturer's standard colors, patterns, textures..., select a manufacturer that provides a range of colors in a product that meets all other Contract Document requirements. In this situation, standard shall imply regularly or routinely produced.

PART 3 – EXECUTION

3.01 PRODUCT LIST

- A. Prepare a product list in tabular form acceptable to the Authority showing products specified in the Contract Documents. Coordinate the timing of delivery of products on the product list with the Contractor's Project Schedule as specified in Section 01322, CONTRACT PROGRESS REPORTING, and Contract Document Submittal Log as specified in Section 01330, SUBMITTAL PROCEDURES. At a minimum, provide the following information for each product:
 1. Related specification Section number
 2. Generic name used in the Contract Documents.
 3. Proprietary name, model number, and similar designation
 4. Manufacturer's name and address
 5. Supplier's name and address
 6. Installer's name and address
 7. Projected delivery date and length of delivery period
- B. Within 14 Days of receipt of product list submittals, Contracting Officer Representative will notify the Contractor of Authority acceptance or rejection of the product list. If rejected, product list shall be corrected by the Contractor and resubmitted for review.

3.02 INSTALLATION OF PRODUCTS

- A. Comply with the manufacturer's instructions and recommendations for installation of all products installed under this Contract unless otherwise specified. Products shall be accurately located, aligned with other elements of the Work, and securely installed in place. All exposed surfaces shall be clean as specified in Section 01740, CLEANING, and protected as necessary to prevent damage and deterioration as specified in Section 01723, PROTECTION OF ADJACENT CONSTRUCTION.

END OF SECTION

SECTION 01630
PRODUCT SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Other requirements governing the Contractor's selection of products and product options are included under Section 01610, BASIC PRODUCT REQUIREMENTS.

1.02 DEFINITIONS

- A. Definitions used in this Section are not intended to change the meaning of other terms used in the Contract Documents.
- B. Contractor requests for changes in products, materials, equipment, and methods of construction as required or specified by Contract Documents are considered requests for substitutions. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by the Authority.
 - 2. Specified options of products and construction methods included in Contract Documents. Note that products submitted under an or equal or not limited to provision are considered to be substitutions as specified in Section 00210, SUPPLEMENTARY INSTRUCTIONS TO BIDDERS.
 - 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.03 SUBMITTALS

- A. Requests for substitution from the Contractor during construction will be considered by the Authority if received with adequate time to allow for Authority review and Approval without delaying the Project Schedule. Requests received that may delay the Project Schedule will be considered or rejected at the sole discretion of the Authority.
 - 1. Submit one electronic copy in Adobe (.PDF) file format of the Brand Name or Equal Form, Section 00433, BRAND NAME OR EQUAL FORM, for each request for substitution to the Contracting Officer Representative for consideration of the form and in accordance with procedures required for Change Order proposals as specified in Section 00748, CHANGES, as deemed appropriate by the Contracting Officer Representative.
 - 2. In each substitution request, identify the product and fabrication or installation method to be replaced. The related WMATA Standard Specification Section or Contract Drawing numbers shall be referenced in the submittal. Complete documentation showing compliance with the requirements for substitutions shall also be submitted including the following information as appropriate:
 - a. Product Data, including drawings, fabrication, and installation procedures
 - b. Samples, where samples of the specified product are requested
 - c. A detailed comparison of significant qualities/salient features of the proposed substitution with those of the material or work specified. Significant qualities shall include elements such

as size, weight, durability, performance, visual effect, code compliance, maintenance requirements, energy usage, and environmental considerations.

- d. Coordination information, including a list of changes or modifications made necessary to other parts of the Work and to construction performed by the Authority or separate contractors.
- e. A statement indicating the substitution's effect on the Contractor's Construction Schedule. Indicate the effect of the proposed substitution on overall Period of Performance.
- f. Cost comparison between the product specified and the requested substitution, including a proposal of the net change, if any in the Contract Price.
- g. Certification by the Contractor that the substitution proposed is equal to or better in every respect to that required under the Contract, and that the product will perform as intended. Include a waiver of rights to additional payment or time that may subsequently become necessary should the product fail to perform adequately, or because of changes to other work were required as a consequence of the substitution.
- h. Failure by the Contractor to include the above requirements in the submittal may be cause for rejection of the submittal in its entirety.
- i. If deemed necessary and within 14 Days of receipt of the submittal, the Contracting Officer Representative may request additional information or documentation that, in its sole judgment is required for the evaluation of the substitution request. Within 21 Days of receipt of the original substitution request or of requested additional information or documentation, the Contractor will be notified of acceptance or rejection of the proposed substitution. If a decision on the use of a proposed substitute cannot be made or obtained within the time allocated, the product specified by name in the Contract Documents shall be used.

1.04 SUBSTITUTION PROCEDURE

- A. The Contractor's request for substitution may be rejected by the Contracting Officer Representative if the substitution would involve:
 1. Extensive revisions to Contract Documents
 2. A proposed change not in keeping with the general intent of Contract Documents
 3. An untimely request, not fully documented when submitted
 4. A request that is directly related to an or equal clause or similar language in the Contract Documents
 5. A product or method of construction that could not be provided within the Period of Performance
 6. A product or method of construction that could not be approved by a governing authority
 7. Additional responsibilities or expense to the Authority (including additional expenses for redesign and evaluation services, increased cost of related construction, and other similar considerations) that outweighs any advantage that is being offered to the Authority as a result of the substitution
 8. A method of construction that cannot be provided in a manner that is compatible with other materials, the product cannot be coordinated with other materials, and a warranty cannot be provided for the product in accordance with the requirements of the Contract even though the Contractor expresses a willingness to certify that the apparent deficiencies can be corrected.

- B. Neither the Contractor's submittal nor the Authority's review or Approval of Shop Drawings, product data, or samples that relate to a substitution constitutes an Approval of the requested substitution. Submission of Shop Drawing, product data, or sample submittals does not relieve the Contractor from fulfilling Contract requirements for substitutions.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01711
ACCEPTANCE OF CONDITIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies basic requirements for determining acceptable conditions for installation.

1.02 SUBMITTALS

- A. One electronic copy of the preconstruction inspection records

1.03 PRECONSTRUCTION INSPECTION REQUIREMENTS

- A. Prior to beginning construction work, the Contractor shall inform the Authority of buildings or structures on which it intends to perform work or which performance of the Work will affect.
- B. Conditional inspection of buildings or structures in the immediate vicinity of the Project, which may reasonably be expected to be affected by the Work, will be performed jointly by the Authority and the Contractor. This inspection will be conducted prior to the commencement of construction work to determine pre-existing conditions. After this inspection, the Authority will not assume any responsibility for damages arising from the Work performed and it shall be the responsibility of the Contractor to correct all damages caused by performance of the Work.
- C. Examine substrates, areas, and conditions, with Authority personnel present, for compliance with requirements for installed tolerance and other conditions affecting performance. Record observations from the required preconstruction inspection.
- D. Where a written inspection report requires listing conditions detrimental to performance of the Work, include the following:
 - 1. Description of the Work
 - 2. List of detrimental conditions, including substrates
 - 3. List of unacceptable installation tolerances
 - 4. Recommended corrections

1.04 EXAMINATION

- A. General: Verify dimensions shown on existing work and dimensions required for work that is to connect with work not in place in accordance with Section 01721, LAYOUT OF WORK AND FIELD ENGINEERING.
- B. Existing Conditions
 - 1. The existence and location of Site improvements, above and below-ground utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of above and below-ground utilities, mechanical and electrical systems, and other construction affecting the Work. Verify the location and point of connection of utility services.
 - 2. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water service pipes, and electrical services.

3. Furnish location data for work related to the Project that must be performed by public utilities serving the Project Site.
- C. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- D. Examine rough-in for mechanical and electrical systems to verify actual location of connections before equipment and fixture installation.
- E. Examine new and existing facilities for suitable conditions where products and systems are to be installed.

1.05 ACCEPTANCE OF CONDITIONS

- A. Examine substrates, areas, and conditions, with contract personnel present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work
 - b. List of detrimental conditions, including substrates
 - c. List of unacceptable installation tolerances
 - d. Recommended corrections
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine new and existing facilities for suitable conditions where products and systems are to be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Proceeding with work indicates acceptance of surfaces and conditions.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01722
MOBILIZATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes specifications for the following:
 - 1. Organization and mobilization of Contractor's forces;
 - 2. Design, fabrication, and transportation of construction plant and equipment to the Site and setting up of same;
 - 3. Transporting various tools, materials, and equipment to the Site; and
 - 4. Erection of temporary buildings and facilities required for staging and construction operations.
- B. Mobilization shall include mobilization of all construction equipment, temporary facilities, materials, supplies, appurtenances, staffed and ready for commencing and prosecuting the Work; and the subsequent demobilization and removal from the Site of said equipment, appurtenances, and the like upon completion of the Work.
- C. Mobilization shall also include assembly and delivery to the Site of plant, equipment, materials, and supplies necessary for the prosecution of work, which are not intended to be incorporated in the Work; the clearing of and preparation of the Contractor's work area; the complete assembly, in working order, of equipment necessary to perform the required work; personnel services preparatory to commencing actual work; and all other preparatory work required to permit commencement of the actual work on construction items for which payment is provided under the Contract.

1.02 SUBMITTALS

- A. Refer to Section 01330, SUBMITTAL PROCEDURES, for submittal requirements and procedures for the following submittals:
 - 1. A layout of the construction sites including fences, roads, parking, buildings, staging, and storage areas, within 7 Days after the Notice to Proceed
 - 2. Schedule for mobilization of field office within 7 Days after Notice to Proceed

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION

3.01 DELIVERY

- A. Delivery to the jobsite of construction tools, equipment, materials, and supplies shall be accomplished in conformance with local governing ordinances and regulations.

3.02 TOOLS AND SUPPLIES

- A. Provide construction tools, equipment, materials, and supplies of the types and quantities that will facilitate the timely execution of the Work.
- B. Provide personnel, products, construction materials, equipment, tools, and supplies at the jobsite at the time they are scheduled to be installed or utilized.

3.03 PLANT LOCATION

- A. Locate plant or plants appropriately close to the portion of the Work for which it will be used.

3.04 DEMOBILIZATION

- A. Upon completion of the Work, remove construction tools, apparatus, equipment, unused materials, and supplies, plant, temporary facilities, and personnel from the jobsite.
- B. Restore all areas utilized for the Contractor's temporary facilities and staging purposes to their original, natural state or, when called for in the Contract Documents, complete such areas as indicated.

END OF SECTION

SECTION 01723
PROTECTION OF ADJACENT CONSTRUCTION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the appropriate methods for protection of adjacent construction when performing installations and improvements in and around existing facilities.

1.02 PROTECTION OF EXISTING SURFACES

- A. Existing surfaces shall be carefully protected during construction operations under this Contract to avoid damaging existing surfaces.
 - 1. Existing surfaces shall be protected by the Contractor from all possible damages including chipping, staining, and corroding during performance of the Work.
 - 2. If damage occurs, the Contractor shall repair or replace to match original undisturbed conditions.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01740

CLEANING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes specifications for furnishing all labor, materials, equipment, and services, and performing all operations necessary for, and properly incidental to, cleanup during construction and final cleaning of the facilities and site prior to Acceptance by the Authority.

1.02 RELATED SECTIONS

- A. Division 16, for conduit cleaning.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION

3.01 CLEANUP DURING CONSTRUCTION

- A. Keep the entire Site in a neat and orderly condition at all times during construction. Conduct a general cleanup of the Site daily as a part of the Work. Provide general daily cleanup and disposal service for removal of waste and rubbish from the jobsite. Clean material as necessary prior to incorporating into the Work.
- B. Dispose and recycle waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by Jurisdictional Authorities. Do not bury waste material and debris on the Site. Burning of trash and debris on the Site is prohibited.
- C. Provide daily litter pickup within Project limits. Provide adequate number of trash receptacles for worker's lunches, cigarette butts, and other miscellaneous garbage.
- D. Cleaning and disposal procedures shall be in accordance with the WMATA requirements.

3.02 FINAL CLEANING OF FACILITIES

- A. Prior to final inspection by the Contracting Officer Representative, and after all construction work is essentially complete, thoroughly clean facilities utilizing professional facility cleaners.
- B. Items to be cleaned include, but are not limited to, all glass, doors, opening frames, grilles, trim, exposed non-ferrous metal surfaces, floor coverings, light fixtures and plates, plumbing fixtures and trim, and all finish surfaces throughout the construction.
- C. Vacuum-clean where appropriate and remove all spots, smears, dust, debris, hand prints, and defacements of every sort, including those of vandals. Use commercial cleaning compounds where necessary.
- D. Follow the recommendations of the manufacturers of the materials and items to be cleaned for all cleaning, polishing, and treatment such as waxing or sealing.
- E. Final cleaning shall be in accordance with the project's LEED objectives.

3.03 FINAL SITE CLEANUP

- A. Prior to final inspection, thoroughly clean the entire Site so it is in a neat, acceptable condition. Remove from the entire Site all construction equipment and facilities, construction waste and

unused materials, dunnage, loose rock and stones, excess earth, and debris of any description resulting from the Work.

- B. Hose down and scrub clean where necessary all pavement and paved walks.
- C. Thoroughly remove mortar droppings from concrete slabs and pavement. Hose down and scrub clean all concrete flatwork and exposed vertical surfaces of concrete and masonry. Clean all rail surfaces, special trackwork, track drains, handholes, and manholes.
- D. All drainage systems shall be free and clear. All drainage systems and sewers shall be pressure cleaned and inspected, and all catch basins and sumps shall be cleaned.
- E. All conduits shall be cleaned and openings protected as specified in Division 16.
- F. All spare material shall be delivered to the Authority.
- G. Final site cleanup shall be in accordance with the WMATA requirements.

END OF SECTION

SECTION 01775

CLOSEOUT

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes specifications for performing all operations necessary for and incidental to closing out a Contract and assisting in the Authority's final inspection.
- B. This Section includes procedures for closeout submittals including the following:
 - 1. Operation and maintenance manuals;
 - 2. As-Built Drawings and Specifications;
 - 3. Spare parts list, delivery information, and distribution of spare parts;
 - 4. Training manuals, lesson plans, and student's training manuals and electronic media of such, as applicable;
 - 5. Survey record log;
 - 6. Correspondence file;
 - 7. Releases;
 - 8. Vouchers;
 - 9. Records for design (if provided by Contractor), inspection, testing and other quality elements;
 - 10. Request for final payment;
 - 11. Certifications, affidavits, and warranties and guarantees; and
 - 12. Correction of deficiencies submittals as applicable
- C. This Section establishes required actions by the Contractor for facility systems and subsystems commissioning that include the preparation of an asset database, the preparation of preventive maintenance instructions, and labeling and packaging of spare parts.

1.02 REFERENCES

- A. U.S. Green Building Council LEED for New Construction and Major Renovations

1.03 CLOSEOUT SCHEDULE AND PROCEDURE

- A. Changes from Original Conditions:
 - 1. Upon completion of the Work and prior to Substantial Completion, the Contractor shall examine each property to determine changes from the original conditions established by the preconstruction inspection, and Section 01711, ACCEPTANCE OF CONDITIONS, and shall furnish a written description to the Contracting Officer Representative of measures taken to correct damage that may have resulted from performance of this Contract, and shall obtain a written release from each owner accepting condition of the building or structure, corrections, or both, thereby relinquishing any claim against the Contractor. In the event any owner refuses to furnish a release of claims, the Contractor shall notify the Contracting Officer Representative in writing.

2. The Authority will not assume responsibility for alleged damages arising from the Work performed under this Contract.

B. Requirements Preparatory to Final Inspection by the Authority:

1. Notify the Contracting Officer Representative to perform a preliminary final inspection for the purpose of determining the state of completion of the Work. Notify the Contracting Officer Representative at least 14 Days in advance of requested inspection. The Contracting Officer Representative will perform the inspection within 3 working days of the requested date. From the information gathered from this inspection, the Contracting Officer Representative will prepare a Punch List of work to be performed, corrected, or completed before the Work will be accepted. All work on the Punch List shall be completed by the Contractor prior to final inspection.
2. Temporary facilities, except as may be required during Punch List work, shall be removed from the Site.
3. Clean the Site and all applicable appurtenances and improvements as specified in Section 01740, CLEANING.
4. Properly mount operating instructions for equipment and post as specified or required.

C. Final Inspection by the Authority:

1. After all requirements preparatory to the final inspection have been completed as hereinbefore specified, notify the Contracting Officer Representative to perform the final inspection. Notice shall be given at least 14 Days in advance of the time the Work will be available for final inspection. The Contracting Officer Representative will perform the inspection within 3 working days of the requested date.
2. Contractor or its principal superintendent, authorized to act on behalf of the Contractor, shall accompany the Contracting Officer Representative on the final inspection, as well as any principal Subcontractors that the Contracting Officer Representative may request to be present.
3. If the Work has been completed in accordance with the Contract Documents, and no further corrective measures are required, the Contracting Officer Representative will accept the Work and will issue a Certificate of Completion as evidence of acceptance.
4. If the Work has been substantially completed in accordance with the Contract Documents, and the Work can be used for its intended purpose with only minor corrective measures required, the Contracting Officer Representative will conditionally accept the Work and will issue a Certificate of Substantial Completion based upon the Contractor's assurance that corrective measures will be completed within the shortest practicable time. A fixed schedule for such corrective measures shall be submitted to the Contracting Officer Representative for approval.
5. If the Work has not been substantially completed in accordance with the Contract Documents, and several or many corrective measures are still required, the Contracting Officer Representative will not issue a Certificate of Substantial Completion. Instead, a new Punch List will be prepared based on the information gathered from the final inspection, and the Contractor will be required to complete this work and then call for another final inspection, following the procedure outlined above.

D. Asset Database:

1. Prepare a database for all new systems installed as per this contract, listing each system and subsystem asset with attribute data to include asset name, asset location, manufacturer name and contact information, model number, serial number, expected useful life, warranty period with start and end date, digital link to warranty documentation, digital link to Operation and

Maintenance Manual, spare parts provided for the asset, and special tools required to perform asset maintenance.

2. Sample asset tables are attached at the end of this Section for the Contractor's guidance in preparing the asset database.

E. Preventive Maintenance Instructions:

1. Prepare preventive maintenance instructions for each asset, including asset name, asset location, manufacturer name, model number, serial number, maintenance instructions for each asset and each scheduled maintenance based on requirements of the associated Operations and Maintenance Manual, and identification of special test equipment required to test the asset subsequent to performing maintenance.
2. A sample preventive maintenance instruction is attached at the end of this Section for the Contractor's guidance in preparing the preventive maintenance instructions.

1.04 SUBMITTALS

- A. Make all submittals in accordance with Section 01330, SUBMITTAL PROCEDURES, and as specified below.

B. Operation and Maintenance:

1. Furnish manuals for equipment and systems as required by the Contract Documents.
2. Data copy included from standard catalogs shall be edited to reflect only conditions pertinent to this Contract.
3. Data copy shall be suitable for dry-copy reproduction on standard office copy machines.
4. Hard copy manuals shall be prepared using the following materials:

a. Binder:

(1) One of following:

- (a) Loose-leaf; three-ring with elliptical rings; stiff cover with covering resistant to oil, water, and wear; reinforced hinges; label holder on spine; mechanical device to open, close and lock rings; and sheet lifters. Size for 8-1/2-inch by 11-inch paper, 3-inch maximum capacity.
- (b) Loose-leaf three-post binder conforming to FS UU-B-320, Type II, Class 2, with covering resistant to oil, water, and wear; label holder on spine; size for 8-1/2-inch by 11-inch paper; capacity as required, 4-inch maximum thickness.

- (2) When the assembled data exceeds the capacity of one binder, provide additional binders as necessary.

b. Pages:

- (1) Originals: White, 60-pound bond with plastic-reinforced binding edge.
- (2) Catalog data: Offset-printed copy on white paper, with plastic-reinforced edge.
- (3) Standard: 8-1/2 inches by 11 inches.
- (4) Fold-out: 11 inches by 8-1/2 inches for binding portion of page plus 7-1/2 inches for each additional portion of folded page; title and page number visible without unfolding.

Provide a filler at the binding edge of fold-out pages, equal in thickness to the folded portion.

- (5) Holes punched for standard three-ring binder.
 - (6) Consecutively numbered.
5. Electronic Copies shall accompany the paper copies of all submittals of all manuals. These electronic copies shall be submitted in an editable, non-copyrighted Microsoft Office format. There shall be two electronic copies per submitted manual delivered one each to the programs office and to the applicable training department.
6. Manuals shall include the following data:
- a. Table of contents.
 - b. Design-Builder's name, address and telephone number, with similar data for its 24-hour service organization.
 - c. Manufacturer's name, address and telephone number, with similar data for its local representative, distributor, and service agency.
 - d. Catalog, model, and serial number of equipment installed. Include WMATA unit numbers where applicable.
 - e. Description of equipment.
 - f. Detailed Theory of Operation of each system and subsystem to Lowest Repairable Unit (LRU)
 - g. Troubleshooting and Diagnostic Procedures for each piece of equipment delivered to LRU
 - h. Block Diagrams and Schematics of equipment as installed
 - i. Software administrative procedures for data input, failure diagnosis and system restoration
 - j. Statement of warranty as specified.
 - k. Description of modification, servicing and repairs performed prior to start of warranty.
 - l. Dates warranty begins and expires.
 - m. Standard starting, stopping and operating procedures.
 - n. Emergency and special operating procedures.
 - o. Routine maintenance procedures.
 - p. Servicing and lubrication schedule.
 - q. Manufacturer's printed operating and maintenance instructions, manufacturer's parts list, illustrations, and diagrams.
 - r. O&M data as required to meet design goals.
 - s. One copy of each wiring diagram.
 - t. List of spare parts, prices and recommended stock quantities for routine maintenance of the equipment for 1 year and list of spare parts that are considered critical and for which extended time frames for acquisition would create undesirable down-time for equipment.

- u. List of special tools required to perform inspection, adjustment, maintenance, and repair. Special tools are those developed to perform a unique function related to the particular equipment and not available from commercial sources.
- v. Copy of each approved Shop Drawing of equipment and system. Include drawings, which show outline dimensions, weights, and assembly data. Do not include drawings, which show manufacturing details.

7. Manuals submittal schedule:

- a. Four copies of sample formats and outlines of contents in draft form 120 Days prior to the time scheduled for operation inspection, testing, or acceptance of the equipment.
- b. Four copies of complete manual in final form 45 Days prior to the time scheduled for operation inspection, testing, or acceptance of the equipment.
- c. Four bound sets and electronic media of approved manual before the time scheduled for operation inspection, testing, or acceptance of the equipment.
 - (1) Electronic copy files shall be in latest version of Adobe (.PDF) file format. Files shall be submitted in accordance with Section 01330, SUBMITTAL PROCEDURES.
 - (2) Shop Drawings submitted with manuals shall be in AutoCAD (.DWG) file format. Line work shall be shown on designated layers in accordance with standard CAD layering guidelines as specified in the WMATA CAD Manual. Images shall be clear, sharp, and readily legible.
 - (3) The Authority reserves the right to have any images, illustrations, diagrams, and drawings resubmitted until the Contracting Officer Representative approves their legibility.
- d. In addition to the other requirements of this Section, if manufacturer's hardcopy illustrations, diagrams, and drawings are also used in the preparation of Operation and Maintenance manual illustrations, diagrams, and drawings, they shall also be furnished in Adobe (.PDF) file formats.

8. If operation and maintenance training is included in the Contract, provide to each trainee, hard and electronic copies of approved operation and maintenance manuals for this purpose as specified in Section 01820, DEMONSTRATION AND TRAINING.

C. As-Built Drawings and Specifications:

1. General:

- a. As-Built Drawings shall include Shop Drawings, Working Drawings, and field prepared drawings.
- b. Maintain a hard copy drawing and specification record of as-built conditions on a set of Contract Documents as the Work progresses. The Contract Documents shall be kept current with all Modifications issued by the Authority. The hard copy drawing and specification record shall be maintained at the Contractor's field office. Periodic review of the completeness of the hard copy record will be conducted by the Authority as deemed necessary to ensure the record is kept up to date.

2. As-Built Drawings:

- a. Draft Deliverable: Submit to the Authority, for review and comment, separate sets of draft As-Built Drawings in both an AutoCAD (.DWG) file format and an Adobe (.PDF) file format (.PDF files shall be capable of printing full-size drawings.), in print quality black and white,

with all fonts embedded. The latest versions of both file formats shall be used. All line work shall be shown in accordance with the WMATA CAD Manual. Images shall be clear, sharp, and readily legible. The Authority reserves the right to have drawing(s) resubmitted until the Contracting Officer Representative accepts the legibility of the drawing contained in the file. In addition, submit one set of full-size and two sets of half-size black ink on white paper copies of draft As-Built Drawings for review and comment by the Authority in accordance with Section 01330, SUBMITTAL PROCEDURES.

- b. Upon return of one set of full-size black ink on white paper copy of the draft As-Built Drawings with Authority comments, incorporate additions and corrections resulting from Authority review comments. Contractor shall direct specific attention, by annotation on resubmitted As-Built Drawings, to revisions other than the corrections requested by the Contracting Officer Representative on previous submittals.
- c. Final Deliverable: By the date scheduled for receipt of final approved As-Built Drawing deliverables in the Contract Schedule, separate sets of As-Built Drawings in both an AutoCAD (.DWG) file format and an Adobe (.PDF) file format, in print quality black and white, with all fonts embedded. Submit one set of full-size and two sets of half-size black ink on white paper copies, produced from the Adobe file, to the Contracting Officer Representative for review and Approval. If this submittal is found to be incomplete it will be returned to the Contractor with comments for re-submittal.
- d. The completed As-Built Drawings do not require the signature of the Engineer or Architect of Record. Each completed As-Built Drawing produced in Adobe (.PDF) electronic format shall have the signature of an officer of the Contractor's organization, certifying compliance with as-built conditions, using a stamp as follows:

AS-BUILT

I CERTIFY THAT THIS DRAWING
ACCURATELY DEPICTS THE WORK
CONSTRUCTED AS OF

(date)

(an officer of the Contractor)

Contractor's Name

3. As-Built Specifications:

- a. By the date scheduled for receipt of final approved As-Built Specification deliverables in the Contract Schedule, submit As-Built Specifications in both latest version of MSWord (.DOCX) file format with tracked changes and an Adobe (.PDF) file format, in print quality black and white. Submit two bound sets of black ink on white paper copies produced from the Adobe (.PDF) format to the Contracting Officer Representative for review and acceptance in accordance with Section 01330, SUBMITTAL PROCEDURES.

D. As-Built Project Schedule:

- 1. Submit one electronic copy of the approved As-Built Project Schedule as required.

E. Spare Parts:

1. This Contract includes the requirement for spare parts, either specifically identified in the price schedule or to be identified later during the term of the Contract. Ensure that all spare parts required by this Contract are provided and delivered in accordance with the following paragraphs.
2. Submit to the Authority the one electronic copy of the list of required spare parts specifically identified in the Contract Documents. The list provided by the Contractor shall include part name, model number, part number, serial number, stock number, component name, location for use, manufacturer's name and contact information, unit cost, quantity, available packaging, special storage and handling instructions, replacement schedule, and anticipated annual usage. In addition, the spare parts listing shall include the following additional information as appropriate:
 - a. Group the list by system and subsystem for inventory system identification. Include order and procurement information for subassemblies and components.
 - b. Correlate the required quantities with the reliability requirements and lead time considering the following classifications:
 - (1) Wear: Components which may be expected to require regular replacement under normal maintenance schedule and operations, such as mechanical parts subject to continuous operation within projected mean time between failure levels.
 - (2) Consumables or expendables: Components which are consumed, used up, destroyed, or upon failure, are otherwise made unusable for their intended purpose and are economically unrecoverable except for inherent scrap value.
 - (3) Recoverable or repairable: Components, which upon failure are capable of being repaired or remanufactured to a serviceable, operational condition and maintained available for use within their initial intended purpose. Such items shall be accounted for via appropriate asset records.
 - (4) Long lead: Components, which are not available on short notice from commercial distributors or within 48 hours from the manufacturer, such as specially made or selected components.
 - (5) Cross referencing: Where replacement components are common to more than one system or subsystem, include a cross reference and indexing system in the replacement components list.
 - (6) Non-unique parts: In all components lists, items which are not unique to the system and have been manufactured by others shall be identified by the manufacturer's name and part number, as well as by the Contractor's component number, if any.
3. Within 30 Days after the Contractor submits the required spare parts listing, the Authority will provide the Contractor with shipping instructions and with WMATA stock numbers for each item the Contractor is required to furnish. Spare parts shall be packaged such that parts for a particular asset or a particular facility are grouped together. The Contractor shall ship, within a 25-mile radius of the Project, the required parts to the designated points specified by the Authority and shall include the Contract number, manufacturer part number, quantity, unit price, and WMATA part number on the shipping document.
4. The identification of the individual manufacturer's part numbers shall be cross referenced to the assigned WMATA stock numbers by including a column with appropriate heading adjacent to the manufacturer's part numbers in any parts manual or listing provided in accordance with Article 1.04E.21-04D.2 above.

5. Parts furnished in accordance with this provision shall not be used to satisfy replacement needs under any warranty provision of this Contract.
 6. Spare parts shall be the same in all respects as their counterparts furnished as part of the assembled equipment to be delivered under the terms of this Contract.
 7. Unless otherwise specified in this Contract, the spare parts shall be delivered at the same time as the counterpart equipment delivery. The spare parts shall be properly packaged or crated so as to prevent damage during shipment and long-term storage. The spare parts shall be labeled in accordance with the instructions contained in Article ~~1.04E.34-04D-3~~ above.
- F. Asset Database as described above.
- G. Preventive Maintenance Instructions as described above.
- H. Survey Field Notes in accordance with Section 01330, SUBMITTAL PROCEDURES:
1. As applicable, submit electronic media of the following as specified in Section 01721, LAYOUT OF WORK AND FIELD ENGINEERING:
 - a. Survey Record Log.
- I. Releases and Vouchers:
1. As applicable, submit one original hard copy and electronic media, in Adobe (.PDF) file format, of releases and vouchers.
- J. Records for Inspection, Testing, and Other Quality Elements:
1. Submit one original hard copy and electronic media, in Adobe (.PDF) file format, of records for inspection, testing or other quality elements as more fully specified in Section 01470, QUALITY MANAGEMENT SYSTEM.
- K. Request for Final Payment:
1. Submit one original hard copy and electronic media, in Adobe (.PDF) file format, of final payment request. Final Settlement will be made in accordance with Section 00744, METHOD OF PAYMENT.
- L. Correction of Deficiencies Submittals:
1. As applicable, submit original hard copy and electronic media, in Adobe (.PDF) file format, of Schedule of Deficiency Corrections, Recommendation for Corrective Actions, together with supporting information, Data and Reports applicable to any correction, and a Technical and Cost Proposal to amend the Contract to permit acceptance of the affected materials, equipment, systems, or subsystems as specified in Section 00758, CORRECTION OF DEFICIENCIES.
- M. Certifications, Affidavits, and Warranties and Guarantees:
1. Required Affidavits, Certificates, Written Descriptions and Releases and Warranties and Guarantees provided by the Contractor; i.e., Certificates of Acceptance and Compliance, Certification that all facilities were constructed in conformance with ADAAG regulations (Form attached at end of Section), of System Safety and Security, of Substantial Completion, and of Final Payment; Written Description of measures taken to correct damage that may have resulted from performance of this Contract; Written Releases; Contractor's executed Affidavit of Payment of All Applicable Taxes and License Fees in connection with the Contract and Affidavit of Payment of Debts and Claims; Consent of Surety Company to Final Payment; Warranties and Guarantees as specified in Section 00757, WARRANTY/GUARANTEE OF CONSTRUCTION, and Section 00758, CORRECTION OF DEFICIENCIES, and various Sections of the Contract

Specifications as applicable: Submit the original hard copy and one electronic copy in Adobe (.PDF) file format.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01820
DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the general requirements for operation and maintenance training for equipment and systems provided by the Contractor and the general requirements for a Project performance demonstration.

1.02 DEFINITIONS

- A. Acronyms used in this specification have the following definitions:

- 1. TSMT – Technical Skills and Maintenance Training
- 2. ROQT – Rail Operations Quality Training
- 3. TTDC – Technical Training Document Control

1.03 SUBMITTALS

- A. Submit in accordance with Section 01330, SUBMITTAL PROCEDURES, the following at the times stated:
 - 1. Training plan preliminary submittal: One electronic copy and one printed paper copy not later than 60 Days after commencement of construction work. Submittal shall include at a minimum:
 - a. Instructional outline: A complete, accurate, and detailed listing of topics to be addressed in the instructional program using the specified content list.
 - b. Specimens of instructional material to be used
 - c. Descriptions of audio-visual material and equipment to be used
 - 2. Training plan intermediate submittal: One electronic copy and one printed paper copy not later than 60 Days after approval of preliminary submittal.
 - a. All material submitted for preliminary submittal incorporating or resolving comments.
 - b. Complete instructional plans including audio-visual aids and descriptions of instructional techniques and procedures.
 - 3. Training plan final submittal: One electronic copy and one printed paper copy not later than 30 Days prior to scheduled date for operation inspection, testing, or acceptance of the equipment.
 - a. All material submitted for intermediate submittal incorporating or resolving comments.
 - 4. Training contract closeout submittal: As specified in Section 01775, CLOSEOUT.
 - 5. Training instructor's qualifications.
 - 6. A complete set of all training manuals, handouts, aides and presentations, for instructor and student, shall be provided at the end of the vendor's first training class to each of the audience's training groups (two sets when there are two supporting training groups, etc.) in an approved, editable electronic format, and free from copyright restrictions.

7. Printed copies of each student guide and student-learning materials (schematics, books of plans, etc., as determined useful) shall be prepared and bound by equipment's training provider. Provide one printed copy for each student to use during training and to keep after class completion
8. Printed copies of the instructor's guide, student guide, presentation, and all supplemental training materials for each of the audience group's training instructors (not to exceed five copies), free from copyright restrictions, shall be provided at the end of the first vendor training session.
9. Performance demonstration plan and procedures: submit for Approval as part of the final design review package but no later than 90 Days prior to first performance demonstration.
10. Provide video documentation of demonstration and training classes.

1.04 OPERATION AND MAINTENANCE TRAINING

A. General:

1. Where specified, develop and conduct a program to train selected Authority personnel in the operation and maintenance of equipment and systems furnished.
2. Furnish instructors, instructional materials, and audio-visual aids and equipment.
3. The Authority will furnish physical facilities.

B. Operations training:

1. Operations training shall be tailored specifically to the WMATA equipment being purchased and training shall be designed to teach all trainees the functional use of all of the major modes of equipment operation.
2. The training shall be sufficient in quality and scope to bring personnel to a level of operating proficiency such that vendor support is not needed during routine equipment operation in any mode or capacity.

C. Maintenance training:

1. Maintenance training shall be tailored specifically to the WMATA equipment being purchased and shall be designed to develop the knowledge and skills required to maintain and repair all item(s) delivered under the Contract. Maintenance training shall address the detailed theory of operation, maintenance, testing, repair, overhaul, replacement, alignment, and troubleshooting of the delivered equipment (hardware and software).

D. Other Training:

1. Any other training (as determined by WMATA) necessary to support the safe operation, use, or maintenance of the equipment.

E. Training Plan:

1. Training plan shall contain an organized summary of the events, and associated times, necessary for the completion of all materials necessary to successfully perform the required training. The plan shall be submitted to the applicable end user's training group(s) (TTDC, TSMT, or ROQT currently) within a Contract specified period after NTP has been issued. The training plan must address all deliverables using a timeline that includes periods for review, feedback, resubmission, approval, and delivery accomplishing all by a Contract-determined date related to the equipment being placed into service. The training plan shall include the following:

- a. Course list including course title, duration, audience, audience size, and purpose
- b. Instructor qualifications: A description of the instructor's qualifications for each class must be submitted to the end user's training group(s) (TTDC, TSMT, or ROQT currently) for approval as part of the training plan. The description (resumé, curriculum vitae, or other description of instructional qualifications) shall document a thorough knowledge of the subject equipment, an understanding of the adult learning process, and demonstrated experience in vocational instruction.
- c. Audience qualifications and prerequisites: For the purpose of course development and presentation, vendors shall assume all WMATA students are high school graduates (or equivalent)
- d. Instruction and testing methods to be utilized
- e. Summary of the strategies to be employed in the accomplishment of the training
- f. Proposed schedule of delivery of materials and training

F. Instructor's Guide:

- 1. The instructor's guide for each course shall contain all the information and direction necessary for the instructor to make an effective presentation. The instructor's guides shall include adequate guidelines to conduct a comprehensive training program. Individual lessons within the course shall be organized as separate blocks (or modules), which may be taught as a unit. In some instances, the same standard operating procedures could be used for train operators, transportation supervisors, and central control supervisors. The instructor's guide shall contain, at a minimum:
 - a. Program overview stating the overall program goals
 - b. Training syllabus
 - c. Lesson plans arranged as a session by session outline containing the following:
 - (1) Overview of each lesson
 - (2) Outline of major topics to be covered including timelines for each course, lesson, and topic
 - (3) Outline of learning objectives for each major topic
 - (4) Information regarding important subjects and terms to be emphasized during each section of the training
 - (5) References to the associated Student Guide pages and presentation slides
 - d. Suggested instructional methods/learning activities
 - e. Required equipment or resources needed for effective instruction
 - f. Test question pool(s) with each question referenced to the respective learning objective(s) and student guide or other instructional materials
- 2. A guide (FAQ) providing questions/problems and answers as related to course content

G. Student's Guides:

1. Student guides for each course that shall contain all the information and direction necessary the student to interact effectively in the learning environment. The student guides shall be written in a fully developed prose format, developed in the same modular format as the instructor's guides. The student's guides should contain, at a minimum:
 - a. Program overview/introduction
 - b. Statement of overall program goals
 - c. All major topics to be covered
 - d. Student learning objectives associated with each of the major topics stated in quantifiable terms
 - e. All illustrations, block diagrams, charts, schematics, wiring diagrams, logic flow diagrams, troubleshooting guides, graphics, and visual aids that may be used during course presentation to enhance presentation content and provide a seamless facilitation of instruction
 - f. Supplemental materials that may be necessary to facilitate theoretical discussions

H. Training Presentations:

1. Training Presentations shall be matched to the instructor guides and student guides and shall facilitate seamless, effective communication of the course information to the target audience.
2. Training Presentation format(s) shall be agreed upon by the target audience's training group(s) (TTDC, TSMT, ROQT, currently).

I. Training Aides:

1. Depending upon the equipment or system(s), a functional mockup or a functional representation may be required. These may be in the form of animated illustrations, animated schematics, model(s) of the equipment, actual device(s), interactive video training, or any accepted media format as determined by the audience's training group.
2. All mockups become the property of audience's training group after completion of the final scheduled training class. Supplemental materials shall be demonstrated as fully operable during the first training class. All necessary repairs to the supplemental materials are the responsibility of the vendor for the duration of vendor training sessions.

J. OEM Operator's Manual(s) describing the equipment's or system's operation in each mode and capacity of use.

1. OEM Technical Manuals describing the detailed theory of operation, maintenance, testing, repair, overhaul, replacement, alignment, and troubleshooting shall be delivered to the appropriate training groups.

1.05 MATERIALS AND INSTRUCTION

- A. Training materials shall be provided and approved by audience's training groups (TTDC, TSMT or ROQT) prior to the final acceptance of training schedule or training date(s).
- B. Training materials updates are required when, in the scope of the Contract, changes or Modifications are made that affect the operation or maintenance of the contracted item(s).
- C. Instruction shall include material covered in the operation and maintenance manuals as well as the following:

1. Detailed theory of operation to one level below Lowest Repairable Unit (LRU)
 2. Practical aspects of operation
 3. Description of system, equipment, and components
 4. Functional characteristics of system, equipment, and components
 5. Emergency operating procedures
 6. Location, removal, and reinstallation of components
 7. Maintenance procedures
 8. Servicing intervals and schedules
 9. Block diagrams of equipment hardware and software functionality as installed
 10. Schematics of equipment hardware as installed
 11. Diagnosis and problem solving (troubleshooting)
 12. Repair
 13. Overhaul
- D. Daily class duration shall be a nominal 7-1/2-hour shift, with advantageous combinations of theoretical/classroom instruction and hands-on practice, utilizing operational equipment, presentations, mockups, and test equipment as applicable. For on-the-job training (OJT) at work locations as applicable, training shall include participation in installation activities, fault diagnosis, and equipment alignment/adjustment exercises.
- E. Operating and maintenance training shall be completed prior to the time scheduled for operation inspection, testing, or acceptance of the equipment. In addition to the retainage specified in Section 00744, METHOD OF PAYMENT, payment will be withheld until training is complete and accepted.
- F. Furnish to applicable training group, a minimum of four O&M Manuals as described in Section 01775, CLOSEOUT, for each piece of equipment and system, unless otherwise specified, and a minimum of one editable, non-copyrighted electronic copy in a Microsoft Office format, as specified.

1.06 PROJECT PERFORMANCE DEMONSTRATION

- A. Integrated system testing shall culminate in a project performance demonstration that shall simulate all operations and shall exercise all systems and system elements. Prepare performance demonstration plan and procedures. Include testing of anticipated normal and abnormal operations, in addition to simulations of emergency operations. Performance demonstration plan shall delineate the following:
1. Tests to be performed
 2. Date and time when each test is to be performed
 3. An outline of the test parameters
 4. Pass/fail criteria, which must be quantified and measurable

- B. The project performance demonstration shall include those static and dynamic tests used to demonstrate that the Design-Builder designed the systems and subsystems according to the specification and the performance specified, and shall include:
1. All necessary functional and performance testing conducted during construction and manufacture of the system elements; and
 2. Operational tests, which include integrated testing of system interfaces to assure that the Project as a whole is capable of operating as specified.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES

SOP # 28 PROTECTION FOR ROADWAY WORKERS AND ESTABLISHMENT OF
THIRD RAIL POWER OUTAGES AND WORK AREAS ON THE
ROADWAY

28.1 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to describe, in detail, the responsibilities and procedures for the removal and restoration of third rail power and the establishment of work areas.

28.2 SCOPE

This SOP is applicable to all WMATA and non-WMATA personnel who perform, supervise, or manage work on the mainline and yard Roadway.

28.3 DEFINITIONS

28.3.1 Foul Time (FT): A method of Roadway protection in which all trains and/or track equipment are STOPPED. The RWIC requests ROCC to stop all traffic until the RWIC reports clear of the track. This is used only for short time periods (approximately 3 minutes or less) in specific segments of track such as work areas, blind spots and no clearance zones.

28.3.2 Fouling A Track: The placement of an individual or equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment.

28.3.3 Inaccessible Track (IT): A section of track where a physical barrier has been placed to prevent trains and/or track equipment from entering the work area. (i.e. derailleurs, barricade, rail out, etc.).

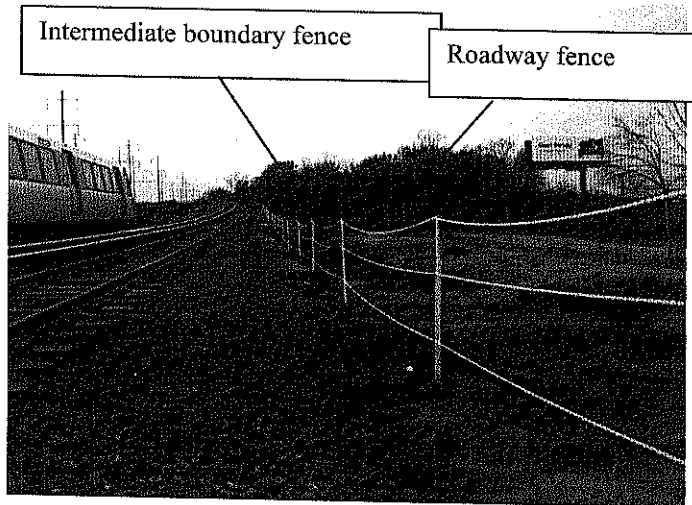
28.3.4 Individual Train Detection (ITD): A method where an individual provides for their own protection. The individual detects approaching trains and moves to a place of safety before the train arrives. For Lone Workers, this method of detection may ONLY be used under circumstances strictly defined in the RWPM.

28.3.5 Intermediate boundary fence: A five (5) foot high, plastic chain fence which is positioned ten (10) feet from the end of the cross ties along sections of Metrorail above ground roadway. Where constructed, it separates Metro property into roadway and NON-roadway territory. Individuals on the track side of the Intermediate boundary fence are considered "on" the roadway; individuals on the non-track side of the Intermediate boundary fence are considered "off" the roadway. (Pictures 1 and 2).

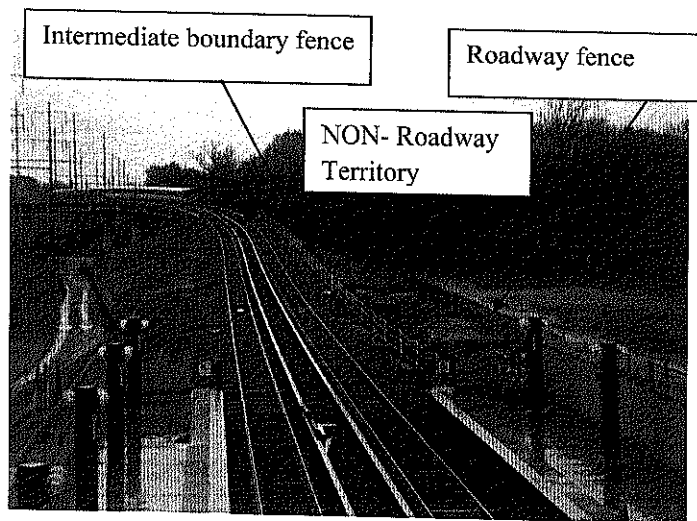
RWP SOPs



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES



Picture 1



Picture 2

28.3.6 Lone Worker: A RWIC qualified single Roadway worker who provides for their own protection. This individual is not a member of a work crew. A lone worker is not engaged in a common task with another Roadway worker.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

- 28.3.7 Qualified Person: The worker has successfully completed training and demonstrated the knowledge and ability to perform their duties. WMATA will maintain the appropriate standards and records. Roadway workers shall be required to re-qualify.
- 28.3.8 Roadway: Any location where roadway worker protection is required:
- 28.3.8.1 On at-grade track, it is all areas between the roadway fences, except where an intermediate boundary fence exists.
 - 28.3.8.2 On aerial structures, it is all areas between hand railings to include all safety walks.
 - 28.3.8.3 In tunnel areas, it is all areas between tunnel walls to include all safety walk areas and open shafts and ancillary areas.
 - 28.3.8.4 In transition areas, it includes fence to fence, wall to wall, railing to railing, fence to wall, fence to railing, and wall to railing.
 - 28.3.8.5 The shop aprons, yards and tracks are excluded from the Roadway, and from Roadway Protection Rules, with the exception of yard's arrival and departure tracks (receive and dispatch tracks), and in areas where track repair work is being performed, in which case, Roadway Worker Protection rules shall be put in place for the gangs and workers associated with that track work and its associated work zone. Individual train detection (ITD) is an accepted form of protection in all yards where track work is not being performed. Embedded tracks within maintenance facilities are not considered part of the roadway; however, carwash tracks are included. Station platforms are not considered part of the roadway, nor are the walkways beyond the station platform endgates protected by handrails. However, any maintenance or construction, the use of tools, ladders, scaffolds or lifts that have the potential for **fouling the track** requires a RWIC to use Roadway worker protection in accordance with the RWPM, even if performed behind the hand rails. Individuals are considered off the roadway if they are on the non-track side of the intermediate boundary fence.
 - 28.3.8.6 For WMATA employees, walkways protected by handrails beyond the station platform endgates are not considered part of the WMATA Roadway. All non-WMATA employees must be escorted and be granted permission by ROCC to go beyond endgates (pictured below). All personnel shall put on safety vests before going beyond the station endgates.

RWP SOPs



**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES**





WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES



Roadway begins at end of handrail

RWP SOPs



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

- 28.3.9 Roadway Flag Person: A qualified employee designated by the RWIC to direct or restrict the movement of trains. Roadway Flag Persons shall be equipped to properly provide proper warnings. Their SOLE duty is to look out for approaching trains and/or track equipment. From a place of safety, Roadway Flag Persons shall signal trains to **STOP** before entering the working limits. Roadway Flag Persons will not permit the movement of trains and/or track equipment into the working limits unless authorized by the RWIC.
- 28.3.10 Roadway Worker: Any employee or contractor whose duties could potentially cause them to foul the Roadway.
- 28.3.11 Roadway Worker in Charge (RWIC): A qualified employee responsible for the Roadway safety for all workers and work gangs within their working limits.
- 28.3.12 Roadway Worker Protection (RWP) Manual:
- 28.3.13 Shop Apron: A concrete or asphalt area between shop doors and ballasted tracks.
- 28.3.14 Train coordination: A method of establishing working limits on track upon which a train holds exclusive authority to move whereby the train yields that authority to a Roadway Worker in Charge (RWIC).
- 28.3.15 Vehicle Flag Person (VFP): A qualified employee who is assigned to flag a rail vehicle.
- 28.3.16 Watchmen/Lookout: A qualified employee who provides warning to Roadway workers of approaching trains and/or track equipment. A Watchmen/Lookout's sole duty is to warn workers to move to, and remain in, a place of safety for an ample amount of time before the arrival of trains or rail vehicles.
- 28.3.17 Work Crew/Gang: Two or more railroad workers organized to work together on a common task; including the RWIC.
- 28.3.18 Work Zone: A segment of track within working limits that is being occupied for maintenance or repair.
- 28.3.19 Work Zone Authorization: The written authorization designed to convey rights to obstruct or use a designated section of track between specified points and for a specified period of time with or without the removal of third rail power or signal power.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

28.4 RESPONSIBILITIES

- 28.4.1 All personnel who perform or supervise work on the Roadway are responsible for ensuring that their actions, work areas and third rail power outages conform to the requirements of this SOP and the RWP Manual.
- 28.4.2 All personnel shall be trained and qualified in Roadway safety, according to their role and function, prior to entering WMATA's Roadway.
- 28.4.3 MOC and ROCC personnel are responsible for ensuring that field personnel are conforming to this SOP when work is being performed on the Roadway.
- 28.4.4 Supervisors and managers of personnel working on the Roadway are responsible for ensuring that their assigned personnel are properly and fully trained on the content of this SOP and the Roadway Worker Protection Manual and are working in full compliance with both documents at all times. The Roadway Worker in Charge (RWIC) shall focus on rules/compliance/oversight and the safety of their work crews. The RWIC shall not engage in any other job site work activities.



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28.5 PROCEDURES

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28.5.19	Roadway Clarifications: D&G Platform, Alexandria Yard Platform, Shady Grove Yard Lead, Brentwood Yard
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28.5.1 Guidelines for the Removal of Third Rail Power for WMATA Employees:

28.5.1.1 A red tag power outage is required for all activities that require contact with the third rail or items connected to the third rail.

28.5.1.2 A supervisory power outage is required for all activities on the Roadway not covered by Section 28.5.1.1 of this procedure. When incidental contact with the third rail is possible, Safety Department approved rubber mats shall be used to protect affected employees.



Warning: The third rail shall always be considered energized during supervisory outages.

28.5.1.3 Exceptions to 28.5.1.2 are made for employees performing certain routine inspection and maintenance activities that do not require third rail power outages. These exceptions require the approval of the Chief Safety Officer and the Assistant General Manager of Rail Operations Delivery and are listed in Appendix A of this SOP.

28.5.1.4 When a power outage is required, it need cover only the entire actual work area and does not have to cover the adjacent safety zones. Protected work areas outside of the actual work area do not require a power outage.

28.5.2 Guidelines for the Removal of Third Rail Power for Non-WMATA Personnel:

28.5.2.1 A red tag power outage is required for all activities that require contact with the third rail or items connected to the third rail.

28.5.2.2 A supervisory power outage is required for all activities on the Roadway not covered by Section 28.5.2.1 of this procedure.



Warning: The third rail shall always be considered energized during supervisory outages.

28.5.2.3 When a power outage is required, it must cover the entire actual work area, but does not have to cover the adjacent safety zone.

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28.5.3 Special Requirements for Non-WMATA Personnel:

- 28.5.3.1 Non-WMATA personnel cannot enter the Roadway while the third rail is energized, except for those referenced in 28.5.3.7 and in appendix A.
- 28.5.3.2 The point of entry and exit onto the Roadway for non-WMATA personnel must be within the actual work area limits. However, when this is not possible, a qualified RWIC may ask permission from ROCC to remove third rail power and stop all Class 1 and Class 2 equipment movement to allow the non-WMATA personnel into the actual work area limits.
- 28.5.3.3 Non-WMATA personnel cannot enter the Roadway without a trained and certified WMATA RWIC.
- 28.5.3.4 Non-WMATA personnel must possess a valid orange WMATA contractor ID with a Roadway training endorsement before entering the Roadway. This ID shall be displayed on an outer garment at all times while on WMATA property.
- 28.5.3.5 Non-WMATA personnel who will be performing work on the rail system, prior to performing that work, must successfully complete an approved WMATA course on the rail system, procedures, restrictions and any other pertinent information as applicable.
- 28.5.3.6 WMATA RWICs shall ensure the Non-WMATA personnel have a valid orange contractor ID that is not expired and is stamped with the Roadway Trained endorsement, prior to allowing those personnel onto the Roadway.
- 28.5.3.7 Representatives from the Tri-State Oversight Committee and the National Transit Safety Board shall have access to energized operational tracks with an assigned WMATA RWIC for the purposes of observing tests and performing inspections. Protection provided these personnel shall be consistent with the Metrorail Safety Rules and Procedures Handbook.



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28.5.4 Removal of Third Rail Power and Establishment of a Work Area Under a Red Tag Outage.

28.5.4.1 The WMATA maintenance personnel that require the outage shall submit the request via GOTRS (General Orders – Track Rights System).

28.5.4.2 Prior to the start of work, the RWIC shall, contact the MOC to verify that the red tag has been activated and obtain the red tag number.

28.5.4.3 After receiving the red tag number from MOC and prior to beginning work, the RWIC shall contact ROCC by radio advising them of the red tag number and request permission to enter the track bed to test the third rail and protect the work area. The RWIC shall establish the appropriate protection and verify the necessary protection elements for the type of protection required with ROCC as defined in Appendix B.

28.5.4.4 Once verification between ROCC and the RWIC is complete according to Appendix B, control of the work area is passed from ROCC to the RWIC.

28.5.4.5 Prior to starting work, the RWIC shall brief the personnel of the work crew on applicable WMATA safety rules/procedures, track(s) involved, work area limits, the means of protection, safe areas in which to clear, red tag number and any restrictions on the work, and document meeting on department issued safety briefing form (see Appendix C of this SOP for example).

28.5.4.6 In the event the work continues through an MOC or ROCC shift change, it shall be the responsibility of the initial MOC or ROCC Supervisor to advise the relief person of the details involving the work taking place, including the name of the Red Tag Holder and/or the RWIC. ROCC Controllers shall contact and be briefed by the RWIC on the protection required / type of protection for work zones on their lines when changing shifts.

28.5.4.7 If the Red Tag Holder is to be relieved, both the original Red Tag Holder and the new Red Tag Holder must contact MOC and ROCC advising them of the change prior to making the change.

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28.5.5 Restoration of Third Rail Power and Clearing of a Work Area Under a Red Tag Outage:

- 28.5.5.1 The RWIC shall contact MOC advising them that the work area has been inspected for re-energization, all personnel/equipment are clear and the red tag can be cleared identifying it by number.
- 28.5.5.2 After contacting MOC, the RWIC shall contact ROCC advising them that all personnel/equipment are clear of the work area and that the red tag has been cleared through MOC.
- 28.5.5.3 Prior to allowing personnel to leave the area, ROCC shall verify removal of the shunt straps when the work has been completed, time period has ended or when requiring the personnel to clear.
- 28.5.5.4 ROCC shall ensure that the times the shunt straps are applied and removed are recorded on the ROCC radio tape and/or in writing.
- 28.5.5.5 ROCC shall remove prohibit exit commands only after the person holding the red tag has reported personnel and equipment clear of the track.
- 28.5.5.6 When the red tag is cleared, MOC shall in coordination with ROCC, direct power crews to remove block tags, rack in and place in remote the appropriate circuit breakers at the involved substations.
- 28.5.5.7 MOC shall advise ROCC that the breakers for each outage area are positioned to be re-energized.
- 28.5.5.8 MOC and ROCC shall cause announcements to be made on MOC and ROCC radio nets that power is being restored and allow at least one minute for a response to the announcement before closing breakers.
- 28.5.5.9 ROCC shall restore power by supervisory control as described in SOP 2.5.6 and notify MOC of any circuit breakers that do not close.



Notice: Personnel are not to enter/re-enter the Roadway, unless authorized by the ROCC Supervisor.

28.5.6 Removal of Third Rail Power and Establishment of a Work Area Under a Supervisory Outage:

- 28.5.6.1 The WMATA maintenance personnel requiring the outage shall submit the request via General Orders Track Rights System (GOTRS).



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- 28.5.6.2 Prior to allowing work to begin, the RWIC shall contact ROCC by radio and request that the supervisory outage be initiated.
- 28.5.6.3 ROCC shall initiate the outage recording the date/time that power removal was completed, the breaker number(s) involved, and the name of the person in charge of the work crew in the request log.
- 28.5.6.4 ROCC shall then contact the RWIC. The RWIC shall establish the appropriate protection and verify the necessary protection elements for the type of protection required with ROCC as defined in Appendix B.
- 28.5.6.5 Once verification between ROCC and the RWIC is complete according to Appendix B, control of the work area is passed from ROCC to the RWIC.
- 28.5.6.6 Prior to allowing the crew to begin work, the RWIC shall brief personnel of the work crew that the third rail is to be considered energized at all times and not to make contact with it or its connected equipment. In addition, personnel will be advised of any applicable rules, procedures or restrictions, the track(s) involved, work area limits, the means of protection and safe areas in which to clear, and document meeting on department issued safety briefing form (see Appendix C of this SOP for example).
- 28.5.6.7 The RWIC must maintain contact with ROCC during the work in the event ROCC would have to clear the work area and restore power in response to an emergency. In addition, the RWIC shall periodically check the third rail to confirm it is still de-energized.
- 28.5.6.8 In the event that the work continues through an ROCC shift change, it shall be the responsibility of the initial ROCC Supervisor to advise the relief person of the outage and the name of the RWIC. ROCC Controllers shall contact and be briefed by the RWIC on the protection required / type of protection for work zones on their lines when changing shifts.
- 28.5.6.9 In the event that the work continues through the work crew's shift change, it will be the responsibility of the initial RWIC to advise ROCC of the name of the person in charge of the relief crew. At all times, ROCC must be kept informed as to who is the RWIC and responsible for clearing the work area.



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28.5.7 Restoration of Third Rail Power and Clearing of a Work Area Under a Supervisory Outage:

28.5.7.1 Upon completion of the inspection, the RWIC shall contact ROCC advising them that the work area has been inspected for re-energization, all personnel/equipment are clear of the track(s) and give ROCC clearance to re-energize the third rail in the area.

28.5.7.2 When ROCC receives the clearance from the RWIC and no other crews are holding the same third rail area out of service, ROCC shall ensure that announcements are made on their radio net and the MOC net that third rail power is being restored in the work area and allow at least one minute for a response to the announcement before closing breakers.

28.5.7.3 After announcements have been made, ROCC shall re-energize the third rail in the cleared work area. ROCC shall record the request to re-energize in the power outage or restoration request log and also the time the restoration was completed.



Notice: Personnel are not to enter/re-enter the Roadway, unless authorized by the ROCC Supervisor.

28.5.8 Additional Requirements when more than One Crew is Working in a Single Work Area (Piggybacking):

28.5.8.1 The RWIC who holds the track rights is responsible for all activities within the work area, to include but not be limited to:

28.5.8.1.1 All communication and coordination with ROCC;

28.5.8.1.2 Verification of third rail power and placement of safety equipment;

28.5.8.1.3 Monitoring of the activities of all crews within the work area, and;

28.5.8.1.4 Ensuring that all personnel and equipment of all work crews in the work area are clear and that the entire area is safe for train movement prior to turning the work area back to ROCC.

28.5.8.2 The person in charge of the piggybacking crew must contact the RWIC for permission to enter the RWIC's work area and notify ROCC.

28.5.8.3 The on-site maintenance supervisor, crew leader or escort of piggyback area is responsible to ensure site specific activities in the piggyback zone conform to all rules and procedures.



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28.5.8.4 If a rail vehicle is being used by one of the crews, a pair of red lights or flags is to be placed between the crews to limit the movement of the rail vehicle.

The supervisor shall coordinate with the supervisor of adjacent crews if work equipment is required to move past red lights.

28.5.8.5 If additional PPE, such as respirators, is required for the work of one of the crews, all personnel within the work area shall be required to wear the additional PPE.

28.5.9 Additional Protection Requirements when Single-Tracking:

If no SSRM approved physical barrier exists between the affected tracks, a restriction of 35 MPH shall be placed immediately adjacent to the actual work area on the operational track(s). The length of this restriction shall be equal to or greater than the length of the actual work area and shall parallel the entire length of the actual work area.

28.5.10 Establishment of a Work Area without a Power Outage:

28.5.10.1 The WMATA maintenance personnel requiring the work area shall submit the request via General Orders Track Rights System (GOTRS).

28.5.10.2 Prior to allowing work to begin, RWIC shall contact ROCC by radio and request permission to enter the Roadway to establish the work area. The RWIC shall establish the appropriate protection and verify the necessary protection elements for the type of protection required with ROCC as defined in Appendix B.

28.5.10.3 Once verification between ROCC and the RWIC is complete according to Appendix B, control of the work area is passed from ROCC to the RWIC.

28.5.10.4 Prior to allowing the crew to begin work, the RWIC shall brief personnel of the work crew that the third rail is energized and that entry onto the Roadway is prohibited. In addition, personnel will be advised of any applicable rules, procedures or restrictions, the track(s) involved, work area limits, the means of protection, and safe areas in which to clear, and document meeting on department issued safety briefing form (see Appendix C of this SOP for example).

28.5.10.5 The RWIC must maintain contact with ROCC during the work in the event ROCC would have to clear the work area in response to an emergency.

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28.5.10.6 In the event that the work continues through an ROCC shift change, it shall be the responsibility of the initial ROCC Supervisor to advise the relief person of the work area and the name of the RWIC. ROCC Controllers shall contact and be briefed by the RWIC on the protection required / type of protection for work zones on their lines when changed shifts.

28.5.10.7 In the event that the work continues through the work crew's shift change, it will be the responsibility of the initial RWIC to advise ROCC of the name of the person in charge of the relief crew. At all times, ROCC must be kept informed as to who is the RWIC and responsible for clearing the work area.

28.5.11 Clearing of a Work Area:

Upon completion of the inspection, the RWIC shall contact MOC and ROCC advising them that the work area has been inspected all work crews and equipment are clear of the track(s) and give ROCC clearance to establish normal operations in the area.

28.5.12 Working on Roadway without a Work Area Established:

28.5.12.1 When engaged in work for a period of more than 3-minutes at a stationary location on the Roadway, restrict speeds entering the work site by using one of the following methods:

28.5.12.1.1 Coordinate with ROCC, the application of a shunt strap on the work track in accordance with the established traffic direction. The shunt strap(s) shall be applied at a track location that will assure trains enter and travel a significant portion (at least 30%) of the work area at a restricted speed (15mph). At least one train on each track shall be allowed to operate through the affected area to observe that the desired speed has been achieved before work begins. The shunt strap must be verified by ROCC prior to the start of any wayside work and remain in place until the work is complete and all crew members have cleared to the safety walk or other known clearance area. The shunt strap shall not be placed or removed in front of a train that is visible on the affected track. ROCC shall coordinate train movement through the affected area.

28.5.12.1.2 Implement speed restrictions through the application of the ATP Slow speed couplers in the applicable Train Control Room(s). Work crews must be mindful that trains will operate through the affected area without communicating with ROCC.



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28.5.12.1.3 Insertion of switch crank(s) prior to the work being started. Removal of the switch crank shall take place only after all crew members have cleared to the safety walk or other known clearance area. ROCC shall coordinate train movement through the affected area.

28.5.12.1.4 Taking local control of the interlocking or dropping track circuits, forcing red aspects at all signals. Signals shall be cleared only after positive communication verifying that all crew members have cleared to the safety walk or other known clearance area is received by the person controlling the signals. ROCC shall coordinate train movement through the affected area.

28.5.12.1.5 Implement methods specified in 28.5.12.1.1 and 28.5.12.1.2 on the track(s) immediately adjacent to the work area when there is no physical barrier, such as a wall or SSRM approved barrier that obstructs or greatly impedes passage and the work being performed is more than 100 feet beyond the end of a center platform station.



Notice: Track Inspections are exempt from the restrictions cited in 28.5.13, however, when the activity transitions from inspection to hands-on work, the restriction(s) must be applied. This exemption will not preclude inspection crews from asking for and implementing speed restrictions to protect them.

28.5.12.1.6 When notified of an impending single track operation through their area, clear the Roadway and notify ROCC when they are totally cleared.



Notice: Roadway personnel may request a transport train in order to expedite clearing their work area.

28.5.12.1.7 ROCC shall:

28.5.12.1.7.1 Make periodic (20- minute) radio announcements to inform train operators of those locations where corrective maintenance actions are being performed within the dynamic outline of a train.

28.5.12.1.7.2 These announcements shall be made at more frequent intervals as deemed necessary by ROCC or as requested by the maintenance/wayside personnel performing the work. (Related Rule 4.180).

28.5.12.1.8 Prior to establishing single track operations or any train movement into mainline Connector tracks (i.e. B&E/C&A Connectors) where personnel are on the roadway:



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- 28.5.12.1.8.1 Announce the limits of the operation, the affected track and request that all personnel on the operational track clear the Roadway;
- 28.5.12.1.8.2 Upon request, use the first train entering the single track area (connector track) to pick up and clear personnel on the Roadway, and;
- 28.5.12.1.8.3 Inform Roadway personnel of the location of the transport train when it is made available.
- 28.5.12.1.9 To further protect mainline work gangs performing walking inspections,
 - 28.5.12.1.9.1 Place "prohibit exit" command on the signal that establishes a reverse route into the area where personnel are to walk and verify that a "Blocked Track" indication is on ROCS/AIM screen.
 - 28.5.12.1.9.2 Take interlocking(s) signals (that can establish a reverse route) out of automatic mode anytime track walkers or workers occupy an area governed by automatic signaling. In cases where workers are granted permission to occupy a connector track (i.e. B&E/C&A Connectors), Controllers will contact the associated controlling console to ensure:
 - 28.5.12.1.9.2.1 Signals allowing movement into the connector track on from either line, are taken out of automatic.
 - 28.5.12.1.9.2.2 The block track indication is visible on the associated console, and;
 - 28.5.12.1.9.2.3 A "prohibit exit" command has been placed on signal(s) which can establish a route into the connector track.
 - 28.5.12.1.9.3 Request control of the terminal interlocking and set "prohibits and block track" commands on the track section where the personnel are requesting to walk/work when granting access to Roadway at a mainline terminal.
 - 28.5.12.1.9.4 Maintain control of the terminal interlocking until the personnel have either reported clear of the tracks or they have moved completely out of the section of track controlled by the terminal interlocking.
 - 28.5.12.1.9.5 If positive communication is not received from personnel on the Roadway, direct the next train through the area to proceed at 10 MPH sounding the horn until sighting personnel.



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28.5.12.1.9.6 When the crew is located, direct the Train Operator to stop and inform the personnel to clear the wayside.

28.5.12.1.9.7 If work crew is not located, continue to operate trains through the affected area at 10 MPH until confirmation of work crews' whereabouts is obtained.

28.5.13 Use of Derailers:

When it is deemed necessary and appropriate to apply clamp-on derailleurs to further protect a work area, the following actions shall be taken:

28.5.13.1 Use only derailleurs that are approved by TSSM and SAFE.

28.5.13.2 The direction from which unauthorized vehicle movement is to be prevented by the use of derailleurs shall be specifically written in the approved SSWP for the work. Derailleurs can be used to prevent unauthorized vehicle entry into the Protected Work Area or to prevent unauthorized vehicle exit from the Actual Work Area.

28.5.13.3 WMATA personnel, qualified in the installation of derailleurs, must be assigned to the work area and remain in the work area until the area is cleared.

28.5.13.4 The WMATA escort, who must also be qualified in the installation and removal of derailleurs, is responsible for installing and removing the derailleurs.

28.5.13.5 The WMATA escort shall coordinate with ROCC the exact locations, by chain marker, of installation and removal of the derailleurs. Placement of the derailleurs must be within the Protected Work Area.

28.5.13.6 Contractors are not permitted to install or remove derailleurs.

28.5.13.7 After all personnel and equipment are clear of the Roadway and it is safe to operate trains through the area where the work took place, the derailleurs are to be removed and ROCC notified. Escorts are to verify the removal of the derailleurs and ROCC shall confirm with the Escort that all derailleurs installed have been removed by chain marker. A test train shall then be operated through the work area to confirm the work area is clear.

28.5.13.8 Shunt straps shall be installed within 10 feet of the derailleurs at the beginning of the protected work area.

28.5.13.9 When the use of derailleurs are required, no access to the work area shall be permitted (with the exception of rail equipment) until the entry prevention derailleurs and the associated shunt straps and all other required safety equipment are installed.



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28.5.13.10 When exit protection is required, no work with on track equipment is permitted until the exit prevention derailleurs and associated shunt straps and red flags/lanterns are installed at the ends of the Actual Work Area.

28.5.14 Personnel Responding to Incident on Roadway:

28.5.14.1 Employees responding to incidents on the Roadway (malfunctioning train, interlocking out of correspondence, fire in tunnel, etc) shall request permission from ROCC and notify ROCC the direction from which the incident is to be approached. Responders are responsible for using Individual Train Detection or Lookout/Watchman as a means of protection en-route to incident.

28.5.14.2 Employees shall approach the incident in a manner that ensures their safety in case service is restored and trains begin moving while personnel are en-route. Employees shall use catwalks or safety walks and, when responding to malfunctioning trains, approach on the track with the malfunctioning train.

28.5.14.3 Upon arriving at the scene, employees shall make positive contact with the Train Operator prior to starting work on or boarding the train.

28.5.14.4 Responders shall use Train Coordination or Foul Time to protect themselves while addressing the incident.

Train Operators shall not move train without permission of mechanic when mechanic working on Roadway near train.

28.5.15 Working on WMATA property outside the Roadway (beyond the Intermediate Boundary Fence):

28.5.15.1 Employees and contractors working on the safe, non-track side of the Intermediate boundary fence will be considered off the Roadway. Hand signaling to train operators is not required.

28.5.15.2 Employees conducting work on WMATA property and on the safe side of the Intermediate boundary fence shall notify ROCC when starting work. ROCC permission is not required.

28.5.15.3 Escorts shall accompany contractors whether working on the safe side or the track side of the Intermediate boundary fence.

28.5.15.4 Train operators shall use caution when approaching individuals on WMATA property, but will not be required to slow trains or sound horns if personnel are on the safe side of the Intermediate boundary fence.



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- 28.5.15.5 Track inspection and wayside scheduled maintenance which occurs on the track, Roadway side of the Intermediate boundary fence will be conducted primarily between 10:00 am and 3:00 pm during manual mode train operations.
- 28.5.15.6 Personnel working on the track side of the Intermediate boundary fence are considered on the Roadway and are governed by all applicable rules in the MSRPH.
- 28.5.15.7 Operators shall report any personnel on WMATA property (and on either side of the Intermediate boundary fence) who are not wearing proper PPE.
- 28.5.16 Establishment of Work Area in the Yard Car Wash Facility (except Branch Ave.):
 - 28.5.16.1 Securing car wash area and car, the supervisor in charge shall:
 - 28.5.16.1.1 Ensure that cars are in the proper position and that the correct car number is in the car wash.
 - 28.5.16.1.2 Ensure that a handbrake has been applied on at least one railcar.
 - 28.5.16.1.3 Turn off Battery Circuit Breakers and secure Battery Circuit Breaker Cover.
 - 28.5.16.1.4 1000 series cars, only turn off the battery output circuit breaker.
 - 28.5.16.1.5 4000 series cars, turn off battery circuit breaker.
 - 28.5.16.1.6 2/3/5/6000 series cars, turn off the battery circuit breaker and the outside light indicator circuit breaker.
 - 28.5.16.1.7 Via the radio, request that the tower de-energize the third rail in the car wash via red tag.
 - 28.5.16.1.8 Upon being notified by the tower via the radio that the third rail has been de-energized, verify that the third rail power is down with a "HOT STICK".
 - 28.5.16.1.9 Verify with the tower via the radio that you have "HOT STICKED" the third rail power in the car wash and that it is de-energized at this time.
 - 28.5.16.1.10 Connect the WSAD, third rail warning system.
 - 28.5.16.1.11 De-energize ground switch circuit, verify green light is on.
 - 28.5.16.1.12 Install a lock on the ground switch circuit.



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- 28.5.16.1.13 Report back to your supervisor that the train in the carwash is secured.
- 28.5.16.1.14 Escort contract employees to car wash. Contract employees shall not leave car wash without escort.
- 28.5.16.1.15 The on-site supervisor or contractor escort must strictly enforce contractor's compliance with staying within boundaries of work area.
- 28.5.16.2 Preparing Train for Service, the supervisor in charge shall:
 - 28.5.16.2.1 Ensure all personnel and equipment is clear of train and third rail.
 - 28.5.16.2.2 Remove lock from ground switch circuit and energize ground switch circuit.
 - 28.5.16.2.3 Energize Battery Circuit Breakers.
 - 28.5.16.2.4 Disconnect WSAD third rail warning devise.
 - 28.5.16.2.5 Via radio, request that the tower re-energize the third rail power in the car wash.
 - 28.5.16.2.6 Upon being notified by the tower via the radio that the third rail power has been energized in the carwash, verify using a "HOT STICK" that the third rail power in the carwash is energized.
 - 28.5.16.2.7 Via radio, notify the tower that the power has been restored in the carwash and was confirmed using a "HOT STICK".
 - 28.5.16.2.8 Remove hand brake, key up the train, recharge brake pipe and check for brakes off and perform a manual door operation functional check to both cars. Follow all steps in SOP 34.4.3
 - 28.5.16.2.9 Notify tower via radio that the train is ready to be moved out of the car wash and contact your supervisor.
- 28.5.16.3 Alarm Activation Siren and Strobe Light During Car Wash Activities, the supervisor in charge shall:
 - 28.5.16.3.1 Notify Tower and immediately respond to the car wash track to ensure all personnel are safe and no injuries have been sustained. If personnel have sustained injury, notify ROCC immediately.
 - 28.5.16.3.2 Via the radio, inform the tower of your arrival and utilize a HOT STICK to verify the condition of the Third Rail.
 - 28.5.16.3.3 If the third rail is energized, immediately suspend all exterior cleaning operations and notify ROCC, Tower and MOC Power.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

- 28.5.16.3.4 If no voltage is present, ensure proper connection and operation of the WSAD device. Notify Tower that normal exterior cleaning operation will resume at this time. If the unit is found to be defective, tag it out of service and notify your supervisor immediately.
- 28.5.16.3.5 Test and verify the proper operation of a spare WSAD device and place it in operation. Notify Tower that normal Exterior Cleaning Operation will resume at this time.
- 28.5.16.4 Alarm Activation Siren Only During Car Wash Activities, the supervisor in charge shall:
 - 28.5.16.4.1 Notify Tower and immediately respond to the car wash track to ensure all personnel are safe and no injuries have been sustained. If personnel have sustained injury, notify ROCC immediately.
 - 28.5.16.4.2 Via the radio, inform the tower of your arrival and utilize a Hot Stick to verify the condition of the Third Rail. If the Hot Stick will not detect voltage, verify the level of voltage with a volt meter. If voltage is present, immediately suspend all exterior cleaning operations and notify ROCC, Tower and MOC Power.
 - 28.5.16.4.3 If no voltage is present, ensure proper operation of the WSAD device. Notify Tower that normal Exterior Cleaning operation will resume at this time. If the unit is found to be defective, tag it out of service and notify your Supervisor immediately.
 - 28.5.16.4.4 Test and verify the proper operation of a spare WSAD device and place it in operation. Notify Tower that normal exterior cleaning operation will resume at this time.
- 28.5.17 Removal of Third Rail Power and Establishment of a Work Area under a Remote Red Tag Outage for Branch Avenue Yard Carwash Facility only:
 - 28.5.17.1 This remote red tag outage applies to Branch Avenue WMATA Yard Carwash Facility only; where vehicles are washed by hand.
 - 28.5.17.2 This remote red tag outage does not require car maintenance personnel (CMNT) to submit red tag outage request via GOTRS (General Orders – Track Rights System).
 - 28.5.17.3 The supervisor in charge shall via the radio, request that the tower de-energize the third rail in the car wash via a remote red tag.
 - 28.5.17.4 Third Rail power is de-energized and recorded by Yard Interlocking Operator under this remote red tag outage.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

- 28.5.17.5 Remote indication confirms that TPSS carwash track breaker #32 is open.
- 28.5.17.6 The Yard TPSS carwash track breaker #32 is then tagged by Yard Interlocking Operator by turning and locking the tagging control switch to tag position.
- 28.5.17.7 Control power to the carwash breaker #32 is removed by the tagging relay.
- 28.5.17.8 Remote indication confirms that TPSS carwash track breaker #32 is tagged and control power to the breaker is removed.
- 28.5.17.9 Upon being notified by the tower via the radio that the third rail has been de-energized, CMNT personnel will verify with a working hot stick that the third rail power is down.
- 28.5.17.10 CMNT personnel will verify with the tower via the radio that you have "HOT STICKED" the third rail power in the carwash and that it is de-energized at this time.
- 28.5.17.11 CMNT personnel will verify that the running rail grounding green light is on.
- 28.5.17.12 CMNT personnel will manually open the ETS circuit. Disconnect switch located in carwash bldg.
- 28.5.17.13 CMNT & Contractor personnel will place lock out/Tag out device on the ETS circuit Disconnect switch box.
- 28.5.17.14 The ETS Disconnect switch is interlock with the (ETS) Emergency Trip Switch circuit to breaker E-F99-32 located in Branch Ave Traction Power Sub-Station and provides additional safety measure controlled by the carwash facility personnel.
- 28.5.17.15 CMNT personnel will connect a third rail warning device (WSAD) on the third rail in the actual work area. The rail warning device shall be tested before being connected to the third rail. The third rail warning devices shall be positioned so that every member of the work crew will be able to see and hear the alarms.
- 28.5.17.16 Report back to your supervisor that the train in the carwash is secured.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

28.5.18 Restoration of Third Rail Power and Establishment of a Work Area under a Remote Red Tag Outage for Branch Avenue Yard Carwash Facility only.

28.5.18.1 Ensure all personnel and equipment is clear of train and third rail.

28.5.18.2 CMNT personnel will disconnect the third rail warning device (WSAD).

28.5.18.3 CMNT & Contractor will remove locks from ETS circuit disconnect switch located in carwash bldg.

28.5.18.4 CMNT personnel will Close ETS circuit disconnect switch.

28.5.18.5 The supervisor in charge shall Via the radio, request that the tower re-energize the third rail in the car wash.

28.5.18.6 Yard Interlocking Operator unlocks the remote tagging control switch and removes the tag from the Yard TPSS carwash breaker # 32.

28.5.18.7 Remote indication confirms that TPSS carwash track breaker #32 is normal.

28.5.18.8 Yard Interlocking Operation will close breaker #32.

28.5.18.9 Remote indication confirms that TPSS carwash track breaker #32 is closed and third rail is energized.

28.5.18.10 Upon being notified by the tower via the radio that the third rail power has been energized in the carwash, verify using a "HOT STICK" that the third rail power in the carwash is energized.

28.5.18.11 CMNT personnel will verify that the running rail grounding green light is off.

28.5.18.12 Via radio, notify the tower that the power has been restored in the carwash and was confirmed using a "HOT STICK".

28.5.18.13 Remove hand brake, key up the train, recharge brake pipe and check for brakes off and perform a manual door operation functional check to both cars. Follow all steps in SOP 34.4.3

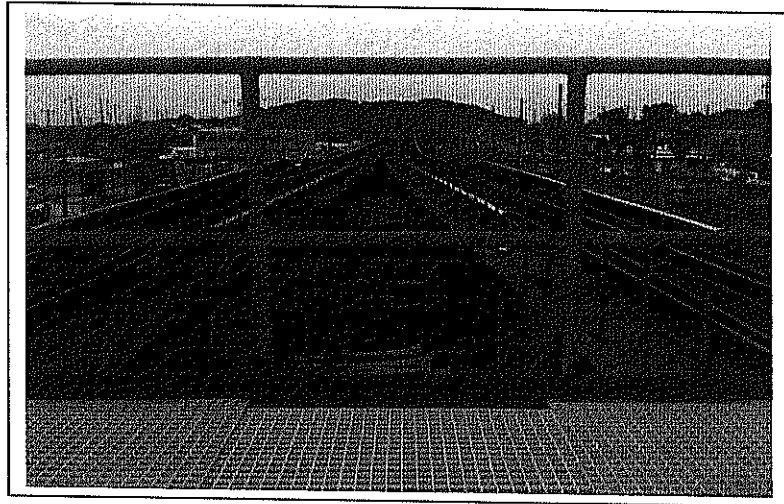
28.5.19 Roadway Clarifications: D&G Platform, Alexandria Yard Platform, Shady Grove Yard Lead, Brentwood Yard:

RWP SOPs

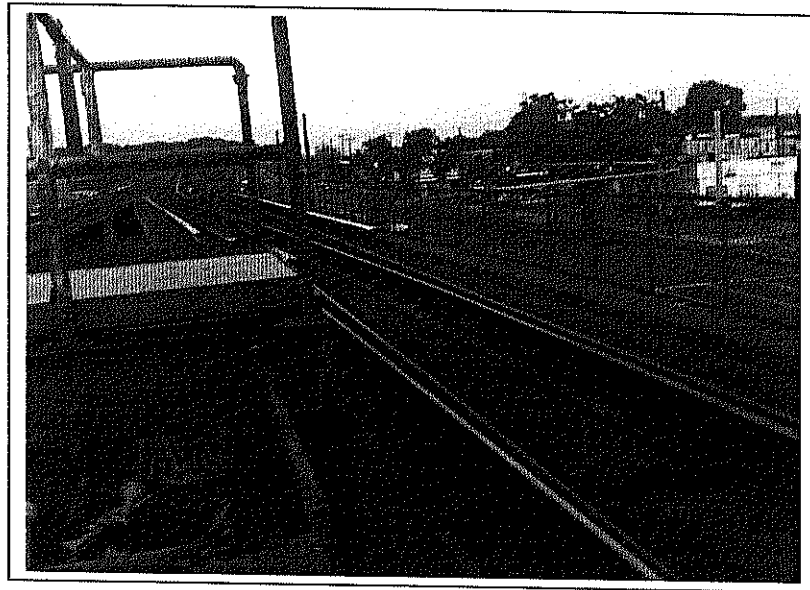


WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

28.5.19.1 D&G Platform (Picture 3 and 4) shall be considered Roadway at all times.



Picture 3 - D & G Platform facing Benning Road portal and Minnesota Avenue aerial structure.

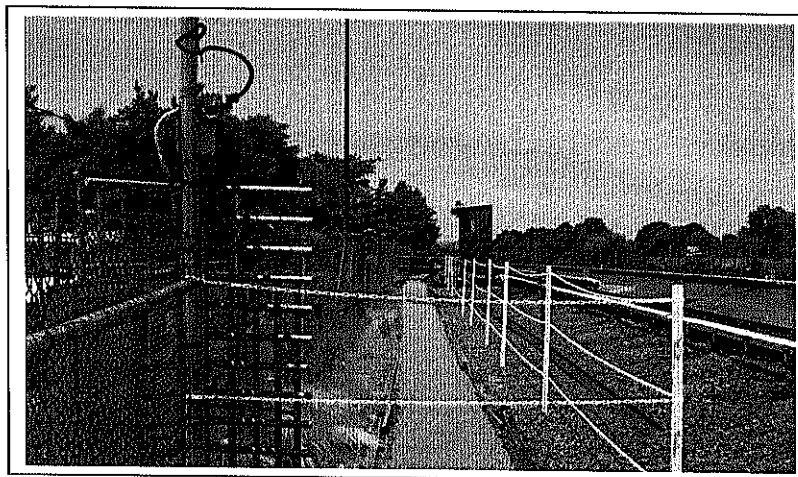


Picture 4 - D & G Platform, Track 1



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

28.5.19.2 Alexandria Yard Platform – the walkway to the Alexandria Platform stop will be protected by an Intermediate Boundary fence. Where constructed, it separates Metro property into Roadway and Non-Roadway territory. Individuals on the track side of the Intermediate boundary fence are considered “on” the Roadway; individuals on the non-track side of the Intermediate boundary fence are considered “off” the Roadway (pictured below).



Employees shall have an approved Safety Vest and be Roadway trained in order to walk to and from the Alexandria Platform. Non-WMATA employees must be escorted with Roadway trained employee and have on a safety vest.

Employees and contractors walking on the safe, non-track side of the Intermediate boundary fence will be considered off the Roadway. Hand signaling to train operators is not required.

28.5.19.3 Shady Grove Yard Lead – Employees traveling to/from the Shady Grove facility from the Shady Grove terminal via the paved yard lead must be Roadway trained and have on a safety vest. Non-WMATA employees must be escorted with Roadway trained employee and have on a safety vest.

28.5.19.4 Brentwood Yard;

28.5.19.4.1 The inbound platform stop shall not be used by administrative personnel or Station Managers.

28.5.19.4.2 Due to the proximity to mainline and the dangers of high speed train operations, the following sections of Brentwood Yard shall be treated as mainline track:



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

- 28.5.19.4.2.1 From B99-38 signal to B99-64 signal along the receiving and dispatch tracks;
- 28.5.19.4.2.2 In between the receiving and dispatch track and the inbound mainline track from B99-38 signal back towards NY Ave;
- 28.5.19.4.2.3 Signs shown in Figure 4 shall be placed every 20 feet on the Roadway in the areas of Brentwood Yard defined as mainline track.

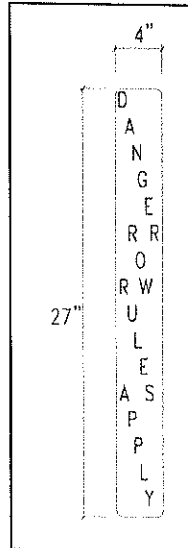


Figure 4

- 28.5.19.4.3 Personnel going Roadway for any reason in the areas of Brentwood Yard defined as mainline track (28.5.17.4.2) shall request permission from both the Brentwood Interlocking Operator and the ROCC Supervisor and be governed by all Roadway safety rules and procedures when personnel are on the Roadway (personnel request permission and be responsible for their own safety; train operators shall slow and sound their horns when sighting personnel in areas defined in section 28.5.17.4.2).

28.6 REFERENCES

- 28.6.1 SOPs # 2, # 19, # 23
- 28.6.2 Operating Rule 3.87
- 28.6.3 Safety Rules 4.1, 4.2, 4.163-4.199



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

Appendix A to SOP 28

The following activities are the only exceptions to supervisory third rail power outage requirement for WMATA employees described in section 28.5.1.3:

1. Verifying third rail voltage testing devices, e.g., approved hot sticks and meters.
2. Establishing work area safety zones adjacent to the actual work area.
3. Walking and/or performing inspections on the Roadway.
4. Performing ATC switch maintenance and testing.
5. Performing ATC track circuit maintenance and testing.

The following activities are the only exceptions to red tag third rail power outage requirement for non-WMATA employees described in section 28.5.2.1:

1. Site verification and field measurements of rail flaws detected by ultrasonic rail flaw detection equipment – no power outage required; protection ensured by the WMATA Roadway Worker In Charge.
2. On-Call General Automatic Train Control and Trackwork Engineering Consultant Services – no power outage required; non-WMATA employee shall be RWP trained for contractors; protection ensured by the WMATA Roadway Worker in Charge.



Notice: The above are just examples. Departments should submit proposed activity exemption lists to the MSRPB Rule Book Committee for review.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES

Appendix B to SOP 28

ROCC Coordination with Roadway Worker In-Charge

For Establishment of Work Zones

Protection Coordination	Inaccessible Track	Individual Train Detection	Exclusive Track Occupancy	Train Approach / Watchman-Lookout	Foul Time
Verify Shunt	R	NA	O	O	NA
Work Limits in GOTRS	R	NA	O	O	NA
Prohibit Exits	R	O	R	R	NA
Speed Restriction Adjacent Track	O	NA	O	O	NA
Physical Barrier (i.e. Derailers / Switches Blocked/Clamped)	R	NA	NA	NA	NA
PPE	R	R	R	R	R
WSADS	R	NA	O	NA	NA
ROCC Notification/Pre-Fouling Briefing	R	R	R	R	R
Drop Circuits	NA	NA	O	NA	NA
Drop Signals	NA	NA	O	NA	NA
Announcements	NA	NA	O	R	R
Stop Train Movement	NA	NA	NA	NA	R

R = Required

O = Optional

NA = Not Applicable



Notice: All Rail ROCC Supervisors shall place the Human Form Indication as well as the Blocked Track Indication on the AIM screen at all fixed work locations.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES

Appendix C to SOP 28 Example of Safety Briefing Form

Date: December 10, 2008	Time: 10:00 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	Line/Division: Red Line- Shady
Work Location/Track Number(s)/Chain Markers: Shady Grove to White Flint Track #1 A1-905+50-A1-600+00		Description of Work Assignment: Track Inspection <input checked="" type="checkbox"/> Safety rule read pertaining to job? Safety rule number(s) read? 4.164
Name of employee(s) providing on-track protection: Troy Lloyd		
Department: Track	Qualifications: <input type="checkbox"/> Supervisor <input type="checkbox"/> Leadman <input type="checkbox"/> Escort <input checked="" type="checkbox"/> Track Walker	
What form of on-track protection will be used: (Check all that apply)		
<input type="checkbox"/> Track Out of Service Which Track is Out of Service? <input type="checkbox"/> #1 <input type="checkbox"/> #2 <input type="checkbox"/> #3		
<input checked="" type="checkbox"/> Watchman/Flagman <input type="checkbox"/> Shunt Strap(s) <input type="checkbox"/> ATP Slow Speed Couplers (Inspection duties only)		
<input type="checkbox"/> Insertion of Switch Crank <input type="checkbox"/> Local Control of Interlocking		
<input type="checkbox"/> Yes <input type="checkbox"/> No If performing Roadway maintenance work during revenue hours, is there a physical barrier such as a wall or SSRM approved barrier between you and your work area on the adjacent track(s)? If not,		
How are the adjacent track(s) protected? <input type="checkbox"/> Physical Barrier <input type="checkbox"/> Shunt(s) <input type="checkbox"/> ATP Slow Speed Couplers		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Have you discussed a safe clearing location for the passing of trains and work equipment?		
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Will the use of cranes, booms or other type equipment be utilized during revenue hours that could encroach on the dynamic outline of a passing train? If so,		



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

<input type="checkbox"/> Yes <input type="checkbox"/> No Do you have flagmen assigned to each side of the work area?	
<input type="checkbox"/> Yes <input type="checkbox"/> No Do you have an employee with a radio exclusively assigned to monitor crane operations?	
If performing on-track inspection duties only, which track are you inspecting? <input checked="" type="checkbox"/> #1 <input type="checkbox"/> #2 <input type="checkbox"/> #3	
What are the location(s) that you will be inspecting? Shady Grove to White Flint, including interlockings.	
(Employees should discuss their on-track safety procedures, watchman duties and proper PPE)	
What type of power outage is being utilized?	What about your on-track safety equipment?
<input type="checkbox"/> Supervisory	<input type="checkbox"/> Yes <input type="checkbox"/> No Is your WSAD in place?
<input type="checkbox"/> Red Tag Number _____	<input type="checkbox"/> Yes <input type="checkbox"/> No Shunts and red lanterns in place?
<input checked="" type="checkbox"/> No Power Outage	<input type="checkbox"/> Yes <input type="checkbox"/> No Work mats in place?
Have the negative reference cables been disconnected and temporally reconnected? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Personnel have all required PPE?
<input type="checkbox"/> If working around on track machinery and equipment, the operators must discuss the dangers of the equipment, minimum spacing between equipment and safe working speeds.	
<input type="checkbox"/> Are there other departments involved in this work assignment? If so, discuss their involvement.	
<input type="checkbox"/> Does anyone have any questions or concerns? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If yes, have they been addressed to everyone's satisfaction? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Employees must sign the "On-Track" safety briefing sheet at the job site! (List or sign-in optional)	

System Safety and Risk Protection

Material Safety Data Sheet Review Request

Return this form to Diana Wood at Pennsy Drive or

FAX to (301) 583-3033

Please allow 3 weeks lead time for requests

Attach clear copy of most recent MSDS



Please Provide the Following Information	
Today's Date:	<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">Requesting Dept.:</div> <div style="width: 40%;">Phone:</div> </div>
Contact Name:	FAX Number:
Material Status:	In Use <input type="checkbox"/> New Material <input type="checkbox"/> For Testing <input type="checkbox"/> Contractor MSDS <input type="checkbox"/> Contractor Name: _____
Trade Name:	_____
WMATA Stock No.:	_____
SARP MSDS No.:	_____
Reason for Request:	_____
Where will product be used?	_____
What will product be used for?	_____
How will product be applied?	_____
Size of Container:	_____
Physical State of Product:	Aerosol Spray <input type="checkbox"/> Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Paste/Cream <input type="checkbox"/> Pellets <input type="checkbox"/> Powder <input type="checkbox"/> Solid <input type="checkbox"/> Other <input type="checkbox"/> _____
Manufacturer's Name & Phone No.:	_____
Vendor's Name & Phone No.:	_____
Best Time to Contact You (Requestor):	_____

FOR SARP USE ONLY		
Reviewing Safety Officer:	Date Received:	Return Date:
Review Status:		
Comments:		

Washington Metropolitan Area Transit Authority



Replacement of Chillers and Cooling Tower Accessories at Eight Metro-Rail Stations

**Department of Design and Construction
Services**

Office of Infrastructure Renewal Program Group

Contract No.: FQ18102

TECHNICAL SPECIFICATIONS

April 2018

**REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT
METRO-RAIL STATIONS**

SECTION 3
TECHNICAL PROVISIONS

REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS

SECTION 3

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SECTION 01000

SCOPE OF WORK

PART 1 – GENERAL

1.01 DESCRIPTION:

A. This section specifies the furnishing and installation of the chillers, cooling tower accessories, refrigerant leak detection systems and chilled/ condenser water system accessories at CWPA1 Farragut North (A02), CWPA5 Bethesda (A09), CWPA6 Medical Center (A10), CWPD2 Federal Center SW (D04), CWPE3 Columbia Heights (E04), CWPG2 Capitol Heights (G02), CWPKE1 Clarendon (K02) and CWPKE2 Ballston (K04) chiller plant locations. The Contractor shall furnish all labor, tools, permits, coordination, materials, transportation, and other items necessary to satisfactorily complete this Project as written in the Specifications and as indicated on the Contract Drawings.

B. Particulars include but are not limited to the following:

1. Contractor shall be responsible for all permits and inspections. Contractor shall comply with Federal and jurisdictional requirements and codes pertaining to this project. Contractor shall also comply with all safety requirements and permits required by WMATA. When transporting chillers via prime mover, modular components shall be removed from the chillers to comply with the Authority's Dynamic Envelope.

2. CWPA1 – FARRAGUT NORTH (A02) CHILLER PLANT

- a. Remove and dispose one water cooled chiller (Chiller #1) as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
- b. Remove and dispose of the abandoned pneumatic Johnson Controls panels, tubing and wiring associated with these controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
- c. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA

equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.

- d. Remove and dispose of chilled water pumps associated with both the chillers. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls, if applicable.
- e. Condenser water pumps shall be reused. Removal shall include the condenser water pump motors, motor starters, wiring, conduit, disconnects.
- f. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- g. Provide and install two new chilled water pumps with variable frequency drive motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- h. Provide and install two new condenser water pump motors with variable frequency. New installation shall include the inverter duty rated motors, associated disconnects, conduit, power wiring and control wiring and controls.
- i. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- j. Replace two balancing valves on the condenser water loop, including chain actuators.
- k. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- l. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
- m. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- n. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
- o. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
- p. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.

- q. Provide and install refrigerant detection, alarm system and interface with the exhaust system.
 - 1) Remove and replace exhaust fans and associated ductwork.
 - 2) Remove power wiring and conduit for EF-1 and EF-2.
 - 3) Remove existing ventilation control system.
 - 4) Remove existing refrigerant monitoring control system, sensors, and devices.
 - 5) Provide and install new Sherlock 402 Refrigerant Monitor panel with optional strobe light.
 - 6) Provide and install new Sherlock refrigerant sensors for R-134A.
 - 7) Provide and install two strobe lights, one at the front entrance doors to the chiller room and one near the hatch door leading to the tunnel.
 - 8) Provide and install a combination audible alarm and strobe assembly within the chiller room.
 - 9) Provide and install all necessary power and control wiring.
 - 10) Provide and install fan, fan controller to integrate with the refrigerant monitoring panel and chiller plant control panel, motor operated dampers, ductwork, grilles, sensors and associated controls.
 - 11) Provide and install space thermostats, conduit and associated wiring for new exhaust fans.
- r. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
- s. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls.
- t. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- u. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
- v. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- w. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motor's, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.

- 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
 - x. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
 - y. Provide unit heaters for space heating.
 - z. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
 - aa. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
 - bb. Train WMATA personnel on system operations and maintenance at the manufacturer's facility for at least two, eight-hour days.
 - cc. Test and Balance the water system in accordance with NEBB or AABC.
3. **CWPA5 – BETHESDA (A09) CHILLER PLANT**
- a. Remove and dispose one water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
 - b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.
 - c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
 - d. Provide and install one new 350 ton oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
 - e. Provide and install two new chilled water pumps, two new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control

- wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
 - g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
 - h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
 - i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
 - j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
 - k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
 - l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
 - m. Provide and install refrigerant detection, alarm system and interface with the exhaust system.
 - 1) Remove and replace chiller room exhaust fans and associated ductwork.
 - 2) Remove power wiring and conduit for the two exhaust fans.
 - 3) Remove existing ventilation control system.
 - 4) Remove existing refrigerant monitoring control system, sensors, and devices.
 - 5) Provide and install new Sherlock 402 Refrigerant Monitor panel with optional strobe light.
 - 6) Provide and install new Sherlock refrigerant sensors for R-134A.
 - 7) Provide and install one strobe light at the front entrance doors to the chiller room.
 - 8) Provide and install a combination audible alarm and strobe assembly within the chiller room.
 - 9) Provide and install all necessary power and control wiring.
 - 10) Provide and install fan, fan controller to integrate with the refrigerant monitoring panel and chiller plant control panel, motor operated dampers, ductwork, grilles, sensors and associated controls.
 - 11) Provide and install space thermostats, conduit and associated wiring for new exhaust fans.
 - n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
 - o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.

- p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
- r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
- u. Provide unit heaters for space heating.
- v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
- w. Provide and Install new service platform to access the large ventilation fan units (serving the traction power room) in the chiller room. Contractor shall field verify and relocate piping, electrical conduit, wiring, lighting fixtures, and associated materials to accommodate the structural platform.
- x. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
- y. Train WMATA personnel on system operations and maintenance at the manufacturer's facility for at least two, eight-hour days.
- z. Test and Balance the water system in accordance with NEBB or AABC.

4. CWPA6 – MEDICAL CENTER (A10) CHILLER PLANT

- a. Remove and dispose one water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited

laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.

- b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.
- c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
- d. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- e. Provide and install two new chilled water pumps, two new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
- i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
- k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.

- l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
- m. Provide and install an interface between the refrigerant detection/ exhaust system installed as part of WMATA contract FQ14114.
- n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
- o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
- p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
- r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
- u. Provide unit heaters for space heating.
- v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
- w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
- x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
- y. Test and Balance the water system in accordance with NEBB or AABC.

5. CWPD2 – FEDERAL CENTER SW (D04) CHILLER PLANT

- a. Remove and dispose two water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed
- b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. . If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.
- c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
- d. Provide and install two new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- e. Provide and install four new chilled water pumps, four new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Re-use existing chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
- i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include

- a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
 - k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
 - l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
 - m. Provide and install refrigerant detection, alarm system and interface with the exhaust system.
 - 1) Remove and replace chiller room supply fan. Provide new chiller room exhaust fans and associated ductwork.
 - 2) Remove power wiring and conduit for the fan.
 - 3) Remove existing ventilation control system.
 - 4) Remove existing refrigerant monitoring control system, sensors, and devices.
 - 5) Provide and install new Sherlock 402 Refrigerant Monitor panel with optional strobe light.
 - 6) Provide and install new Sherlock refrigerant sensors for R-134A.
 - 7) Provide and install one strobe light at the front entrance doors to the chiller room.
 - 8) Provide and install a combination audible alarm and strobe assembly within the chiller room.
 - 9) Provide and install all necessary power and control wiring.
 - 10) Provide and install supply fan, exhaust fan, controllers to integrate with the refrigerant monitoring panel and chiller plant control panel, motor operated dampers, ductwork, grilles, sensors and associated controls.
 - 11) Provide and install space thermostats, conduit and associated wiring for new exhaust fans.
 - n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
 - o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
 - p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
 - q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
 - r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
 - s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.

- 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
 - u. Provide unit heaters for space heating.
 - v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
 - w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
 - x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
 - y. Test and Balance the water system in accordance with NEBB or AABC.

6. CWPE3 – COLUMBIA HEIGHTS (E04) CHILLER PLANT

- a. Remove and dispose one water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
- b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.

- c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
- d. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- e. Provide and install two new chilled water pumps, two new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
- i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
- k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
- l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
- m. Provide and install an interface between the refrigerant detection/ exhaust system installed as part of WMATA contract FQ14114.
- n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
- o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
- p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.

- r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
- u. Provide unit heaters for space heating.
- v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
- w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
- x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
- y. Test and Balance the water system in accordance with NEBB or AABC.

7. CWPG2 – CAPITOL HEIGHTS (G02) CHILLER PLANT

- a. Remove and dispose one water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
- b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the

refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.

- c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
- d. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- e. Provide and install two new chilled water pumps, two new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
- i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
- k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
- l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
- m. Provide and install refrigerant detection, alarm system and interface with the exhaust system.
 - 1) Remove and replace chiller room exhaust fans and associated ductwork.
 - 2) Remove power wiring and conduit for the two exhaust fans.
 - 3) Remove existing ventilation control system.
 - 4) Remove existing refrigerant monitoring control system, sensors, and devices.

- 5) Provide and install new Sherlock 402 Refrigerant Monitor panel with optional strobe light.
 - 6) Provide and install new Sherlock refrigerant sensors for R-134A.
 - 7) Provide and install one strobe light at the front entrance doors to the chiller room.
 - 8) Provide and install a combination audible alarm and strobe assembly within the chiller room.
 - 9) Provide and install all necessary power and control wiring.
 - 10) Provide and install exhaust fans, fan controller to integrate with the refrigerant monitoring panel and chiller plant control panel, motor operated dampers, ductwork, grilles, sensors and associated controls.
 - 11) Provide and install space thermostats, conduit and associated wiring for new exhaust fans.
- n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
- o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
- p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
- r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- s. Provide and install components for cooling towers as listed.
- 1) Remove and dispose of cooling tower fan motor's, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
- u. Provide unit heaters for space heating.

- v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
- w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
- x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
- y. Test and Balance the water system in accordance with NEBB or AABC.

8. CWPk1 – CLARENDON (K02) CHILLER PLANT

- a. Remove and dispose two water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
- b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. . If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.
- c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
- d. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
- e. Provide and install four new chilled water pumps, four new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
- g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
- h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.

- i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
- j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
- k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
- l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
- m. Provide and install an interface between the refrigerant detection/ exhaust system installed as part of WMATA contract FQ14114.
- n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
- o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
- p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
- q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
- r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
- s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.
 - 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fan's (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.

- 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
 - t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
 - u. Provide unit heaters for space heating.
 - v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
 - w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
 - x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
 - y. Test and Balance the water system in accordance with NEBB or AABC.
9. **CWPK2 – BALLSTON (K04) CHILLER PLANT**
- a. Remove and dispose two water cooled chiller as indicated on the drawings. Removal shall include the chiller, chiller supports, starter, wiring, conduit, disconnect, all applicable Automated Energy Management System (AEMS) sensors, and controls. If the work to remove and replace chillers and associated equipment will disturb suspect asbestos-containing materials (e.g., thermal system insulations), the Contractor must first sample the suspect materials and submit the samples to a NVLAP-accredited laboratory for analysis using Polarized Light Microscopy (PLM). Results of laboratory analyses must be submitted to WMATA for review before work can proceed.
 - b. Removal of the chiller shall include R-134A refrigerant evacuation and recovery performed according to Federal and jurisdictional requirements. Submit to WMATA: Certifications for technicians performing removal and replacement of chillers, and maintain certificates for inspection while the work is being performed. Only technicians with Universal certification may perform the work related to refrigerant handling. The recovery and recycling equipment used on site must be certified by an approved EPA equipment testing organization as being capable of achieving the level of evacuation needed for the chillers. Contractor upon evacuating and recovering the refrigerant, the refrigerant shall be cleaned, recycled and returned to WMATA in appropriately marked recovery cylinders or tanks meeting DOT specifications. If the Contractor reclaims the refrigerant, only certified reclaimers shall be used; Contractor shall provide WMATA the copy of reclaimer certification. If WMATA decides the R-134A Refrigerant should change ownership, submit to WMATA documents certifying transfer of refrigerant ownership.
 - c. Remove and dispose of chilled water and condenser water pumps. Removal shall include the pumps, chilled water pump motors, pump supports, vibration isolators, immediate piping and valves, motor starters, wiring, conduit, disconnects, all AEMS sensors, and controls.
 - d. Provide and install one new oil less, water-cooled chiller. Installation shall include all related pipe fittings, valves, insulation, piping support, vibration isolation, unit mounted starter, disconnects, conduit, wiring, and controls. Replace all isolation valves on the chiller side as indicated on the drawings.
 - e. Provide and install four new chilled water pumps, four new condenser water pumps with variable frequency drive (VFD) motors. New installation shall include the pumps, inverter duty rated motors, associated disconnects, conduit, power wiring, control

- wiring, pump supports, vibration isolators, immediate piping, flexible connectors, strainers, valves and controls.
- f. Provide and Install chilled water pumps VFDs, condenser water pumps VFDs, all associated disconnects, conduit, power and control wiring.
 - g. Integrate each pump VFD with the chiller control systems. Pump control features shall include soft-start and off modes. Frequency adjustment shall be used for flow balancing and shall not be varied during normal operation.
 - h. Provide and install WMATA chilled water and condenser water systems, including piping, water chemical sensors, flow switch and pH probes.
 - i. Provide and install a Chiller Plant Control Panel (CPCP). The CPCP shall be provided by the contractor and built as per the CPCP drawings provided by WMATA. The CPCP shall include two Hach Inductive Conductivity sensor – 3725E2T, sensor module for conductivity-9013000, and a convertible Digital Differential pH sensor (chilled water loop only) product number DPC1R2A. Two HACH SC200 Controllers shall be installed to accept the input probes and control chemical injection. Hach controller shall include a RS485 communications card. CPCP shall include Automatic Direct Productivity 3000 PAC Controller, Modbus capable Input and Output Cards.
 - j. Provide and install a third- party water treatment system for the chilled and condenser water systems. The water treatment system shall include web based remote monitoring, control, and reporting. Contractor shall coordinate with other related WMATA projects involving replacement of water treatment system.
 - k. Provide and install a new expansion tank and air separator on the chilled water return loop, including supports.
 - l. Provide and install outdoor air temperature, relative humidity and inside space air temperature sensors and interface with Chiller Plant Control Panel; Automation Direct Productivity 3000 PAC. Contractor to install P3-08RTD input module in Productivity 3000 PAC to accept input from RTD temperature sensors.
 - m. Provide and install an interface between the refrigerant detection/ exhaust system installed as part of WMATA contract FQ14114.
 - n. Provide and install one chilled water and one condenser water flow monitoring system. Siemens Sitrans FUS 1010 or approved equal.
 - o. Provide and install chilled water fan coil unit connected to the chilled water supply and return system to serve the chiller plant mechanical equipment room. Provide and install one new AEMS sensor and controls. Replace the outside air intake louver and damper.
 - p. Provide and install any other equipment and components required by chiller and cooling tower manufacturers to ensure a satisfactory performance of the manufacturer's system.
 - q. Provide, install and coordinate with WMATA on a new ModBus communication cards and control, Microtech II, on new replacement chiller to allow for remote monitoring and control of equipment.
 - r. Repair and/or modify existing housekeeping pads as needed for new chiller and pumps.
 - s. Provide and install components for cooling towers as listed.
 - 1) Remove and dispose of cooling tower fan motors, related starters and controls. Modify existing cooling tower Control Panel to adopt new variable frequency drive controller(s).
 - 2) Remove and dispose of existing tower water treatment components.
 - 3) Provide and install two cooling tower inverter-rated fan motor, as shown in the drawings.

- 4) Replace the belt-driven fan drive assembly with a direct drive assembly, include mounting hardware for the Cooling Tower.
 - 5) Replace the motor of the Cooling Tower fans (two). Motor shall be inverter duty type to match the variable frequency drive controller, including disconnects, conduit, power and control wiring.
 - 6) Integrate tower fan VFD with the cooling tower controller. Tower fan control features shall include soft-start, load modulation, and off modes. Modulation will be controlled based on the condenser water temperature.
 - 7) Replace existing plastic air intake louvers and inside fill on each cooling tower.
 - 8) Provide and Install maintenance and safety platform (low and high) around the cooling tower, if not installed already. Coordinate with WMATA and cooling tower manufacturer for installation.
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- t. Install a new utility sink, permanent eye wash station, associated instantaneous water heater, backflow preventer, associated piping and valves. Drain piping on floor shall be protected with proper measures to prevent tripping.
 - u. Provide unit heaters for space heating.
 - v. Paint chiller plant floors and equipment pads with battle ship grey or equal. Provide safety lines and tripping hazard lines that shall be painted yellow or red.
 - w. Provide Maintenance and Repair and Testing and Operations manuals for all systems and components, individually for each location.
 - x. Train WMATA personnel on system operations and maintenance at the manufacturer's facility.
 - y. Test and Balance the water system in accordance with NEBB or AABC.

1.02 QUALITY ASSURANCE

A. Qualifications of Manufacturer:

1. Equipment shall have been produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.
2. Minimum expected life of this equipment shall be 10 years. All equipment furnished shall be heavy duty, commercial type. Ready availability of spare and repair parts will be important criteria in evaluating manufacturer's proposals. Maintainability and ease of service are additional important evaluation criteria.
3. The COR reserves the right to inspect materials, and their sources, workmanship, and construction methods at any time, at the Manufacturer's shop or fabricating facility. The AR further reserves the right to be present for any or all shop tests of components, assemblies, or systems. Contractor shall notify the COR 2 weeks in advance of any tests.
4. The Authority shall have final approval of the equipment manufacturer.

B. Manufacturer's Representative:

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check-out, and start-up operations at each location.

C. Equipment Warranty:

1. All major equipment shall be provided with five year warranty on entire parts and labor.
2. All major equipment manufacturers shall have a local factory service within 100 miles of jobsite for regular maintenance.

D. Within the five years warrant, provide yearly maintenance contracts for all major equipment and control systems. Yearly maintenance requirements shall be coordinated with the owner.

E. Reference Codes and Specifications:

1. Codes and regulations of the District of Columbia.
2. Code and regulations of Maryland.
3. Code and regulations of Virginia.
4. Discipline specific 2015 International Code Council.

1.03 SUBMITTALS:

A. Submit the following for approval in accordance with Section 2, Special Conditions and with the additional requirements as specified for each:

1. Shop Drawings and Manufacturer's Literature:
 - a. Show details of construction and interfacing with other trades.
 - b. Bar graph progress and delivery schedule.
 - c. Provide manufacturer's product literature for all installed items.
2. Design drawings for additional equipment-related structural work:
 - a. Show details of construction and interfacing with other trades.
3. Operation and Maintenance Manual:
 - a. Provide complete parts, operating, and maintenance manual covering equipment at time of installation including, but not limited to:
 - 1) Description of system and components.
 - 2) Schematic diagrams of electrical, plumbing, and drainage systems.
 - 3) Manufacturer's printed operating and maintenance instructions.
 - 4) List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts, stock quantity, and local parts and service source.
 - a) Assemble and provide four (4) copies of manual, per location, in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable.
 - b) Provide electronic files for manual using MSWord 2016 for text and Auto CAD Latest Version /Group 4 (PDF) Format for Drawings and Diagrams.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during shipment and storage.

1.05 OPERATION AND MAINTENANCE TRAINING:

- A. Upon completion of the equipment installation and ten days before start-up, a qualified representative of the manufacturer shall be present for a minimum of three (3), eight (8) hour working days to instruct personnel in the operation and proper care of the equipment at each location.
1. Instructional period: Three consecutive man-days (regular working hours) minimum. A minimum of one day to be devoted to hands-on demonstration of the equipment operation, trouble analysis, repair, adjustment and maintenance.
 2. Train personnel in preventive maintenance, operation of systems and to recognize malfunctions.

3. Provide complete printed operating instructions in manual or handbook form, completely and clearly indexed for ready reference during actual operation and for use as text during instruction of operating personnel.
 - a. Include descriptions of systems, background information and complete procedures for adjustment, calibration, replacement and repair of components in the system(s).

1.06 LABELING:

- A. Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.
- B. Label all added/modified piping as to its function and flow direction.
- C. Label all new/modified circuits in power panels.

PART 2 – PRODUCTS

2.01 MAJOR EQUIPMENT SELECTION

- A. All water-cooled chillers shall be selected and installed as specified in Section 15625.
- B. Chilled water and condenser water pumps shall be selected and installed as specified in Section 15185.
- C. All refrigerant monitoring and safety equipment shall be selected and installed as called out on drawings and per manufacturers instructions.
- D. All Cooling towers shall be per Section 15640.
- E. All other ancillary components for a complete functional system shall be per corresponding specifications and drawings.

2.02 MISCELLANEOUS

- A. All facilities restoration work shall be performed as specified in Section 02205.
- B. All demolition work shall be performed as specified in Section 02220.
- C. All field painting shall be performed as specified in Section 09920.
- D. HVAC motors and variable frequency drives shall be selected and installed as specified in Section 16225 and 16480.
- E. All mechanical equipment and piping shall have vibration isolation as specified in Section 15070.
- F. All mechanical equipment and piping shall be identified as specified in Section 15075.
- G. All equipment and piping insulation shall be selected and installed as specified in Section 15080.
- H. Water treatment system shall be selected and installed as specified in Section 15186A.

- I. All piping shall be selected, installed and tested as specified in Section 15205.
- J. All air conditioning systems shall be selected, installed and tested as specified in Section 15733A.
- K. All heating equipment shall be selected, installed and tested as specified in Section 15765.
- L. All ductwork shall be selected, installed and tested as specified in Section 15810.
- M. All fans shall be selected, installed and tested as specified in Section 15830.
- N. Chiller plant monitoring shall be selected and installed as specified in Section 15900A.
- O. All systems shall be tested and balanced in accordance with Section 15950.
- P. All wiring and equipment shall comply with grounding and bonding requirements as specified in Section 16060.
- Q. All wire and cable shall be selected, installed, and tested as specified in Section 16120.
- R. All raceways, boxes and cabinets shall be selected, installed and tested as specified in Section 16130.
- S. All motors shall be selected, installed and tested as specified in Section 16225 except as noted above. All motor enclosures shall be rated "water-proof".
- T. All motor starters and control center components shall be installed and tested as specified in Section 16425.
- U. All circuit breakers, panel boards, and load centers shall be selected, installed and tested as specified in Section 16440 except as noted above.

PART 3 – EXECUTION

3.01 SITE PREPARATION

- A. Provide scoping and design documentation (drawings) for construction of required equipment supports and other mounts not originally specified in this document.
- B. Coordinate the installation of equipment supports with the demolition and reconstruction work of the HVAC, plumbing, and electrical contractors.

3.02 INSPECTION

- A. Check location of rough-in work and utility stub-outs to assure match with the equipment to be installed.
- B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all items.
- C. Report in writing to the COR any damaged, missing or incomplete scheduled equipment and improper rough-in work or utility stub-outs.

3.03 INSTALLATION

- A. The Contractor shall be responsible for complete operational equipment installation.
- B. Work shall be performed under the direct supervision of Construction Superintendent. He shall coordinate the installation of scheduled equipment with the Contracting Officer Representative (COR).
- C. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:
 - 1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb and at right angles to adjacent work.
 - 2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
 - 3. Anchorage: Use fastenings as specified herein. Attach equipment securely to prevent damage resulting from inadequate fastenings. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.
 - 4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.04 TESTING

- A. Specification Compliance: After final connections are made and prior to authorizing payment, specified equipment and systems shall be satisfactorily tested for compliance with all specified features.
- B. Malfunctions during testing shall be corrected within five days and retested. Malfunctions during second testing shall be corrected within five days and retested.
- C. Inadequate Performance: If equipment fails the third test, the Authority may elect to have all equipment installed by this contract removed from site at no cost or obligation to the Authority.

3.05 CLEANUP

- A. Touch-up damage to painted finishes.
- B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.
- C. Clean area around equipment installation and remove packing or installation debris from job site.
- D. Notify AR for scheduling of acceptance inspections.

3.06 WARRANTY

- A. In addition to the requirements of the General Provisions, the equipment shall be guaranteed against defective parts and faulty workmanship for a period of two (2) years after substantial completion inspection (SCI). This requirement is for all new equipment installation excluding all Chillers.
 - 1. Chillers: Provide five (5) year parts, labor and refrigerant warranty and routine service requirement for the new chillers during the warranty period.

2. Cooling Tower: Provide five (5) year parts, labor and routine service requirement for the new cooling tower during the warranty period.

3.07 PERSONNEL

- A. The Contractor will perform all services using factory-trained technicians who have required Federal and jurisdictional certifications and specialize in HVAC, refrigeration and electronic system maintenance and repair service.

3.08 REPAIR SERVICE

- A. The Contractor will perform all services during its regular working hours unless otherwise specified. Any services requested or agreed to by the Authority that are outside the Scope of Work will be performed by the Contractor as a contract modification.

3.09 REPORTS

- A. The Contractor will provide the COR with a detailed report of the services performed on each inspection. Report shall be submitted to COR, shall include equipment log readings taken during inspection, condition of equipment, recommended repairs and/or services performed.

3.10 ADDITIONAL SERVICES

- A. Additional services will be furnished upon request and proper authorization from the Authority. All additional services will be requested in writing according to contract modification procedures.

3.11 EMERGENCY SERVICE

- A. Emergency service will be available, for the chillers under the five year warranty only, on a 7 day, 24-hour basis at no additional cost.

3.12 SCOPE OF SERVICE

- A. Contractor will perform the following services pursuant to the terms of this contract:
 1. Perform five monthly inspections and one annual shutdown service on the equipment listed as water cooled chillers between May 15 and October 15.
 2. Complete seasonal start-up services as described below once per year prior to May 15.
- B. In addition, the following service applies to the air conditioning equipment listed as both water cooled and air-cooled chillers:
 1. Parts and Labor Coverage - furnish all labor, parts, and supplies necessary to make repairs, adjustments and routine maintenance.
 2. Miscellaneous Parts Coverage - provide coverage for miscellaneous replacement of relays, controls, for control panels.
 3. Provide MOD-BUS communication service for the duration of the Agreement.
- C. Contractor Maintenance Service shall include:
 1. Furnish all labor, parts, refrigerant, oil, and material needed to maintain the equipment in good operating condition. Perform service during normal working hours, unless otherwise specified herein, and the maintenance service shall be in accordance with the scope

previously stated. Annually brush clean the water side of water cooled condensers and air side of air cooled condensers with procedures determined by the equipment manufacturer.

2. Maintain the following items related to the Equipment:
 - a. Electric wiring from the starter to its respective motor on unit mounted starters only.
 - b. Refrigerant piping between two or more pieces of Equipment, if installed per manufacturer's recommendations.
 - c. Insulation on the refrigerant piping and Equipment if disturbed to perform service.
 - d. The pressure and temperature controls, thermometers, gauges, control devices, thermostats and manual valves located on the Equipment.
 - e. Starters. (Excludes line side damage.)
3. Provide a written report to the Authority about the condition of the Equipment and any recommendations for enhancements to maintain capacity, reliability, and efficiency.
4. The following tasks are performed during the annual inspection once each year during a shutdown period in order to properly evaluate equipment status and prepare unit for the next cooling season:
 - a. Test for refrigerant leaks including relief valve piping outlets.
 - b. Check main starter, control panel, and frequency drives.
 - c. Inspect and tighten electrical connections.
 - d. Check relays, operating, and safety controls.
 - e. Check flow switch operation.
 - f. Measure and record water side pressure drops across vessels.
 - g. Perform equipment monitoring system check, log, and last fault analyses. Analyze performance, trend log if necessary.
 - h. Download latest software version if applicable.
 - i. Check compressor readouts.
 - j. Inspect vibration eliminators and inspect water piping for leaks.
 - k. Check head pressure control operation for tower fans or bypass valve.
 - l. Check minimum condenser water temperature operation.
 - m. Manually clean water side of condenser. (Removal of one head only.)
 - n. Head removal by Contractor.
5. The following tasks are performed during seasonal startups:
 - a. Review manufacturer's recommendations for startup.
 - b. Check auxiliary equipment operation.
 - c. Download latest software version if applicable.
 - d. Check relays, operating, and safety controls.
 - e. Start chilled water pump(s).
 - f. Start condenser water pump(s) and cooling tower.
 - g. Start water chiller.
6. The following tasks shall be performed during monthly maintenance inspections:
 - a. Log all operating conditions after unit stabilizes.
 - b. Review operating procedures with chiller operator.
 - c. Review owner's log for trends.
 - d. Inspect chiller for leaks.
 - e. Inspect starter for burns and discoloration.
 - f. Run chiller and log readings, analyze performance.
 - g. Record unusual noises and vibrations.
 - h. Record refrigerant level in sight glass.

- i. Review chiller operation with chiller operator.
- j. Test for refrigerant leaks including relief valve piping outlets.
- k. Check main starter and control panel.
- l. Check relays, operating, and safety controls.
- m. Check flow switch operation.
- n. Perform equipment monitoring system check, log, and last fault analysis, analyze performance.

D. Authority agrees to:

- 1. Designate a representative in its employ to receive instructions in the operation of the equipment. Such representative shall have authority to carry out recommendations received from manufacturer in conjunction with the performance of this Agreement.
- 2. Allow Contractor to start and stop the Equipment in order to perform services specified in this Agreement.
- 3. Operate the Equipment in accordance with manufacturer's instruction, and to notify Contractor promptly of any change in the usual operating conditions.
- 4. Provide reasonable means of access to the Equipment, including any required removal, replacement and refinishing of the building structure.
- 5. Permit the use by Contractor of the usual building maintenance materials and tools.
- 6. Employ only Contractor personnel or persons authorized by Contractor to perform all work on the Equipment, except for operation of same.

END OF SECTION

SECTION 02205

REMOVAL AND RESTORATION OF EXISTING FACILITIES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies removing, restoring, and reinstalling miscellaneous items on WMATA property which are removed during construction.
- B. Related Work Specified Elsewhere:
 - 1. Selective Demolition: Section 02220.
- C. Definitions:
 - 1. Miscellaneous items include, but are not limited to, the following: finishes, walls, partitions, doors, door frames, plumbing fixtures, mechanical items, lighting, operators, controls, and other utility facilities indicated on the Contract Drawings and located in areas to be cleared.
 - 2. Salvage: To remove and store material and equipment for reuse indicated on the Contract Drawings and located in areas to be cleared in this or other Authority contracts.
- D. Salvage:
 - 1. Items to be salvaged shall be coordinated by the contractor with WMATA during construction.
 - 2. Clean salvaged items of foreign material and store in accordance with the General Requirements unless otherwise shown, approved or directed.
 - 3. Unless otherwise specified, items removed but not to be salvaged will become the property of the Contractor.

1.02 SUBMITTALS (NOT USED):

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 REMOVALS:

- A. Remove work to extent shown. Avoid damage to items which is to remain in place. Do not remove structural items without prior written approval of COR.

3.02 STORE FRONTS, BAY WINDOWS AND CORNICES (NOT USED):

3.03 ALARM AND SPRINKLER SYSTEMS AND FIRE ESCAPES (NOT USED):

3.04 CANOPIES, AWNINGS AND GRILLES (NOT USED):

3.05 VAULTS (NOT USED):

3.06 HEATING, COOLING AND ELECTRICAL FACILITIES (NOT USED):

3.07 SIGNS, FLAGPOLES, RAILINGS AND FENCES:

A. Signs:

1. All signs must comply with WMATA standards.

3.08 FLOORS, CEILINGS, WALLS, PARTITIONS AND OTHER FINISHES:

- A. Where cutting and patching of floors, ceilings, walls, partitions and other exposed work is necessary, provide such items in accordance with the Technical Sections of this document so as to maintain continuity of quality and appearance between existing and new construction.

3.09 SIDEWALKS AND CURBS (NOT USED):

3.10 PARKING AREAS AND DRIVEWAY PAVEMENTS (NOT USED):

3.11 LANDSCAPING (NOT USED):

3.12 JOINTS BETWEEN EXISTING AND RESTORED WORK:

- A. Make joints between existing and restored work as inconspicuous as practicable.
- B. Use saw to cut straight line at joint between existing and new concrete, steel and masonry surfaces.
- C. Make joints between existing and restored work at least equal structurally to original undisturbed items.

END OF SECTION

SECTION 02220

DEMOLITION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies demolition work.
- B. Definitions:
 - 1. Demolition: Complete removal and disposal of existing facilities from areas to be cleared.
 - 2. Existing facilities include, but are not restricted to, buildings and other utility facilities located in the area.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Certification:
 - a. Submit copy of request to utility companies owning or agency controlling services and appurtenances affected by demolition work for discontinuance of services along with certificates of severance.
 - 2. Documentation:
 - a. Demolition permit from the jurisdictional agency or owner.
 - b. Permits and releases from each owner of property where demolition debris will be deposited absolving the Authority of responsibility in connection with such disposal.

1.03 QUALITY ASSURANCE:

- A. Submit Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.

1.04 JOB CONDITIONS:

- A. Street and Road Closures:
 - 1. Make arrangements with appropriate jurisdictional agency for temporary closing of public streets or highways to traffic as necessary.
 - 2. Arrange with the appropriate agency for the rerouting of traffic and comply with its regulations.
 - 3. Furnish and maintain temporary signs, barricades, flashing lights and flag persons necessitated by the work and remove same upon completion of work.

B. Maintenance of Traffic:

1. Construct, maintain and remove on completion of work, temporary canopies and other structures for protection of the public in accordance with applicable codes to ensure continuous safety of traffic.
2. Bridge cuts in traffic areas with steel plates or by other approved means.
3. Keep traffic areas free from debris and spillage of materials.
4. When demolition work interferes with bus loading facilities, provide and maintain surfaced areas at alternative locations or arrange rerouting with appropriate authorities for duration of work.

C. Protection and Restoration:

1. Prevent damage to pipes, conduits, wires, cables and structures above and below ground which are not designated for removal. Repair or replace damaged items.

- D. For Cooling Towers located on a commercial property other than WMATA, contractor shall coordinate any demolition work with the building management.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 PRESERVATION OF REFERENCES:

- A. Prior to removal, record location and designation of survey markers and monuments located within demolition area. Store markers and monuments during period of work. Restore survey markers and monuments upon completion of work.

3.02 DISPOSAL:

- A. Remove debris resulting from demolition work to locations outside Authority's right-of-way.
- B. Dispose of debris off site only with permission of property owner where such debris is to be deposited and in accordance with codes and regulations of the jurisdictional authorities.
- C. Do not burn debris at demolition site.

END OF SECTION

SECTION 03100
CONCRETE FORMWORK

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies formwork for concrete structures and other facilities.
- B. Related work specified elsewhere:
 - 1. Concrete reinforcement: Section 03200.
 - 2. Cast-in-place structural concrete: Section 03300.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ACI: 347, Publication # 4
 - 3. Western Woods Producers Association: Western Lumber Grading Rules.
 - 4. CE: CRD-C 572.
 - 5. AASHTO: M153.
 - 6. ASTM: D1056, D1149, D1692.
 - 7. APA: HDO Plywood Exterior Grade.
 - 8. U.S. Product Standard: PS 1
- B. Responsibilities:
 - 1. Design and construction of formwork is the responsibility of the Contractor, subject to review by the Engineer.
- C. Design Criteria:
 - 1. Design formwork for vertical loads and lateral pressures in accordance with ACI 347.
 - 2. Design formwork system which is adequately braced and has adequate strength and stability to ensure finished concrete within the specified tolerances.
 - 3. When necessary to maintain the specified tolerances, design camber into the formwork to compensate for anticipated deflection and creep due to the weight and pressure of the fresh concrete, pre-stressing forces and construction loads.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Working Drawings:
 - a. Include details of form types, methods of form construction and erection, design computations and location of form joints and form ties, location and dimensions of blockouts and openings in structure, and embeds.
 - 2. Samples:

- a. Snap-off form ties: Two.
- 3. Certification:
 - a. Manufacturer's certificates.
 - b. Certified test reports of specified concrete tests.
- 4. Documentation:
 - a. Calculations: Early form removal calculations as specified certified by a professional engineer registered in the area where the work is to be performed. Submit in advance for obtaining approval prior to form removal.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. General:

- 1. Wood forms:
 - a. All framing lumber stress-graded.
 - b. Lumber in direct contact with concrete, dressed on at least the contact side, with dressed or tongue-and-groove edges; other lumber may be dressed or rough.
 - c. Where vertical board finish is shown, or specified, use the following:
 - 1) Form board: Tongue-and-groove, Number 1 Common or better, Ponderosa or White pine, in accordance with the Western Lumber Grading Rules book published by WWPA (not the Southern Pine Inspection Bureau grading rules), one-inch nominal thickness, four-inch nominal width, groove S2S milled or beveled one side only and center matched with 45-degree beveled edges to produce sharp V-shaped 3/8-inch wide in concrete. Four-inch tongue-and-groove boards to be toenailed at edge or face-nailed to backer board.
 - 2) Smooth concrete: Tongue-and-groove, square cut unturned edges, Number 1 Common or better, Ponderosa or White pine, in accordance with the Western Lumber Grading Rules book published by WWPA (not the Southern Pine Inspection Bureau grading rules), one-inch nominal thickness, four inches nominal width, S2S and center-matched.
- 2. Plywood forms:
 - a. APA grade-marked:
 - 1) B-B Plyform Exterior grade Group I or II for unexposed finished concrete.
 - b. APA High-Density Overlay (HDO) plywood;
 - 1) B or better face veneer Exterior grade Group I for exposed to public view finished concrete.
 - c. USPS: PS 1
- 3. Hardboard:
 - a. For concrete not exposed to public view: tempered, smooth-one-side (S1S) panels not less than 3/16-inch thick, in accordance with AHA IS 1.

4. Form ties:
 - a. Factory-fabricated, snap-off metal type, of adequate design to minimize form deflection and preclude concrete spalling upon removal.
 - b. Fabricated so that set-back in concrete is such that portion of tie remaining after snap-off and removal of exterior portions is at least 1-1/2 inches below concrete surface.
5. Form release agent: Chemically reactive liquid product that will not bond with, stain, or impair concrete surfaces. Follow form panel manufacturers approved product and recommendations for application. Agents containing castor oil are prohibited
6. Chamfer strips: Except where other sizes are shown, 3/4-inch by 3/4-inch triangular fillets milled from clear, straight-grain pine, surfaced-each-side, or extruded-vinyl tape.
7. Miscellaneous preformed strips for reveals, rustications and similar joints: Fabricated of wood, metal, plastic or other approved material formed to cross sections shown.
8. Conduit: Schedule 40, black steel pipe, butt-welded as specified in Section 15205.
9. Bonding adhesive: As recommended by manufacturer of premolded elastic filler.

PART 3 – EXECUTION

3.01 CONSTRUCTION AND WORKMANSHIP:

- A. Concrete finishes and usage locations of various types of forms and form lining: As shown or specified.
- B. Unless otherwise shown for concrete surfaces exposed to public view, use HDO Plywood in largest practicable continuous panels to produce plane, smooth surface free from grain imprint, patchmarks, and discoloration.
- C. Construct adequately braced formwork so that resulting concrete surfaces conform to specified tolerances.
- D. Brace forms, falsework and centering adequately to retain forms in position as shown on approved working drawings.
- E. Provide mortar-tight forms of wood, plywood, or other approved materials which conform to shapes, lines and dimensions shown and produce smooth surface without fins and projections.
- F. Where shown, or directed because of lagging or form irregularity, and where concrete surfaces will not be exposed to public view, line inner form surfaces with hardboard as follows:
 1. Use widest available width of hardboard.
 2. Line areas less than four feet wide with single-width piece of hardboard.
 3. Offset lining joints from those in backing.
 4. Fasten securely to backing with galvanized or aluminum nails driven flush.
- G. Forms shall be clean of any rust, molds, concrete scale. etc.

3.02 FIELD QUALITY CONTROL:

- A. Allowable Tolerances:
 1. Construct elements except concrete linings of tunnels to meet allowable tolerances of dimensions, elevations and positions shown and specified in Section 03300.

3.03 COATING FORMS:

- A. Lightly coat form panels with chemically reactive release agent prior to initial concrete placement and before each subsequent placement.
- B. Do not allow excess coating material to stand in puddles in forms nor to come into contact with concrete against which fresh concrete is to be placed.
- C. Coat with release agent bolts and rods that are to be completely removed or to be free to move.

3.04 EMBEDDED ITEMS:

- A. Ensure that items to be embedded in concrete are free from oil and foreign matter that would weaken bond of concrete to such items.
- B. Install in formwork inserts, anchors, sleeves and other items specified elsewhere. Close ends of conduits, piping and sleeves embedded in concrete with caps or plugs.
- C. Install continuous dovetail-anchor slots where shown.
- D. Complete tests on piping and other items before starting concrete placement.
- E. Before depositing concrete, check location and support of piping, electrical conduits and other items which are to be wholly or partially embedded.

3.05 OPENINGS AND RECESSES IN CONCRETE:

- A. Provide openings and recesses; place sleeves furnished by other trades.

3.06 JOINTS:

- A. Unless otherwise directed, make contraction, expansion and construction joints only where shown. Where concrete will be exposed to public view, use largest practicable size sheets to minimize joints.
- B. Form keyways as shown.
 - 1. Continue reinforcing steel and wire fabric across joints unless they are shown as being free to move.
- C. Make maximum distance between transverse contraction joints 50 feet or as shown, as measured along centerline of track on tangent alignment.
- D. Install premolded joint filler at locations shown. Extend filler from bottom of concrete up flush to finish concrete surface or hold down below finish surface as shown.
 - 1. Make splices in premolded filler in manner to preclude penetration of concrete between joint faces.
- E. Where premolded joint filler is held below finish concrete face, install in the form a water-soaked wood strip of dimensions shown, to form, after removal, proper size slot to receive sealant compound.

3.07 WATERSTOPS:

- A. Install waterstops in construction joints below grade and where shown. Use six-inch minimum width, except use nine-inch minimum width in tunnel structures, or as shown.
- B. Support and protect that portion of waterstop which extends beyond bulkhead, during placing of concrete and subsequent removal of forms.
- C. Position waterstops so as to clear reinforcement. Ensure that the waterstop does not get misaligned or misplaced during concreting.
- D. Make field splices by heat-sealing square cut ends of waterstop using hot metal plate or thermostatically controlled electric-heating iron designed for such purpose. Join ends when material becomes molten, maintaining continuity of ribs and bulbs; allow to cool before stressing.
- E. Make field splices to develop water tightness equal to that of unspliced material and tensile strength of not less than 50 percent of unspliced material. Have 90-degree splices and as many other splices as possible made in the factory.

3.08 REMOVAL OF FORMS, FALSEWORK AND CENTERING:

- A. Maintain forms, falsework and centering in place until the concrete has attained minimum percentage of specified design strength in accordance with Schedule 1:

Structural Member	Minimum Percentage of Specified Design Strength	
	Schedule 1	Schedule 2
Footings; inverts; sides of beams; slabs and girders; slabs and beams on grade	25	20
Free-standing walls, columns and piers	40	30
Cantilevers	90	70

- B. Early removal of forms, falsework and centering will not be allowed for concrete strength values below Schedule 2, but will be allowed for concrete strength values between Schedule 1 and Schedule 2 only after:
 - 1. The Engineer has approved calculations showing anticipated concrete strengths at time of proposed early removal based on:
 - a. Ratio of dead load over live load.
 - b. Span, height and shape.
 - c. Ratio of rise over span.
 - d. Reshoring.
 - e. Loads, resultant stresses and deformations to which concrete and reinforcing steel will be subjected at time of removal, subsequent to removal and until concrete has attained design strength.
 - f. Prevailing site conditions.
 - 2. Concrete strength attained prior to form removal has been determined by analysis of quality-assurance data in accordance with Section 03300.
- C. Do not remove wood board forms within 48 hours of pouring concrete.

- D. Do not alter loading conditions on concrete subsequent to removal of forms if it results in exceeding permissible stresses and deformations at attained concrete strengths.
- E. The Engineer may permit early removal of concrete support without submittal of calculations prior to attainment of specified design strength if he considers such submittals to be unnecessary.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies reinforcement for concrete structures and other facilities.
- B. Related Work Specified Elsewhere:
 - 1. Concrete formwork: Section 03100.
 - 2. Cast-in-place structural concrete: Section 03300.
- C. Definitions:
 - 1. Cover: Thickness of concrete between outside surface of reinforcement and outside face of concrete.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Detail reinforcing in accordance with ACI SP-66.
 - b. Bar lists showing the individual weight of each bar, total weight of each bar size and total weight of bars on list. Base calculated weights on theoretical unit weights shown in ASTM A615, Table 1.
 - c. Details showing bonding of reinforcement for stray current and cathodic protection.
 - 2. Certification:
 - a. Manufacturer's certificates.
 - b. Mill tests on each heat showing chemical and physical analyses performed in accordance with ASTM A615, as modified by ACI 318.
 - c. Record of mill tests traceable to individual reinforcement bars supplied to the project.

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ACI: SP-66, 318.
 - 3. CRSI: Manual of Standard Practice; Placing Reinforcing Bars.
 - 4. AASHTO: Standard Specifications for Highway Bridges.
 - 5. ASTM: A82, A185, A615, A775, A706.

B. Allowable Tolerances:

1. Cut and bend reinforcing steel to conform to dimensions shown within the following tolerances:
 - a. Sheared length: Plus-or-minus one inch.
 - b. Depth of truss bars: Plus zero or minus 1/2 inch.
 - c. Stirrups, ties and spirals: Plus-or-minus 1/2 inch.
 - d. All other bends: Plus-or-minus one inch.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. Reinforcing Steel Bars:

1. ASTM A615, Grade 60, modified in accordance with ACI 318.
2. ASTM A706, for all welding reinforcing bars, except for electrical bonding.
3. Epoxy Coating: ASTM A775, as shown. Epoxy Coating: ASTM A775, as shown.

B. Spiral Reinforcement: ASTM A82 or ASTM A615, Grade 60.

C. Welded Steel-Wire Fabric: ASTM A185.

D. Metal Accessories: As recommended by CRSI Manual of Standard Practice. Where concrete surfaces will be exposed to public view in finish structure, use supports with plastic-protected legs or stainless steel legs.

PART 3 – EXECUTION

3.01 CUTTING AND BENDING:

- A. Perform cutting and bending in the shop. Bend steel cold. Do not bend or straighten bars so as to damage material.
- B. Do not bend bars in the field except to correct minor errors and damage occurring during shipping and handling.

3.02 BAR SUPPORTS AND SPACERS:

- A. Support bars by means of bolsters or chairs with no less than minimum required by ACI SP-66.
- B. Reinforcing steel in bottom of slabs resting on earth may be supported by concrete brick or mortar blocks.
- C. In walls, columns, piers and abutments hold reinforcing steel in position by means of mortar blocks, bar supports or spacers wired to reinforcing steel.
- D. Do not use stones, clay bricks, wood blocks or pieces of broken concrete to support reinforcing steel.
- E. Do not place bars or fabricated mats on layers of fresh concrete as work progresses.

3.03 PLACING AND FASTENING:

- A. Arrange and place reinforcing steel as shown.
- B. Secure reinforcement positively against displacement during placing of concrete.
- C. Wire or clip bars together as recommended in CRSI Placing Reinforcing Bars.
- D. Maintain reinforcing steel accurately in locations shown in tops of inverts to permit arrangements of anchor bolts for rail-tie plates.
- E. Before placement, ensure that reinforcement is free from dirt, mill scale, rust scale, oil, grease and other foreign matter.

3.04 SPLICING:

- A. Furnish reinforcing bars in full lengths as shown on the Contract Drawings and approved shop drawings.
- B. Do not splice bars unless approved in writing.
- C. Make splices when authorized, in accordance with ACI 318, except make all butt splices by welding with a capacity of not less than 125 percent of minimum yield strength of bar. Mechanical connections for tensile splice shall be by cadweld only. Connections for t Cadweld only. However, mechanical connection for precast prestressed structures and parking garages, when the splice is located inside the precast member, may be made by NMB Splices instead of the Cadweld, with prior approval of the Authority.

3.05 ELECTRICAL BONDING:

- A. Weld steel straps to transverse end reinforcing bars and longitudinal reinforcing bars adjacent to joints between pour sections at locations shown.
- B. No electrical bonding is required for epoxy coated rebar.
- C. Thermite weld or cadweld stranded, bare-copper conductors to adjacent steel strips at specified end locations. Likewise, weld copper conductors to lapped, welded-wire fabric at joints in slabs at locations shown.
- D. Additional copper bonding work adjacent to traction power substations: Section 16060.

3.06 INSPECTION:

- A. Placement of concrete prior to approval of reinforcement and electrical bonding work is prohibited.

3.07 CONCRETE PROTECTION FOR REINFORCEMENT (COVER):

- A. Structures:
 - 1. Concrete cast against and permanently exposed to earth – 3 inches.
 - 2. Concrete exposed to earth or weather – 2 inches.
 - 3. Concrete not exposed to weather or in contact with ground - 1½ inches.

3.08 EPOXY COATING:

A. Preparation of surface: Perform the following in order given:

1. Clean surface contaminated with oil and grease using naptha or xylol.
2. Remove weld slag, rust and mill scale from surfaces by wire brushing.
3. Coat surfaces immediately with methyl-methacrylate primer.
4. Apply coating only to surfaces which are dry and free of contaminants.

END OF SECTION

SECTION 03300
CAST-IN-PLACE STRUCTURAL CONCRETE

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing Portland-cement cast-in-place concrete.
- B. Related Work Specified Elsewhere:
 - 1. Concrete formwork: Section 03100.
 - 2. Concrete reinforcement: Section 03200.
 - 3. Copper bonding work: Section 16060.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ACI: 201.2R, 211.1, 304, 309, 318, 318.1.
 - 3. AASHTO: M182, T26.
 - 4. NBS: Handbook 44.
 - 5. USBR: Concrete Manual.
 - 6. FS: A-A-341A, HH-I-521, K-P-146.
 - 7. ASTM: A43, A47, A48, C31, C33, C39, C40, C42, C87, C88, C94, C131, C150, C171, C172, C260, C295, C309, C311, C330, C494, C535, C586, C595, C618, C665, C685, C881, C989, C1107, C1260, D98, E328.
 - 8. CPMB (Concrete Plant Manufacturer's Bureau): Concrete Plant Standards.
- B. Testing Laboratory:
 - 1. Furnish the services of an independent testing laboratory. Employment of an independent laboratory does not relieve the Contractor of the obligation to perform the work in accordance with requirements of the Specifications and Drawings. Submit certified results of the tests performed.
 - 2. Furnish proof that the laboratory satisfies the requirements of the American Council of Independent Laboratories' Recommended Requirements for Independent Laboratory Qualification. Laboratory need not be a member of the American Council of Independent Laboratories.
 - 3. Certify that testing equipment has been calibrated by an accredited calibration agency at not more than 12-month intervals using devices of accuracy traceable to the National Institute of Standards and Technology (NIST) or accepted values of material physical constants
- C. Properties of Concrete:
 - 1. General:
 - a. Design mixes to produce concrete of proper workability, durability, strength, maximum density, minimum shrinkage and permeability.

- b. Design mixes to have minimum water content per cubic yard of concrete, cement content corresponding to appropriate water-cement ratio, largest permissible maximum size specified of coarse aggregate available and optimum percentage of fine aggregate.
 - c. Use maximum size of coarse aggregate in accordance with ACI 211.1.
 - d. Use same brand from same source throughout the work.
 - e. Use aggregates from same source throughout the work.
 - f. Use ground-iron blast-furnace slag and fly ash from the same sources respectively throughout the work.
 - 2. Durability:
 - a. Maximum water cementitious materials ratio as per ACI 318, Chapter 4 and ACI 201.2R.
 - b. Use a suitable combination of approved air-entraining admixture and water reducer to reduce water content and permeability of the concrete, provided such admixtures do not adversely affect other specified properties of concrete.
 - 3. Workability:
 - a. Use approved chemical admixtures as needed for workability so that concrete can be placed, consolidated, and finished without segregation or excessive bleeding.
 - 4. Strength:
 - a. Design mix for each class and type of concrete of each specified strength based on overdesign factor in accordance with ASTM C94. Unless otherwise shown, working-stress method applies to structures.
 - b. Design each class of concrete in accordance with the following:
 - 1) Not more than the following percentages of strength tests to have values less than specified strength:
 - 2) Working-stress method: 20 percent.
 - 3) Ultimate-strength method: 10 percent.
 - 4) Prestressed structures: 10 percent.
 - 5) Average of the following numbers of consecutive strength tests to be equal to or greater than specified strength:
 - a) Working-stress method: Six.
 - c. When number of tests totals six or less, average to be in accordance with Note 21 of ASTM C94.
 - 5. Appearance:
 - a. Cured concrete exposed to public view shall be uniform in color, texture and finish with no discernible form or patch marks, grain imprint, joint irregularities or discoloration. Use only manufacturer approved chemically reactive release agents on HDO plywood forms.
 - b. Final selection and approval for color shall be made by the Engineer.
- D. Method of Proportioning:
- 1. Proportion mixes as described in ACI 211.1.
 - 2. Approximate mixing-water and air-content requirements for mixes of different slumps and nominal maximum sizes of aggregates as specified in ACI 211.1, Table 5.3.3.

3. Do not vary proportions of ingredients of approved mixes without written approval.
- E. Ready-Mixed Concrete: ASTM C94.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 1. Product Data: Manufacturer's literature completely describing each material, standard, test data, installation instructions and special instructions or safety precautions applicable to the materials.
 - a. Samples:
 - 1) Concrete surface sealer: Two, each one pint.
 - 2) Membrane-forming curing compound: Two of each type, each one pint.
 2. Sandblast finish:
 - a. Number 6 sandblast finish as specified, each 12 inches square by two inches: Two.
 - b. Seal 1/2 of face of each sample with concrete surface sealer.
 - c. If samples are not approved or if concrete mix is changed, submit additional samples until approved.
 - d. When samples have been approved, submit details of procedures followed to produce approved surface finish including, but not limited to, the following:
 - 1) Size and type of nozzle.
 - 2) Air pressure.
 - 3) Distance of nozzle from surface blasted.
 - 4) Duration of blast.
 3. Certification:
 - a. Ingredients:
 - 1) Submit with mix design, laboratory test reports and mill or manufacturer's certificates verifying that ingredients conform to specified requirements. Use ingredients in design mix which are representative samples of materials to be used in the work.
 - 2) Submit test results whenever the aggregates, cement or other additives to be used in the concrete come from a different lot, source, other area of the quarry, different quarry or from other than the representative stockpile or batch from which the original material was tested and approved.
 - b. In case the source, brand or characteristic properties of ingredients need to be varied during the term of the Contract, submit revised laboratory-mix report in accordance with procedures specified for original mix design.
 - c. Batch tickets:
 - 1) Before unloading at the site, submit certification or delivery ticket from concrete supplier with each batch delivered to the site bearing the following information:
 - a) Name of supplier.
 - b) Name of batching plant and location.
 - c) Serial number of ticket.

- d) Date.
- e) Truck number.
- f) Specific job designation: Contract number and location.
- g) Volume of concrete in cubic yards.
- h) Class and type of concrete.
- i) Time loaded.
- j) Type and brand of cement.
- k) Weight of cement and fly ash or ground-iron blast-furnace slag.
- l) Maximum size of aggregates.
- m) Weights of coarse and fine aggregates.
- n) Maximum amount of water to be added and amount of water added at the site.
- o) Kind and amount of admixtures.

4. Documentation:

- a. Proposed methods for controlling concrete temperature and plans for placing concrete taking into account sun, heat, wind, ambient air temperature or other limitations of facilities that will prevent proper finishing or curing.
- b. Quality control plan for floor treatment. Submit as specified prior to installation.
- c. Quality control reports. Submit as specified after installation.
- d. Design mixes:
 - 1) Prior to placing concrete, submit design mixes for each class and type of concrete, certifying that proposed concrete ingredients and proportions will result in concrete mix meeting specified requirements.
 - 2) Include for each class and type of concrete as many mix designs as there are combinations of different ingredients or types of ingredients anticipated to cover requirements of the work.
 - 3) Establish mix designs through an approved design laboratory.
 - 4) Design concrete mix for protection against alkali-aggregate reactivity.
 - 5) The Contractor may present for approval a concrete mix previously approved for Authority work provided such mix is made with proposed ingredients that meet requirements and provided that concrete has complied with compressive-strength requirements based on control record of at least 30 consecutive-strength tests recently obtained.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Aggregates:

- 1. Transport and stock pile aggregate separately according to sources and gradations. Handle so as to prevent segregation, loss of fines and contamination by earth or other foreign materials.
- 2. If aggregates show segregation or if different grades become mixed, rescreen before placing in proportioning bins.
- 3. Do not combine aggregate from different sources or of different gradations except to obtain different gradations.
- 4. Do not transfer aggregates directly from trucks, railroads cars or barges to proportioning bins when moisture content is such that it will affect accurate proportioning of concrete mixture. In such cases, stockpile aggregate until excess moisture drains off.

B. Packaged Cement:

1. Deliver to project site in original sealed packages labeled with weight, name of manufacturer, brand and type.
2. Store packages in watertight building.
3. Do not use cement which has been reclaimed by cleaning bags.
4. Do not use cement which has been exposed to moisture or contaminated.
5. Deliver packages conforming to weight specified.
6. Packaged cement will be subject to testing.

C. Bulk Cement:

1. Store bulk cement separately from other cement and protect to prevent exposure to moisture and contamination.
2. In ready-mix plant, provide facilities to maintain separation of cement meeting specified requirements from other cement.
3. Provide in cement manufacturer's plant, facilities for sampling cement at weighing hopper or in feed line immediately before entering hopper.

D. Ready-Mixed Concrete: ASTM C94.

E. Blast-Furnace Slag or Fly Ash for use with Portland Cement:

1. Transport in covered carriers.
2. Store in watertight bins or silos to provide protection from dampness and contamination. When compartmented bins are used, conduct periodic, but not less than weekly checks between adjacent bins to avoid contamination of either of the stored materials.

F. Concrete Additives, Sealers and Corrosion Inhibitor. As required by the manufacturer.

1.05 **WARRANTY**

- A. Penetrating Concrete Sealer: Provide a minimum effective service life warranty of 10 years for the penetrating concrete sealer.

PART 2 – PRODUCTS

2.01 **MATERIALS:**

A. Cementitious Materials:

1. Portland Cement: ASTM C150, Types I and II. Use Type II only for underground structures.
 - a. Alkali content not to exceed 0.6 percent.
2. Blended Hydraulic Cement: ASTM C595 Type IS and IP.

B. Ground-Iron Blast Furnace Slag: ASTM C989, Grade 100 or 120.

C. Fly Ash: ASTM C311 and ASTM C618, Class F:

1. Loss on ignition not to exceed 4 percent.

2. Maximum available alkalis (for combination of cement and fly ash) not to exceed 0.6 percent based on proportions to be used and alkalinity measurements for cement and fly ash individually or in combination.
 - a. Fly ash used to be qualified for each source.
 3. Uniform color when used in concrete exposed to public view.
- D. Aggregates:
1. Aggregates for normal concrete and shotcrete: ASTM C33 with the following additional requirements:
 - a. Coarse aggregate: Gravel, crushed gravel or crushed stone.
 - 1) Deleterious substances:
 - a) Maximum allowable amounts:
- | <u>Substance</u> | Maximum Allowable
Percentage
by <u>Weight</u> |
|---|---|
| (1) Soft particles: | 5.0 |
| (2) Coal and lignite
particles: | 0.5 |
| (3) Friable particles: | 0.25 |
| (4) Material passing Size
200 sieve: | 1.0 |
| (5) Thin or elongated
pieces: | 15.0 |
| (6) Other local deleterious
substances | 1.0 |
- b) Soft particles: Higher percentage may be approved where concrete is not subject to abrasion, provided concrete strength is achieved without the use of excess cement.
 - c) Crushed aggregates: If material finer than Number 200 sieve consists of dust of fracture essentially free from clay or shale, percentage may be increased to 1.5.
 - d) Thin or elongated pieces: Length of pieces to be greater than five times the smallest dimensions of a circumscribing rectangular prism.
 - 2) Percentage of wear: 45 maximum when tested in accordance with ASTM C131 and ASTM C535.
 - 3) Weighted percentage of loss: 15-percent maximum by weight when subjected to five cycles of magnesium sulfate soundness test in accordance with ASTM C88.
 - 4) Gradation: In accordance with ASTM C33, Table 2, and represented by a smooth gradation curve within required limits.

b. Fine aggregate:

- 1) Washed natural sand or washed stone sand. Stone sand may be subject to special gradation requirements as directed.
- 2) Gradation in accordance with ASTM C33.
 - a) Minimum percentages of material passing Size 50 and Size 100 sieves may be reduced to five and zero, respectively, if aggregate is to be used in concrete with three percent minimum air entrainment, or in concrete containing more than 517 pounds of cement per cubic yard.
- 3) Weighted percentage of loss not more than 12 percent by weight when subjected to five cycles of magnesium sulfate soundness test in accordance with ASTM C88.
- 4) Deleterious Substances:

<u>Substance</u>	<u>Maximum Allowable Percentage by Weight</u>
a) Friable particles:	1.0
b) Coal and lignite:	0.5
c) Material passing the Size 200 sieve	5.0
d) other deleterious substances, such as shale, alkali, mica, coated grains, soft and flaky particles	2.0

- 5) Free from injurious amounts of inorganic impurities as determined by ASTM C40. Should materials fail to pass test for organic impurities in sand for concrete, retest in accordance with ASTM C87. If fine aggregate shows by colorimetric test a darker color than that of sample originally approved for the work, stop using such aggregate until approved tests have been made to determine whether change in color is indicative of injurious amount of deleterious substances.

c. Evaluate for potential alkali aggregate reactivity:

- 1) Perform a petrographic examination in accordance with ASTM C295. The petrographic analysis will identify the constituents of the fine and coarse aggregate and will also identify aggregate found to be potentially alkali-carbonate reactive. Fine and coarse aggregate containing more than the following quantities of constituents is unacceptable:
 - a) Optically strained, microfractured or microcrystalline quartz exceeding five percent (a common constituent of granite and granite gneiss).
 - b) Chert, Metaquartzite, Chalcedony or combination thereof exceeding three percent. However, fine aggregate may contain up to eight percent provided that mortar bar test results are acceptable.
 - c) Tridymite or cristobalite exceeding one percent.
 - d) Opal exceeding five percent.
 - e) Natural volcanic glass in volcanic rocks exceeding three percent.

- 2) Test aggregate for alkali-silica reactivity in accordance with ASTM C1260. Aggregate sources that exhibit a C1260 mean mortar bar expansion at 16 days greater than 0.08 percent are unacceptable.
 - 3) Aggregate identified by the petrographic analysis to be potentially alkali-carbonate reactive is to be further evaluated in accordance with ASTM C586. Expansion of test specimen cylinders not to exceed 0.10 percent after 28 day immersion in NaOH solution.
- d. Aggregate which fails the evaluation criteria for potential alkali aggregate reactivity may be reclassified as acceptable if prior field performance demonstrates that the aggregate is nonreactive. Include service records (material records, batch quantities, exposure conditions, and petrographic evaluation) demonstrating the aggregate to be nonreactive in the mix design submittal.

E. Water

1. Natural potable water with no pronounced taste or odor.
2. Containing no impurities, suspended particles, algae or dissolved natural salts in quantities that will cause:
 - a. Corrosion of reinforcing steel.
 - b. Volume change that will increase shrinkage cracking.
 - c. Efflorescence.
 - d. Excessive air entraining.
3. pH: Not less than five.
4. When tested in accordance with AASHTO T26, standard mortar-briquette tests to show no indication of unsoundness, no change in setting time in excess of plus-or- minus 30 minutes and no reduction in strength in excess of 10 percent.

F. Ready-Mixed Concrete: ASTM C94, Option C.

G. Admixtures:

1. In accordance with the following:
 - a. Air-entraining admixtures: ASTM C260.
 - b. Chemical admixtures: ASTM C494.
2. Approved brands: Chlorides may be present in admixtures provided total chloride in mixing water of proposed concrete mixture, including chloride ions contributed by admixture or admixtures, aggregate and mixing water is not in excess of 150 ppm.
3. Meeting requirements of reference standards or documented to have five-year minimum history of demonstrably satisfactory performance for similar structures under equivalent conditions.

H. Aluminum Powder: FS A-A-341A, free of oil, grease, soluble alkalis and organic materials, gradation as approved.

I. Ferrous Aggregate:

1. Cast-iron particles, ASTM A43, ASTM A47, or ASTM A48, free of oil, grease, soluble alkalis and organic materials.
2. Aggregate graded as follows:

Sieve Designation US	Percentage by Weight
<u>US Standard Square Mesh</u>	<u>Passing Individual Sieves</u>
3/8 inch	----
Size 4	100
Size 8	90 – 100
Size 16	75 – 90
Size 30	45 – 60
Size 50	15 – 25
Size 100	10 – 20

3. If recommended by manufacturer and approved, in lieu of the above gradation use lower percentage of aggregate passing Size 100 sieve.
- J. Abrasive Aggregate: 60 to 75 percent silicon-carbide abrasive, bonded by vitreous ceramic material, black, graded from 12 to 30.
- K. Floor Treatment:
 1. Sealer: Zinc or magnesium fluosilicate and wetting agent formulated and mixed with water in concentration recommended by manufacturer.
 2. Floor hardener system:
 - a. Floor hardener:
 - 1) Free from non-ferrous metallic particles, filler material, silica sand, natural aggregates, rust and materials which disguise rust.
 - 2) Ready-to-use formulation proportioned, mixed and packaged at factory ready for application.
 - 3) Ingredients proportioned to maintain two parts well-graded iron aggregate to one part consisting of cement, plasticizing agents and other ingredients designed to absorb moisture from floor slab.
 - 4) Color: Per sample, or as selected by the Engineer.
 - 5) Masterplate 200, Master Builders, or equal.
 - b. Floor curing compound:
 - 1) Clear modified-acrylic resin.
 - 2) Moisture retention: In accordance with ASTM C309 when applied at a rate of 400 square feet per gallon.
 - 3) Masterkure, Master Builders, or equal.
- L. Penetrating Concrete Sealer:
 1. Penetrating silane sealer, which is readily absorbed into concrete substrate and which reacts chemically to provide a hydrophobic barrier that will not wear off when exposed to sunlight or wheel traffic; which allows concrete to breath, allowing the escape of water vapor but preventing the absorption of surface water; colorless; not altering the surface texture of the concrete substrate. See Warranty requirements.
 2. Provide one of the following:

- a. Chem-Trete BSM 40, Hüls America, Inc. (1-800-828-0919).
- b. Penetrating 40, Sonneborn Division Chemrex (1-800-CHEMREX).
- c. Master Seal SL40, Master Builders Technologies.

M. Curing Materials:

1. Plastic sheeting: Polyethylene, ASTM C171.
 - a. Curing sheet: Type 1.1.1 and 1.1.2.
 - b. Vapor barrier: Clear 10-mils thickness.
2. Burlap sheet: AASHTO M182, Class 3 or 4.
3. Tarpaulin: FS K-P-146.
4. Blanket insulation: FS HH-I-521.
5. Membrane-forming curing compound: ASTM C309, Type 1-D, 100 resin with fugitive dye, and Type 2.

N. Epoxy Mortar:

1. Epoxy: ASTM C881, Type III-C, grey.
2. Sand: Clean, dry, well-graded particles, passing Size 16 sieve, with the following additional requirements:

<u>Individual Sieve Size</u>	<u>Percent by Weight Retained on Sieve</u>
30	26 to 36
50	18 to 28
100	11 to 21
Pan	25 to 35 (range shown is applicable when 60 to 100 percent of pan is retained on Size 200 sieve)

O. Waterstop: Section 03100.

P. Chairs for Reinforcement: Plastic or stainless steel.

- Q. Corrosion-inhibitor in concrete. The corrosion-inhibitor shall be calcium nitrite-based admixture DCI or approved equal. Use four (4) gallons per cubic yard of the corrosion inhibitor when the water-cement ratio is 0.40 or less and use three and a half gallons (3-1/2) per cubic yard when water-cement ratio is 0.38 or less.

2.02 GROUT MIXES:

A. Portland-cement grout:

1. Prepare grout composed of portland cement, sand and water.
2. Use portland-cement grout under bearing plates, in recesses, holes and surfaces under structural members and at other locations shown.
3. Do not use staining ingredients in grout exposed to view.
4. Formulation: Two parts sand and one-part cement measured by volume.
5. Mix grout with sufficient water to permit placing and packing, approximately 45 minutes prior to use.

B. Nonshrink grout: ASTM C1107.

C. Shrinkage-compensating grout:

1. Use shrinkage-compensating grout for setting structural members, anchor bolts, embedded items or items of equipment and machinery on hardened concrete.
2. Prepare nonstaining shrinkage-compensating grout with portland cement, sand and aluminum powder and use in accordance with manufacturer's recommendations.
3. Prepare shrinkage-compensating grout for use up to two inches thick as follows, measured by volume:
 - a. One-part portland cement, Type I or II.
 - b. One-part fine natural-sand aggregate, graded as specified.
 - c. One-part ferrous aggregate, graded as specified, combined with Type-A chemical admixture, oxidation agent and water in sufficient amount to permit placing and packing.

D. Premixed shrinkage-compensating grout:

1. In lieu of specified shrinkage-compensating grout, use premixed ready-to-use formulation when approved. Approval will be based on manufacturer's certification that:
 - a. Material will perform as specified.
 - b. Composition and proportioning of grout materials is essentially as specified for shrinkage-compensating.
 - c. Formulation has been used successfully in like applications for at least five years.
2. Proportion ingredients in accordance with the manufacturer's recommendations.

E. Mixing water:

1. Proportion mixing water in accordance with grout manufacturer's recommendation or to produce flowable mixture without segregation or bleeding.

F. Curing:

1. After grout has attained initial set, keep damp for 24 hours minimum.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL:

A. Classes of Concrete:

1. Classes of concrete are designated by numerals corresponding to their specified 28-day compressive strength in pounds per square inch as determined by ASTM C94.
2. Concrete classes used in this project are specified. Unless otherwise indicated, use Class 4000.
3. Each class of concrete may comprise one or more mixes determined by maximum size of aggregate, cement factor and types of admixtures used.
 - a. Portland cement may be used alone or mixed with either ground-iron blast- furnace slag or fly ash. Do not use fly ash in architectural concrete exposed to public view.

- b. Maximum allowable ground-iron blast-furnace slag: 50 percent of the total weight of the portland cement and ground-iron blast-furnace slag mixture.
 - c. Maximum allowable fly ash: 20-percent of the total weight of the portland cement and fly-ash mixture.
- 4. Concrete with fly ash or ground-iron blast-furnace slag may be used at locations shown on the drawings.

B. Types of Concrete:

- 1. Types of concrete are designated as Concrete other than Lightweight and Lightweight Structural Concrete.

C. Minimum Cement Factor:

- 1. Observe minimum cement factor for various classes of concrete other than lightweight, as follows:

Class of Concrete	Minimum Cement Factor Bags Per Cubic Yard Of Concrete
5,000	6.5
3,500 - 4,000	6.0
2,500 - 3,000	5.0

* one bag of cement = 94lbs. of cement

- 2. If a mix of portland cement and ground-iron blast-furnace slag or portland cement and fly ash is used, the mix is the basis of determining the bags per cubic yard of concrete.

D. Air Entrainment:

- 1. Determine air content of concrete in accordance with ASTM C94.

E. Testing of Concrete:

- 1. General:
 - a. Provide the Engineer with molds and concrete, and cast specimens for testing. In addition, furnish necessary testing equipment and tools to perform sampling, slump tests and yield tests. Furnish boxes for shipping samples.
- 2. Perform strength tests by making not less than one set of standard cylindrical test specimens for each 100 cubic yards of concrete or any portion thereof for each structure.
 - a. For each work shift, when concrete is delivered, make at least one set of specimens. A set of test specimens consists of at least three standard cylinders from a batch.
 - b. Perform slump tests, unit weight and air content tests with no less frequency than that of strength-specimen sets.
- 3. Concrete strengths:
 - a. Determine strengths from standard test specimens according to ASTM C31 and ASTM C172 and cured and tested in accordance with ASTM C39 by the testing laboratory. Core drilling and testing in accordance with ASTM C42. Consider the effects of

corrosion-inhibiting admixture and other admixtures on the strength of the concrete, in the concrete mix design. The corrosion-inhibiting admixture and other admixtures must be present in the concrete used for the test of the proposed mix strength.

- b. Compute and evaluate in accordance with ASTM C94.

F. Variability of Constituents in Concrete:

1. Take representative samples of concrete mortar.
2. Maximum allowable unit-weight variation of air-free mortar taken from consecutive batches as discharged from mixer:
 - a. Average of two mortar weights: 0.8-percent maximum.
 - b. Average of six mortar weights: 0.5-percent maximum.
3. Maximum allowable weight variation of coarse aggregate per cubic foot of concrete taken from consecutive batches as discharged from mixer.
 - a. Average of two weights: Five-percent maximum.

G. Allowable Concrete Finish Tolerances:

1. Finish concrete elements to dimensions, elevations and positions shown within the tolerances specified for each:
 - a. Formed surfaces such as walls, roof soffits, columns, beams and girders: Plus-or-minus 1/4 inch.

3.02 MATERIAL PREPARATION:

A. Mixing Concrete:

1. Operations:
 - a. Provide concrete mixers that discharge concrete of uniform composition and consistency.
 - b. Combine coarse aggregates of different gradation and identical sources, provided corresponding concrete mix has been approved. The use of alternate batches of gravel, crushed gravel or crushed stone of a single size is prohibited.
 - c. Adequacy of mixing will be determined by the Engineer by means of mixer performance tests in accordance with USBR Concrete Manual, Designation 26, Variability of Constituents in Concrete, in the appendix.
 - d. The Engineer may reduce size of batch to be mixed or increase mixing time when charging and mixing operations fail to produce concrete which conforms to specified requirements and which has uniform coloration and consistency.
 - e. Add water prior to, during and following mixer-charging operations. Do not overmix or add water to maintain consistency.
 - f. Use of concrete to which water in excess of amount permitted by approved design mix has been added to overcome conditions caused by excessive retention in mixer is prohibited.
2. Central-mixed concrete:
 - a. Arrange mixers in centralized mixing plant so that mixing action in mixers can be conveniently observed by the Engineer and plant operator.

- b. Do not load mixers in excess of rated capacity. Mix concrete ingredients in batch mixer for not less than period of time specified for various mixer capacities after each ingredient except full amount of water is in mixer. Reduce mixing time if thorough mixing as specified can be obtained in less time and if approved.
- c. Mixing time:

Cubic-Yard Capacity of Mixer	Mixing Time
2 or less	1-1/2 minutes
3	2 minutes
4	2-1/2 minutes
More than 4	To be determined per ASTM C94 tests

- d. Equip each mixer with mechanically operated batch counter and timing and signaling device to indicate completion of mixing period.
3. Truck-mixed concrete: Use equipment and procedures that conform to the requirements of ASTM C94 and ACI 304, Chapter 5, with the following additional requirements:
- a. Introduce materials, including water and mixtures, into the mixing drum only at the central batching plant, or
 - b. Transport aggregates from the central plant to the jobsite in the mixing drum and add measured and recorded cement, admixtures and water into the drum prior to mixing at discharge point.
 - c. When ice is used, add it with the water and counted as part of the water- cement ratio.
 - d. Place concrete within 90 minutes after cement is introduced into the mixing drum.
 - e. Accomplish initial mixing by 70 to 100 revolutions with drum rotating at the manufacturer's recommended speed. 30 revolutions at mixing speed will be required, if the addition of water is permitted. Do not exceed total of 300 mixing and agitating revolutions.
4. Temperature control:
- a. Use preparation methods capable of producing concrete with temperature 85F maximum and 55F minimum at time of placement.
 - b. Do not heat concrete ingredients to temperature higher than that necessary to keep temperature of mixed concrete as placed within specified temperatures.
 - c. Do not heat water in excess of 140F.
- B. Admixtures:
- 1. Introduce admixtures in solution form.
 - 2. Air-entraining admixture: Use for concrete exposed to weathering or in contact with rock or moist soil.
 - 3. Chemical admixtures:
 - a. Use water-reducing admixtures in concrete areas below grade in contact with rock, earth or fill.
 - b. Employ admixtures without interfering with specified air-content dosage of air-entrained concrete.

- c. Except as otherwise specified or approved, use of water-reducing, set- retarding or set-accelerating admixtures is prohibited.
- d. If introduction of certain admixtures to improve concrete strength is approved, do not reduce cement content below minimum amounts specified.

C. Consistency:

- 1. For concrete to be compacted by approved mechanical vibrators, maintain slump range at point of delivery within the following limits:
 - a. Concrete pavement, pavement base, sidewalk and incidental construction: Two to three inches.
 - b. Unreinforced concrete other than pavements: One to three inches.
 - c. Reinforced concrete: Two to four inches.
 - d. Concrete placed by pumping and concrete for filling steel-shell piles: Four to five inches.
 - e. Do not use concrete if slump exceeds maximum by 1/2 inch or more.

3.03 CONVEYING:

A. General:

- 1. Provide equipment for conveying concrete from mixer with continuous flow of concrete to point of placement without segregation.
- 2. Provide arrangement at discharge end of conveyor to prevent segregation.
- 3. Design long conveyor runs to discharge concrete into hopper, without segregation, before it is deposited in forms.
- 4. Ensure that pumps, pneumatic equipment, pipes, chutes and troughs are cleaned of dirt and concrete before use.

B. Chutes and Troughs:

- 1. Use only ferrous-metal-lined chutes and open troughs. Where steep slopes are unavoidable, equip chutes or troughs with baffles to minimize segregation of aggregates. Keep chutes or open troughs clean of hardened concrete by flushing with water after each use.
- 2. Discharge water used for cleaning outside lines of structure. Lay out chutes or open troughs with slope one-foot vertical to two feet horizontal maximum and one-foot vertical to three feet horizontal minimum.
- 3. Discharge chutes 20 feet or more in length into hopper before final distribution.

C. Adjustable Length Pipes (Elephant Trunks):

- 1. Use flexible pipes of ferrous metal, rubber or plastic, six inches minimum diameter so as to prevent segregation of concrete.
- 2. Position chutes or flexible pipes so that concrete is delivered in continuous flow to points not more than five feet horizontally and five feet vertically from final location. In vicinity of expansion and contraction joints, reduce horizontal distance to three feet maximum.
- 3. Clean flexible pipes and elephant trunks after each use.

D. Buggies:

1. Construct runways for buggies so they will not come into contact with or be supported by reinforcing steel of structure.

3.04 PLACEMENT:

A. General:

1. Prior to placing concrete, remove debris and extraneous material from interior of forms.
2. Place first lift of concrete on wet surface. Consolidate by dragging vibrator along edges of joints. Make sure there is no free or standing water over the surface.
3. Place concrete continuously and as rapidly as possible after mixing. Do not use vibrators for shifting mass of fresh concrete.
4. Place concrete in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams or planes of weakness. Cover each layer of concrete with fresh concrete within 45 minutes.
5. Do not place concrete which has attained initial set or concrete which has contained mix water for more than 90 minutes.
6. Remove temporary spreaders in forms when concrete has reached elevation which makes them unnecessary.
7. Place column concrete using adjustable-length flexible pipes or elephant trunks to avoid dropping concrete over five feet. In monolithic placements, do not deposit concrete in supported elements such as beams, girders and slabs until concrete previously deposited in columns or walls has completed its settlement shrinkage, but not to the point at which concrete in supporting members will not permit vibrator to sink into its mass of its own weight.
8. Placing will not be permitted when sun, heat, wind or limitations of facilities will prevent finishing and curing.
9. Concrete temperature at time of placement:
 - a. 55F, minimum.
 - b. 85F, maximum.
10. Unless approved, do not continue concreting when descending ambient air temperature falls lower than 40F.
11. Prior to placing fresh concrete against rock or previously placed concrete, take necessary steps, such as flushing with water, to ensure removal of foreign matter which would adversely affect bond.
12. Maintain wire fabric and other reinforcing in proper position on chairs during concrete placement.

B. Consolidation:

1. Consolidate concrete thoroughly as it is placed in order to secure a dense mass. Work concrete well around reinforcement, embedded items and into the corners of forms. Consolidate concrete in accordance with ACI 309.
2. Use internal vibrators unless external vibrators are approved.
3. Use vibrators capable of generating frequencies of not less than 7,000 impulses per minute. Verify that vibrators have power and amplitude factor so as to visibly affect mass of concrete of one-inch slump over radius of at least 18 inches. Prevent formation of laitance and accumulation of excessive water on surface of concrete as it is deposited. Remove excessive water by pumping or other approved means.
4. When consolidating concrete in haunches, girders, beams or slabs, ensure that vibrator penetrates and revibrates previously placed concrete in top of supporting members.

5. Do not use vibrators where internal vibration might cause damage to embedded items; in such cases spading is required.

3.05 CURING AND PROTECTING:

A. General:

1. Protect freshly placed concrete from excessively hot or cold temperatures. Maintain without drying for period of time necessary for hydration of cement and proper hardening of concrete.
2. Provide sufficient tarpaulins to cover completely or enclose forms and working areas prior to and during placing and finishing operations.
3. Cure newly placed concrete continuously for seven days at ambient temperature in excess of 55F.
4. Cure concrete in subway structures by normal curing method specified.
5. During curing period keep steel and wood forms wet. If forms are removed during curing, use one of the following methods of curing immediately and continue for remainder of the curing period.

B. Normal Curing and Protection:

1. Use one of the following methods for flat surfaces, weather permitting:
 - a. Use ponding on horizontal surfaces providing surface is continuously submerged for required curing period.
 - b. Apply continuous sprinkling with nozzle or nozzles which, during first 24 hours, atomize flow of water providing a mist and not a spray. Do not apply moisture under pressure directly upon concrete; avoid flowing or washing on surfaces while susceptible to erosion.
 - c. Cover entire surface of concrete with double thickness burlap sheet, laid directly on concrete and kept continuously wet. Maintain in good condition.
 - d. Sprinkle concrete surface as specified for at least 18 hours and immediately cover with waterproof curing sheet, free from holes or tears. Hold in position so that entire surface of concrete is fully and continuously covered.
 - e. Do not damage burlap, waterproof sheet or concrete surfaces.

C. Membrane-Forming Curing Compound:

1. Use curing compound when approved for circumstances where application of moisture is impracticable and where such compounds will not jeopardize appearance of concrete. Except as otherwise specified, use Type-1 compound, uniformly applied over surface at thickness recommended by manufacturer. Thoroughly mix compound and apply within one hour after mixing.
2. Where surfaces are subject to sunlight, apply Type-2 compound. Except for surfaces exposed to public view and architectural finished concrete.
3. Do not apply wax-resin curing compounds to surfaces requiring bond for additional concrete or where bonded surface coating such as paint, tile, dampproofing, waterproofing or roofing is to be applied.
 - a. Do not apply curing compound to floors to be chemically sealed.
4. Warm or stir curing compound if necessary for satisfactory application in accordance with manufacturer's recommendations. If film of compound is damaged before expiration of curing period, repair immediately with additional compound.

5. Inside surfaces of tunnels, cut-and-cover boxes and other surfaces specifically approved may be cured with Type-1 membrane curing compound.
6. Finish surfaces prior to application of curing compound. Do not use curing compound on construction joints.
7. Apply curing compound in two coats. Apply first coat immediately after stripping of forms and acceptance of concrete finish.
8. If surface is dry, thoroughly wet concrete with water and apply curing compound just as surface film of water disappears. Apply second coat after first coat has set.
9. Protect coating against damage for at least 10 days after application. If damage occurs, apply additional coating.
10. If use of curing compound results in streaked or blotchy appearance, cease operations and use other method of curing until cause of defective appearance is corrected.

D. Floor Treatment:

1. In accordance with recommendations of manufacturer of floor hardener, apply floor curing compound and curing sheet to surfaces to receive floor hardener.
2. Where such surfaces are subject to sunlight, protect them by tenting white opaque, polyethylene waterproof sheet.

E. Protection of Rod Reinforcement:

1. After forms are removed, coat rod reinforcement and dowels extending beyond concrete surfaces with application of neat cement paste.
2. Remove hardened cement paste and resultant debris immediately prior to extension of reinforcement or installation of formwork.

3.06 COLD WEATHER CONCRETING:

- A. Do not place concrete when ambient temperature is less than 55F and falling. Do not place concrete unless the form temperature at the time of placement is at least 40F.
- B. When ambient temperature is 40F and falling, carry out one of the following procedures to protect placed concrete:
 1. Heating:
 - a. Enclose forms or structures and heat to maintain concrete and air within enclosure at not less than 55F for seven days after placement.
 - b. Maintain relative humidity at not less than 40 percent during curing period when heat is applied to enclosures. Arrange stoves, salamanders or heaters so as to provide uniform distribution of heat. Vent combustion gases to outside air. Do not let hot air blow across concrete surfaces.
 - c. After seven-day curing period, reduce temperature within enclosure gradually at maximum rate of 20F per day until outside temperature has been reached.
 - d. Provide continuous and adequate fire protection and watchmen when heating units are in operation.
 2. Form insulation:
 - a. Insulate forms with blanket insulation of approved type and thickness to maintain concrete at 55F minimum for seven days.
 - b. Protect top of placed concrete by tarpaulins or other approved waterproof material over insulation.

- C. Do not allow concrete to freeze in a saturated condition prior to achieving a strength of 4000 psi.

3.07 HOT WEATHER CONCRETING:

- A. When temperature in forms is 75F or above, carry out the following procedures to protect placed concrete:
 - 1. Protect concrete from direct sunlight.
 - 2. Keep forms moist by means of cool-water sprinkling or application of wet burlap or cotton mats.
 - 3. At 90F or above cool aggregates with water spray hoses.
 - 4. Cool truck barrels with water spray system.

3.08 JOINTS:

- A. General:
 - 1. Unless otherwise shown make construction joints bonded joints by roughening surface to expose aggregates. Clean and roughen surface by wet sandblasting, by cutting with high-pressure water jet with a minimum pressure of 2,000 psi or by other approved means. Perform cleaning after concrete has hardened to prevent raveling of surface.
 - 2. Exercise caution in cleaning concrete to prevent damage to waterstops.
 - 3. Treat overlays on slabs the same as for rock or other bonded joint.
 - 4. Place construction joints at locations shown, or at locations approved by the Engineer.
- B. Horizontal Construction Joints:
 - 1. Joints within 18 inches of tops of faces are prohibited.
 - 2. Trowel top surface of concrete adjacent to forms smooth to minimize visible joints on exposed faces. Remove laitance and other objectionable materials from joint surface to expose sound concrete as soon as concrete is firm enough to retain its form.
 - 3. Immediately after placement of concrete, remove accumulations splashed on exposed reinforcement and surfaces of adjacent forms before concrete attains initial set.
- C. Other Joints:
 - 1. Install forms for vertical joints. Remove forms as soon as concrete has attained sufficient strength to be self-supporting.

3.09 CONCRETE FINISHING:

- A. When forms are removed, do not remedy voids, stone pockets and other defects until the Engineer has inspected them and given directions.
- B. Finish concrete surfaces as shown and as follows:
 - 1. Form Finish:
 - a. Immediately following form removal, remove fins and irregular projections from surfaces exposed to view or those that will receive waterproofing.
 - b. Prepare pointing mortar not more than 30 minutes prior to use.
 - c. Cure mortar patches as specified under curing and protection.
 - d. Leave contraction joints and articulated joints in completed work carefully tooled and free of mortar and concrete.

- e. Leave joint filler exposed for its full length with clean and true edges.
 - f. Apply this finish to structures, unless otherwise shown.
2. Wet-Rubbed Finish:
- a. Start rubbing of concrete after removal of forms and as soon as its condition will permit. Keep concrete thoroughly saturated with water before starting this work.
 - b. Allow sufficient time to elapse before wetting down to allow pointing mortar to thoroughly set. Rub surfaces with medium-coarse carborundum stone.
 - c. Continue rubbing until form marks, projections and irregularities have been removed, voids are filled and uniform surface is obtained.
 - d. Leave paste produced by rubbing in place. Obtain final finish by rubbing with fine carborundum stone and water after concrete above surface being treated has been cast. Continue rubbing until entire surface is of smooth texture and uniform color. After final rubbing is completed and surface has dried, rub with burlap to remove loose powder and objectionable marks.
3. Broomed Finish:
- a. Where floors and other areas are shown to have rough finish, strike-off surface with screeds and wood floats at elevation shown.
 - b. Before concrete has achieved initial set, broom transversely to flow of traffic with stiff, medium-bristle broom especially made for intended purpose to develop corrugations not more than 1/8-inch deep.
4. Steel-Troweled Finish:
- a. Where floors are shown to have a steel-troweled finish, screed concrete to established grades and compact with wood or power-driven disc float.
 - b. After surface has hardened sufficiently, finish with steel trowel to dense hard finish, free of trowel marks.
 - c. Do not use dry cement or mixture of dry cement and sand to absorb water.
- C. Do not sprinkle water or cement on surfaces to be trowel finished.

3.10 DEFECTIVE CONCRETE:

- A. Concrete will be considered defective unless it is structurally sound, watertight, properly finished and within specified tolerances.
- B. Concrete in place that is deemed structurally defective will be checked by the Engineer by drilled core specimens. If testing of core specimens shows that strength is less than 85 percent of specified strength, costs incurred in taking and testing of core specimens will be borne by the Contractor.
- C. Replace, strengthen or correct defective concrete as directed.

3.11 PROTECTION FROM AND REMOVAL OF STAINS:

- A. Protect concrete structure from rust staining by structural-steel members or from other substances during the work.
- B. If staining should occur, remove stains and restore concrete to its original color.

3.12 DAMAGED WORK:

- A. Before final acceptance of the work, neatly repair damaged surfaces, corners of concrete and concrete finish.
- B. Where surface repairs are permitted, finish damaged areas to smooth, dense watertight condition.
- C. Replace concrete that is not satisfactorily repaired.

3.13 CORRECTIVE WORK:

- A. Submit corrective action patching procedure.
- B. If correction of defects is approved, remove defective concrete; key area to be repaired, soak surface with water and patch with approved materials. Patch architectural concrete so as to match existing. Use bonding agents applied to the substrate or mixed with patching material only as approved by the Engineer.
- C. Clean surface cavities produced by form ties, other holes, honeycomb spots, broken corners or edges and other defects. Saturate with water and point with mortar paste consisting of cement and fine aggregate mixed in proportions to give same appearance as original concrete.
- D. Prepare pointing mortar not more than 30 minutes prior to use. Cure mortar patches properly. Carefully tool contraction and articulated joints in completed work and keep them free of concrete. Where necessary, leave joint filler exposed for its full length with clean and true edges.
- E. Tolerance deviations and other surface defects may also be corrected, if approved, by grinding high areas and swales. Leaks in station electrical rooms, TPSS and TBS shall be epoxy injected.
- F. Where necessary or when directed, repair leakage in excess of specified maximum allowable, by means of contact grouting, chemical grouting or other approved means.
- G. Where corrective work is unsatisfactory, completely remove such work and replace with new work complying with specified requirements.

3.14 EPOXY MORTAR REPAIRS:

- A. Surface Preparation:
 - 1. Remove defective concrete with chipping hammers or other approved equipment. To prevent removing extra material and causing cracks, saw-cut concrete area to be removed into maximum six-inch square checkerboard pattern 4-1/2 inches deep.
 - 2. Prepare exposed concrete surface by sandblasting clean and allowing to dry thoroughly. Surface drying may be accomplished by air jet. Ensure that compressed air used in cleaning and drying is free from oil or other contaminating materials.
 - 3. Maintain concrete surface in sufficient depth at temperature of 65F minimum during first four hours after placement of epoxy bond coat. Preheating may be done with radiant heaters or other approved means. Do not preheat concrete in excess of 200F with final surface temperature below 105F at time of placing epoxy materials.
- B. Application of Epoxy Bonding Agents:

1. Prepare epoxy bonding agent in accordance with manufacturer's recommendations.
2. Apply epoxy bonding agent to prepared dry concrete surface at coverage of 80 square feet per gallon maximum or as recommended by manufacturer
3. Epoxy bonding agent may be applied by any convenient and safe method which will yield effective coverage, such as squeegees, brushes or rollers.
4. During application of epoxy bonding agent, ensure that material is confined to area being bonded; avoid contamination of adjacent surfaces. Extend epoxy bond coat slightly beyond edges of repair area.

C. Application of Epoxy Mortar:

1. Mix epoxy components in accordance with manufacturer's recommendations.
2. Proportion: 5-1/2 parts sand by weight to one-part epoxy.
3. Mix components with slow-speed mechanical device.
4. Prepare mortar in small batches so that each batch can be completely mixed and placed within approximately 30 minutes.
5. Do not add thinners or dilutants to mortar mixture.
6. Immediately after application of epoxy bonding agent, place, tamp, flatten and smooth epoxy mortar.
7. Work mortar to grade.
8. Steel-trowel finish. Trowels may be heated to facilitate finishing.

D. Curing:

1. Cure epoxy mortar repairs immediately after completion at 60F minimum until mortar is hard.
2. Initiate post-curing of four hours minimum at surface temperature of 90F minimum, 110F maximum.
3. Heat may be applied by using portable propane heaters, infrared heaters or other approved sources positioned to attain necessary surface temperature.
4. Do not subject epoxy-bonded epoxy mortar to moisture until after specified post-curing has been completed.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies structural steel work.
- B. Options:
 - 1. Substitution of rolled shapes for welded sections and vice versa is permitted, provided that shapes and sections to be substituted are approved and comply with the following:
 - a. Keep depth, width, average or mean thickness, web shear area, moments of inertia, torsional constant and warping constant to be at least equal to those for shape or section shown. Maintain clearances and other dimensions shown as critical.
 - b. Have steel shapes, plates and bars conform to same ASTM designation as material for which substitution is made.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. AWS: D1.1.
 - 3. AISC:
 - a. Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design.
 - b. Manual of Steel Construction-Allowable Stress Design.
 - c. Code of Standard Practice for Steel Buildings and Bridges.
 - d. Allowable Stress Design Specification for Structural Joints using ASTM A325 or A490 Bolts.
 - 5. ASNT: Recommended Practice SNT-TC-1A.
 - 6. SSPC: SP-6, SP-10.
 - 7. ANSI: B27.2.
 - 8. MS: MIL-P-21035.
 - 9. ASTM: A6, A27, A36, A108, A109, A123, A148, A153, A242, A307, A325, A370, A449, A490, A500, A501, A514, A517, A572/572M, A588, A668, A673, A709, A780, B663, B766.
- B. Source Quality Control:
 - 1. Testing and inspection:
 - a. Nondestructive-test requirements for welded members:
 - 1) Perform the following:
 - 2) Tension butt welds in fracture-critical nonredundant members and member components of structures subject to repetitive dynamic loading: 100 percent of welds inspected by radiographic and ultrasonic examination.
 - 3) Butt welds of flange material for compression and tension splices: 100 percent of welds inspected by ultrasonic examination.
 - 4) Butt welds for web splices beginning at point of maximum stress: 40 percent of welds inspected by ultrasonic examination.

- 5) Fillet welds connecting web plates to flange plates: 25 percent of welds inspected by magnetic particle inspection.
- 6) For all other fillet-weld connections: 10 percent of welds inspected by magnetic particle inspection.
- 7) The Engineer may designate additional items to be inspected by radiography.
- b. Bolts:
 - 1) The Engineer will randomly select at least five bolts for test purposes from each bin of bolts furnished.
- C. Qualification of Welding Personnel and Procedures:
 1. Prior to qualifying welding personnel and welding procedures, confirm an agreement with the Engineer as to procedural details, sequence of welding, handling of materials to be inspected, and approval of electrodes, wire, flux and other welding materials and equipment.
 2. Employ welding personnel whose qualification is certified in accordance with AWS D1.1. Such certification is to remain in force for the duration of the welding operations under this Contract.
 3. Do not start fabrication until qualification has been successfully completed.
- D. Qualification of Nondestructive-Testing Personnel:
 1. Nondestructive testing of fracture-critical members to be conducted by personnel qualified as NDT Level II or Level III in accordance with ASNT SNT-TC-1A.
 2. Level-II technicians to be supervised by Level III-personnel.
- E. Stock Material:
 1. For qualification of welding personnel and procedures and for quality-assurance testing, use only stock materials which can be identified as having been rolled from a given heat and for which certified mill tests can be produced.
 2. When stock material is proposed, inform the Engineer of such intention at least 10 days in advance of commencing fabrication to permit sampling and testing. Select identified material from as few heats as possible.
- F. Welder's Identification Mark (for Fabrication Shops):
 1. Assign each welder and welding operator an identification mark to stamp on pieces he has welded.
 2. Have welder or welding operator place his identification mark by metal-die stamp in letters 3/8-inch high in position that identification of welder or operator will appear adjacent to each of his welds in finally assembled members for ready reference to radiographic films and for identification by the Engineer.

1.03 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

- A. Shop Drawings:
 1. Structural details: Include the following:
 - a. Bills of materials giving complete information for fabrication and erection of component parts of structures including material and finish information.
 - b. Details of location, type, sizes of bolts and welds and for welded structures details of welding as specified.

- c. Structural computations for Contractor-designed work certified by a professional engineer registered in the jurisdiction where the work is to be performed.
 2. Match marks:
 - a. Provide diagram showing match marks for connecting structural parts assembled in shop for purpose of drilling or reaming holes in field connections.
 3. Welding:
 - a. Complete shop details of qualification test specimens.
 - b. Include information on specimen identification, number of pieces and welding procedure specification, type of material, sizes of pieces and welds and other variables affecting detail or tests.
 4. Erection Plan:
 - a. Details of methods of erection proposed to be used, including calculated stresses for proposed erection certified by a professional engineer registered in the jurisdiction where the work will be performed. Do not proceed until approval has been received.
 5. Manufacturer's test procedures for bolts.
- B. Certification:
 1. Certified mill test reports of structural steel at least 10 days prior to start of fabrication.
 2. Certified quality-assurance testing and inspection reports.
 3. Certification verifying that welding personnel have been qualified in accordance with AWS D1.1 and as specified above under Qualifications of Welding Personnel and Procedures.
 4. Manufacturer's certification that bolts meet approved testing.
 5. Certification of nondestructive-testing personnel.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. General:
 1. Load, transport, unload and store structural materials so as to keep them clean and free from damage.
 2. Store material on platforms, skids or other supports above the ground and ensure proper drainage and protection from corrosion.
- B. Steelwork:
 1. When handling and shipping steelwork, prevent bending, scraping or over stressing members.
 2. Block projecting parts likely to be bent or damaged during handling with wood or other approved material
 3. Replace pieces bent or damaged unless repair is approved.
 4. Indicate weight on members weighing more than three tons by means of paint contrasting with shop coat.
- C. Bolts and Nuts:
 1. Ship small parts such as bolts, nuts, washers, pins, fillers and small connecting plates or angles in boxes, crates or barrels.
 2. Pack separately bolts of each length and diameter and loose nuts or washers of each size.
- D. Paint:

1. Have paint materials delivered in manufacturer's original sealed containers, bearing manufacturer's label and name, specification identification number where applicable as well as month and year of manufacture.

1.05 JOB CONDITIONS:

A. Environmental Requirements:

1. Welding:

- a. When welding during cold weather, avoid chilling weld metal within zone of welding influence and avoid restraining manual functions of welder or welding operator.
- b. When temperature where steel is stored is more than 20F below that of welding shop, move steel to be welded into shop sufficiently in advance of welding to allow it to attain shop temperature prior to welding.
- c. Steel to be free of moisture. Dry as necessary by application of heat not exceeding 100F.
- d. Do not weld when shop temperature is below 40F.

2. Painting:

- a. Apply paint when temperature of steel and paint is above 40F and temperature is forecast to remain above 40F until paint has dried.
- b. Painting steel at a temperature which can cause blistering, porosity or conditions otherwise detrimental to life of paint is prohibited. When paint is applied in hot weather or thinned in cold weather, ensure that specified thickness of paint coating is obtained.
- c. Application of paint in rain, wind, snow, fog or mist or when steel surface temperature is below dew point is prohibited, unless otherwise approved. If painting in damp or cold weather is unavoidable, provide protective covering and heat steel and surrounding air to 40F minimum. Maintain this temperature until weather conditions permit discontinuance.

PART 2- PRODUCTS

2.01 MATERIALS:

- A. Carbon-Steel Plates, Shapes and Bars: ASTM A36, ASTM A709, Grade 36.
- B. High-Strength, Low-Alloy, Structural Steel: ASTM A992.
- C. Low-Carbon Steel Bolts and Nuts: ASTM A307, Grade A or B.
- D. High-Strength Carbon-Steel Bolts, Nuts and Washers for Structural Joints: ASTM A325; for bolts over one-inch diameter, ASTM A449.
- E. High-Strength Alloy-Steel Bolts, Nuts and Washers for Structural Joints: ASTM A490.
- M. Structural-Steel Tubing:
 1. Structural framing: ASTM A500, Grade B.
- N. Structural Steel Pipe: ASTM A53, Grade B.
- T. Paint for Shop Prime Coating: FS TT-P-645.

- U. Cleaning Solution: Muriatic acid solution, specific gravity 1.18, prepared in a solution of one-part muriatic acid and five parts water.

PART 3 - EXECUTION

3.01 FABRICATION:

- A. Workmanship and finish to best commercial practice accomplished in structural or bridge shops.
- B. Straightening Material:
1. Use rolled material that, before being laid off or worked, is straight within tolerances specified in ASTM A6.
 2. Perform straightening where necessary by approved methods which will not overstress material.
 3. Do not heat-shrink low-alloy structural steel.
 4. Achieve fabrication tolerances which will result in full bearing.
 5. Perform straightening, planing and connecting of portions of members in bearing assemblies and in direct bearing after fabrication as necessary to provide full bearing assemblies and bearing areas.
- C. Cutting:
1. Flame-cut edges of members subject to dynamic loading by mechanically guided torch or by hand. Remove nicks by grinding to depth not exceeding 1/4 inch.
 2. Shape re-entrant corners notch-free to radius of 1/2-inch minimum.
 3. Perform flame cutting so that metal does not carry stress during cutting operation.
 4. Direct flame so that remaining material is not damaged.
- D. Planing and Facing:
1. Plane to depth of 1/4 inch sheared edges of plates more than 5/8-inch thick which will carry calculated stress.
 2. Face and bring abutting joints to even bearing where shown.
 3. Fabricate floor beams, stringers and girders having end connection angles to exact length back-to-back of connection angles.
 4. For compression joints depending on contact, prepare bearing surfaces to a common plane by milling, sawing or other approved means.
 5. Where end connections are faced, ensure that finished thickness of angle is not less than that shown.
- E. Bolt Holes:
1. Punch or drill holes for bolts.
 2. Subpunch or subdrill and ream assemblies using steel template for alignment of connections as necessary. Flame cutting is prohibited.
 3. Subdrill or subpunch holes 3/16-inch less than nominal diameter of bolt; drill or ream holes 1/16-inch greater than nominal diameter of bolt.
- F. Connections:
1. Except where welded or ASTM A307 bolted connections are shown, use ASTM A325 or ASTM A490 bolts for shop connections.
 2. Unless otherwise shown, bolt field connections using ASTM A325 or ASTM A490 bolts in accordance with AISC Specifications for Structural Joints.
 3. Use of ASTM A490 bolts for dynamic or fluctuating loadings is prohibited.

G. Plates:

1. Bent plates: For load carrying cold-bent plates, use identified stock and arrange direction of bending at right angles to direction of rolling. Ensure radius of bend, measured on concave face of metal, is not less and preferably more than the following:

Angle of Plate Bend in Degrees	Minimum Radius
61 - 90	1.0T*
91 - 120	1.5T*
121 - 150	2.0T*

*T = Plate thickness.

2. Sheared plates: For gusset plates or connection plates, use sheared plates designed to resist applied loads in more than one direction in plane of plate.

3.02 WELDING:

- A. Perform welding in accordance with AWS D1.1.
- B. Perform procedure and sequence of welding so as to avoid needless distortion and to minimize stresses. Straighten transverse warpage of flanges, if necessary, by controlled heating along outside face.
- C. Make allowance in shop for expected weld shrinkage in laying out and assembling members. Trim members to size when most or all of welding has been completed.
- D. Complete butt welds in flange joints before flanges are assembled on web. Use extension blocks on such joints when making ends of butt welds, removing extension blocks only upon completion and cooling of weld. Ensure ends of welds are finished smooth and flush with edges of abutting parts. Use double-V-flange butt welds, unless otherwise shown. Back puddle all end craters.
- E. Make welds in web plates where shown.
- F. Prior to ultrasonic or radiographic testing of butt welds of flanges and webs, grind or machine weld reinforcement of joint to remove irregularities of weld surface so that it merges smoothly with base surface; one side for ultrasonic testing and both sides for radiographic testing.
- G. Ensure that welded joints which are to be radiographed are free of paint, scale and grease. Grind off welded ripples and surface irregularities on both sides of joint. Grind perpendicular to length of weld and to such a degree that resulting radiographic contrast due to remaining irregularities cannot mask or be confused with that of objectionable defect and so that weld surface will merge smoothly into adjoining surface.
- H. Repair defective welds by chipping or melting out such defects from one or both sides of joint removing no more weld metal than necessary to correct defect. Reweld and have weld retested radiographically.
- I. Welded Structures Subjected to Dynamic Loads:
 1. Do not use backup bars for fracture-critical nonredundant members or member components, as defined by AASHTO on Interim 1981 Fracture Control Plan.

2. Avoid use of backup bars elsewhere, unless explicitly permitted by original design.
3. When use of backup bars is unavoidable because of practicality but not explicitly permitted by original design, remove backup bar after welding is completed and affected surfaces of weld metal and base metal is ground flush. Roughness of ground surfaces to be similar to that of surrounding unaffected plate surface.

3.03 BOLTING:

- A. Connections using high-strength steel bolts in accordance with AISC Specifications for Structural Joints using ASTM A325 or ASTM A490 bolts.
- B. Assemble high-strength bolted parts so that they fit solidly together when assembled. Do not use gaskets or other compressible materials.
- C. Remove scale, dirt, burrs and other defects likely to prevent proper seating when assembling joint surfaces, including those adjacent to washers.
- D. Remove oil, paint, lacquer and galvanizing from contact surfaces of friction joints.
- E. Use two nuts on unfinished bolts and turned bolts in tension.
- F. Tightening Bolts:
 1. Tighten ASTM A325 or A490 bolts to bolt tension not less than proof load given in AISC Specifications for Bolts.
 2. If approved, tighten by means of properly calibrated wrenches or turn-of-nut method.
 3. When tightening, place hardened washer under nut or bolt head, depending on which element is turned in tightening operation.
 4. Calibrate torque wrenches daily by tightening bolt assembly in device capable of indicating actual bolt tension.
 5. Install three bolts minimum from each lot.
 6. Nuts or bolts to be in tightening motion when torque is measured.
 7. Adjust power wrenches to cut-out or stall at required tension.
- G. Arrange bolts so that heads show in areas exposed to public view.

3.04 SHOP ASSEMBLY:

- A. Clean surfaces of metals in contact with each other with high speed wire brushes before assembling.
- B. Assemble parts to line and fit; drill or ream bolt holes while assembled. Hand reaming is prohibited unless approved.

3.05 SHOP PRIME PAINTING:

- A. Clean steel surfaces in accordance with SSPC SP-6 or SP-10.
- B. Shop Painting:
 1. Shop paint structural-steel work which will be left bare in finished structures.
 2. Do not shop paint the following:
 - a. Surfaces within three inches of joints to be field welded.

- b. Contact surfaces: Apply rust-inhibitive treatment to such surfaces; remove by means of appropriate solvent prior to assembly.
- c. Surfaces to be encased in concrete or in fire-protection material.
- 3. Use paint-spraying equipment, if approved, with type of spray gun recommended by paint manufacturer for paint being applied.
- 4. Use brushes of good quality bristle. Nylon brushes and roller coaters are prohibited.
- 5. Neutralize areas of welding which are to be painted by applying specified cleaning solution. Wash neutralized area thoroughly with clean water and allow to dry before painting.
- 6. Apply shop prime coat at minimum wet-film thickness of three mils. Give surfaces which will be inaccessible after assembly or erection three coats of paint before assembly.
- 7. Caulk small cracks, cavities and open seams around stiffeners and connections with pasty mixture of red lead and linseed oil or approved caulking putty and allow to dry before applying full shop coat.
- 8. Apply stripe coat of paint to edges, corners, bolts, welds and other sharp edges before giving steel full shop coat of paint. Apply stripe coat at least one-inch beyond area to be striped and allow to dry before applying full shop coat.
- 9. Paint erection marks and weight on each member after shop coat has dried.
- 10. Complete shop painting and ensure paint has completely dried prior to shipment of steel.

3.06 ERECTION:

- A. Install anchor bolts accurately in positions shown.
- B. If anchor bolts are cast in substructure masonry during its construction, ensure that each bolt is firmly held in its correct position and elevation by suitable templates.
- C. If approval is given for installing anchor bolts in preformed holes or in drilled holes in concrete or masonry, use approved nonshrink, nonstaining grout to secure them in place.
- D. Set bearing assemblies to lines and grades shown and adjust to horizontal position shown.
- E. Erect steel structures true and plumb following match marks.
- F. Use temporary bracing to support loads to which structures may be subjected including erection equipment and their operations. Leave bracing in place as long as safety requires.
- G. Report immediately to the Engineer errors in shop fabrication or deformation resulting from handling or transportation which prevent proper erection and fitting of parts.
- H. As erection progresses perform sufficient bolting of work to support dead load, wind load and erection load. Perform permanent bolting when enough alignment has been accomplished to ensure that as much of structure as possible will be supported by such fastening work.
- I. Ensure that holes are not enlarged and that metal in vicinity of holes is not disturbed by drifting during assembly.
- J. Enlargement of holes to accept bolts for connections is prohibited unless approved. Make enlargement by reaming not by burning. Avoid hand reaming.

- K. Do not field weld main stress members.

3.07 NONDESTRUCTIVE TESTING OF FIELD WELDS:

- A. Perform pertinent testing specified for source quality control.

3.08 FIELD TOUCH-UP PAINTING:

- A. Retouch surfaces where shop coat has been damaged using paint and paint-film thickness identical to original shop coat.
- B. After erection, clean field bolts, nuts and adjacent areas and apply coat of paint identical to original shop coat.

3.09 FINISH PAINTING:

- A. Ferrous Metal - Alkyd, Semigloss: Two coats over primer with total dry film thickness not less than 2.5 mils.
- B. Undercoat: Enamel undercoat made for use as an undercoat over a primer on ferrous metal under an odorless alkyd enamel:
- a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel.
 - c. Moore: Moore's Alkyd Enamel Underbody 217.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100 Series.
- C. Finish Coat: Semigloss odorless alkyd enamel made for use over a primer and undercoat on ferrous metal surfaces (FS TT-E-509):
- a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel
 - c. Moore: Moore's Satin Impervo Enamel 235.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100 Series.
- D. Apply paint by spray in accordance with the manufacturer's directions to achieve required dry film thickness (DFT). Where specifically approved by the Engineer, use rollers or brushes as best suited for material being applied. For covers on rollers use carpet with velvet back and high-pile sheep's wool or use short-hair covers, as best suited for material and texture specified. Except where otherwise noted, apply paint to a minimum dry-film thickness (DFT) of five mils, excluding filler coats, using no less than the number of coats specified in Part 2 – Products.

END OF SECTION

SECTION 05500

MISCELLANEOUS METAL

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing miscellaneous metal, with the exception of ornamental (architectural) metal and metalwork provided as a part of mechanical, electrical and construction systems.
- B. Related Work Specified Elsewhere:
 - 1. Concrete, concrete fill and non-shrink grout: Section 03300.
 - 2. Concrete formwork: Section 03100.
 - 3. Concrete reinforcement: Section 03200.

1.02 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

- A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
 - 2. Manufacturer's standard drawings may be submitted in lieu of Contractor-prepared shop drawings if manufacturer's standard drawings show required details.
- B. Certification:
 - 1. Certification that welding personnel are currently qualified in accordance with AWS D1.1.
 - 2. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements for corrosion resistance of Type 316 stainless steel.

1.03 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. AWS: D1.1.
 - 3. AISC: Specification for Structural Steel for Buildings-Allowable Stress Design
 - 4. SSPC: SP 11, Paint 12.
 - 5. FED STD: 595.
 - 6. MS: MIL-P-21035.
 - 7. FS: A-A-462, FF-B-588, FF-H-116, FF-P-395, FF-S-325, RR-T-650, TT-P-86.
 - 8. ASTM: A36, A53, A74, A108, A123, A167, A193, A229, A242, A276, A307, A313, A325, A413, A490, A501, A536, A570, A572, A588, A666, A780, A786/A786M, B 221, B 632, B633, D412, D1187, E488, F 593, F 594, F1554.
 - 9. AGA: The Design and Fabrication of Galvanized Products.
 - 10. ANSI: A14.3

11. ASME: A 17.1, B18.6.3, B18.21.1, B18.22.1.

B. Qualifications of Welding Personnel:

1. Welding: Qualify procedures and personnel according to the following:

- a. AWS D1.1, "Structural Welding Code--Steel."
- b. AWS D1.2, "Structural Welding Code--Aluminum."
- c. AWS D1.3, "Structural Welding Code--Sheet Steel."
- d. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification. Such certification is to remain in force for the duration of the welding operations under this Contract.

C. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.04 PROJECT CONDITIONS:

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products undamaged.
- B. Store products so as to prevent rust.
- C. Handle products so as to prevent damage.
- D. After completion of factory testing, package and ship hatches as directed.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. General Requirements:

1. Insofar as practicable, furnish similar products of a single manufacturer.
2. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 FERROUS METALS:

- A. Structural steel: Plates, shapes, bars and angles, ASTM A36.
- B. Rolled-Steel Floor plate: ASTM A786/A786M; Fabricate raised-pattern floor plates from rolled-steel floor plate, galvanized after fabrication, of thickness and in pattern indicated below:
 - 1. Thickness: Minimum 1/4 inch, unless otherwise shown or calculated.
 - 2. Pattern: No. 2, or as selected from manufacturer's standard patterns; flat back.
- C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Hot-rolled carbon steel sheets and strips: ASTM A570.
- E. Pipe, Pipe Sleeves and Pipe Fittings:
 - 1. Cast iron: ASTM A74, service weight.
 - 2. Steel: ASTM A53, galvanized unless otherwise shown or specified.
- F. Guard Chain: ASTM A413, Class Grade 28, galvanized steel, 9/32-inch thick, complete with stainless-steel eyes, spring-loaded catches and mounting components.

2.03 COATINGS:

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Zinc-rich paint: MS MIL-P-21035.

2.04 FASTENERS:

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Screws: Material, type and size to suit the purpose; steel, except stainless, zinc-plated.
 - 1. Stainless steel, ASTM A193, Alloy S30400.
- C. Machine bolts: Material, type and size best suited to the purpose. Minimum tensile strength 60,000 psi.
 - 1. Carbon steel: ASTM A307, Grade B, galvanized.
 - 2. Stainless steel: ASTM A193, Class 1A.
- D. Toggle bolt: FS FF-B-588.
- E. Drive stud: FS FF-S-325, Group 6.
- F. Expansion shield: FS FF-S-325 Group I, Type 2, Class 2, Style 1; Group II, Type 3, Class 1; Group IV, Type 1; best suited to the purpose.
- G. Screw anchors: Lead or plastic for wood or metal screws.

- H. Anchor-bolt sleeve: Corrugated high-density polyethylene plastic.
- I. Powder actuated: FS FF-P-395.
- J. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F593 and nuts complying with ASTM F594.
- K. Internally Threaded Steel Anchor: ASTM A108.

2.05 CONCRETE AND GROUT:

- A. Nonshrink Grout: Section 03300.

2.06 FABRICATION, GENERAL:

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges
- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.07 LADDERS:

- A. General: Fabricate ladders for locations as called out on drawings or as required, with dimensions, spacings, details, and anchorages as indicated.
 - 1. Comply with ANSI A14.3, unless otherwise indicated.
- B. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
- C. Bar Rungs: 3/4-inch diameter steel bars, spaced 12 inches o.c., unless shown otherwise.
- D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and not more than 48 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
- F. Provide nonslip surfaces on top of each rung by coating with abrasive material metallurgically bonded to rung by a proprietary process.
- G. Galvanize ladders, including brackets and fasteners, in exterior locations and in areas with corrosive environments:

2.08 LADDER SAFETY CAGES:

- A. General: Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or riveting.
- B. Primary Hoops: 5/16-by-4-inch steel flat bar hoops. Provide at tops and bottoms of cages and spaced not more than 20 feet o.c.
- C. Secondary Intermediate Hoops: 5/16-by-2-inch steel flat bar hoops, spaced not more than 48 inches o.c. between primary hoops.
- D. Vertical Bars: 5/16-by-2-inch steel flat bars secured to each hoop, spaced approximately 9 inches o.c.
- E. Fasten assembled safety cage to ladder rails and adjacent construction by welding or riveting, unless otherwise indicated.

- F. Galvanize ladder safety cages, including fasteners, in exterior locations and in areas with corrosive environments.

2.09 SAFETY TREAD:

- A. FS RR-T-650, Type C, metallic, nonskid, class and style as shown.
- B. Drilled and countersunk to receive flathead screws.

2.10 SHELF ANGLES:

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.
- C. Galvanize shelf angles to be installed in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.11 MISCELLANEOUS ITEMS:

- A. Fabricate metal items indicated on the drawings from materials shown or, if not otherwise described, from steel or from galvanized steel wherever exposed to the weather or in contact with concrete or masonry.
- B. Make miscellaneous items to the size and configuration indicated, welded or bolted at joints to develop full strength equal to a continuous member, and in every way complete for the intended purpose and finished in appearance.

2.12 FINISHES:

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish metal fabrications after assembly.
- B. Galvanizing:
 - 1. Clean ferrous metal thoroughly before applying zinc coating.
 - 2. Apply zinc coating to products after fabrication, by hot-dip method, using coating weighing not less than 2.0 ounces per square foot.
- C. Shop Paint:
 - 1. Ferrous metal thoroughly cleaned as recommended by primer manufacturer and in accordance with SSPC SP11 and, except for items to be encased in concrete, given prime coat of paint.
 - 2. Zinc yellow iron-oxide primer or red-lead base primer applied so as to thoroughly cover surfaces without leaving runs or sags.

- D. Stainless Steel: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- E. Aluminum: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- F. Non-Slip Abrasive Surfaces: SLIP-NOT as manufactured by the W. S. Molnar Company or approved equal. Fabricate from steel plate or bar with abrasive material metallically bonded to steel by a proprietary process. Provide material with coefficient of friction of 0.6 or higher when tested according to ASTM C1028.

PART 3 – EXECUTION

3.01 PREPARATION:

- A. Remove foreign substances from surfaces to receive metal items.
- B. Protect surrounding surfaces from damage while performing the work of this section.

3.02 INSTALLATION, GENERAL:

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.03 PAINTING AND REPAIRING COATED SURFACES:

- A. Before erection or enclosing construction, paint items that support masonry or will be concealed in finished work, except items encased in concrete.
- B. Where shop coat is abraded, or burned by welding, clean and touch-up.
- C. Touch-up primed surfaces with same material as coating.
- D. Where aluminum parts come in contact with concrete or steel, coat contact surfaces of aluminum with bituminous coating.
- E. Coat field welds and repair damage to zinc-coated surfaces in accordance with ASTM A780 and as follows:
 - 1. Wire-brush areas to be coated to bright metal.
 - 2. Apply galvanizing repair compound at rate of two ounces per square foot.

END OF SECTION

SECTION 05521

HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing steel pipe and tube handrails and railings.
- B. Related Work Specified Elsewhere:
 - 1. Miscellaneous Metal: Section 05500.
 - 2.

1.02 PERFORMANCE REQUIREMENTS:

- A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
 - 1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
- B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated or higher if required by the jurisdictional authority where installed
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated or higher if required by the jurisdictional authority where installed:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area or higher if required by the jurisdictional authority where installed.
 - a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.03 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of handrails and railings.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
 - 1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for products with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, prepared on components indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. 6-inch-long sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
- E. Product Test Reports: From a qualified testing agency indicating products comply with requirements, based on comprehensive testing of current products.
- F. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.04 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ADA: Americans with Disabilities Act.
 - 3. AGA: The Design and Fabrication of Galvanized Products.
 - 4. AISC: S335.
 - 5. AISI: SG-673, Part I.
 - 6. ASTM: A36, A53, A90, A123, A143, A153, A384, A500, A780, B633, C1107, D256, D635, D638, D695, D790, E488, E548.
 - 7. AWS: D1.1, D1.3.
 - 8. FED STD: 595.
 - 9. FS: A-A-462, FF-B-588, FF-H-116, FF-P-395, FF-S-325, TT-P-644.
 - 10. NAAMM: Metal Finishes Manual for Architectural and Metal Products, Pipe Railing Manual.
 - 11. SSPC: PA 1, Paint 5, SP 6, SP 7.

- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E548.
- D. Welding: Qualify procedures and personnel according to AWS D1.1 "Structural Welding Code-Steel," and AWS D1.3, "Structural Welding Code-Sheet Steel".
- E. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products undamaged.
- B. Store handrails and railings in a dry, well-ventilated, weathertight place.
- C. Handle products so as to prevent damage.

1.06 PROJECT CONDITIONS:

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 COORDINATION:

- A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.08 SCHEDULING:

- A. Schedule installation so handrails and railings are mounted only on completed structure. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.01 FERROUS METALS:

- A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

- B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
 - 1. Steel Pipe: ASTM A53; finish, type, and weight class as follows
 - a. Black finish, unless otherwise indicated.
 - b. Galvanized finish for exterior installations and where indicated. Type E, Grade A, standard weight (Schedule 40) for rails and extra heavy weight (Schedule 80) for posts, unless another grade and weight are required by structural loads.
 - 2. Steel Tubing: Cold-formed steel tubing, ASTM A500, Grade A, unless another grade is required by structural loads.
 - 3. Steel Plates, Shapes, and Bars: ASTM A36.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.02 WELDING MATERIALS, FASTENERS, AND ANCHORS:

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction Indicated and capable of withstanding design loads.
 - 1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating.
- C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.
 - 2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. Anchoring Devices:
 - 1. Toggle bolt: FS FF-B-588.
 - 2. Drive Stud: FS FF-S-325, Group 6.
 - 3. Expansion Shield: FS FF-S-325, Group I, Class 2, Style 1; Group II, Type 3, Class 1, Group IV, Type 1; best suited to the purpose.
 - 4. Screw Anchors: Lead or plastic for wood or metal screws.
 - 5. Powder actuated: FS FF-P-395.

2.03 COATINGS:

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

- B. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.
- C. Galvanizing (zinc-coating by hot-dipped process): ASTM A90, ASTM A123, or ASTM A143, ASTM A153 or ASTM A384, as applicable.
- D. Galvanizing Repair Compound: Stick form, melting point 600-degree F to 650-degree F, GALVABAR or equal.
- E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.04 FABRICATION, GENERAL:

- A. Fabricate and prepare products required to be galvanized in accordance with recommendations of AGA.
- B. Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- C. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- D. Form changes in direction of railing members as follows:
 - 1. By bending.
 - 2. By radius bends of radius indicated on approved shop drawings.
- E. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- F. Welded Connections: Fabricate metal handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

- H. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- I. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- J. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- K. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- L. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- M. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- N. Fabricate joints that will be exposed to weather in a watertight manner.
- O. Close exposed ends of handrail and railing members with prefabricated end fittings.
- P. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated on approved shop drawings.

2.05 FABRICATION, PIPE RAILINGS AND RAILING GATES:

- A. Pipe: Black steel, ASTM A53, Type E, Grade A, standard weight (Schedule 40) for rails and extra heavy weight (Schedule 80) for posts, unless another grade and weight are required by structural loads, 1 inch nominal ID unless otherwise shown on approved shop drawings. Fabricated in accordance with NAAMM, "Pipe Railing Manual" and as shown on approved shop drawings.
- B. Plates, shapes and bars: Structural Steel.
- C. Intersections neatly coped, fully welded and ground smooth.
- D. Heated and bent smoothly, without distortion.
- E. Galvanized after fabrication.
- F. Hardware:
 - 1. Hinges: FS FF-H-116, Type 2127H, US2H finish.
 - 2. Cane bolt: FS A-A-462.
 - 3. Double-acting latch:

- a. Shop fabricated.
- b. Housing and strike: Steel, ASTM A36.
- c. Turn piece and bolt: Bronze, US10B
- d. Spring: Phosphor bronze.

2.06 FABRICATION, HANDRAILS:

- A. Pipe: Black steel, ASTM A53, Type E, Grade A, standard weight (Schedule 40), 1 inch nominal ID, unless otherwise indicated on approved shop drawings.
- B. Galvanized after fabrication.
- C. Bonderized and shop primed.

2.07 FINISHES, GENERAL:

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

2.08 STEEL FINISHES:

- A. Galvanized Handrails and Railings: Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A153/A153M.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A123, for galvanizing steel and iron products.
 - 2. ASTM A153/A153M, for galvanizing steel and iron hardware.
- C. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- E. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
- F. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."

2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning." Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
3. Do not apply primer to galvanized surfaces.
4. Stripe paint edges, corners, crevices, bolts, and welds.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL:

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.02 RAILING CONNECTIONS:

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.03 ANCHORING POSTS:

- A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
 2. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.04 ANCHORING RAILING ENDS:

- A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
 1. Weld flanges to railing ends.

3.05 PAINTING AND REPAIRING COATED SURFACES:

- A. Before erection or enclosing construction, paint items that support masonry or will be concealed in finish work, except items encased in concrete.

- B. Where shop coat is abraded or burned by welding, clean and touch-up.
- C. Touch-up primed surfaces with same material as coating.
- D. Where aluminum parts come in contact with concrete or steel, coat contact surfaces of aluminum with bituminous coating.
- E. Coat field welds and repair damage to zinc-coated surfaces in accordance with ASTM A780 and as follows:
 - 1. Wire brush areas to be coated to bright metal.
 - 2. Apply galvanizing repair compound at rate of two ounces per-square-foot.

3.06 PROTECTION:

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 05531

METAL GRATINGS AND FLOOR PLATES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section includes providing corrosion resistant gratings.
 - 1. Related Work Specified Elsewhere:
 - a. Structural Steel: Section 05120.
 - b. Miscellaneous Metal: Section 05500.
 - c. Handrails and Railings: Section 05521.

1.02 PERFORMANCE REQUIREMENTS:

- A. Structural Performance: Provide gratings capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections:
 - 1. Steel gratings: For maintenance platforms and locations subject to foot traffic only: Capable of withstanding a uniform load of 40 lbf/sq. Ft or 2000 lbf concentrated load. Limit deflection to 1/200 of span.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Product Data: For the following:
 - a. Gratings.
 - b. Clips and anchorage devices for gratings.
 - c. Paint products (if applicable).
 - 2. Shop Drawings: Show fabrication and installation details for gratings. Include plans, elevations, sections, and details of connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
 - a. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 3. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
 - 4. Welding Certificates: Copies of certificates for welding procedures and personnel.
 - 5. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.04 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ADA: Americans with Disabilities Act.
 - 3. ASME: B18.21.1, B18.22.1.

4. ASTM: A36, A90, A123, A143, A153, A242, A307, A384, A510, A570, A536, A563, C633, A653, A780, B633, C1028, D1187, E140, E384, F594.
 5. AASHTO HS-20-44.
 6. AWS: D1.1, D1.3.
 7. FS: RR-G-661.
 8. MS: MIL-P-21305.
 9. NAAMM: MBG 531, MBG 532.
 10. SSPC: PA 1, SP 3, SP 6/NACE No. 3, Paint 12
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of gratings that are similar to those indicated for this Project in material, design, and extent.
- C. Fabricator Qualifications: A firm experienced in producing gratings similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Metal Bar Grating Standards: Comply with applicable requirements of the following:
1. Non-Heavy-Duty Metal Bar Gratings: Comply with NAAMM MBG 531, "Metal Bar Grating Manual for Steel, Stainless Steel, and Aluminum Gratings and Stair Treads."
 2. Heavy-Duty Metal Bar Gratings: Comply with NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
- E. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
 2. AWS D1.3, "Structural Welding Code--Sheet Steel."
 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.05 PROJECT CONDITIONS:

- A. Field Measurements: Where gratings are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating gratings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products undamaged.
- B. Store products so as to prevent rust.
- C. Handle products so as to prevent damage.

1.07 COORDINATION:

- A. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete

inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. General Requirements:
 - 1. Insofar as practicable, furnish similar products of a single manufacturer.
 - 2. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.02 FERROUS METALS:

- A. Steel Plates, Shapes, and Bars: ASTM A36.
- B. High-Strength Low Alloy Structural Steel:
 - 1. ASTM A242.
 - 2. Resistance to atmospheric corrosion: Four times that of carbon steel, minimum.
- C. Wire Rod for Grating Crossbars: ASTM A510.
- D. Uncoated Steel Sheet: ASTM A570, Grade 33.
- E. Galvanized Steel Sheet: ASTM A653, structural quality, Grade 33, with G90 coating.
- F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy to be welded.
- G. Ductile Iron: ASTM A536.
- H. Grating: Steel, bar and crossbar type as shown, hot-dipped galvanized after fabrication and sizing, FS RR-G-661, Type , Class 1 or 2.

2.03 COATINGS:

- A. Shop Primer for Ferrous Metals: Fast-curing, lead- and chromate-free, universal modified alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Zinc-rich paint: MS MIL-P-21305.
- C. Galvanizing (zinc-coating by hot-dipped process): ASTM A90, ASTM A123, or ASTM A143, ASTM A153 or ASTM A384, as applicable.
- D. Galvanizing Repair Compound: Stick form, melting point 600-degree F to 650-degree F, GALVABAR or equal.
- E. Bituminous Coating: Cold-applied asphalt mastic complying with SSPC Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D1187.

2.04 FASTENERS:

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Plain Washers: Round, carbon steel, ASME B18.22.1.
- D. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F593 and nuts complying with ASTM F594.

2.05 FABRICATION:

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- C. Shear and punch metals cleanly and accurately. Remove burrs.
- D. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated.
- E. Fit exposed connections accurately together to form hairline joints.
- F. Welding: Comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - 4. Fabricate toeplates at height indicated to fit grating units and weld to units in shop, unless otherwise indicated.

2.06 STEEL GRATINGS:

- A. Angles or other structural shapes as supports for grating: Structural steel.

- B. Grating manufactured by electro-pressure welding or pressure-locking process, forming sound welded or pressure-locked joints at intersection of bars and having bars in the same plane.
- C. For maintenance platforms and other locations subject to foot traffic only:
 - 1. Traffic Surface: Serrated.
 - 2. Gratings: Rectangular type, unless otherwise shown, subject to loadings identified under "Performance Requirements." Fabricated of 1-1/4-inch by 3/16-inch bearing bars at 1-3/16-inch o.c. and crossbars at 4 inches o.c.
- D. Steel Finish: As follows:
 - 1. Shop primer applied according to manufacturer's standard practice.
 - 2. Hot-dip galvanized with a coating weight of not less than two ounces per-square foot of coated surface.
- E. Fabricate removable grating sections with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
 - 1. Provide not less than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
 - 2. Provide not less than four saddle clips for each grating section composed of rectangular bearing bars 3/16 inch or less in thickness and spaced 15/16 inch or more o.c., with each clip designed and fabricated to fit over two bearing bars.
 - 3. Furnish removable steel gratings equipped with locking lugs and provision for bolting to supporting members with stainless steel bolts.
- F. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
 - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of the same size and material as bearing bars.
- G. Do not notch bearing bars at supports to maintain elevation.

2.07 FLOOR PLATES:

- A. Steel Floor Plates: Form to configurations shown from abrasive-surface floor plate of thickness necessary to support indicated loads, but not less than 1/4 inch.
 - 1. Abrasive-Surface Floor Plate: SLIP-NOT as manufactured by the W. S. Molnar Company or approved equal:
 - a. Surface Texture: Grade 1, fine.
 - b. Surface: All metal plasma stream deposition process bonds surface to substrate. Anti-slip primarily martensitic steel surface consisting of a random hatch matrix.
 - c. Surface Hardness, Rockwell C Scale, ASTM E 140 and E 384: Minimum of 55.
 - d. Bond Strength, Surface to Substrate, ASTM C 633: Minimum of 4,000 psi.
 - e. Coefficient of Friction, Anti-Slip Surface: Minimum of 0.6.
 - f. UL Listed: Slip-resistant.

2.08 GRATING FRAMES AND SUPPORTS:

- A. Steel Frames and Supports: Fabricate from structural-steel shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive

gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

- B. Equip units with integrally welded anchors for casting into concrete or building into masonry.
 - 1. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.
 - 2. Galvanize frames and supports unless otherwise indicated.

2.09 FINISHES:

- A. General:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Finish gratings, frames, and supports after assembly.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed items:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of gratings, frames, and supports, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL:

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 INSTALLING GRATINGS:

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

3.03 PAINTING AND REPAIRING COATED SURFACES:

- A. Before erection or enclosing construction, paint items that support masonry or will be concealed in finish work, except items encased in concrete.
- B. Where shop coat is abraded or burned by welding, clean and touch-up.
- C. Touch-up primed surfaces with same material as coating.
- D. Where aluminum parts come in contact with concrete or steel, coat contact surfaces of aluminum with bituminous coating.
- E. Coat field welds and repair damage to zinc-coated surfaces in accordance with ASTM A780 and as follows:
 - 1. Wire brush areas to be coated to bright metal.
 - 2. Apply galvanizing repair compound at rate of two ounces per-square-foot.

END OF SECTION

SECTION 07841

FIRESTOPPING

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This Section specifies perimeter fire containment systems and specifies through penetration firestop systems for penetrations through the following fire resistance rated assemblies:
 - 1. Floors.
 - 2. Roofs.
 - 3. Walls and partitions.
 - 4. Construction enclosing compartmentalized areas.
 - 5. Smoke barriers
- B. Related Work Specified Elsewhere:
 - 1. Division 15 Sections specifying piping penetrations.
 - 2. Division 16 Sections specifying cable and conduit penetrations.

1.02 PERFORMANCE REQUIREMENTS:

- A. General: For the following constructions, provide through penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated.
 - 1. Fire resistance rated non-load bearing walls, including partitions, with fire protection rated openings.
 - 2. Fire resistance rated floor assemblies
 - 3. Fire resistance rated roof assemblies.
- B. F-Rated Systems: Provide through penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire resistance rating of constructions penetrated.
- C. LHJ T Rated Systems: For the following conditions, provide through penetration firestop systems with T ratings indicated, as well as F ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire protection rated openings.
 - 4. Penetrating items larger than 4 inch diameter nominal pipe or 16 sq. in. in overall cross sectional area.
- D. For through penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing provide moisture resistant through penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through penetration firestop systems not requiring removal of insulation.
- E. For through penetration firestop systems exposed to view, provide products with flame spread ratings of less than 25 and smoke developed ratings of less than 450, as determined per ASTM E 84.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the Special Conditions and with the additional requirements as specified for each:
- B. Product Data: For each type of through penetration firestop system product indicated.
- C. Shop Drawings: For each through penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through penetration firestop system configuration for construction and penetrating items.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Certification: Signed by manufacturers of through penetration firestop system products certifying that products furnished comply with requirements.

1.04 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 1. Comply with codes and regulations of the jurisdictional authorities.
 2. ASTM E 84, E 814.
 3. UL - 1479.
- B. Installer Qualifications: An experienced installer who has completed through penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in service performance.
- C. Source Limitations: Obtain through penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- D. Fire Test Response Characteristics: Provide through penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Through penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through penetration firestop systems correspond to UL in Fire Resistance Directory reference to through penetration firestop system designations.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver through penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.06 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install through penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced air circulation.

1.07 COORDINATION:

- A. Coordinate construction of openings and penetrating items to ensure that through penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core drilled holes, or cut openings to accommodate through penetration firestop systems.
- C. Do not cover up through penetration firestop system installations that will become concealed behind other construction until the Engineer has examined each installation.

PART 2 – PRODUCTS

2.01 FIRESTOPPING, GENERAL:

- A. Compatibility: Provide through penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through penetration firestop systems, under conditions of service and application, as demonstrated by through penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
 - a. Slag /rock wool fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire rated form board.
 - d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.02 FILL MATERIALS:

- A. General: Provide through penetration firestop systems containing the types of fill materials indicated in the Through Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single component latex formulations that after cure do not re-emulsify during exposure to moisture
- C. Firestop Devices: Factory assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.
- E. Intumescent Putties: Non-hardening dielectric, water resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable, heat expanding pillows/bags consisting of glass fiber cloth cases filled with a combination of mineral fiber, water insoluble expansion agents and fire retardant additives.
- I. Silicone Foams: Multicomponent, silicone based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Moisture curing, single component, silicone based, neutral curing elastomeric sealants of grade indicated below:
 1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.03 FILL MATERIALS:

- A. Where indicated for gaps between the perimeter edge of fire-resistance-rated floor assemblies and non-fire-resistance-rated exterior curtain walls, provide a perimeter fire-containment system with the fire-test response characteristics indicated, as determined by testing identical systems per UBC Standard 26-9 and UL 2079 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

PART 3 – EXECUTION

3.01 EXAMINATION:

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A. Surface Cleaning: Clean out openings immediately before installing through penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION:

- A. General: Install through penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 FIELD QUALITY CONTROL:

- A. Where deficiencies are found, repair or replace through penetration firestop systems so they comply with requirements.

3.05 IDENTIFICATION:

- A. In areas not exposed to public view, identify through penetration firestop systems with pressure sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning Through Penetration Firestop System Do Not Disturb."

3.06 CLEANING AND PROTECTION:

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through penetration firestop systems immediately and install new materials to produce through penetration firestop systems complying with specified requirements.

3.07 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE:

- A. Where UL classified systems are indicated, they refer to the alpha numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems for Metallic and Non-metallic Conduit, Tubing, Sleeves, Cable Trays and Cables:
 1. UL 1479: Fire rated for 3 hours.
 2. Type of fill materials: One or more of the following:
 - a. Silicone sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
- C. Firestop Systems for Insulated Pipes: Comply with the following:
 1. UL 1479: CAJ 5087.
 2. Type of Fill Materials: Intumescent putty.
- D. Firestop Systems for Miscellaneous Mechanical Penetrations: Comply with the following:

1. UL 1479: CAS 8033.
 2. Type of Fill Materials: Mortar.
- E. Firestop Systems for Ductwork: Comply with the following:
1. UL 1479: WJ7007.
 2. Type of Fill Materials: Intumescent sealant.

END OF SECTION

SECTION 09920
FIELD PAINTING

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies furnishing and applying paint at the site.
 - 1. Specific surfaces and areas which require field painting and required paint systems are listed in the schedule of painting.
 - 2. Unless an item is shown not to be field painted or specified otherwise paint it in accordance with these specifications.
- B. Definitions:
 - 1. Paint: Includes primers and undercoaters, sealers, stains, paint, varnish, enamel, epoxy and special coatings.
- C. Items Not Included in Field Painting:
 - 1. Stainless steel, ornamental metals, glass, resilient tile, ceramic tile, paving, acoustical tile, plastic laminate and similar items which are prefinished.
 - 2. Mill-, factory- and shop-applied primers and finishes.
 - 3. Corrosion-resistant structural steel, ASTM A242.
 - 4. High-strength structural corrosion-resistant steel shapes, plates and bars, ASTM A588.
 - 5. Galvanized-metal surfaces.
 - 6. UL labels on fire-rated doors and frames.
 - 7. Precast or pre-stressed concrete with a sandblast finish, concrete sealer, or other special finish unless noted otherwise
- D. Related Work Specified Elsewhere:
 - 1. Mill-, factory- and shop-applied prime and finish coats: Specified with the product.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Samples:
 - a. Three each of each color and texture, with identification of materials keyed to those specified and application methods.
 - b. Samples of paint scheduled for application to smooth finishes applied to 12-inch square hardboard or metal panels.
 - c. Samples of paint scheduled for application to concrete masonry units applied to 16-inch square by two-inch thick panel of concrete masonry units, including one tooled masonry joint. Subdivide panel to define prime or filler, intermediate and finish coats.

1.03 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:

1. Comply with codes and regulations of the jurisdictional authorities.
2. FS: TT-E-489, TT-E-490, TT-E-509, TT-F-336, TT-F-1098, TT-P-19, TT-P-29, TT-P-636, TT-P-641, TT-P-645, TT-P-650, TT-P-664, TT-P-1510, TT-P-001984, TT-S-71, TT-S-300, TT-V-86, TT-V-119.
3. ASME: A13.1.
4. ANSI: Z535.1.
5. ASTM: A242, A588, B117, C476, C920.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver products to the jobsite in their original unopened containers clearly labeled with the manufacturer's name and brand designation, referenced specification number and type, as applicable.
- B. Store products in an approved ventilated dry area, protect from contact with soil and from exposure to the elements. Always keep products dry. Do not allow paint to freeze.
- C. Handle products in a manner that will prevent breakage of containers and damage to products.

1.05 JOB CONDITIONS:

A. Environmental Requirements:

1. Do not apply paint to non-protected surfaces in wet weather or to surfaces on which ice, frost, water or dampness is visible.
2. Do not apply exterior paint when the temperature is below 40F or expected to fall below this temperature. Do not apply interior paint when the temperature is lower than 60F or expected to fall below this temperature.
3. Avoid painting steel which is at a temperature which can cause blistering, porosity, or otherwise be detrimental to the life of the paint. When paint is applied in hot weather or thinned in cold weather ensure that the specified thickness of paint coating is obtained.
4. Do not apply paint in rain, wind, snow, fog or mist or when the steel surface temperature is below the dew point, resulting in condensation of moisture.
5. Do not apply interior paint when, in the Engineer's opinion, satisfactory results cannot be obtained due to high humidity and excessive temperature; however, failure of the Engineer to notify the Contractor of the conditions will not relieve the Contractor of responsibility to produce satisfactory results.

PART 2 – PRODUCTS

2.01 GENERAL:

- A. To the maximum extent practicable, use the materials of one manufacturer throughout the project. No claims as to the suitability of a material specified, or of inability to produce first-class work with these materials, will be considered unless such claims are made in writing and submitted with the Contractor's Bid Proposal.
- B. Provide a primer suitable for each substrate type and which is manufactured or recommended by the paint manufacturer as part of a complete painting system.

C. Previously Primed Surfaces:

1. If surfaces have been primed off-site at the mill, factory or shop, omit specified primer, but only if the off-site primer is acceptable to the paint system manufacturer for best performance of the specified paint system.
2. For touch-up of off-site primer, use primer of the same composition as the mill, factory or shop primer.

D. VOC Requirements: Provide products in compliance with local volatile organic compound regulations. If the listed product of a manufacturer does not comply, provide an accepted equivalent product which does comply.

E. Colors:

1. Prior to beginning work, the Contractor will be furnished sample color chips and a Color and Material Schedule for surfaces to be painted.
2. Match the colors of the chips and submit samples before proceeding. Label samples for surface finishes such as satin, flat or gloss as listed in the Color and Material Schedule.
3. Tint each coat of paint slightly lighter or darker than the preceding coat or the finish coat.
4. Final approval of colors will be made by the Engineer on samples applied on the job.
5. Safety Colors: Items specified to be safety colors, e.g. OSHA red (safety red) and ANSI orange, to be in compliance with ANSI Z535.1, Safety Color Code.

F. Listed materials are a guide to quality intended. Substitute materials and paint systems acceptable to the Engineer, as an equal or of superior quality for each intended use, may be used in the work at no additional cost to the Authority.

G. Accessory Materials:

1. General: Provide miscellaneous materials and accessories, whether listed or not, as necessary to complete the work in an approved manner.
2. Caulk: Single-component, chemically curing, synthetic rubber, non-sag, ASTM C920, Type S, NS, Class 25.
3. Spackling compound: Ready-mixed type, U.S. Gypsum Ready-Mixed Joint Compound - Topping, ASTM C476 or equal.
4. Thinner: As recommended by the paint manufacturer.

2.02 EXTERIOR PAINTING SYSTEMS:

A. Exterior Paint Schedule: Provide the paint systems scheduled below for the various substrates, as indicated. Provide a complete paint system by one manufacturer for each substrate. Unless otherwise indicated, provide the following:

1. Ferrous metal: Silicone-alkyd, semigloss.
2. Zinc-coated metal: Silicone-alkyd, semigloss.
3. Mechanical and electrical items (not finish painted): See substrate materials above.

B. Ferrous Metal - Silicone-Alkyd, Semigloss: Two coats over primer. (Apply a second coat of primer on steel which is at grade, at slab, or passing through floor slabs. Apply to a uniform line six inches above top of grade or slab.)

1. Primer: Lead and chromate-free high solids primer which chemically inhibits rusting and is recommended by the manufacturer for application to steel which has been prepared in accordance with SSPC SP2. Rated 10 (less than 0.01% surface rusting) when tested in

accordance with ASTM B117 for 500 hours. Exceeds performance requirements of FS TT-P-636:

- a. Con-Lux: Rust Arrestor 50.
 - b. S-W: Kem Kromik Universal Metal Primer B50NZ6.
 - c. Tnemec: Series P10.
2. Undercoat: Alkyd enamel recommended by manufacturer of finish coat as an intermediate coat over specified primer for application of silicone-alkyd finish coat:
 - a. Con-Lux: FerroX Primer.
 - b. S-W: Silicone Alkyd Enamel B-56 Series.
 - c. Tnemec: Series 23 Enduratone.
 3. Finish Coat: Silicone-alkyd enamel with a minimum of 30% silicone content meeting the qualitative requirements of FS TT-E-490:
 - a. Con-Lux: Steel-Master 9500 Series.
 - b. S-W: Silicone Alkyd Enamel B-56 Series.
 - c. Tnemec: Series 82 Silicone-Alkyd Enamel.
- C. Ferrous Metal - Alkyd, Semigloss: Two coats over primer (primer is not required on shop-primed items):
1. Primer: Quick-drying, rust-inhibiting primer for priming ferrous metal under alkyd enamel (FS TT-P-664):
 - a. Con-Lux: FerroX Primer, 25 Red.
 - b. Devoe: 41820 Bar-Ox Alkyd Shop/Field Primer.
 - c. Moore: Ironclad Retardo Rust-Inhibitive Paint #163.
 - d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
 2. Undercoat: Weather-resistant, air-drying, semigloss alkyd enamel for use on the exterior over prime-coated ferrous metal (FS TT-E-489, Class A):
 - a. Con-Lux: Enamelite Semi-Luster Series
 - b. Devoe: 70XX Mirrolac Interior/Exterior Alkyd Enamel.
 - c. Moore: Impervo Enamel #133.
 - d. S-W: Industrial Enamel, B-54Z Series.
 3. Finish Coat: Weather-resistant, air-drying, semigloss alkyd enamel for use on the exterior over prime-coated ferrous metal (FS TT-E-489, Class A):
 - a. Con-Lux: Enamelite Semi-Luster Series.
 - b. Devoe: 70XX Mirrolac Interior/Exterior Alkyd Enamel.
 - c. Moore: Impervo Enamel #133.
 - d. S-W: Industrial Enamel, B-54Z Series.

2.03 INTERIOR PAINTING SYSTEMS:

- A. Interior Paint Schedule: Provide the paint systems scheduled below for the various substrates, as indicated. Provide a complete paint system by one manufacturer for each substrate. Unless otherwise indicated, provide the following:

1. Concrete floors: Epoxy, gloss, with anti-slip aggregate.
 2. Ferrous metal:
 - a. Exposed steel structure: Silicone-alkyd, semigloss.
 - b. Other interior ferrous metal: Alkyd, semigloss.
 3. Zinc-coated metal: Alkyd, semigloss; except silicone-alkyd where part of ferrous metal assemblies painted with silicone-alkyd.
 4. Non-ferrous metal: Alkyd, semigloss.
 5. Mechanical and electrical items (not finish painted): See substrate materials above.
- B. Concrete Floor Surfaces - Epoxy, Gloss: Two coats over primer, with anti-slip aggregate in finish coat: Chiller Plant Floors and equipment pads shall be painted with battle ship grey or equal, and the safety lines and tripping hazards shall be painted yellow or red.
1. Primer: Epoxy sealer made for use as a primer over concrete floor surfaces and under an epoxy enamel:
 - a. Con-Lux: None required.
 - b. Duron: Acrylic Enamel Undercoater
 - c. Moore: IronClad Chemical and Water Resistant Epoxy Enamel.
 - d. S-W: ArmorSeal 3300LV Epoxy Primer/Sealer.
 2. Undercoat: Epoxy enamel undercoat made for use over an epoxy primer and under a gloss epoxy enamel:
 - a. Con-Lux: Epolon Series with Epolon 145 Reducer.
 - b. Duron: Polyamide Epoxy.
 - c. Moore: IronClad Chemical and Water Resistant Epoxy Enamel.
 - d. S-W: ArmorSeal 1000HS.
 3. Finish Coat: Epoxy enamel finish coat made for use over an epoxy enamel undercoat:
 - a. Con-Lux: Epolon Series with anti-slip aggregate.
 - b. Duron: Polyamide Epoxy with anti-slip aggregate.
 - c. Moore: IronClad Chemical and Water Resistant Epoxy Enamel with anti-slip aggregate.
 - d. S-W: ArmorSeal 1000HS with anti-slip aggregate.
- C. Ferrous Metal - Silicone-Alkyd, Semigloss: Two coats over primer:
1. Primer: Lead and chromate-free high solids primer which chemically inhibits rusting and is recommended by the manufacturer for application to steel which has been prepared in accordance with SSPC SP2. Rated 10 (less than 0.01% surface rusting) when tested in accordance with ASTM B117 for 500 hours. Exceeds performance requirements of FS TT-P-636:
 - a. Con-Lux: Rust Arrestor 50.
 - b. S-W: Kem Kromik Universal Metal Primer B50NZ6.
 - c. Tnemec: Series P10.

2. Undercoat: Alkyd enamel recommended by manufacturer of finish coat as an intermediate coat over specified primer for application of silicone-alkyd finish coat:
 - a. Con-Lux: FerroX Primer.
 - b. S-W: Silicone Alkyd Enamel B-56 Series.
 - c. Tnemec: Series 23 Enduratone.
 3. Finish Coat: Silicone-alkyd enamel with a minimum of 30% silicone content meeting the qualitative requirements of FS TT-E-490:
 - a. Con-Lux: Steel-Master 9500 Series.
 - b. S-W: Silicone Alkyd Enamel B-56 Series.
 - c. Tnemec: Series 82 Silicone-Alkyd Enamel.
- D. Ferrous Metal - Alkyd, Semigloss: Two coats over primer with total dry film thickness not less than 2.5 mils.
1. Primer: Quick-drying, rust-inhibiting primer made for priming ferrous metal under an odorless alkyd enamel (FS TT-P-664):
 - a. Con-Lux: FerroX Primer.
 - b. Devoe: 41820 Bar-Ox Alkyd Shop/Field Primer.
 - c. Moore: Ironclad Retardo Rust-Inhibitive Paint 163
 - d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
 2. Undercoat: Enamel undercoat made for use as an undercoat over a primer on ferrous metal under an odorless alkyd enamel:
 - a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel.
 - c. Moore: Moore's Alkyd Enamel Underbody 217.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100 Series.
 3. Finish Coat: Semigloss odorless alkyd enamel made for use over a primer and undercoat on ferrous metal surfaces (FS TT-E-509):
 - a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel
 - c. Moore: Moore's Satin Impervo Enamel 235.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100 Series.
- E. Ferrous Metal - Epoxy, Gloss: Two coats over primer:
1. Primer: Corrosion-inhibitive primer recommended by manufacturer for priming ferrous metal under an epoxy undercoat:
 - a. Con-Lux: Epolon Mastic 36 White.
 - b. Duron: Dura Clad Universal Phenolic Alkyd Fast Dry Metal Primer.
 - c. Moore: IronClad Epoxy Rust Inhibitive Primer
 - d. S-W: Recoatable Epoxy Primer.

2. Undercoat: Epoxy undercoat made for use as an undercoat over a primer on metal under a gloss epoxy enamel:
 - a. Con-Lux: Epolon Series.
 - b. Duron: Dura Clad Polyamide Epoxy.
 - c. Moore: IronClad Chemical and Water Resistant Epoxy Enamel.
 - d. S-W: ArmorSeal 100HS Series.
 3. Finish Coat:
 - a. Gloss epoxy enamel made for use over a primer and epoxy undercoat on metal surfaces.
 - 1) When the finish coat is applied to a floor surface, add anti-slip aggregate.
 - b. Con-Lux: Epolon Series.
 - c. Duron: Dura Clad Polyamide Epoxy.
 - d. Moore: IronClad Chemical and Water Resistant Epoxy Enamel.
 - e. S-W: ArmorSeal 100HS Series.
- F. Non-Ferrous Metal - Alkyd, Semigloss: Two coats over primer with total dry film thickness not less than 2.5 mils.
1. Primer: Corrosion inhibitive primer recommended by manufacturer for priming non-ferrous metal under an odorless alkyd enamel:
 - a. Con-Lux: Bond-Plex 46 Barrier Green.
 - b. Devoe: 13201 Mirrolac Galvanized Metal Primer.
 - c. Moore: Ironclad Retardo Rust-Inhibitive Paint 163.
 - d. S-W: Kem Kromik Metal Primer B50N2/B50W1.
 2. Undercoat: Enamel undercoat made for use as an undercoat over a primer on non-ferrous metal under an odorless alkyd enamel:
 - a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel.
 - c. Moore: Moore's Alkyd Enamel Underbody 217.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100 Series.
 3. Finish Coat: Semigloss odorless alkyd enamel made for use over a primer and undercoat on non-ferrous metal surfaces (FS TT-E-509):
 - a. Con-Lux: Satin-Lite 900 Series.
 - b. Devoe: 26XX Velour Alkyd Semigloss Enamel.
 - c. Moore: Moore's Satin Impervo Enamel 235.
 - d. S-W: Pro-Mar Alkyd Semi-Gloss Enamel B34WZ1100

PART 3 – EXECUTION

3.01 PREPARATORY WORK:

- A. Inspect surfaces for their suitability to receive a finish. In the event that imperfections due to materials or workmanship appear on surfaces, make the appropriate corrections at no additional cost to the Authority. Correct damage to painted or decorated finishes due to carelessness or negligence of other trades.
- B. Protect hardware, hardware accessories, plates, lighting fixtures and similar items installed prior to painting; remove protection upon completion of each space. Where necessary to remove installed products to ensure their protection, arrange for removal and reinstallation by mechanics of the trade involved. Disconnect equipment adjacent to walls; where necessary, move to permit painting of wall surfaces, and following completion of painting, replace and reconnect.
- C. Clean surfaces to be painted as necessary to remove dust and dirt. Sand as necessary to properly prepare surfaces to receive paint or varnish.
- D. Wash metal surfaces with benzene or mineral spirits to remove dirt, oil or grease before applying paint. Where rust or scale is present, wire brush or sandpaper clean before painting.

3.02 APPLICATION:

- A. Touch-up painting of structural steel, miscellaneous metal, hollow-metal doors and frames, and other materials which have been prime coated as may be required where the shop coat has been damaged by welding or abrasion during the handling and erection operations; also rivets, bolts and welds which are unpainted after assembly and erection.
- B. Apply paint by spray in accordance with the manufacturer's directions to achieve required dry film thickness (DFT). Where specifically approved by the Engineer, use rollers or brushes as best suited for material being applied. For covers on rollers use carpet with velvet back and high-pile sheep's wool or use short-hair covers, as best suited for material and texture specified. Except where otherwise noted, apply paint to a minimum dry-film thickness (DFT) of five mils, excluding filler coats, using no less than the number of coats specified in Part 2 – Products.
- C. Apply material evenly and smoothly without runs, sags or other defects with edges of paint adjoining other materials or color sharp and clean, without overlapping.
- D. Do not paint and finish while surfaces are damp. Allow sufficient time between coats, in accordance with manufacturer's directions to produce an evenly smooth finish.
- E. Do not apply final coats until after other trades, whose operations would be detrimental to finish painting, have finished their work in the areas to be painted and the areas have been approved for painting.

3.03 PROTECTION:

- A. Dispose of soiled cleaning rags and waste at the close of each day's work or store such soiled rags and waste in metal containers with tight-fitting covers. Provide buckets of sand during painting operations for use in the event of fire. Post NO SMOKING signs as necessary and as directed.

- B. Protect the work of other trades against damage or injury by use of suitable covering during the progress of the painting and finishing work. Repair damage to the satisfaction of the Engineer.

3.04 CLEANING:

- A. Upon completion of work, remove staging, scaffolding and containers from the site. Remove paint spots, oil or stains from glass, floors and other surfaces not to be painted, and leave job clean and acceptable to the Engineer.

3.05 COLOR CODING OF PIPING AND EQUIPMENT:

A. General Requirements:

1. Color coding is required for accessible piping systems and related equipment, except associated supports, brackets, hangers and similar accessories.
2. Identify piping systems and related equipment which are to be color coded as follows:
 - a. Apply color to entire length of piping.
 - b. Apply lettered legends indicating the name of the contents of the system as specified.

B. Location of Legends and Bands:

1. Stencil lettered legends on the piping at the horizontal or vertical centerline. Where pipe lines are too close together and where located above the operator's normal line of vision, place the lettering below the horizontal centerline at a point which will be easily visible.
2. Locate lettered legends and bands at points where pipes enter and leave rooms or spaces, at junction points and points of distribution, close to valves and equipment, at changes in direction, and at intervals along piping where necessary for identification.
3. Stencil piping in accordance with ASME A13.1 and as follows to show service and direction of flow, space within sight of each other and not more than 40 feet apart on long runs.

C. Size of Stencil Letters for Piping Identification:

Outside Diameter of Pipe Covering in Inches	Size of Letter in Inches	Width of Color Band in Inches
3/4 to 1-1/4	1/2	4
1-1/2 to 2-1/2	3/4	6
3 to 6	1-1/4	8
7 to 10	2-1/2	12
Over 10	3-1/2	12

D. Schedule of Colors and Legends:

Line	Pipe Color	Black Stenciled Legend
Hot water lines	Yellow	HW, HWR
Potable cold water lines	Blue	CW
Chilled water lines	Blue with yellow band	CHWS, CHWR
Fire lines	Red	F (use White Stencil instead of black)
Condensate lines	White	C
Condenser water lines	White with blue band	CWS, CWR
Soil and waste lines	White	S
Vent lines	Grey with white band	V
Storm Water lines	White	ST-W
Air and control air lines	Green	A

END OF SECTION

SECTION 15070

VIBRATION ISOLATION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing vibration isolation for mechanical equipment and piping.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards, and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ASTM: A123.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Design for concrete inertia block and structural-steel bases. Include tabulation of design data on isolators including actual deflection; outside diameter; free, operating and solid heights of isolators; method of attachment; bolt sizes; and type and sizes of anchor plates.
 - 2. Certification.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. General Requirements:
 - 1. Vibration isolators selected to produce uniform loading and deflection even when equipment weight is not evenly distributed; steel components hot-dip galvanized after fabrication in accordance with ASTM A123.
 - a. Types of vibration isolators:
 - b. For equipment and piping:
 - 1) Floor-mounted: Spring isolators.
 - 2) Ceiling-suspended: Suspension-type isolators.
 - 2. Spring isolators for floor-mounted equipment:
 - a. Free-standing, laterally stable without housing, complete with minimum 1/4-inch thick neoprene, acoustical friction pad in series with spring element.
 - b. Leveling bolts and adequate facilities for bolting to equipment and supporting structure using isolation washers.

- c. Coil outside diameter: Not less than 0.8 of operating height of spring.
 - d. Horizontal stiffness: Not less than 0.8 of vertical stiffness.
 - e. Springs designed to have additional 50-percent capacity beyond rated load.
 - f. Springs designed so that ends remain parallel during and after spring deflection to operating height.
 - g. Vibration isolators selected for lowest operating speed of equipment.
 - h. Built-in adjustable limit stops with isolators provided for equipment of operating weight different from installed weights, to prevent rising of equipment when weight is removed and for equipment exposed to wind. Limit stops not to be in contact during normal operating conditions.
 - i. Welding of springs to load-plate assembly for vibration isolators with capacities of 6,000 pounds or less is prohibited.
 - j. Vibration isolators with capacities of 6,000 pounds or less are permitted use of cups or other positive means for restraining springs.
 - 3. Suspension-type isolation hangers for ceiling-suspended equipment:
 - a. Combination of spring and neoprene in series.
 - b. Spring made of stable steel.
 - c. Encased in structurally stable steel bracket.
 - d. Spring diameter large enough to permit 15-degree angular misalignment of rod connecting hanger to equipment without rubbing on box.
 - e. Designed to provide complete support for suspended units upon failure or rupture of isolator.
 - 4. Concrete equipment subbases (housekeeping pads):
 - a. Concrete: Sections 03300.
 - b. Concrete subbases not less than four inches high provided for floor-mounted equipment. Subbases resting on structural floor and reinforced with steel rods interconnected with reinforcing bars of floor by means of tie bars hooked at both ends.
 - c. Clearance between subbases and inertia bases: Two inches minimum.
 - d. Subbase concrete: Class 2500, Finish No. 4.
- B. Isolation-Unit Types and Deflection:
- 1. Fans and air-conditioning units: Floor-mounted and ceiling-suspended.
 - a. Spring isolators designed for a minimum of 1.5 inches deflection.
 - b. Snubbers:
 - 2. Pumps:
 - a. Base-mounted pumps on inertia bases.
 - b. Inertia bases shaped to include base elbow supports for connected piping and at least 1-1/2 times weight of supported equipment or a minimum base thickness of eight percent of longest base dimension, whichever results in greater weight.
 - c. Springs with minimum deflection of 1.5 inches under imposed static load.
 - 3. Chillers:

- a. Vertically restrained spring isolators designed for 1.5 inches minimum deflection. Inertia bases if recommended by chiller manufacturer.
- 4. Cooling towers:
 - a. Steel beams mounted on vertically restrained spring isolators designed for 1.5 inches minimum deflection.
 - b. Rails: Acceptable, if performance requirements for spring isolators specified for cooling towers are met.
 - c. Height of steel beams designed to support loads and eight-percent minimum of longest span between isolators.
- 5. Piping:
 - a. Ceiling-suspended piping: Combination spring and neoprene in shear element hangers as specified for ceiling-suspended equipment. Springs designed for 1.5-inch minimum deflection. First two isolation hangers of each pipe connected to equipment to have deflection equal to equipment isolation-support deflection.
 - b. Floor-mounted piping isolated by spring isolators with one-inch minimum static deflection. First two spring isolators of each pipe connected to equipment to have deflection equal to equipment isolation-support deflection.
- 6. Grout:
 - a. Section 03300, premixed shrinkage-compensating grout.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install vibration isolators where shown as recommended by the equipment manufacturer.
- B. Mount mechanical equipment on vibration isolators to isolate equipment from structure.
- C. Jack bases and equipment into position and wedge or block before vibration isolators are loaded.
- D. Use isolator leveling bolts for final leveling of equipment after equipment is in operation.
- E. Springs installed so that ends remain parallel during and after deflection to operating height.
- F. Mount snubbers as close to vibration isolators as practicable.
- G. Grout void between pump bases and inertia-base concrete.
- H. Piping connected to equipment isolated from structures as follows:
 - 1. Condenser-water piping in its entirety.
 - 2. Chilled-water piping: Piping connected to equipment, mounted on vibration isolators or suspended with vibration hangers, isolated for a distance of 50 feet from equipment. Piping with installed length less than 50 feet isolated in its entirety only when connected to equipment provided with vibration isolators.

END OF SECTION

SECTION 15075
IDENTIFICATION OF MECHANICAL EQUIPMENT AND PIPING

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing nameplates/placards, tags, and labels on mechanical equipment and piping.
- B. Related Work Specified Elsewhere:
 - 1. Field painting: Section 09920.

1.02 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Samples:
 - a. Labels and tags in each size.
 - 2. Documentation:
 - a. Charts for valves; include valves identification number, location, and purpose.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Nameplates/Placards: Engraved laminated acrylic plastic 1/8" thick, glossy surface.
- B. Pipe Label: Polyester-coated, pre-printed
- C. Pipe Marker: Cylindrically coiled or flat plastic, pre-printed
- D. Valve Tags: 18-gauge stainless steel.
- E. Identification Plates: Bronze, Authority-furnished.

PART 3 – EXECUTION

3.01 IDENTIFICATION:

- A. Equipment:
 - 1. Label equipment with one-inch high black letters engraved on 1-1/2 inch high, white background, laminated-plastic nameplates securely fastened to metal panels, showing function and unit number of item.

B. Devices:

1. Identify devices including transducers, controls, and switches by means of 1/2-inch high black letters engraved on one-inch high, white background, laminated plastic nameplates identifying manufacturer and function of equipment.

C. Piping:

1. Snap-Around plastic pipe marker, plastic wrap-around pipe sleeves, or polyester-coated label showing service and direction of flow.
2. Stencil legends and bands on piping showing service and direction of flow as specified in Section 09920.
3. Color coding of exposed piping and terminating's of piping per following:
 - a. Hot Water Lines – Yellow color field with black letters HW, HWR
 - b. Potable Cold-Water Lines – Blue color field with Black letters CW
 - c. Chilled Water Lines – Blue & Yellow band color field with black letters CHWS, CHWR
 - d. Fire Lines
 - 1) Standpipe – Red reflective color field with White letter, and Vent-shaft or Fan-shaft identification.
 - 2) Sprinkler – Red color field with White letter.
 - e. Condensate Water Lines – White & Blue band color field with Black letters CWS, CWR
 - f. Compressed Air (Shop) Lines – CA
4. ID Size
 - a. Pipe 3/4" to 1 1/4": 1/2" letters on 8" long color field.
 - b. Pipe 1 1/2" to 2 1/2": 3/4" letters on 8" long color field.
 - c. Pipe 3" to 6": 1 1/4" letters on 12" long color field.
 - d. Pipe 7" to 10": 2 1/2" letters on 24" long color field.
 - e. Over 10": 3 1/2" letters on 32" long color field.

D. Valves:

1. Identify valves with 1-1/2 inch diameter, 18-gauge stainless-steel tags.
2. Designate appropriate service on each tag with 1/4-inch stamped black-filled letters and valve number with 1/2-inch stamped black-filled numbers.

3.02 INSTALLATION:

A. Equipment:

1. Cement placard/nameplate with permanent adhesive on equipment. Clean surfaces thoroughly to ensure adhesion of nameplate. Nameplates to be attached to equipment to allow for easy viewing of nameplate during operation of equipment.

B. Devices:

1. Affix placard/nameplate to surface of control and switch boxes by means of sheet-metal rivets. Placard/nameplate to be affix to wall or surface adjacent or below control devices such as thermostats, toggle switches, etc. Cement placards/nameplates to surface with permanent adhesive when rivets cannot be used.

C. Piping:

1. Color coding as specified above is required for accessible piping systems, except associated supports, brackets, hangers and similar accessories. Apply color coding per Section 09920.
2. Galvanized pipe is not to be painted, polyester-coated label applied with adhesive directly to the pipe or plastic wrap-around pipe markers with pre-printed graphics permanently secured to the pipe with plastic cable ties. For adhesive labels clean pipe thoroughly to ensure adhesion of label.
3. Insulated pipe or jacketed pipe, use polyester-coated label applied with adhesive directly to the insulation or jacket or plastic wrap-around pipe marker with pre-printed graphics permanently secured to the pipe with plastic cable ties. For adhesive labels apply to clean insulation or jacket to ensure adhesion of label.
4. Location of pipe markers:
 - a. Locate at points where pipes enter and leave rooms or spaces, at junction points and points of distribution, close to valves and equipment, at changes of direction, and at intervals of maximum 50 ft along each run of piping. Reduce intervals to 25 ft in congested areas of piping.

D. Valves:

1. Fasten tags securely to valves with brass jack chain, so as to permit easy reading.

END OF SECTION

SECTION 15080

INSULATION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing insulation for Rail Stations and Roadway Facilities, excluding rail yards.
- B. For all other locations the local & federal applicable codes and regulations shall be used to determine the insulation.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Fire Protection Association (NFPA): 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.
 - 3. American Society for Testing and Materials (ASTM):
 - a. C240 Standard Test Methods of Testing Cellular Glass Insulation Block.
 - b. C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - c. C547 Standard Specification for Mineral Fiber Pipe Insulation.
 - d. C552 Standard Specification for Cellular Glass Thermal Insulation.
 - e. C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - f. C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - g. C916 Standard Specification for Adhesives for Duct Thermal Insulation
 - h. C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
 - i. C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
 - j. E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. Sheet Metal and Air-Conditioning Contractors National Association (SMACNA): HVAC Duct Construction Standards – Metal and Flexible.
 - 5. Underwriters Laboratories (UL): Building Material Directory
 - 6. Military Specification (MS): MIL-B-19564
- B. Fire-Hazard Ratings:
 - 1. Determine fire-hazard ratings in accordance with ASTM E84.
 - a. Insulation, fastener, and jacketing materials, except flexible cellular plastic for expansion joints: Not exceeding 25 for flame spread, 50 for fuel contributed and 50 for smoke developed.

- b. Use of flame-proofing and fireproofing treatments for the purpose of achieving specified fire-hazard ratings for insulation not meeting specified requirements is prohibited.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Label each item with manufacturer's name and brand designation, referenced specification number, type, class, and thermal and acoustical rating as applicable.
- B. Ship each type of insulation and accessory materials securely packaged and labeled for safe handling in shipment and to avoid damage.
- C. Store materials in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. External Insulation on Ductwork:
 - 1. Insulation:
 - a. Mineral Fiber Rigid board for exposed rigid ductwork:
 - 1) Thickness: One inch.
 - 2) Density: Three pounds per cubic foot.
 - 3) ASTM C612
 - b. Mineral Fiber Flexible duct wrap for round or flexible ductwork:
 - 1) Thickness: Two inches.
 - 2) Density: 1.5 pounds per cubic foot.
 - 3) ASTM C553.
 - 2. Vapor-barrier facing: Impermeable vapor retarder per ASTM C1136. All Service Jacket (ASJ) which consists of White kraft paper, reinforced fiber glass scrim, and aluminum foil laminate.
- B. Piping Insulation:
 - 1. General:
 - a. Vapor-permeance resistance:
 - 1) Maximum vapor permeance: 0.5 percent by volume.

- 2) Vapor-permeance ratings for piping insulation determined in accordance with ASTM C240.
2. Chilled-water piping insulation:
 - a. All locations except mechanical rooms to be rigid premolded cellular glass, 2" thick covered with metal pipe jacket; ASTM C552.
 - b. Mechanical rooms molded mineral fiber pipe insulation, industrial-type covered with aluminum jacket 0.016-inch thick; ASTM C547.
 - c. Insulation for buried or embedded pipe to consist of preinsulated piping system with polyurethane foam or foamglass insulation placed around the service pipe with an outer protective pipe jacket.
3. Metal Pipe Jacket:
 - a. Galvanized sheet steel, 24 gauge (U.S.S.) having Z-type longitudinal joint seam.
 - b. Aluminum alloy, 0.016-inch thick, mill-finish, having Z-type longitudinal joint seam.
 - c. Stainless steel, .016-inch thick, having Z-type longitudinal joint seam for use where jacket will be exposed to weather or water.
 - d. Band clamp material to match jacket material.
4. Insulation for water service hot/cold/tempered potable-water piping:
 - a. Pipe, valves, flanges and fittings: As specified for chilled-water piping except insulation to consist of one layer, one-inch thick.
 - b. Insulation not required on embedded or buried pipe.
5. Refrigerant-piping insulation:
 - a. As specified for chilled-water piping except insulation to consist of one layer, one-inch thick.
6. Condensate lines:
 - a. Interior unconditioned locations as specified for chilled-water piping except insulation to consist of one layer, one-inch thick.
 - b. Insulation not required for conditioned or exterior location.
- C. Chilled-Water Pump Insulation:
 1. Rigid premolded cellular glass: Two inches thick, ASTM C552.
- D. Chiller Insulation:
 1. Insulation:
 - a. Flexible Elastomeric Cellular factory installed on all low (cold) temperature surfaces to prevent condensation.
 - 1) Thickness: 1-1/2 inches thick
 - 2) ASTM C534.
 2. Vapor-barrier coating: Meet the 25/50 flame and smoke requirement of NFPA 90A, Resistant to fire and water; water vapor permeance .02 perms per ASTM E-96.
 3. Fire-resistant lagging adhesive: ASTM C916 type I.

- E. Air-Separator Insulation:
 - 1. As specified for chilled-water pump.
- F. Compression-Tank Insulation:
 - 1. As specified for chiller.
- G. Expansion-Joint Insulation: Flexible unicellular, ASTM C534, one-inch thickness, two layers.
- H. Wire Mesh: Galvanized wire, 22-gauge, one-inch mesh welded.
- I. Corner Beads: Galvanized steel, 26-gauge, 2 1/2-inch wings.
- J. Rigid-Insulation Adhesive and Sealer: Cold-applied, non-hardening asphaltic-type, in accordance with MS MIL-B-19564.
- K. Fabric Pipe Jacket: Prefabricated laminate containing 10-by-10 asphalt-impregnated glass fabric and aluminum foil one-mil thick, sandwiched between three layers of bituminous mastic, for use on embedded or inaccessible piping.
- L. Insulation-Hanger Shields: Galvanized steel, minimum 0.050-inch (18 ga.) thick, mill-finish, covering bottom 180 degrees of pipe insulation, lengths as follows:

Pipe Sizes/Inclusive	Shield Length
1/2 inch to 2 inches	6 inches
2-1/2 inches to 6 inches	9 inches
6 inches to 12 inches	12 inches

PART 3 – EXECUTION

3.01 APPLICATION OF INSULATION:

- A. General:
 - 1. Do not apply insulation until all surfaces to be covered are clean, dry, and free of foreign materials, such as oil, grease, rust, scale, and dirt.
 - 2. Apply only clean and dry insulation.
 - 3. Install insulation in accordance with manufacturer's recommendations as a minimum requirement.

4. Provide complete moisture and vapor seal wherever insulation terminates against metal hangers, anchors, and other projections through insulation on cold surfaces.
 5. Provide continuous insulation through sleeves and openings except pipe sleeves piercing exterior walls, floors, and ceilings below ground level.
 6. Stagger joints with respect to adjacent butt joints.
 7. Unless otherwise shown, insulate the following:
 - a. Ancillary-area air-conditioning ductwork, supply and return, except ductwork within air-conditioned space.
 - b. Ancillary-area heating ductwork, ventilating ductwork and combined heating and ventilating ductwork, supply and return except ductwork within heated space.
 - c. Outside-air intake ductwork.
 - d. Exhaust-air ductwork between automatic damper on discharge side of fan and louver, except under-platform and dome exhaust-air ductwork where insulation is not required.
- B. External Insulation on Ductwork:
1. Install insulation continuously through openings provided for passage of ductwork and unbroken over seams, angles, hangers and other accessories.
 2. Do not use scrap pieces of insulation to make up full-length sections. Eliminate voids by refitting or replacing insulation.
 3. Mineral Fiber Rigid board for exposed rigid ductwork:
 - a. Fasten to duct with mechanical fasteners spaced 12 inches to 18 inches on center, with minimum of two rows on each side of duct.
 - b. Secure with washers firmly embedded in insulation.
 - c. Seal joints, breaks and punctures with fire-resistant vapor-barrier coating reinforced with a three-inch wide vapor-barrier strip.
 4. Mineral Fiber Flexible duct wrap for round flexible ductwork:
 - a. Round flexible duct to have factory applied insulation and jacket.
 5. Mineral Fiber Flexible duct wrap for round rigid ductwork:
 - a. Adhere to duct with fire-resistant adhesive in sufficient quantities to prevent sagging.
 - b. Secure insulation tightly to the ducts with Type 316 stainless-steel insulation bands spaced 12 inches maximum center-to-center.
 - c. For duct widths over 30 inches, secure on underside of duct with mechanical fasteners on 18-inch centers.
 - d. Butt insulation, overlap joints with vapor-barrier facing two inches minimum; seal with fire-resistant vapor-barrier adhesive.
 - e. Seal breaks and punctures with vapor-barrier strip and coating.
 6. Flexible Elastomeric Cellular for under platform and below platform level air conditioned supply ductwork:
 - a. Install insulation in accordance with manufacturer's recommendations using required adhesive to adhere insulation to exterior surface of ductwork.
- C. Piping Insulation:
1. Chilled-water/Hot water/ Cold water/ Tempered water piping:

- a. Insulation thickness:
 - 1) Rigid premolded cellular glass:
 - a) Pipe sizes four inches and smaller: Install two layers of one-inch thick insulation on supply and return piping, valves, and fittings.
 - b) Pipe size five inches and larger: Install one layer of two-inch thick insulation on supply and return piping, valves and fittings.
 - 2) Rigid premolded insulation sleeving: Install one layer of two-inch thick on supply and return piping, valves, and fittings as follows:
 - a) IPS sizes: 1/2 inch through 30 inches.
 - b) Copper tubing: 1/2 inch through 6-1/8 inches.
 - 3) Buried or embedded pipe: Install one-inch thick insulation on pipes 1" to 12" dia. and one and a half-inch thick insulation on pipe 14" and larger.
- 2. Refrigerant-piping insulation:
 - a. Install insulation consisting of one layer, one-inch thick and finished as specified for chilled-water piping.
- 3. Embedded or inaccessible-piping insulation:
 - a. Install insulation consisting of layers or thickness specified for usage specified.
 - b. Insulation to be applied around service pipe with outer protective pipe jacket.
- D. Application of Insulation on Pipe Saddles:
 - 1. Cut two-inch thick piece of premolded pipe insulation of same material as used on piping, slightly larger than void formed by outer pipe circumference and pipe saddle.
 - 2. Press insulation into void by hand pressure, to that both ends project slightly beyond each end of saddle.
 - 3. Cut ends of insulation flush with saddle ends.
 - 4. Use of filter, adhesive or other material to fill voids or imperfections in insulation is prohibited.
- E. Expansion Joints for Piping Insulation:
 - 1. Install expansion joints in both horizontal insulation and vertical runs of piping on centers not to exceed 50 feet.
 - 2. Install joints one-half inch wide and fill with cushioning material in accordance with insulation manufacturer's recommendations.
- F. Insulation for Anchors:
 - 1. Insulate anchors which are secured directly to cold piping as specified for a minimum distance of eight inches from surface of pipe insulation and sufficient to prevent sweating.
- G. Application of Chilled-Water Pump Insulation:
 - 1. Install two-inch thick insulation as complete unit or in sections, constructed so that insulation can be removed and replaced without damage.
 - 2. Fit insulation snugly against pump without voids.

3. Bevel curved surface edges to provide tight joint.
 4. Provide metal insulation covers with metal fasteners, supports, frames, and membranes.
- H. Application of Chiller Insulation:
1. Insulate water-cooler shell, water boxes of water cooler, exposed suction piping and cold gas-inlet connection to hermetic-unit motors.
 2. Exposed suction piping: As specified for chilled-water piping.
 3. Cooler shell:
 - a. Cut and miter insulation to fit contour of surface. Secure in place with bands not over 12 inches on center. Stagger and seal joints with vapor-barrier mastic.
 - b. Apply tack coat of adhesive conforming to MS MIL-A-3316, Class 1, at 60 to 70 square feet per gallon by spray or brush. Embed glass cloth into wet coating, smoothing to remove wrinkles. Overlap seams at least two inches. By spray or brush apply finish coat of lagging adhesive to entire fabric surface at rate of 60 to 70 square feet per gallon. Apply finish coat not later than one hour after tack coat.
 4. Removable heads and water boxes:
 - a. Cover removable heads and water boxes with galvanized-steel box, 22-gauge minimum, constructed as complete unit or in sections. Construction to permit removal and replacement of covers without damage to insulation.
 - b. Line metal covers with insulation of type and thickness used for cooler shell. Impale insulation on weld pins and secure with speed washers.
 - c. Seal voids and joints with vapor-barrier mastic to prevent infiltration of moisture in space between insulation and metal cover.
- I. Application of Air Separator Insulation:
1. As specified for chilled-water pump.
- J. Application of Compression-Tank Insulation:
1. As specified for chiller.

END OF SECTION

SECTION 15120

COMPRESSION TANKS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing compression tanks complete with fittings and appurtenances.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ASME: Boiler and Pressure Vessel Code.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Complete catalog information and shop drawings including piping diagrams.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Compression Tank:
 - 1. Compression tank diaphragm type.
 - 2. Black-steel, welded plate with rustproof coating on exterior, capacity as shown.
 - 3. Designed for working pressure of 125-psig minimum; meeting ASME Boiler and Pressure Vessel Code.
 - 4. Diaphragm made of butyl, replaceable.
 - 5. System connection forged steel.
 - 6. Factory precharged to 12 psig.
 - 7. Provided with charging valve and drain plug.
 - 8. Tank shall have NPT system connection, glass gauge tapings and drain.
 - 9. Tank shall be furnished with saddles/ hanger support attachment lug.
- B. Nameplates:
 - 1. Securely attached plate on each tank showing manufacturer's name, model number and serial number.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install equipment and appurtenances within space provided and locate for easy servicing.
- B. Provide concrete pad, bracket supports, saddles and hangers for tanks.

END OF SECTION

SECTION 15185

HYDRONIC PUMPS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing chilled-water and condenser-water pumps, complete with motor drives.
- B. Related Work Specified Elsewhere:
 - 1. Closeout: Section 01775
 - 2. Insulation: Section 15080.
 - 3. Vibration isolation: Section 15070.
 - 4. Water Treatment: Section 15186A
 - 5. Chillers: Section 15625
 - 6. Cooling Tower Accessories: Section 15640
 - 7. Motors: Section 16225.
 - 8. Variable Frequency Drives: Section 16480.
 - 9. Piping Systems: Section 15205.
 - 10. HVAC Instrumentation and Controls: Section 15900A

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. American Standard for Testing and Materials (ASTM):
 - a. A29/A29M Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
 - b. A48/A48M Standard Specification for Gray Iron Castings
 - c. A479/A479M Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
 - d. B505/B505M Standard Specification for Copper Alloy Continuous Castings
 - e. B584 Standard Specification for Copper Alloy Sand Casting for General Applications
 - 3. International Organization for Standardization (ISO):
 - a. 7005-2 – Metallic Flanges – Part 2: Cast Iron Flanges
 - 4. National Electric Code (NEC)
- B. Pump Capacity/ Design Criteria:
 - 1. Select pumps based on capacity, type and total dynamic head shown on equipment schedule and per this specification requirement.
- C. Source Quality Control:

1. Test pumps at 1-1/2 times working pressure (total dynamic head).
2. Pump impeller shall be dynamically balanced.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 1. Product Data and Shop Drawings:
 - a. Submit complete catalog information and product data. The data shall consist of manufacturer's descriptive and technical literature, catalog cuts, performance charts and curves, and installation instructions, including wiring and control diagrams. Identify the model being supplied and all options included.
 - b. Shop drawings for material and equipment including wiring and control diagrams.
 2. Certification:
 - a. Manufacture's certified test reports.
 3. Operation and Maintenance Manuals:
 - a. Shall be in accordance with Section 01775.
 - b. Submit for each pump.
 - c. In addition, shall include a step-by-step procedure required for system start-up and shut-down. Maintenance manuals shall include piping and equipment layout, equipment set-points.
 4. Commissioning:
 - a. Submit complete mechanical and electrical information on chilled water pump equipment, nameplate data, devices, and performance at time of commissioning in WMATA provided COBie (Construction Operations Building Information Exchange) electronic Excel spreadsheet as supplied by the WMATA Project Manager.
 - b. Complete software, licenses, programs, and site-specific configuration files as stated in Section 15900A.
 5. Warranty:
 - a. Shall be accordance with Section 01775 with the following additional requirements:
 - 1) Submit complete information concerning warranty terms and conditions including warranty period, start of warranty, and items covered.
 - b. Variable Frequency Drive Warranty:
 - 1) VFD Warranty shall be according to Specification Section 16480.

1.04 JOB CONDITIONS:

- A. Safety Requirements:
 1. Properly guard rotating parts to prevent danger to personnel.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of piping equipment, subassemblies, parts, motors, starters and relays. This specification pertains to the Chilled water and Condenser water pumps.

B. Casings:

1. Material: Close-grained cast iron class 30 minimum, ASTM A48/A48M.
2. Type: Volute-type with 125psig ANSI flanges, Horizontal split case, split coupled vertical inline case, or horizontal base mounted end suction with flanged suction and discharge, designed for optimum-velocity change and hydraulic balance.
3. Case Openings: Shall be drilled and tapped for discharge-volute venting and casing drainage.
4. Suction and Discharge Connections: Flanged conforming to ISO 7005-5. Suction and discharge connections shall be drilled and tapped for gauge connections.
5. Impeller Access: Sections of casings to permit access to impeller without removal of piping after inspection or replacement of parts.

C. Impeller:

1. Material: Bronze.
2. Type: Shall be double suction, fully enclosed, dynamically balanced, and hydraulically balanced, secured to shaft by key and locking collars for exact alignment.
3. Exterior surfaces machined.
4. Interior surfaces and water passages deburred and hand-finished.
5. Provide suction guide and angle flange rated for a minimum of 150 psi.

D. Casing Wearing Rings:

1. Material: Bronze
2. Type: Replaceable case wear rings.

E. Shafts:

1. Material: Carbon steel C1045, ASTM A29/A29M.
2. Performance: Sized to provide maximum 0.002-inch deflection at face of stuffing box.
3. Shaft Sleeves: Shall be stainless steel, ASTM A479/A479M, or Bronze.

F. Mechanical Seals:

1. Selection based on pressure, temperature and speed.
 - a. Temperature range: 40F to 225F.
 - b. Seal Pressure Rating: Minimum 150 psi.
 - c. Pump Speed: As per equipment schedule.
 - d. Maintenance: Shall be replaceable without disturbing motor.

G. Bearings:

1. Type: Dust-tight ball bearings.
 2. Lubrication: Permanently sealed grease type lubrication and maintenance free.
 3. L-10 Life: Designed for 150,000 hours average life minimum.
- H. Leakage Containment: Fitted with drain connection.
- I. Coupling:
1. Flexible, nonlubricated, pin and bushing.
- J. Coupling Guard:
1. Fabricated steel-housing enclosure bolted to base plate.
- K. Bedplate:
1. Material: Structural steel.
 2. Drip collection chamber provided with ½-inch IPS connection at low point of bedplate.
 3. Openings: Drilled and tapped to accommodate pump, motor and coupling guard.
- L. Flexible Connection:
1. Reinforced-rubber-type or contour-molded reinforced-Teflon-type with flanged ends at inlet and outlet of pump.
 2. Reinforcement: Monel or stainless-steel rings.
 3. Designed for 150 percent of maximum working pressure.
- M. Strainers: Section 15205.
- N. Suction Diffuser/ Guide:
1. Provide suction guide/ suction diffuser at inlet of pumps, as shown on the contract drawings.
 2. Unit shall consist of cast iron body, cast iron cover plate, synthetic fiber cover gasket, grooved system connection, flanged pump connection, stainless steel inlet vanes and combination diffuser-strainer orifice cylinder with 3/16 diameter opening for pump protection. The orifice cylinder shall be equipped with a disposable fine mesh strainer which shall be removed after pump start up. Strainer shall be stainless steel, 0.125" perforation.
 3. Orifice cylinder shall be designed to withstand pressure of 175 psi, temperature of 230F and shall have a free area equal to five times cross section area of pump suction opening.
 4. Vane length shall be no less than 2-1/2 times the pump connection diameter.
 5. Unit shall be provided with adjustable support foot to carry the weight of suction piping.
 6. Size shall be per the inlet line size.
 7. Basis of Design: Armstrong SG 64/86 or Xylem Bell & Gossett Model No. SDG.
- O. Provide pump to piping connection enlarger/ reducer as required.
- P. Vibration Isolators: Section 15070.
- Q. Nameplates:
1. Securely attached on each pump showing manufacturer's name, model number and serial number.

R. Motors:

1. Shall be in accordance with Section 16225 with the following additional requirements:
 - a. Maximum Pump Motor Speed: As shown on equipment schedule.
 - b. Frequency: 60 Hz
 - c. Phase: 3~
 - d. Voltage: 460-volt; tolerance plus or minus 10 percent, nameplate value voltage; non-overloading at all points of pump curve.
 - e. All motors shall be inverter-duty rated.

S. Motor Control Device: Variable Frequency Drive (VFD):

- a. Variable Frequency Drives: VFDs shall be designed for use with pumping applications. Refer to specification section 16480.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances within space provided and make readily serviceable.
- B. Provide housekeeping foundation pads for all pumps.
- C. Construct subbases for equipment in accordance with Section 15070.
- D. Insulate pumps as specified in Section 15080.
- E. Make final alignment on pump and motor coupling prior to operation.
- F. Mount pumps on vibration isolators where shown on drawings.
- G. Ensure that pump and motor operate without noticeable vibration after installation.

END OF SECTION

SECTION 15186A

WATER TREATMENT SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing complete Water Treatment for chilled-water and condenser-water systems. The Water Treatment System - Monitoring Panel shall be integrated with/ part of the Chiller Plant Monitoring Panel. See spec Section 15900A. Water treatment system installation shall be coordinated with other WMATA contract. The requirements in this specification are generic.
- B. Related Work Specified Elsewhere
 - 1. Piping systems: Section 15205.
 - 2. Insulation: Section 15080.
 - 3. Vibration isolation: Section 15070
 - 4. HVAC Instrumentation and Controls: Section 15900A.
 - 5. System Balancing and Testing: Section 15950.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. NEMA: 250
- B. Design Criteria:
 - 1. Provide automatic water-treatment monitoring and control systems to minimize corrosion and prevent fouling of components. The system shall be a packaged unit from the manufacturer.
 - 2. Design shall include provide remote monitoring and control of the automated system using Modbus over ModBus RTU.
 - 3. System cleaner: Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.
 - 4. Chilled water: Select chemicals for control of corrosion, scale and algae that are not toxic to humans in concentrations found in operating system. Closed loop water systems need the following:
 - a. pH control
 - b. An oxygen scavenger
 - c. Bactericide
 - d. Corrosion inhibitor
 - 5. Condenser water: Select chemicals for control of corrosion, scale and algae that are not toxic to humans in concentrations found in operating system. Open loop water systems need the following:
 - a. pH control
 - b. Micro biological controls

- c. Corrosion inhibitor

1.03 CHEMICAL FEED SYSTEM DESCRIPTION

A. Condenser Water Piping and Cooling Tower

1. Pump sequestering agent and corrosion inhibitor from solution tank into condenser water supply to the cooling tower. Use agitator as required.
2. Intermittently feed biocide and algaecide to condenser water to achieve a toxic level of the chemical to kill the organisms present.
3. Change biocides periodically to avoid chemical immunity.
4. Activate chemical solution pump from water meter in makeup water line to cooling tower when condenser water pumps are running.
5. Automatically feed chemical with electronic solid-state controllers.
6. Deactivate solution pump and signal alarm by a liquid-level switch in each solution tank on low chemicals.
7. Continuous pH and Conductivity monitoring and correction.

B. Chilled Water Piping and Chiller

1. Initial Chiller Plant start-up, Pump sequestering agent and corrosion inhibitor from solution tank into chilled water supply to the chiller. Use agitator as required.
2. Provide electronic solid-state controllers.
3. Continuous pH and Conductivity monitoring and correction.

1.04 SPECIAL REQUIREMENT:

- A. As part of Chiller Plant Monitoring Panel; provide automatic water-treatment monitoring and control systems. Control panels provided shall comply with the reference drawings shown as part of the contract drawing package.
- B. For Water Treatment: provide chemical pumps, solution tanks, agitator, liquid-level switches, packaged conductivity controller, cold-water meter, piping, valves, strainers, etc. as indicated in the Contract Drawing and as required per the manufacturer for a complete functional system. Provide 3/4-inch branch piping and fittings between the Chilled Water Main and Condenser Water Main which shall be connected to the Water Treatment Valves Assembly. Provide copper pipe, ASTM B88, Type K, hard-drawn, fittings ANSI/ASME B16.22. Piping (maximum 18-inch long) from Valves Assembly to chemical pumps shall be braided stainless steel flexible piping with appropriate connections provided to valves and to pumps at the end. Cold water metering cable should terminate in the chiller plant control panel.
- C. Provide Shop-Fabricated, Water Treatment Piping Loop and Valve Assembly for Chilled water and Condenser water on steel support angle and steel plate. Properly hang the support plate on wall. Terminate water treatment loop piping in the water treatment panel as well as the chiller plant control panel.
- D. Provide a portable stainless steel bench with wall support, to accommodate 3-chemical pumps for Condenser Water and space for future Chilled Water Pumps, include on-off-auto switches for pumps, indicating light for pump running status, bleed valve on-off and status indicating light, and electrical receptacle for pumps.

1.05 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

1. Shop Drawings.
 - a. Complete catalog information and shop drawings for material and equipment including wiring and control diagram. Differentiate between manufacturer-installed and field-installed wiring.
 - b. Shop drawings of the Water Treatment Piping and Valve Assembly together with listing of Material, Equipment and Accessories. Indicate Wall support devices.
 - 1) Make sure that the Valve Assembly; including Sample Pet Cock, Strainer, Ball Valves, Flow Switch are installed at 5-feet above finish floor for easy maintenance.
 - c. Shop drawings of portable bench for pumps. Indicate Electrical Receptacle and Wall support devices.
 - d. Coordinate shop drawings of the Chiller Plant Monitoring Panel. See spec Section 15900A and Contract drawing.
2. Certification
 - a. Manufacturer's certified test reports.
3. Documentation:
 - a. Water analysis:
 - 1) Water-sample analysis. Submit prior to introducing chemicals into systems.
 - b. Chemical-quantity requirements:
 - 1) Submit calculations showing total quantities of various chemicals required for two years operation of water-treatment systems
 - 2) Base quantity of chemicals for 2,000 full-load operating hours per annum for designed tonnage and average of five cycles concentration of condenser water.
 - c. Chemical-quality requirements:
 - d. Submit chemical formulae and descriptions or generic names of materials used.
 - e. Prior to acceptance, submit toxicity data of water treatment complying with applicable codes and regulations of jurisdictional authorities
 - f. If required by the jurisdiction, submit their approval of chemicals proposed for use
4. MSDS approval by WMATA SAFE:
 - a. Submit Manufacturers' Safety Data Sheets (MSDS) for approval by WMATA's Safety Office (SAFE) for use by WMATA personnel and for use in the WMATA system.
5. Operation and Maintenance Manuals.

1.06 JOB CONDITIONS:

- A. Safety Requirements:
 1. Store and handle chemicals so as to prevent danger to personnel.

1.07 FIELD SERVICE:

- A. Engage services of specialist for five years from the day when air-conditioning system is first put into normal and continuous operation, supervise and train plant-operating personnel in correct use of water treatment system. Specialist to be certified by water-treatment system manufacturer as qualified in operation of system provided.
- B. Specialist's services to include the following:
 - 1. Supervision of pretreatment, startup and adjustment of automatic water-treatment systems.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Ship products securely packaged and labeled for safe handling in shipment and to avoid damage and distortion.
- B. Label each item with manufacturer's name, brand, reference specification, type, class and other pertinent information as applicable.
- C. Supply liquid chemicals in thirty-gallon polyethylene-lined steel drums or five-gallon plastic pails.
- D. Ship chemicals which are not used for initial startup to Authority-designated storage facility.
- E. Store products in a secure, dry storage facility.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. General Requirements:
 - 1. In design and purchase of equipment, provide for interchangeability of items of piping equipment, injectors, subassemblies, parts, and controllers.
 - 2. See spec Section 15900A and Contract Drawing for the Design Intent and requirement of the Water Treatment Monitoring System.
- B. Monitoring Systems employ sensors for the continuous real time direct analysis of water chemistry required to control scale, corrosion, and microbiological content.
- C. Chemical Injection Systems adjust water treatment programs based on changing system demands.
- D. Controllers provide for remote monitoring and control of water treatment via ModBus over ModBus RTU (RS485 communications card shall be included).
 - 1. Custom controls that regulate blowdown and chemical feed and immediately communicate upset conditions
 - 2. Web-enabled monitoring and control software to provide performance-based feedback and alerts

E. Chemical Feeding Equipment:

1. Pot-type chemical feeder shall be included for manual chemical injection as needed:
 - a. Designed and constructed for 150-psig water working pressure.
 - b. Chemical feeder: Minimum capacity, 15 gallons.
 - c. In accordance with applicable codes and regulations for unfired pressure vessels.
 2. Packaged Conductivity Controller: HACH Controller, model SC 200 with ModBus Network Module. Conductivity Sensor Module with Electrodeless Conductivity Sensors. RS485 communications card shall be included.
 3. Cold-Water Meter: Positive-displacement type with sealed, tamperproof magnetic drive, impulse contact register. Terminate cold water meter cable in the chiller plant control panel. Include blow down meter and terminate in the chiller plant control panel.
 - a. Rotating-disc type with bronze or cast-iron body rated for 125 psig
 - b. Magnetic-drive matched to signal receiver
 - c. At least six-digit totalizers
 - d. 120V, 60Hz.
 4. Solenoid Valves: Forged-brass body, globe pattern, and general-purpose solenoid enclosure with 120V, continuous-duty coil.
 5. Chemical Tubing: copper pipe, ASTM B88, Type K, hard-drawn, fittings ANSI/ASME B16.22.).
 6. Ball Valves shall be bronze construction, threaded ends type, rated at minimum 150 psi
 7. Strainer: bronze cleanable stainless-steel strainer element.
 8. Chiller Plant Control Panel, integrating Water-Treatment Control Panel: See spec Section 15900A and Contract Drawing.
 - a. Control dissolved solids, based on conductivity, and include the following:
 - 1) HACH Controller, model SC 200 with ModBus Network Module
 - 2) Conductivity Sensor Module with Electrodeless Conductivity Sensors.
 - 3) Bleed-off light to indicate valve operation
 9. Chilled Water and Condenser Water Loop Flowmeter: Provide Ultrasonic Non-intrusive Flowmeter, Siemens Sitrans FUS1010 (wall mounted) or approved equal; non-intrusive clamp-on flow sensors, wall mounted NEMA 4X enclosure with transmitter, Local Key Pad and Display. ModBus capable to interface with Productivity 3000 System. Provide hardware and software
- F. Name Plates: Securely attached to each major item of equipment showing manufacturer's name, model number and serial number.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances to space provided and make readily serviceable.
- B. Provide foundations, platforms and hangers for proper installation of equipment.
- C. Provide waste connections for water-treatment equipment as specified in Section 15205.

- D. Insulate piping and equipment in accordance with Section 15080
- E. Install water treatment as per manufacturer's recommendation.

END OF SECTION

SECTION 15205

PIPING SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing piping, fittings, valves, drains, specialties and supporting devices.
- B. Related Work Specified Elsewhere:
 - 1. Firestopping: Section 07841.
 - 2. Field Painting: Section 09920.
 - 3. Identification of Mechanical Equipment and Piping: Section 15075.
 - 4. Insulation: Section 15080.
 - 5. Grounding and Bonding: Section 16060.
 - 6. Hydronic Pumps: Section 15185.

1.02 QUALITY ASSURANCE:

- A. Qualifications of Welder: Section 05500.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. The Model Plumbing Code.
 - 3. ASSE Standards.
 - 4. AWWA Standards.
 - 5. ASME Code for Unfired Pressure Vessels, ASME Section VIII, Division 1.
 - 6. ANSI/ASME: B16.1, B16.5, B16.9, B16.11, B16.22, B16.39, B31.1, B31.3, B31.4, Z21.22.
 - 7. ANSI/AWS: E8016, E8018.
 - 8. AISI
 - 9. FS: SS-C-153C, WW-P501, WW-U-516B, WW-U-531, WW-V-51F.
 - 10. MSS: SP-58, SP-67, SP-70, SP-71, SP-80, SP-85, SP-110.
 - 11. ASTM: A53, A105, A126, A234, A276, A395, A536, B32, B61, B62, B88, B150, B306, F709.
 - 12. U.L. Listed
 - a. ANSI/ASME B16.9.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Complete catalog information and shop drawings for material and equipment.
 - b. Submittals include, but are not limited to, the following:
 - 1) Pipes and piping layout, including locations of hangers and supports.
 - 2) Pipe hangers and supports.
 - 3) Valves.

- 4) Escutcheons.
- 5) Gauges.
- 6) Expansion joints, guides and anchors.
- 7) Air eliminators.
- 8) Pipe sleeves.
- 9) Drains.
- 10) Strainers.
- 11) Flexible Connectors.

2. Certification:

a. Certificates from manufacturers verifying the following:

- 1) That pipe-joint gaskets and lubricants are satisfactory for use with pipe and fittings specified.
- 2) That expansion joints are designed and tested as specified.

1.04 JOB CONDITIONS:

- A. Do not perform welding when the temperature of base metal is less than zero degree F.
- B. Do not perform welding when surfaces are wet from rain, snow, ice or during periods of high wind unless operator and work are properly protected.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of piping equipment, subassemblies and parts.

B. Piping:

1. Steel pipe and fittings:

- a. Seamless piping: ASTM A53, Types Grade B, hot-dip galvanized, Schedule 40, provided for the following applications:
 - 1) Chilled-water and condenser-water supply and return embedded or otherwise inaccessible.
- b. Fittings for chilled water, condenser water: ASTM A234 and ANSI/ASME B16.9 for dimensions and tolerances but not chemical properties.
- c. Flanges: ASTM A105 and ANSI/ASME B16.5 for dimensions and tolerances.
- d. Fittings and flanges furnished with properties equal to or greater than that of adjacent pipe.

2. Copper tubing and fittings:

- a. Copper tubing for potable water and where embedded or otherwise inaccessible: ASTM B88, Type K, hard-drawn.
- b. Provide copper tubing for potable water: ASTM B88.
 - 1) Potable water: Type L.

- 2) Potable water: Type K, annealed and lengths of piping 100 feet or less continuous without joints.
 - c. Fittings for potable-water piping: ANSI/ASME B16.22.
 - 1) Fitting wall thickness after forming not less than that of adjacent piping.
 - d. Solder joints: Lead-free 95.5-percent tin, 4.0-percent copper and 0.5-percent silver with non-corrosive flux; ASTM B32.
3. Copper drainage tube (DWV) and fittings:
 - a. Seamless tubing: ASTM B306, No. 122 for drainage, waste, and vent piping and fittings.
4. Condensate-drain pipes:
 - a. Hard-drawn copper: ASTM B88, Type L.
5. Unpolished stainless-steel drip pans:
 - a. Provided under water, waste or condensate-drain piping which run over transformer vaults or electric motor starters.
 - b. Each drip pan provided with one-inch drain.
6. Black-steel seamless pipe and fittings:
 - a. Exposed chilled water, condenser-water supply and return piping: ASTM A53, Schedule 40.
 - b. Pipes 1-1/2 inch and smaller connected with socket-weld fittings or screwed fittings.
 - c. Pipes two inches and larger connected with welded fittings.
 - d. Pipes larger than 12 inches in diameter: Minimum 3/8-inch wall.
 - e. Threaded-pipe fittings: FS WW-P-501, Type I, Class B.
 - f. Welding fittings made of same schedule or weight classification as the pipe.
 - 1) Factory-made welding fittings.
 - 2) Mitered joint elbows and field-made reducers will not be permitted.
 - g. Butt-welded fittings larger than 1-1/2 inches: ANSI/ASME B16.9.
 - h. Socket-welding fittings: ANSI/ASME B16.11.
 - i. Flanges for welded piping system: ANSI/ASME B16.5, forged steel, welded-neck type, 150-pressure class.
7. Unions:
 - a. 1-1/2 inch and smaller: Threaded, ASME B16.39, Type A or B to match piping.
 - b. Two inch and larger unions: ASTM A126, Class B, flanged.
 - 1) Two, 2-1/2 and three-inch union flanges: Steel, ASME-B16.39 or of cast iron, ANSI/ASME B16.1, 125-pound class.
 - c. Four inch and larger union: Forged steel, 150-pound class, slip-on weld-neck flanges, ANSI/ASME B16.5.
 - d. Nonferrous-piping unions: Brass, A-A-59617.

C. Valves:

1. Gate valves two inches or smaller:

- a. MSS SP-80, Type 2, Class 150.
 - b. Bronze with threaded ends, rough bodies and finished trim.
 - c. Materials except hand wheels: ASTM B61.
 - d. Furnished with malleable-iron hand wheels.
2. Gate valves 2-1/2 inches and three inches:
 - a. MSS SP-70, Type 3, Class 125, OS&Y flanged end, Type I, Class 2, cast-iron bodies and bonnets.
 - b. Seat rings, disc, disc guide and stem furnished in bronze.
 - c. Outside stem and yoke (OS&Y), flanged-end connections and malleable-iron hand wheels.
3. Gate valves four inches and larger:
 - a. MSS SP-70, Type 2, Class 125, OS&Y, flanged end, cast-iron bodies and bonnets.
 - b. Seat rings, disc, disc guide and stem furnished in bronze.
 - c. Outside stem-and-yoke type and cast-iron hand wheels.
4. Butterfly valves (To be used only at Bethesda Chiller Plant):
 - a. MSS SP-67, sizes as shown.
 - b. Provide extended necks or neck extenders to accommodate two inches of insulation.
 - c. Provide 10-position latch-lock handles.
 - d. Provide enclosed work screw operators, sizes eight inches and larger.
 - e. Provide chainwheels when above normal reaching area.
 - f. Provide adjustable balance-return stops for balancing service.
 - g. Test shell at 225 psi.
 - h. Body:
 - 1) Lug-type, ductile iron, ASTM A536 grade 60-40-18, or ASTM A395.
 - 2) To fit between ANSI/ASME B16.5 flanges.
 - 3) Bodies with integral flanges or full lugs drilled.
 - i. Seat:
 - 1) Provide ethylene-propylene-terpolymer (EPT) bonded to rigid ring providing non-collapseable and replaceable seat.
 - 2) Provide bubble-tight shutoff of 150 psi at temperatures between 25F and 225F.
 - 3) Provide O-ring as secondary seal between seat and stem.
 - j. Disc:
 - 1) Aluminum-bronze: ASTM B150.
 - k. Stem:
 - 1) Stainless steel: AISI Type 304, 316, 410 or 416.
 - 2) Isolate from contact with piped material.
5. Globe, angle and check valves:
 - a. Two inches and smaller:
 - 1) MSS SP-80, Class 150.
 - 2) Bronze with threaded ends, rough bodies and finished trim.
 - 3) Materials except hand wheels: ASTM B61.
 - 4) Globe and angle valves furnished with malleable-iron hand wheels.
 - 5) Check valves four inches and larger:

- a) Swing-type valve seat, with iron or steel body and cap and flanged-end connections.
 - b) 150-pound class, renewable arm, disc assembly and seat ring with bronze trim.
 - c) Outside arm and weight for pump discharge check valves.
6. Globe valves four inches and larger:
- a. MSS SP-85, Class 125, OS&Y, flanged end, cast-iron bodies and bonnets.
 - b. Seat rings, disc, body, swivel nut, disc guide shall be cast iron; stem furnished in steel, complying with ASTM A126.
 - c. Outside stem-and-yoke type and cast-iron hand wheels.
 - d. Rated for 200psi CWP, maximum working temperature of 450F.
7. Ball valves four inches or smaller:
- a. MSS SP-110, Rated for 600WOG, Class 150 SWP.
 - b. Bronze with threaded ends, hard chrome-plated solid bronze or brass ball.
 - c. RTFE seats and packing, blowout-proof stem, adjustable packing gland.
 - d. Zinc coated steel hand lever operator with vinyl grip.
8. Check valves four inches and larger:
- a. MSS SP-71, Class 125, silent with bolted bonnet, flanged end, horizontal swing, cast-iron body.
 - b. Seat rings, disc, disc plate, cage furnished in cast iron.
 - c. Rated for 200psi CWP, maximum working temperature of 450F.
9. Valves for copper piping:
- a. Gate valves with solder ends: MSS SP-80, Type 2, Class 150, Bronze, Type 1, Class B.
 - b. Gate valves with flanged ends: MSS SP-80, Type 2, Class 150, Bronze.
 - c. Globe, angle and check valves with solder or flanged ends: MSS SP-80, Bronze, Class B.
10. Pressure-reducing valves:
- a. Direct-acting type in which diaphragm and spring act directly on valve stem.
 - b. Constructed to ensure that delivered pressure does not vary more than one psi for each ten-psi variation in inlet pressure.
 - c. Wearing parts readily renewable.
 - d. Valves two inches and smaller designed for working pressure of 250 psi, brass construction except yoke connecting valve body to separate diaphragm chamber having brass cover and assembled with brass bolts.
 - e. Valves larger than two inches designed for minimum 125 psi, iron bodies and bronze trim.
 - f. Adjustable to any outlet pressure.
 - g. Gate valve and union on both inlet and outlet connections.
 - h. Provided with bypass one pipe-size smaller than main water line.
 - i. Stem-mounted pressure-reducing valve gauges, 3-1/2 inch dial, solid brass or stainless steel case and connections with T-handle stops.
 - j. Pressure-reducing valve strainer: Brass, removable without disconnecting piping.
- 1) Strainers two inches and smaller: Brass, bodies designed for minimum working pressure of 250 psi.

- 2) Strainers 2-1/2 inch and larger: Iron bodies designed for minimum working pressure of 125 psi.

11. Pressure-temperature relief valves:

- a. Temperature-and-pressure-actuated type, adjustable, bronze, single disc with bottom guide to ensure proper seating.
- b. Body, disc and base: Bronze, ASTM B62.
- c. Spring and stem: Steel.
- d. Lever: Malleable iron.
- e. Pressure range from three psi to 250 psi rated and tested under ANSI/ASME Z21.22.
- f. Temperature range: To 400F.

12. Automatic flow-control valve:

- a. Individually selected by manufacturer to automatically limit rate of flow to design capacity, regardless of system fluctuations.
- b. Selected to regulate flow within five percent of nameplate rating of system in which installed. Maximum operating differential between body tapings necessary for control not to exceed two psi.
- c. Self-cleaning, cartridge-piston type with stainless-steel variable-area orifices.
- d. Designed for minimum of 125 psi or 150 percent of system working pressure, whichever is greater.
- e. Tamperproof with body tapings for connecting instruments for verifying flow-control performance.
- f. Threaded or flanged connections as required for pipe fittings.
- g. Furnished with valve kit consisting of 1/8-inch by two-inch minimum size nipples, shutoff valves located outside of insulation and hose fittings for use with measuring instruments.

13. Refrigerant valves: UL listed.

14. Balancing cocks:

- a. Resilient-faced, eccentric-plug type designed for minimum of 125 psi or 150 percent of system working pressure, whichever is greater.
- b. Six inches and under, wrench-operated; eight inches and over, operated by worm or spur gear.

15. Line Strainers:

- a. Water Y strainers, Y or basket-type, 1-1/2 inches and smaller: ASTM A126, Grade B, iron bodies with screwed connections.
- b. Two inches and larger Y strainer: Complies with ASME B31.1, ASME 31.3, ASME 31.4 and/or ASME section VIII Division 1. The strainer body shall be carbon steel, screen shall be perforated stainless steel, provide with bolted hinged cover furnished with a drain connection and plug as standard, inlet size to match line size shown on the drawings, class 150, flat face flanged end connections. Basis of design: Y strainers, FY1 series.
- c. Designed for minimum of 125 psi or 150 percent of system working pressure, whichever is greater.
- d. Stainless-steel screens as follows:

Perforations:

Strainer size	Perforation size
3/4-inch to two-inch inclusive	1/32 inch
2-1/2 inch to six-inch inclusive	1/16 inch
Eight-inch to 12-inch inclusive	1/8 inch
Over 12 inches	5/32 inch

1) Free area of screen minimum three times area of strainer inlet pipe.

e. Strainer provided with 3/4-inch drain valve.

16. Backflow preventer:

- a. Reduced-pressure type with two check valves and automatically operated pressure-differential relief valve located between two check valves.
- b. Relief valve and discharge port to drain intermediate chamber to level below supply-line inlet.
- c. Moving parts and trim constructed of corrosion-resistant material.
- d. Equipped with test cocks.
- e. Conform to applicable section of ASSE and AWWA Standards.

D. Portable Flow Meters:

1. Factory-fabricated case, carrying handle and fitted to hold meter securely to accommodate the following accessories:
 - a. Two 10-foot lengths of connecting hose with female connectors for venturi-tube pressure-tap nipples.
 - 1) Hose designed for minimum of 125 psi or 150 percent of system working pressure, whichever is greater.
 - 2) Completely assembled three-valve manifold with two block valves and vent and drain valves piped and mounted on base.
 - b. Set of curves showing flow versus pressure differential for each orifice or venturi tube.
 - c. Metal instruction plate, secured inside cover, illustrating use of meter.

E. Orifices and Venturis:

1. Stainless steel, square-edge type, mounted between pipe flanges with factory-made pressure taps.
2. Taps with shut-off valves and with quick-connection hose fittings for portable meters.
3. Orifice-throat diameter at specified flow and differential pressure in inches water gauge as follows:
 - a. Fall in 60 to 80 percent of full scale reading for square-root meters.
 - b. Twelve to 40 inches for linear-scale meters.
4. Venturi size selected with design flow rate between 10 and 40 inches of water-pressure differential.

- a. Permanent pressure loss: 25-percent maximum of indicated flow-rate differential pressure.
5. Flow-metering equipment: Supplied by same manufacturer.
- F. Thermometers:
 1. Dial-type, chromium-plated case, remote or direct-type bulb with accuracy of plus-or-minus one degree.
 - a. Three-inch minimum dial with white face and black digits, graduated in two-degree increments.
 2. Liquid-in-glass thermometers.
 3. Thermometer ranges suitable for service at not less than 20 degrees above controlled temperature settings.
- G. Thermometer Wells:
 1. Stainless steel with portions surrounding bulbs not over 1/16-inch thick, designed to hold engraved-stem thermometer.
 2. Six inches projecting two inches into pipe with dust-excluding caps with gaskets and chains.
 3. Pipe smaller than 2-1/2 inches enlarged where wells are located.
 4. Set vertical or at angle to retain oil.
- H. Gauges:
 1. ASME B40.100 Grade 1A, Class 1, 2 or 3, Style A, Type I or III with metal case.
- I. Expansion Joints:
 1. General:
 - a. Designed for 150 psi and 200F for systems operating at 100 psi or less.
 - b. Provide expansion joint traverse with 150 percent of pipe expansion resulting from temperature variation of 80F.
 - c. Provide corrugated-bellows expansion joints for pipe expansion of 1-1/2 inches or less, minimum of 200 percent of expansion.
 - d. 1-1/2 inches and smaller, threaded ends; two inches and larger, flanged ends.
 2. Flexible ball joints:
 - a. Carbon steel, providing 360 degrees rotation plus 15 degrees minimum angular-flexing movement, furnished with non-asbestos composition gaskets, steam-molded in steam-heat presses.
 3. Corrugated-bellows expansion joints:
 - a. Bellows constructed of single-ply or multiple-ply, formed, corrugated stainless steel for pipe sizes smaller than three inches.
 - b. Self-equalizing type with equalizing or reinforcing rings, internal-telescoping stainless-steel or Monel sleeves, removable steel housing to protect bellows and support insulation.
 - c. Corrugated element: Seamless tubing or of single sheet of metal rolled into cylinder having one longitudinal seam for sizes up to 16 inches.
 - d. Joints 2-1/2 inches and smaller: Internal guides and limit stops.

- e. Designed for a minimum life of 5,000 full-rated traverse cycles when tested at specified pressures and temperatures.

J. Supporting Devices:

1. Pipe hangers and supports:

a. Provide adjustable steel pipe hangers and supports as follows:

- 1) Clevis and clamp, zinc-plated: MSS SP-58, Type 1 and Type 8 for steel and cast-iron piping.
- 2) With cast-iron roller and sockets: MSS SP-58, Type 41 for chilled-water piping.
- 3) Space not greater than six feet for pipe sizes up to and including 1-1/2 inches; 10 feet for pipe sizes two inches through six inches; 16 feet for pipe sizes eight inches and larger.

b. Pipe hangers for copper tubing: Steel, copper-plated, clevis-type, spaced at maximum five feet for tubing sizes through 1-1/2 inches and maximum eight feet for sizes two inches and larger.

c. Hanger rods minimum diameter 3/8 inch, constructed of steel, zinc-hot dipped galvanized, threaded full-length and diameter required by pipe size and load imposed.

d. Hanger rod nuts and washers: Steel, zinc-hot dipped galvanized.

e. Supported from malleable-iron, hot-dip galvanized inserts in concrete slab: MSS SP-58, Type 18.

f. Pipe hangers and supports in tunnels and shafts: MSS-SP-58, stainless steel, ASTM A276, Type 304.

2. Pipe rolls, plates and stands:

a. Cast iron: MSS SP-58, Types 44, 45, and 46.

- 1) Adjustable types selected for piping require grading after setting in place.

b. Protection saddles for support piping: MSS SP-58, Type 39, welded to pipe.

3. Pipe anchors:

a. Designed to withstand five times anchor load minimum.

b. Vertical pipes anchored by means of clamps welded around pipes and secured to wall or floor construction.

4. Pipe guides:

a. Factory-made cast semi-steel or heavy fabricated galvanized steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider bolted or welded tight to pipe.

b. Designed to clear pipe insulation and to prevent over travel of spider and cylinder.

c. Guides not less than 12 inches long and spiders not less than the following:

Pipe size/ inches	Spider length/ inches
1-1/2 and smaller	2
2 to 3	2-1/2
4	3

5 and larger	3-1/2
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5. Expansion bolt anchors:
 - a. Consisting of bolt, expander, star lock washer and nut.
 - b. Fabricated of stainless steel, Type 303, including expander and star lock washer.
 - c. Anchor assemblies: FS: A-A-1992, Group II, Type 4, Class 1.
 6. Self-drilling anchors:
 - a. Self-drilling expansion anchors, with self-cutting annular broaching grooves.
 - b. Anchor and expander plug: FS: A-A-1992, Group III, Type 1, double-plated.
 7. Pipe sleeves:
 - a. Through interior masonry-unit walls: As shown. Sleeve to be large enough to accommodate pipe and covering but not less than two sizes larger than pipe size.
 - b. Through poured-concrete interior walls, floors and ceiling: As shown.
 - 1) Sleeves minimum two sizes larger than pipe. At floors, sleeves to project four inches above finish floor. Sleeves shall be hot dipped galvanized.
 - c. Through exterior structural elements: Minimum two sizes larger than pipe and as shown.
 - d. Sleeves designed to allow expansion/contraction movement of pipe.
 8. Escutcheon plates:
 - a. Polished brass or stainless steel, screw-fastened to wall or ceiling.
 - b. Plate collars caulked watertight with mastic.
 - c. Mastic: FS SS-C-153C, Type I.
- K. Air Separators:
1. Provide in-the-pipeline air separators with tangential openings for water in and out.
 2. Design to create low-velocity vortex for internal separation of free air from water stream.
 3. Size according to size of connecting pipeline as shown.
 4. Equip with two-inch blowdown connection located at bottom of separator.
 5. Equip with 1-1/4 inch minimum compression tank connection located at top of tank.
 6. Tank:
 - a. Size as shown and rated at 125-psi working pressure.
 - b. Construct of carbon steel and in accordance with ASME Code for Unfired Pressure Vessels and so certified and stamped.
 7. Strainer:
 - a. Stainless steel with perforations sized for water flow.
 - b. Install in location to assist in separation of air.
 - c. Removable from bottom of separator.
 8. Insulation: Section 15080.
- L. Flexible Connectors:

1. Braided flexible connectors shall consists of braided metal hose, with inlet and outlet 150# carbon steel plate flange connections. The connectors shall be engineered to move laterally, absorb vibration and shall impart no thrust loads to system anchors.
2. Materials of construction of the braided connector hose to be corrugated stainless steel with a stainless-steel braid.
3. Connectors shall be rated for at least 150# design pressure and 120F temperature.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Welding Procedure:

1. Perform welding by manual metallic arc-process except for pipe sizes four inches and smaller where gas welding (oxyacetylene) may be used.
 - a. Use electrodes and rods of composition recommended for pipe by AWS.
 - b. Heat surface within three inches from point where weld will start to temperature warm to the hand before welding.
2. Weld corrosion-resistant nickel-copper alloy steel pipe by arc-process utilizing low-hydrogen electrodes of AWS E8016 or E8018 types.
3. Leave joint surfaces smooth, uniform, free from fins, tears and other defects which adversely affect proper welding.
4. After each pass of weld on multiple-pass welding, clean weld free of slag and other deposits before applying next pass.
5. Peen with light blows of blunt-nosed peening hammer.
 - a. Do not peen surface layers or first pass in groove welds.
6. For groove welds, have surface pass substantially centered on the seam, smooth and free from depressions.
7. Perform fillet-welds with minimum cutting back of outside pipe.
 - a. Leave throat of full fillet-weld not less than 0.707 of thickness of pipe.
 - b. Repair excess cutting back and undercutting of base metal in pipe adjoining weld.
 - c. Fill up craters to full cross section of weld.
8. Align and position accurately joints to be welded, so that pipe will not project beyond its adjoining pipe by more than 20 percent of pipe wall thickness or 1/8-inch maximum.
9. Install welded pipe in accordance with ANSI/ASME B31.1.

B. Potable-Water System Installation:

1. Connect and install service water piping, sizes as shown, to fixtures, equipment and outlets.
2. Install water meter in accordance with requirements of local water authority and provide the following valves:
 - a. Main shut-off gate valve inside service room ahead of water meter.
 - b. Drain with globe valve and hose nipple for 3/4-inch hose installed on house side of meter.
3. Pipe or tubing free from cuts, dents and other surface damage. Remove damaged pipe and replace with new pipe or tubing.
4. Cut square and ream ends of copper tubing.

5. Tubing ends to extend full depth of fitting recesses without binding.
 6. Use lead-free 95.5-percent tin, four-percent copper and 0.5-percent silver solder with non-corrosive flux; ASTM B32.
 7. Ream and clean ends of threaded pipes before assembling with fittings and apply approved joint compound to pipe thread only.
 8. Make connections to equipment and fixtures without undue strain.
 9. Run horizontal piping with minimum pitch of one inch in 40 feet and arrange for drains at low points.
 - a. Install drain valves and hose nipples not smaller than 3/4 inch at low points.
 10. Connect nonferrous piping to ferrous piping with dielectric couplings.
 11. Install pressure-reducing valves where main water pressure exceeds 60 psi to maintain pressure of 20 psi at most remote fixture.
- C. Steel-Pipe Installation:
1. Weld embedded pipe and install so that pipe will not penetrate construction joints or structural contraction joints.
 2. Install horizontal piping with minimum pitch of one inch in 40 feet and arrange for drains at low points.
 - a. Install drain valves and hose nipples not smaller than 3/4 inch at low points.
 3. Install high-capacity automatic air vents at high points, designed for 125 psi and suitable for operation on pressures under 125 psi.
 - a. Pipe air-vent outlet to floor drains.
 4. Pipe drip pan to discharge as shown; if not shown, discharge to nearest open drain.
 5. Provide flexible connections to coils, pumps and other equipment so as to eliminate undue strains in piping and equipment.
 6. Install condensate-drain lines for each air-handling unit with pitch of 1/4 inch per foot in the direction of flow.
 - a. Run drain lines to nearest open drain.
 - b. Do not exceed 400 feet maximum length of pipe between anchor and expansion joint or 90-degree offset.
 7. Do not support embedded pipe from reinforcing bars with metallic means.
- D. Expansion-Joint Installation:
1. Field set expansion joints for position corresponding to ambient temperature at time of installation.
 2. Setting based on manufacturer's calibration data furnished with expansion joints.
 3. Do not use corrugated-bellows expansion joints where exposed in train tunnels.
 4. Install ball joints in accordance with approved published recommendations of manufacturer.
 5. Do not use shims or steel spacers.
- E. Pipe Anchors:
1. Securely anchor piping where shown and where necessary for proper installation to force pipe expansion in proper direction.
- F. Expansion-Bolt Anchors:

1. Drill holes and install expansion-bolt anchors as recommended by anchor-bolt manufacturer. Do not locate less than eight inches from concrete edge.
- G. Pipe Sleeves:
 1. Exterior walls:
 - a. Install as shown.
 - b. For cathodically protected pipe, test in accordance with Section 16060.
 2. Interior walls:
 - a. Install as shown. Seal to maintain integrity of walls.
- H. Plumbing-Fixture and Equipment Connections:
 1. Make connections to wall-hung water closets and urinals with adjustable flanged nipples secured to chair supports, wax rings and rubber or impregnated-felt gaskets.
 2. Face plate of carrier not more than six inches from back of finish wall.
- I. Air-Separator Installation:
 1. Install air separator on suction side of chilled-water pump and as near to pump as practicable.
 2. Install dead-level in both directions and support from structure so that pipe can be removed without moving air separator.
 3. Install two-inch drain line, equipped with gate valve and union, from blowdown connection to nearest drain.
- J. Attachments to Prestressed-Concrete Girders:
 1. Attach pipes and similar items to prestressed girders by welding to embedded plates or bolting to embedded fittings. Drilling into prestressed girders is prohibited.
- K. Bonding: In accordance with Section 16060, and with the following additional requirements:
 1. Bond mechanical joints and fittings, including valves, by exothermic-welding method.
 2. Make welds in accordance with recommendations of the manufacturer. Clean and coat with coal tar epoxy.
 3. Bond pipe using bonding strap welded to each side of joint not less than six inches from joint. Allow sufficient slack in conductor for expansion of pipe.
- L. Firestopping: Section 07841.
 1. Pipe penetration through fire rated partitions to be sealed with approved fireproof sealant.

3.02 PROTECTION OF PIPING AND EQUIPMENT:

- A. Protect pipe, openings, valves and fixtures from dirt, foreign objects and damage during construction.
- B. Replace damaged piping, valves, fixtures and appurtenances.
- C. Prior to testing, flush piping with chemically treated water until systems are clean and free of scale, slag, dirt, oil, grease and other foreign material.
- D. Hand-clean expansion joints and strainers.

3.03 FIELD QUALITY CONTROL:

A. Water-Pressure Testing:

1. Prior to burial or concealment, test affected piping in presence of the Engineer using specified procedures.
2. Test entire piping systems and test until found leak-free in presence of and to satisfaction of the Engineer.
3. Notify the Authority at least 36 hours in advance of making tests.
4. Test piping at following pressures:
 - a. Chilled-water and condenser-water piping embedded or otherwise inaccessible: 200-psi minimum.
 - b. Ductile-iron pipe: 150 psi or 1-1/2 times maximum working pressure, whichever is greater, at lowest point in system.
 - c. Potable-water piping: 1-1/2 times operating pressure but not less than 100 psi at topmost outlet.
 - d. Chilled-water and condenser-water piping, exposed and accessible: 150 psi or 1-1/2 times maximum working pressure, whichever is greater, at lowest point in system.

B. Test Procedures:

1. Chilled-water and condenser-water piping embedded or otherwise inaccessible:
 - a. Avoid excessive pressure on safety devices and mechanical seals.
 - b. Fill entire system with water and vent air from system at least 24 hours before test pressure is applied.
 - c. Apply test pressure when water and average ambient temperatures are approximately equal and constant.
 - d. Maintain test pressure for minimum of six hours without drop after force pump has been disconnected.
 - e. Visually inspect joints while pipe is under test pressure.
2. Ductile-iron pipe and black-steel piping:
 - a. Use procedure specified for chilled-water and condenser-water piping embedded or otherwise inaccessible.
3. Potable-water piping:
 - a. Use procedure specified for chilled-water and condenser-water piping embedded or otherwise inaccessible, except tests may be conducted in sections as long as no pipes or joints are left untested.

C. Repair of Leaks:

1. Do not repair by mechanical caulking leaks in threads or welds occurring while pipeline is under test or in service.
2. Introduction into piping system of material intended to stop leakage is prohibited.
3. Repair leaks in threaded piping by breaking joint, cutting new threads on pipe and installing new pipe fitting.
4. Remove defective welds by chipping or gas gouging from one or both sides of joint.
 - a. Reweld chipped-out places.
 - b. When base metals of fillet-weld are cut back or throat of weld is less than specified, repair defect by adding additional weld metal.

END OF SECTION

SECTION 15410
PLUMBING FIXTURES/ EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing plumbing fixtures, including emergency-eyewash.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
1. Comply with codes and regulations of the jurisdictional authorities.
 2. FS: WW-P-541/GEN, A-A-1154.
 3. ASMEA112.19.2M
 4. ADA.
 5. ANSI: Z358.1.
 6. ASSE: 1071.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Product Shop Drawings.
 2. Certification.
 3. Operation and Maintenance Manuals.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Ship products securely packaged and labeled for safe handling in shipment and to avoid damage and distortion.
- B. Mark each item permanently and legibly with manufacturer's name, brand, reference specification, type, class and other pertinent information as applicable.
- C. Store products in a secure, dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Plumbing Fixtures/ Equipment:
1. General requirements:
 - a. A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction

that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

- b. Use or reuse of components and materials without a traceable certification is prohibited. Brass fittings, faucets, traps and exposed piping, chrome-plated over nickel plate, with polished finish.
- c. Brass pipe, chrome-plated over nickel plate and provided with heavy cast-brass escutcheons and set screw plated to match pipe at fixtures passing into floors, walls or partitions.

1) Utility Sink:

- a) Fixture: Enameled cast iron with stainless steel rim guard and blank back.
- b) Faucet: exposed top supplies, with hose threads, vacuum breaker, and rod support.
- c) Accessories: 3-inch trap standard with grid strainer.

2) Instantaneous Electric Water Heater:

- a) Description: UL listed, tankless with removable cover, replaceable heating element, immersion-type thermostat, replaceable inlet filter, and flow regulator.
- b) Capacity: As shown on the drawing.

B. Fixture Supports:

- 1. Supports for wall-hung water closets, urinals and lavatories: FS WW-P-541/GEN.
- 2. Supports of metal, concealed in building construction. Fixtures rigidly supported from floor by means of one or more heavy extensions or feet built into floor.

C. Vacuum Breakers:

- 1. Chrome-plated brass sized to provide minimum air area equal to piping served and approved by local jurisdictional authorities

D. Traps:

- 1. Plain-pattern type having seal minimum of 2-1/2 inches and maximum four inches.
- 2. 1-1/2 inch and two-inch traps: Heavy cast brass.
- 3. All other size traps: Same material as specified for piping system to which they are connected.
- 4. Fixture traps: As specified under plumbing fixtures, and insulated in accordance with ADA guidelines.

E. Emergency Eyewash Fountain and Body Spray:

- 1. In accordance with ANSI Z358.1.
 - a. Permanent type:
 - 1) Equipped with automatic pressure and volume-control devices to ensure safe and steady water flow under varying pressures.
 - 2) Wall-mounted, with functional parts constructed of corrosion-resistant materials and as follows:
 - a) Eyewash fountain: Twin chrome-plated brass eyewash heads, angled to direct flow of water into eyes and ocular area of face and mounted in stainless-steel bowl.

- 3) Operated by valves of the following types:
 - a) Eyewash fountain: Push-flag operating handle on stay-open valve.
 - 4) Water filter:
 - a) Made of FDA-approved polypropylene with disposable FDA-approved viscose-fiber filter media capable of removing particles larger than 20 microns.
 - b) Capable of withstanding rate of flow of seven gpm and working pressure of 80 psi at 100F.
- F. Thermostatic Mixing Valve:
1. Mixing valve to comply with ANSI Z358.1-2009, ASSE 1071 standards.
 2. Valve shall meet the flow and temperature requirements for eye/ face wash with a locked temperature setting of 85F.
 3. Provide with integral check stops, wall supports, outlet piping with dial thermometer, built in cold water by-pass to allow for cold water flow in case of hot water failure, temperature override protection with secondary thermostatic valve to open cold water upon temperature rise over set point.
 4. Bronze finish.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Drawings do not attempt to show exact details of fixtures. Changes in locations of fixtures, advisable in opinion of Contractor, shall be submitted to Engineer for review before proceeding with the Work.

3.02 INSTALLATION:

- A. Protection of Fixtures:
1. Protect plumbing fixtures from dirt, foreign objects and damage during construction period.
 2. Do not use warped or otherwise imperfect fixtures.
 3. Do not use installed fixtures for any purpose, except testing, prior to final acceptance by the Authority.
 4. Replace damaged and defective fixtures.
 5. Install vacuum breakers on water supply-piping connections to fixtures and equipment in accordance with requirements of jurisdictional authorities.
- B. Emergency-Eyewash Facilities:
1. Install in locations shown and as follows:
 - a. Install water-supply line connecting facilities to water service.
 - b. Install filter on water-supply line at readily serviceable location.
 - c. Install drain line connecting facilities to drainage system as shown.
- C. Safety Equipment:
1. System Shutoff Valves:
 - a. Shutoff valves shall give visual indication of position (open or closed).

- b. Shutoff valves shall be lockable valves and locked in open position.
- 2. Eyewash shall have red safety signoff tag. After completing requirements listed below, Contractor and Owner shall sign red safety signoff tag. Requirements are as follows:
 - a. Visually check safety shower/eyewash piping for leaks.
 - b. Verify that upon operation, stay-open valves remain open.
 - c. Water arcs from eyewash spray heads must cross. Test with eyewash gauge; Haws Drinking Faucet Co., Model 9015.
 - d. Minimum flow rates for eyewashes shall be 3 gpm.
 - e. Tempered water temperature shall be between 65F – 80F.
- D. Install, arrange, and connect equipment as shown on Drawings and in accordance with manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. Perform visual inspection for physical damage, blocked access, cleanliness, and missing items.
- B. Notify Owner and Engineer 48 hours prior to eyewash testing. Owner and Engineer reserve the right to witness all tempered water testing.
- C. Test eyewash units. Water flow must be tested at eyewash/face ring.
 - 1. Eyewash Flow:
 - a. Test with tube-type water gauge (Haws Drinking Faucet Co., Model 9010) and 1-gallon container.
 - b. Container shall fill in 20 seconds or less.
 - 2. Contractor shall log, date, and initial inspection upon passing flow tests.
- D. Verify alarm operation both locally. Notify security prior to test if alarm is connected system-wide.

END OF SECTION

SECTION 15625

CHILLERS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing complete factory-assembled packaged water-chilling units.
- B. Related Work Specified Elsewhere:
 - 1. Concrete pads: Sections 03300.
 - 2. Water Treatment System: Section 15186A.
 - 3. Piping systems: Section 15205.
 - 4. Insulation: Section 15080.
 - 5. Vibration isolation: Section 15070.
 - 6. HVAC Instrumentation and Control: Section 15900A.
 - 7. Wire, cable and busways: Section 16120.
 - 8. Conduit, raceways and cabinets: Section 16130.
 - 9. Motors: Section 16225.
 - 10. Motor starters and control center: Section 16425.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards, and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. ASME Section VIII Code.
 - 3. AHRI: 550/590
 - 4. ANSI: B9.1.
 - 5. ASHRAE Standards.
 - 6. UL/ ETL
 - 7. NEC
 - 8. OSHA
- B. Design Criteria:
 - 1. For single-chiller chiller plant: Select each water-chilling unit in accordance with the following criteria:
 - a. Water on evaporator: 55F.
 - b. Water off evaporator: 42F.
 - c. Water on condenser: 85F.
 - d. Water off condenser: 95F.
 - e. Net refrigeration effect, chilled-water flow rate and condenser water-flow rate: as shown on the Contract Drawings.
 - f. Control system compatible with AEMS system.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - a. Capacity curves for evaporator/compressor and compressor/condenser plotted on charts to ensure properly balanced refrigeration equipment under design conditions.
 - b. Dimensioned plan and elevation view, including required clearances, and location of all field piping and electrical connections.
 - c. Summaries of all auxiliary utility requirements such as: electricity, water, air, etc. Summary shall indicate quality and quantity of each required utility.
 - d. Diagram of control system indicating points for field interface and field connection. Diagram shall fully depict field and factory wiring.
 - e. Manufacturer's certified performance data at full load plus IPLV or NPLV.
 - 2. Certification.
 - a. Record of packaged water chillers in field operation for minimum of 12,000 operating hours for not less than ten individual units prior to shipment. Types that have already shown satisfactory operation for this period may have modifications, provided modifications will not increase maintenance and operating costs or decrease life of machine and complies with AHRI 55/590; ARI 550.
 - b. Verification of successful use of material used for impeller wheel for centrifugal compressors, if other than aluminum alloy.
 - 3. Operation and Maintenance Manuals.

1.04 JOB CONDITIONS:

- A. Safety Requirements:
 - 1. Properly guard belts, pulleys, chains, gears, couplings, projecting set screws, key and other rotating parts to prevent danger to personnel.

1.05 OPERATION AND MAINTENANCE TRAINING:

- A. In accordance with the General Requirements.

1.06 WARRANTY:

- A. Equipment shall be provided with a five-year entire unit parts and labor warranty. The chiller manufacturer shall cover parts, labor costs for the repair or replacement of defects in material or workmanship for a period of five years from equipment start up. Warranty shall include refrigerant.
- B. Provide yearly Maintenance contracts for chiller and control system. Exact Period of maintenance requirement shall be coordinated with owner.

1.07 DELIVERY AND HANDLING:

- A. Chillers shall be delivered to the job site completely assembled and charged with refrigerant R134a and be shipped on skids with a weather resistant cover.
- B. Comply with the manufacturer's instructions for rigging and transporting units. Leave protective covers in place until installation.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. Provide complete water-cooled, semi-hermetic, oil-free, magnetic bearing, centrifugal compressor water chiller as specified herein. Supply chiller with full operating charge of HFC-134a Refrigerant. In design and purchase of equipment, provide for interchangeability of items of piping equipment, subassemblies, parts, motors, starters and relays. Each compressor shall have an integrated variable-frequency drive operating in concert with inlet guide vanes for optimized full and part load efficiency. On two-compressor units, the evaporator and condenser refrigerant sides and the expansion valve shall be common and the chiller shall be capable of running on one compressor with the other compressor or any of its auxiliaries inoperable or removed.

B. Centrifugal Compressors:

1. The unit shall utilize two magnetic bearing, oil-free, semi-hermetic centrifugal compressors.
2. Single-stage, statically and dynamically balanced impeller.
3. Casing fabricated of cast iron, aluminum or steel plate with split sections gasketed and bolted.
4. Impeller wheel constructed of aluminum alloy or other material that has been demonstrably successful in use.
5. Impeller shaft fabricated of heat-treated alloy steel with sufficient rigidity for proposed operation at specified operating speeds.
6. The chiller shall be equipped with an integrated Variable Frequency Drive (VFD) to automatically regulate compressor speed in response to cooling load and the compressor pressure lift requirement. Movable inlet guide vanes and variable compressor speed acting together, shall provide unloading. The chiller controls shall coordinate compressor speed and guide vane position to optimize chiller efficiency. Capacity reduction designed to provide automatic capacity modulation from 100 percent capacity to 10-percent capacity without cycling.
7. Capacity-control system actuated by temperature of water leaving evaporator.
8. Transducers for remote surveillance and control by Chiller plant monitoring panel system and capability to send signal to the AEMS as shown and in accordance with Section 15900A.

C. Water Cooler/ Evaporator:

1. Removable bundle-type copper tube, constructed of seamless copper tubing minimum 0.035-inch wall thickness, plain or with integral fins individually replaceable and rolled or brazed into copper or steel-tube sheets, with baffles and tube supports of copper or steel.
2. Complete refrigerant-feed control, designed to control feed to evaporator at each level of load range from 100 percent to 10 percent of package water-chilling capacity without use of hot-gas bypass.
3. Performance based on water velocity of minimum three fps and maximum ten fps throughout full length of tubes and fouling factor of 0.00025 for individual machine.
4. Water spaces in coolers designed for minimum 150-psi working pressure; tested in accordance with ASME Code.
5. Water spaces not subject to the ASME Code due to size or other limitations, tested at pressure of not less than 1-1/2 times working pressure.

6. Re-seating type spring loaded pressure relief valves according to ASHRAE-15 safety code shall be furnished. The evaporator shall be provided with single or multiple valves.
 7. Provide factory-mounted and wired, thermal-dispersion water flow switches on each vessel to prevent unit operation with no or low water flow. Paddle and pressure differential type switches are not acceptable due to high rates of failure and false indications from these types of flow indicators.
- D. Insulation:
1. Each water-chilling unit provided with insulation as specified in Section 15080.
- E. Condenser:
1. Shell-and-tube type permitting tubes to be cleaned from each end by removing water-box cover plates or head.
 2. The tubes shall be individually replaceable and secured to the intermediate supports without rolling or expanding to facilitate replacement if required.
 3. Tubes fabricated of seamless copper tubing, minimum 0.035-inch wall thickness, with integral fins individually replaceable and rolled or brazed into copper or steel-tubed sheets.
 4. Performance based on rate of water flow specified and water velocity of 3-fps minimum and 10-fps maximum throughout full length of tubes and fouling factor of 0.00075.
 5. Water spaces in condenser designed for minimum 150-psi working pressure; tested in accordance with requirements of ASME Code.
 6. Refrigerant side of shell tested at 1-1/2 times refrigerant saturation pressure.
 7. Re-seating type spring loaded pressure relief valves according to ASHRAE-15 safety code shall be furnished. The evaporator shall be provided with single or multiple valves.
 8. Provide factory-mounted and wired, thermal-dispersion water flow switches on each vessel to prevent unit operation with no or low water flow. Paddle and pressure differential type switches are not acceptable due to high rates of failure and false indications from these types of flow indicators.
- F. Compressor Drive Motor:
1. Squirrel-cage induction, refrigerant gas-cooled, rated at 460 volts, three-phase and 60 Hertz and in accordance with Section 16225.
 2. The motor shall be of the semi-hermetic type, of sufficient size to efficiently fulfill compressor horsepower requirements. It shall be liquid refrigerant cooled with internal thermal sensing devices in the stator windings. The motor shall be compatible with variable frequency drive operation.
 3. Motor starter conforming to recommendations of water-chiller manufacturer and as specified in Section 16425.
 4. Wiring as recommended by compressor manufacturer to provide complete automatic operation of centrifugal refrigeration system.
- G. Controls, Control Panel and Gauges:
1. Provide a microprocessor control panel which can monitor and display various chiller parameters and alarms, with a touchscreen operator interface and an unit controller. As a minimum, monitor the following points at the Chiller plant monitoring panel:
 - a. Analog points:
 - 1) Chilled water enter temperature DEG F
 - 2) Chilled water leaving temperature DEG F

3) Condenser water entering temperature	DEG F
4) Condenser water leaving temperature	DEG F
5) Condenser water pressure	PSI
6) Chilled water pressure	PSI
7) Condenser refrigerant pressure	PSI
8) Evaporator refrigerant pressure	PSI
9) Percent of 100% speed (per compressor)	%
10) Chiller KW demand	KW
11) Chiller efficiency	KW/TON
12) Chilled water flow	GPM
13) Condenser water flow	GPM
14) Refrigerant Purge Air Pressure	PSI
15) Condenser water pressure flow differential	PSI
16) Chiller Oil Pressure	PSI
17) Outdoor Temperature	Degree F
18) Outdoor Humidity	0-100%
19) Chiller Plant Space Temperature	Deg F
20) Chiller Voltage	V

b. Status Points (Contact Closure):

- 1) Chiller Motor ON/OFF
- 2) Condenser Water Pump ON/OFF
- 3) Chilled Water Pump ON/OFF
- 4) Cooling Tower Fan ON/OFF
- 5) Chiller Refrigerant Purge Air Pump ON/OFF
- 6) Chiller NORMAL/ ABNORMAL
- 7) Chiller Condenser Water Flow NORMAL/ ABNORMAL
- 8) Control Air Pressure NORMAL/ ABNORMAL
- 9) Chiller Plant Space Temperature NORMAL/ ABNORMAL
- 10) Condenser Water Pumps HOA Selector
- 11) Switch AUTO/HAND
- 12) Chilled Water Pumps HOA AUTO/HAND
- 13) Selector Switch
- 14) Cooling Tower Fans HOA AUTO/HAND
- 15) Selector Switch

c. Control Points (Contact Closure):

- 1) Chiller Motor ON/OFF
- 2) Condenser Water Pumps ON/OFF
- 3) Chilled Water Pumps ON/OFF
- 4) Cooling Tower Fans ON/OFF and speed control based on condenser water temperature.

d. Alarm points:

- 1) Chiller bearing temperature
- 2) Compressor failure

e. In addition, for future interface with an Energy Management System, provide a 4-20 mA signal output for each analog point and a dry contact closure for each alarm point.

2. Capacity-control mechanism to be integral part of packaged water chiller maintaining leaving water temperature within 0.75 degrees F of setting temperature from 100 percent to 10 percent of chiller capacity.
 3. Control mechanism: Compressor stopped when chiller output drops below 10 percent and automatically restarted when leaving water rises to preset temperature.
 4. Timing device: Restarting unit limited to four starts per hour, minimum 15 minutes apart.
 5. Modulating chilled-water operating control having adjustable throttling range, with means of calibration by adjusting chilled-water temperature control point. Solid-state electronic control.
 6. Control panel provided on each unit with compressor-operating control, START/STOP switch and the gauges and protective devices as per paragraph G-1.
 7. Signal lights for protective devices.
 8. Alarm-circuit terminals in basic chiller-package control panel designed to actuate alarm device in event of machine cutout of protective devices.
 9. The chiller shall be capable of automatic control of: evaporator and condenser pumps (primary and standby), cooling tower fan cycling control and a tower modulating bypass valve or cooling tower fan variable frequency drive.
- H. Evacuation System:
1. Manually started and stopped evacuation system when positive-pressure refrigerant is used and chiller package is not designed to permit pumpdown storage and isolation of entire charge in condenser.
 2. Motor-driven, air-cooled or water-cooled reciprocating condensing unit and receiver of sufficient capacity to store entire refrigerant charge of largest water-chilling system.
 3. Receiver in accordance with ASME Code, mounted on floor brackets and provided with rupture members and dual relief valves in series.
 4. Entire system completed with valves, piping and controls so that evacuation system may be utilized for pumpout, without temporary piping or wiring.
- I. Receiver, Refrigerant:
1. Horizontal liquid receiver designed, fitted and rated in accordance with ASME Code.
 2. Each receiver having storage capacity 25 percent minimum in excess of that required for fully charged system.
 3. Inner surfaces thoroughly cleaned by sandblasting.
 4. Each receiver equipped with inlet, outlet drip pipe, drain plug, purging valve, relief valves of capacity and setting in accordance with ANSI B9.1 and two bulls-eye liquid sight glasses.
 5. Sight glasses installed in same vertical plane, 90 degrees apart, perpendicular to the axis of the receiver and not over 3-inches horizontally from drip pipe measured along axis of receiver.
 6. Receiver constructed and tested in accordance with ASME Code.
- J. Starter:
1. Motor starters: Section 16425.
- K. Tools:
1. One complete set of special tools as recommended by manufacturer for field maintenance of system.
- L. Factory Wiring:

1. In accordance with manufacturer's standard practice.
- M. Nameplates:
 1. Securely attached to each chiller showing manufacturer's name, model number and serial number.
- N. Power Connection:
 1. Provide single point power connection with non-metal compressor conduits and disconnect switch.
- O. Vibration Isolation:
 1. Provide as required in specification section 15070.
- P. Refrigerant Leak Detection System:
 1. Provide refrigerant leak detection sensors suitable for R-134A per ASHRAE-15 requirements and code compliance.
 2. Provide refrigerant leak detection panel, quantity as required for a complete functional system, with a capability to provide audible and visual alarm and integrated to the exhaust system.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances within space provided and make readily serviceable. Install per manufacturer's requirements, shop drawings, and contract documents.
- B. Provide concrete pads, platforms and hangars necessary for proper installation of equipment.
- C. Install chillers on concrete pads 4-inches minimum height in accordance with Sections 03100 and 03300.
- D. Install chillers on vibration Isolators in accordance with Section 15070.
- E. Coordinate work with other trades.
- F. Mount tools on tool board in equipment room, as directed.
- G. For piping system installation, see Section 15205.
- H. For water treatment installation, see Section 15186A.
- I. For conduit, raceways and cabinets installation, see Section 16130.
- J. For wire cable, and busways, installation, see Section 16120.

3.02 FIELD SERVICES:

- A. Semi-Hermetic Units: Obtain on-site services for two man-days (regular working hours) of manufacturer's engineering representative to advise on the following:

1. Pressure test on semi-hermetic water-chilling unit for leaks.
 2. Evacuation and dehydration of machine to minus 12F wet bulb or to absolute pressure of not over 0.204-inch of mercury for 24 hours minimum.
 3. Charging machine with refrigerant.
 4. Starting machine and instructing representative of the Authority as to its proper care and operation. Provide factory startup personnel to ensure proper operation of the unit, but in no case for less than two full working days. During the period of start-up, the start-up technician shall instruct the owner's representative in proper care and operation of the unit.
- B. Open Units: Obtain on-site services for two man-days (regular working hours) of manufacturer's engineering representative to advise on the following:
1. Erection, alignment, testing and dehydrating.
 2. Charging machine with refrigerant.
 3. Starting machine and instructing Authority personnel in proper care and operation of machine.

END OF SECTION

SECTION 15640
COOLING TOWER ACCESSORIES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing factory-assembled, counterflow, vertical-discharge, induced draft/ forced draft cooling tower accessories and components.
- B. Related Work Specified Elsewhere:
 - 1. Piping systems: Section 15205.
 - 2. Vibration isolation: Section 15070.
 - 3. Sound attenuators: Section 15825.
 - 4. HVAC Instrumentation and Control: Section 15900A.
 - 5. Motors: Section 16225.
 - 6. Variable Frequency Drives: Section 16480.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards, and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. NFPA: 214.
 - 3. CTI: Bulletin ATP-105.
 - 4. ASME: Performance Test Code PTC-23.
 - 5. ASTM: A653, B117.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification.
 - a. Certificates stating that the sound power level of cooling tower based on 10-12 watts does not exceed following decibel ratings, without attenuators:

Octave Band Center Frequency/Hertz	Sound Power Level/dB
63	97
125	95
250	92
500	90
1000	86
2000	85
4000	82
8000	78

b. Certified field test reports as specified and as directed.

3. Operation and Maintenance Manuals.

1.04 JOB CONDITIONS:

A. Safety Requirements:

1. Properly guard belts, pulleys, chains, gears, couplings, projecting set screws, keys and other rotating parts to prevent danger to personnel.

1.05 OPERATION AND MAINTENANCE TRAINING:

A. Upon completion of installation, furnish on-site services of manufacturer's engineering representative with specialized experience in components of system for minimum of 1/2 man-day (regular working hours) to instruct Authority personnel in proper operation and maintenance of each system.

1.06 WARRANTY:

A. Equipment shall be provided with a five-year replacements parts and labor warranty. The cooling tower manufacturer shall cover for parts, labor costs for the repair or replacement of defects in material or workmanship for a period of five years from equipment start up.

1.07 DELIVERY AND HANDLING:

- A. Equipment parts shall be delivered to the job site completely intact and shall be shipped on skids with a weather resistant cover.
- B. Comply with manufacturer's instructions for rigging and transporting. Leave protective covers in place until installation.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of piping equipment, subassemblies, parts, motor starters and relays.
2. Type 304 and/or Type 316 Stainless steel.

B. Cooling Towers:

1. The performance of existing cooling tower (s) are noted on the drawings and as follows:
 - a. Water-flow rate: As shown.
 - b. Cooling: From 95F to 85F minimum.
 - c. Ambient temperature: 78F wet bulb.
 - d. Water-pressure drop: Not exceeding value shown on equipment schedule.
2. Sump sections:
 - a. Stainless steel, heavy-gauge.
 - b. Provided with outlet connection, overflow, valved drain and electric water-level control consisting of magnetic-type electric float switch in moisture proof housing and control solenoid valve in makeup water line.
 - c. Outlet connections with large-area lift-out strainer with perforated openings sized smaller than spray-nozzle orifices, mounted in assembly and baffled to prevent cavitation.
 - d. Pipe drain and overflow connections as shown or to nearest drain leading to sewer.
3. Fan sections:
 - a. Fan material: Aluminum.
 - b. Fans: Axial propeller-type statically and dynamically balanced for induced draft cooling towers; centrifugal type statically and dynamically balanced for forced draft cooling towers.
 - c. Designed to overcome resistance of tower, its enclosure, connecting ductwork and sound attenuators, if any, and quiet in operation.
 - d. Air inlets designed for smooth air entry.
 - e. Hot-dip galvanized bird screen at fan air inlets.
4. Fan bearings
 - a. Heavy-duty ball bearings, precision-grade, incorporating cast-iron pillow blocks and self-aligning with wide inner rings for greater load capacity.
 - b. Slip-fit bearings equipped with eccentric locking collars to provide for positive means of securing bearings to shaft.
 - c. Prelubricated bearings, ready for immediate service.
 - d. Grease-fitting for relubrication.
 - e. Lithium-base grease, waterproof, containing inhibitor and effective for temperature range of minus 65F to plus 250F.
5. Fan drives:
 - a. Fan: Gear driven by electric motors.
 - b. Entire fan drive: Gear driven and other items manufacturer-rated for minimum of 1.5 times maximum horsepower required to drive fan.
 - c. Rating taken from manufacturer's standard catalog data.
 - d. Direct drive compatible with variable frequency drive.
6. Fan motors: Section 16225, with the following additional requirements:
 - a. Four-pole, totally enclosed, fan-cooled, inverter duty rated and guarded.
7. Casings:
 - a. Fabricated of heavy-gauge hot-dip galvanized steel using channel-type sheets.
 - b. Gasketed access doors for strainer.

- c. Towers designed for live load of 40 pounds per square foot on horizontal deck surfaces and wind load of minimum 100 miles per hour for vertical surfaces.
 - d. Ladder: Aluminum or hot-dip galvanized steel for towers having water-distribution section more than eight feet above roof or grade.
- 8. Tower fill and drift eliminators:
 - a. Tower fill (wet deck) fabricated in modular layers consisting of manufacturer recommended plastic, wave-formed, surface sheets or manufacturer's equivalent standard product.
 - b. Drift eliminators fabricated of materials specified for fill but located at top of tower and assembled in easily handled removable sections to provide access to spray tree and nozzles.
- 9. Water distribution:
 - a. Water evenly distributed over tower fill area through spray tree consisting of hot-dip galvanized steel header and removable hot-dip galvanized steel branches.
 - b. Branches and spray nozzles retained in place by means of snap-in rubber grommets to provide for ease of removal for cleaning and replacement of spray nozzles.
 - c. Plastic nozzles provided.
 - d. Spray tree and spray nozzles designed for total flow rate for each tower as specified.
 - e. Spray header with plugged tap for measurement of pressure.
 - f. Separate regulating and stop valves for complete balancing and complete shutoff for each tower.
- 10. Makeup-water solenoid valve:
 - a. 120-volt, 60-Hertz solenoid valve installed in makeup-water line.
 - b. Maximum operating pressure-drop across valve: 10 psi.
 - c. Solenoid valve controlled by electric float switch.
- C. Nameplates:
 - 1. Securely attached plate on each cooling tower showing manufacturer's name, model number and serial number.
- D. Sound Attenuators: Section 15825.
- E. Controls: Section 15900A.
- F. Vibration Isolators: Section 15070.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Start ladders at roof or grade level.
- B. Provide support beams, concrete pads, platforms, hangers and anchor bolts for proper installation of equipment as recommended by the manufacturer.
- C. Install complete potable makeup-water system as shown on the drawings and piping materials as specified in Section 15205.
- D. Mount units on vibration isolators in accordance with Section 15070.

E. Provide sound attenuators where shown.

3.02 FIELD QUALITY CONTROL:

A. Field Tests:

1. Test cooling towers in accordance with ASME Performance Test Code PTC-23 or CTI Bulletin ATP-105, using services of independent testing agency.
2. Prior to commencing tests, submit name of testing agency for approval.
3. Tests will be observed by the Authority and calculations performed immediately following tests. Have tests and calculations signed by observers.
4. Submit computations to the Engineer together with six complete sets of test results.
5. Compute and test in accordance with particular test procedure employed by testing agency.
6. When the Engineer considers the performance of cooling towers unsatisfactory, the Engineer will direct that cooling towers be retested.
7. Should tests show that cooling towers are deficient, modify or replace towers to provide specified capacities.
8. If cooling tower performance is proven satisfactory, cost of tests will be borne by the Authority. If cooling tower performance is proven unsatisfactory, cost of tests will be borne by the Contractor.

END OF SECTION

SECTION 15733A
AIR CONDITIONING UNITS - CHILLED WATER COOLED

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing factory-built air-handling units with cabinet-type fan sections and coil sections.
- B. Related Work Specified Elsewhere:
 - 1. Piping systems: Section 15205.
 - 2. Vibration isolation: Section 15070.
 - 3. HVAC Instrumentation and Control: Section 15900A.
 - 4. Raceways, boxes and cabinets: Section 16130.
 - 5. Wire, cable and busways: Section 16120.
 - 6. Motors: Section 16225.
 - 7. Motor starters and control centers: Section 16425.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. NFPA: 90A.
 - 3. AHRI: 430.
- B. Qualifications of Manufacturer:
 - 1. Furnish air-conditioning units which are the products of a manufacturer who is a member of AMCA.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Operation and Maintenance Manuals.

1.04 JOB CONDITIONS:

- A. Safety Requirements:
 - 1. Properly guard belts, pulleys, chains, gears, couplings, projecting set screws, keys and other rotating parts to prevent danger to personnel.

1.05 WARRANTY:

- A. Equipment shall be provided with a five-year entire unit parts and labor warranty. The manufacturer shall cover parts, labor costs for the repair or replacement of defects in material or workmanship for a period of five years from equipment start up.

1.06 DELIVERY AND HANDLING:

- A. Equipment's shall be delivered to the job site completely assembled and be shipped on skids with a weather resistant cover. Comply with the manufacturer's instructions for rigging and transporting units. Leave protective covers in place until installation.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

- 1. In design and purchase of equipment, provide for interchangeability of items of piping equipment, subassemblies, parts, motors, starters and relays.
- 2. Units shall be tested in accordance with AHRI 430 and AHRI 260.
- 3. Units shall comply with NFPA 90A and be UL listed in the U.S.
- 4. Air handlers shall consist of a hydronic coil, drain pan, air filter and centrifugal fan with motor and drive mounted in a common cabinet.
- 5. Air handlers shall have knockouts in all four corners for installing the unit suspended from the ceiling with threaded rods.

B. Casings

- 1. Casings shall be constructed of heavy-gauge galvanized steel, insulated with one-inch, 1-1/2 lb density fiberglass fire resistant and odorless glass fiber material to provide thermal and acoustical insulation.
- 2. Fan housing sides shall be directly attached to the air handler top and bottom panels strengthening the entire unit assembly.
- 3. Coil access panels are to be located on both sides of the air handler and allow easy removal of the internal coils and drain pan.
- 4. Main access panels shall provide generous access to the fan, motor and drive from both sides of the air handler

C. Fans

- 1. Fans shall be forward curved, centrifugal blower type equipped with heavy-duty adjustable speed V-belt drive.
- 2. The fan shaft shall be supported by heavy-duty, permanently sealed ball bearings.
- 3. Fans shall be dynamically balanced.

D. Hydronic Coils

- 1. Cooling coils shall be four- or six-row, chilled water.
- 2. All hydronic coils shall have 12 fins per inch. All hydronic coils shall use highly efficient aluminum fins, mechanically bonded to seamless copper tubes
- 3. All coils shall be factory tested with 450 psi air under water.
- 4. Maximum standard operating conditions are: 150 psig, 55°F. Sweat type connections are standard.

E. Drain Pan

- 1. The drain pan is noncorrosive and double-sloped to allow condensate drainage.
- 2. The drain pan construction shall be polymer.
- 3. Coils mount above the drain pan—not in the drain pan—thus allowing the drain pan to be fully inspected and cleaned

4. The drain pan shall be removable for cleaning.
 5. The polymer drain pan connections are unthreaded 3/4" schedule 40 PVC for solvent bonding.
- F. Filters
1. Unit shall have filter sized for less than 300 feet per minute at nominal airflow.
 2. Filters shall be two-inch MERV 8
- G. Motors
1. Three-phase motors shall be 460 voltage operation. All motors shall have a plus or minus 10 percent voltage utilization range. All standard motors shall be open drip-proof with permanently sealed ball bearings, internal current and thermal overload protection, a minimum 1.15 service factor and 56 frame resilient bases. Motors shall be factory-installed and wired to the air handler junction box
- H. Piping package
1. Chilled water piping shall consist of circuit setter, three-way control valve, strainer, and ball isolation valves.
 2. The maximum entering fluid temperature to the water valves is 55°F.
 3. All chilled water piping and accessories shall be insulated.
- I. Control Interface
1. Air handler shall be equipped with a control interface is intended to be used with a field-supplied, low-voltage thermostat.
 2. Control interface for fan control shall be as per the sequence of operation called out on the drawings.
- J. Nameplates
1. Securely attached plate to each air-conditioning unit showing manufacturer's name, model number and serial number.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances within space provided and make readily serviceable.
- B. Provide foundations, platforms and hangers necessary for proper installation of equipment.
- C. Install units on vibration isolators as specified in Section 15070.
- D. Electrical connections: Sections 16130 and 16120.
- E. Condensate piping: Section 15205.
- F. After installation, adjust fans to operate without noticeable vibration.
- G. Arrange belt guards to permit oiling, testing and using tachometer with guards in place.

END OF SECTION

SECTION 15765

HEATING EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing heating equipment and electric heat tracing for piping.
- B. Related Work Specified Elsewhere:
 - 1. Vibration isolators: Section 15070.
 - 2. HVAC Instrumentation and Control: Section 15900A.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. UL: 1025.
- B. Source Quality Control:
 - 1. Test electric heating coils dielectrically at 2,000 volts before shipment.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification:
 - a. Successful dielectric testing of electric heating coil at 2,000 volts.
 - 3. Operation and Maintenance Manuals.

1.04 WARRANTY:

- A. Equipment shall be provided with a five-year entire unit parts and labor warranty. The manufacturer shall cover parts, labor costs for the repair or replacement of defects in material or workmanship for a period of five years from equipment start up.

1.05 DELIVERY AND HANDLING:

- A. Equipment's shall be delivered to the job site completely assembled and be shipped on skids with a weather resistant cover. Comply with the manufacturer's instructions for rigging and transporting units. Leave protective covers in place until installation.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of equipment, subassemblies, parts, motors, starters and relays.

B. Electric Unit Heaters:

1. Factory-assembled unit heaters consisting of heating element, fan, fan motor, housing and outlet diffuser.

a. Casings:

- 1) Fabricated of galvanized steel or bonderized steel, factory-primed and finished with baked enamel.
- 2) Parts rigidly stiffened to prevent vibration and to hold working parts in line.
- 3) Casings for suspended-type units designed for direct attachment to hangers.
- 4) Ceiling or wall-mounted, spring-type brackets furnished as necessary to support unit.
- 5) Casings readily removable for access to interior parts.
- 6) Adjustable horizontal vanes, arranged to give uniform air distribution without objectionable drafts.

b. Fan and fan motor:

- 1) Propeller fan directly connected to fan motor.
- 2) Fan factory-balanced dynamically and designed for quiet operation.
- 3) Unit heater/fan motor: As standard with manufacturer.
- 4) Each unit equipped with combination fan guard/motor support resiliently mounted to absorb motor vibration.
- 5) Motor speed: 1,750-rpm maximum.
- 6) Integral transformer where fan-motor voltage differs from line voltage.

c. Heating element:

- 1) Resistance wire of corrosion-resistant metal surrounded by finned metal sheath, interspace filled with ceramic material or magnesium oxide.
- 2) Each heating element wired to built-in, line-voltage, automatic-reset, thermal-overheat protection.
- 3) Complete controls, contactors, control-circuit transformers factory-assembled and factory-wired.
- 4) Unit heaters tested and listed under UL 1025.
- 5) Thermostats: Built-in, unless otherwise shown.
- 6) Disconnect switch near unit heater.
- 7) Starter and Disconnect by manufacturer.

d. Unit heaters with capacities of 10 kW or higher equipped with H.O.A. switches.

C. Electric Heat Tracing for Piping:

1. Heat-traced pipe insulated after installation of heating tape in accordance with Section 15080.

2. Heating tape with single or twin heating elements embedded in impact-resistant, high-dielectric refractory material, UL-listed and with stainless-steel exterior protective sheath acting as electrical ground in case heating element touches sheath.
 3. Heating tape rated for voltage shown and capable of producing wattage shown.
 4. Heating tape flexible with minimum bending radius of not more than six times diameter of tape.
 5. Heating tape compatible with pipe temperature-sensing thermostat: Section 15900A.
 6. Heating tape connected to power source and controls through nonheating leads minimum seven feet in length.
- D. Nameplates:
1. Securely attached to each major item of equipment showing manufacturer's name, model number and serial number.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances to space provided and make readily serviceable.
- B. Mount electric unit heaters on vibration isolators in accordance with Section 15070.
- C. Provide supports, hangers and anchor bolts necessary for proper installation of equipment as recommended by manufacturer
- D. Provide heat tracing on piping where shown.
- E. Install electric heating coil where shown.
- F. Apply insulation on heat-traced piping in accordance with manufacturer's recommendations.
 1. Where heating tape is spiraled, ensure that adjacent turns do not touch so as to avoid overheating and damaging sheath material.
 2. Allow minimum of one inch between spirals.
 3. Do not flex wire when ambient temperature is less than 32F, unless tape is warmed.
 4. Connect unheated cold end to power source.
 5. Secure heating tape in contact with pipe with banding or strapping.
 6. Provide automatic temperature control by thermostat designed and set to energize at 40F.
 7. Upon completion of installation and testing of pipe, install and test heating tape in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 15810

DUCTWORK

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing ductwork and accessories.
- B. Related Work Specified Elsewhere:
 - 1. Firestopping; Section 07841.
 - 2. Insulation: Section 15080.
 - 3. Outlets and Grilles: Section 15850.
 - 4. Firestopping: 07841.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. SMACNA:
 - a. HVAC Duct Construction Standards - Metal and Flexible.
 - b. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems.
 - c. HVAC Systems - Testing, Adjusting and Balancing.
 - d. HVAC Air Duct Leakage Test Manual.
 - 3. ASTM: A36, A53, A653.
 - 4. NFPA: 90A
 - 5. AASHTO: M81.
 - 6. UL: Building Materials Directory, 181, 555.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Scale: 1/4-inch minimum
 - 2. Certification.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Galvanized Sheet Steel: ASTM A653.
- B. Steel Plate: ASTM A36, Grade A.
- C. Steel Pipe: ASTM A53, Grade A.

2.02 FABRICATION:

A. Duct Construction:

1. Fabrication in accordance with SMACNA HVAC Duct Construction Standards-Metal and Flexible.

B. Access Doors in Ducts:

1. Provide access doors to gain access to fans, fan motors, dampers, filters, coils and controls in field verified accessible locations.
2. Doors: Of same metal thickness as ducts.
3. Gasketed doors: Secured to duct.

C. Plenums:

1. Field-fabricated and reinforced consistent with class of ductwork in which used.
2. Outward-opening access doors to plenums provided where necessary for equipment access and as shown.

D. Dampers:

1. Splitter or butterfly damper provided in duct leading to air terminal and branch duct take off from the main irrespective of whether shown on the drawings or not.
2. Butterfly dampers:
 - a. Balanced-type with flat blades.
 - b. Rigid blades fabricated with close-fitting hemmed edges.
 - c. Damper rods minimum 3/8-inch square at one end passing directly through ducts.
 - d. Square end of each rod held in self-locking lever device.
 - e. Where installed in furred ceilings, damper-locking device may be provided with short lever and concealed in box with flush cover in lieu of access panel.
3. Opposed-blade dampers:
 - a. Gang-operated multiple blades provided in ducts over 12 inches in dimension.
 - b. Multiple blades fabricated maximum six inches wide.
 - c. Fabricated with nonmetallic edges or coating in low-pressure, medium-pressure or high-pressure ducts.
 - d. Ends of damper rods sealed to prevent leakage of air.
4. Splitter dampers:
 - a. Single blade with hemmed edges, provided at branch duct connections.
 - b. Each blade hinged at one end with sheet metal straps.
 - c. Free end of each blade connected to 1/4-inch adjusting rod secured to side of duct in flanged bushing with set screws.
 - d. Rods adjusted to operate freely between open and closed positions.
5. Damper material:
 - a. Splitter and damper blades fabricated of same metal and two gauges heavier than ductwork and casings.
 - b. Fastening details and other items fabricated of metal specified for ductwork and casing bracing.

6. Damper regulators:
 - a. Self-locking, damper and splitter regulators furnished, labeled SHUT and OPEN.
 - b. Factory-fabricated damper and splitter hardware furnished with zinc protective coating.
7. Fire dampers:
 - a. Fabricated to meet requirements of codes and regulations of jurisdictional authorities.
 - b. Constructed so that, during normal operation, folded blade assembly does not interrupt air stream.
 - c. Access provided for replacement of links.
 - d. Sleeve provided for fire damper, 14-gauge hot-rolled steel.
 - e. Fire dampers remote from fire partitions; connecting ductwork provided between fire damper and fire partition, fabricated of 11-gauge, zinc-coated sheet steel and supported by ½-inch diameter rods.
 - f. Fire dampers constructed to meet requirements of NFPA 90A and UL 555.
- E. Flexible-Duct Connections:
 1. Flexible-duct connections provided between air-handling unit fan and related ductwork and wherever necessary to prevent transmission of vibration to adjacent elements.
 2. Factory-assembled flexible material bordered each side with three-inch wide galvanized-steel edging mechanically attached.
 3. Width of flexible portion: Three to nine inches as necessary for installation conditions and to allow freedom of movement without unnecessary slack.
 4. Fabric parts of flexible connections: Unpainted.
- F. Instrument Test Holes:
 1. Factory-fabricated, airtight, non-corrosive instrument test hole with screw cap and gasket.
 2. Instrument test holes provided where required by balancing and testing agency.
 3. Cap extended up through insulation.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Ductwork Installation:
 1. Install dampers and splitters so as to permit adjustment after completion of the work.
 2. Install dampers without strain or distortion of any part of dampers.
 3. Adjust moving parts to move freely without binding.
 4. Caulk dampers airtight around frames.
 5. Adjust damper and splitter adjusting rods to operate freely between open and closed positions.
 - a. Cut off projecting ends of rods after adjustment and bend over two inches from bushings.
 - b. Leave cut ends smooth and free from burrs.
 6. Where diffuser is located at end of rectangular duct, extend duct minimum of one-neck diameter beyond center line of neck.

7. Fire dampers:
 - a. Install fire dampers in ducts which penetrate walls or floors separating areas normally used by the public from ancillary areas. Patron-used areas include, but are not limited to, the following:
 - 1) Station train rooms.
 - 2) Train tunnels.
 - 3) Passageways ordinarily used by patrons.
 - b. Install fire dampers in ducts which penetrate walls and floors of elevator machinery rooms.
 - c. Install fire dampers to conform with fire, smoke and radiation damper installation guide for HVAC system
 8. Embedded Ductwork:
 - a. Join sections by continuous weld to achieve water-tightness.
 9. Duct penetration through fire-rated partitions to be sealed with approved fireproof sealant in accordance with Section 07841.
 10. At in-line fans, provide flanged removable transition to permit access to and removal of fan motor
- B. Flexible Connections:
1. Install flexible connections in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible.
- C. Protection of Ductwork:
1. Protect ductwork, appurtenances and openings from dirt, foreign objects and damage during construction.
 2. Replace damaged ductwork and appurtenances.
 3. Provide sheet metal caps on duct ends that are to be connected to future ductwork.

3.02 FIELD QUALITY CONTROL:

- A. Air-Leak Tests for Accessible Ductwork: Perform air-leak tests in accordance with SMACNA HVAC Air Duct Leakage Test Manual.
- B. Air-Leak Test for Embedded Ductwork: Test ductwork with internal air pressure of two inches wg. In accordance with SMACNA.

3.03 CLEANING OF AIR SYSTEM:

- A. Before fans or filters are operated, clean inside of air system, including casing, plenums, ductwork and concrete tunnels/ air shafts used for air supply or return.
- B. Accomplish cleaning by means of industrial vacuum cleaners which will effectively remove dust and foreign material from surfaces swept by air stream.
- C. Clean exposed ductwork and leave in satisfactory condition, free from grease, oil and foreign material prior to application of insulation or finish painting.
- D. Clean ducts after the system has been used for adjusting, testing or temporary ventilation.

END OF SECTION

SECTION 15825

SOUND ATTENUATORS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing factory-fabricated sound attenuators.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:

- 1. Comply with codes and regulations of the jurisdictional authorities.
- 2. AMCA Standards.
- 3. SMACNA HVAC Duct Construction Standards.
- 4. UL: 723.
- 5. NFPA: 255.
- 6. ASTM: E84.

- B. Source Quality Control:

- 1. Run tests for cooling tower fan attenuators on dynamic insertion-loss performance by duct-to-reverberation-room method with air flowing through sound attenuator at rated capacity.
- 2. Test methods to eliminate effects due to end reflection, vibration, flanking transmission and standing waves in reverberant room.
- 3. Take air flow and pressure loss data in accordance with AMCA Standards.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification.
 - a. Certify that values for sound-pressure levels, i.e., decibels, Re 0.0002 microbar, of cooling tower with attenuators do not exceed those scheduled below measured at 50 feet in free field in any direction.

Octave Band Center Frequency/Hertz	Sound Pressure Level/dB at 50 Feet with Inlet and Outlet Attenuators
63	66
125	61
250	54
500	45
1000	42
2000	41
4000	39
8000	39

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of equipment, subassemblies and parts.

B. Cooling-Tower Sound Attenuators:

1. Factory-fabricated, packaged-type, furnished by tower manufacturer.
2. Outer casing constructed of minimum 22-USSG, hot-dip galvanized sheet steel in accordance with SMACNA HVAC Duct Construction Standards.
3. Panels lines:
 - a. With weatherproof, inorganic, permanently odorless, fibrous-glass acoustic material.
 - b. Combination rating when tested in accordance with ASTM E84, NFPA 255, or UL 723, maximum 25 for flame spread, 20 for smoke developed and 20 for fuel contributed.
4. Lining secured in place with galvanized-steel screening.
5. Removable panels: For access to the eliminator sections and upper interior of tower.
6. Exposed metal surfaces finished with zinc-chromate aluminum paint or manufacturer's standard finish providing equal or greater corrosion protection.
7. Intake attenuators designed to bolt directly to the cooling tower, having removable access doors at ends for entry to moving parts of unit.
8. Discharge attenuators designed to mount directly to top of tower and requiring no additional structural support.
9. Galvanized-sheet-metal hooded inlet provided for protection from weather.

C. Nameplates:

1. Securely attached to each attenuator showing manufacturer's name, model number and serial number.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit sound attenuators within space available without restricting air flow.
- B. Install attenuators in accordance with manufacturer's recommendations and printed instructions.
- C. Provide self-supported cooling tower attenuators which can be readily attached.

TABLE 15825-1 MINIMUM DYNAMIC INSERTION LOSS

Std. 8000 Type Hz	Max. Press. Length	Drop In.-	Dynamic Insertion Loss/Hertz					
	<u>Ft.</u>	<u>-wg.</u>	125 <u>Hz</u>	250 <u>Hz</u>	500 <u>Hz</u>	100 <u>Hz</u>	2000 <u>Hz</u>	4000 <u>Hz</u>
3A	3	.31	5	8	15	16	14	10
5A	8							
	5	.31	8	13	25	28	21	14
	10							
7A	7	.31	9	18	31	38	28	18
	12							
3B	3	.31	7	12	19	24	23	18
	11							
5B	5	.37	10	18	30	42	33	23
	14							
7B	7	.40	14	24	36	48	44	31
	18							

END OF SECTION

SECTION 15830

FANS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing fans.
- B. Related Work Specified Elsewhere:
 - 1. Vibration isolation: Section 15070.
 - 2. Ductwork: Section 15810.
 - 3. HVAC instrumentation and Controls: Section 15900A.
 - 4. Motors: Section 16225.
 - 5. Motor starters and control centers: Section 16425.
 - 6. Variable Frequency Drives: Section 16480.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. AISI Standards.
 - 3. AMCA: 210, 99-2408.
 - 4. NFPA: 130.
 - 5. SAE: 1035, 1040.
- B. Factory Wiring:
 - 1. In accordance with manufacturer's standard practice.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Performance tests certified by AMCA or performed either in accordance with AMCA 210 or in a laboratory approved by AMCA, for capacities shown.
 - b. Performance curves for each fan showing brake horsepower, static pressure and static efficiency plotted against air volume and noise level. For reversible fans, submit curves for both forward and reverse modes.
 - 2. Operation and Maintenance Manuals.

1.04 JOB CONDITIONS:

- A. Safety Requirements:

1. Properly guard belts, pulleys, chains, gears, couplings, projecting set screws, keys and other rotating parts to prevent danger to personnel.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. In design and purchase of equipment, provide for interchangeability of items of equipment, subassemblies, parts, motors starters and relays.
2. Requirements of this section apply to fans which are not a component part of air-handling units designed as complete units by the manufacturer.
3. Fan rating based on tests performed in accordance with AMCA 210.
4. Fans statically and dynamically balanced and quiet in operation.
5. Fans designed to ensure that resonance frequency of blade assembly is not within 15 percent of harmonics of rotational frequency.
6. Finished parts of fans, such as shafts and bearings, protected from rust prior to operation by means of wrappings or protective grease or plastic coatings.
7. Exhaust fan shall be provided with fire-stats to stop fan when temperature of air being handled reaches 125F.
 - a. Fire-stat having adjustable range from 100F to 200F and manual reset.
8. Fans with wheels less than 12 inches in diameter, and utility fans operating at less than 0.75 inches WG may have forward-curved blades.
9. Fan construction suitable for operating conditions defined in AMCA 99-2408.

A. Tubular Centrifugal Fans:

1. Class I or II, belt-driven, non-overloading, designed for straight through airflow.
2. Housing: Manufacturer's standard heavy-gauge steel construction.
 - a. Flanged inlet and outlet for connection to ductwork, with inlet and outlet identical in size.
 - b. Welded, cylindrical construction, braced to prevent vibration.
 - c. Fan bearings and drive enclosed and isolated from air stream.
3. Fan wheels:
 - a. Welded construction, centrifugal wheel, with backward-inclined blades.
 - b. Fan wheels 27 inches in diameter or larger supplied with double thickness, air-foil blades.
 - c. Fan wheels less than 27 inches in diameter supplied with plate-type blades.
 - d. Fan wheels statically and dynamically balanced.
4. Fans supplied with stationary conversion vanes on discharge side of wheel designed to reduce turbulence.
5. Fan bearings:
 - a. Heavy-duty, self-aligning ball bearings.
 - b. Lubrication fittings extended to fan casing and provided with covers to effectively exclude water and dirt.
6. Fan shaft accurately machined and ground for proper fit to wheel hub and bearing and designed to operate well below first critical speed.

7. Inside and outside of fan housing factory-painted with baked-enamel primer. Exterior surfaces given an additional factory-coat of corrosion-resistant finish enamel.
8. One coat of corrosion-resistant coating on nonworking surfaces of shafts, factory-applied.
9. Fan driven by V-belt rated at 150 percent of driving-motor brake horsepower.
 - a. Adjustable sheaves furnished on motor allowing 20-percent adjustment in fan speed, with design-capacity setting at approximately midpoint of adjustment.
10. Fan wheels and sheaves splined or keyed and fastened to the shaft with set screws.
11. Internal and external belt guards as necessary for complete protection.
12. Motors:
 - a. One-half horsepower and above: Totally enclosed, fan-cooled and guarded in accordance with Section 16225.
 - b. Less than 1/2 horsepower: Manufacturer's standard for intended use.

B. Power Roof Ventilators:

1. Direct-driven or belt-driven as shown.
2. Consisting of fan with housing and weatherproof hood mounted on factory-supplied acoustical-thermal curb.
3. Fan housing constructed of spun aluminum and arranged to facilitate access for servicing from roof.
 - a. Discharge openings with 1/2-inch wire-mesh bird screen of aluminum or provided with corrosion-resistant coating.
 - b. Acoustical-thermal curb: Product of power roof-ventilator manufacturer.
 - c. Aluminum-blade back-draft dampers sized to fit curb opening.
 - d. Power roof-ventilator housing secured to curb to resist winds of 100 MPH.
4. Motor: Totally enclosed weatherproof housing located outside of air stream and as specified in Section 16225.
 - a. Motor having unfused power-disconnect switch, mounted under fan housing adjacent to motor.
 - b. Permanently sealed, grease-lubricated, ball bearings or roller bearings.
5. Belt-driven unit and belt drivers rated for 150 percent of motor-nameplate horsepower.
 - a. Adjustable sheaves to permit 20-percent adjustment in fan speed, with design fan capacity at approximately midpoint of adjustment.
 - b. Wheel and drive assembly isolated from base section by means of rubber-in-shear isolators.

C. Axial Fans:

1. Direct-driven.
2. Welded tubular-steel casings
3. Equipped with stationary discharge conversion blades and adjustable motor mounts.
4. Air-foil blades: High-strength cast aluminum or steel.
5. Blade pitch:
 - a. Fans with wheels 18 inches or larger: Blades field-adjustable without removing wheel from casing.

- b. Fans with wheels less than 18 inches in diameter: May be equipped with stationary blades.
- 6. Flanged-type for fan-casing connections to ductwork.
- 7. Internal and external belt guards, as appropriate.
- 8. Inlets with smooth, rounded edges.
- 9. Direct-driven fans:
 - a. Provide with high-grade, steel fan shaft accurately machined and ground for proper fit to wheel hub and bearings.
 - b. Fan bearings and drive shafts enclosed and isolated from the air stream.
 - c. Bearings sealed mechanically against dust and dirt, self-aligning and grease-lubricated.
 - d. Fan driven by motor rated at 150 percent of driving-motor brake horsepower.
- 10. Motors:
 - a. 1/2 horsepower and above:
 - 1) Direct-driven fans: Totally enclosed, air-over, fully guarded in accordance with Section 16225.
 - 2) Motor shall be rated for two speed operation.
 - 3) Disconnect provide by fan manufacturer.
 - b. Less than 1/2 horsepower: Manufacturer's standard for intended use.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit fans and appurtenances within space provided and make readily serviceable.
- B. Provide support beams, concrete pads, support legs, platforms, hangers and anchor bolts required for proper installation of equipment as recommended by manufacturer.
- C. Vibration isolation for fans: As specified in Section 15070.
- D. Concrete pads: As specified in Section 15070.
- E. Axial and tubular centrifugal fans: Provide service access in accordance with Section 15810
- F. Motor starters and control centers: As specified in Section 16425.

END OF SECTION

SECTION 15850

OUTLETS AND GRILLES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing outlets and grilles.
- B. Related Work Specified Elsewhere:
 - 1. Ductwork: Section 15810.
 - 2. System balancing and testing: Section 15950.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Samples:
 - a. One full-size sample of each outlet and grille in each finish specified.
 - 3. Certification.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Supply/Exhaust Grilles:
 - 1. Type: Removable core, adjustable, two-way directional.
 - 2. Horizontal adjustment: By means of individually adjustable vertical bars or vanes spaced one-inch apart maximum.
 - 3. Vertical adjustment: By means of individually adjustable horizontal bars or vanes placed in front of vertical bars or by means of fixed fins which can be removed as a unit from frame and inserted in four positions.
 - 4. Fixed fins spaced 1/4-inch apart maximum.
 - 5. Frames constructed of stamped-steel or rolled-steel sections.
 - a. Prior to priming and finishing, steel parts of grilles treated with zinc-phosphate or zinc-chromate, dipped after fabrication.

6. Grilles provided with airtight felt, neoprene or plastic sealing strips at edges, designed to prevent leakage.
7. Corner joints finished to provide neat, trim appearance.
8. Each grille provided with factory-fabricated volume-control damper furnished by grille manufacturer.
 - a. Volume dampers: Group-operated, opposed-blade, key adjustable.
 - b. Volume adjustment: By inserting key through face of grille.
 - c. Operating mechanism not projecting through grille face.
9. Factory-fabricated multiple-blade extractors, furnished by grille manufacturer where shown.
 - a. Multiple-blade extractors: Air-deflecting and air-straightening type with blades spaced two inches apart maximum.
10. For exhaust grilles, provide a single set of nonadjustable face bars or vanes having same appearance as supply grilles.

2.02 FINISHES:

- A. Items exposed to public view in stations: Unless otherwise shown, factory-finished in baked enamel, colors as directed.
- B. Items not exposed to public view: Factory-finished in light-gray baked enamel.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install grilles and diffusers to permit key adjustment from face without other special tools.
- B. Install vanes and volume-control dampers to permit removal through diffuser for access to duct.

END OF SECTION

SECTION 15865

FILTERS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing air filters.
- B. Related Work Specified Elsewhere:
 - 1. Air Conditioning Units: Sections 15733A.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. UL 900 Class 1.
 - 2. ASHRAE: 52.1.
- B. Source Quality Control:
 - 1. Factory-tested or tested by an independent laboratory experienced in testing filters; certify compliance with requirements of ASHRAE Standard 52 for arrestance, efficiency, dust-holding capacity and pressure drop.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. General Requirements:
 - 1. In design of equipment, provide for interchangeability of items of equipment, subassemblies, and parts.
- B. Throwaway (Replaceable) Prefilters:
 - 1. Flat-panel filter units designed and fabricated for disposal when dust-load limit is reached.
 - 2. Dry or adhesive-coated filter media, as standard with the manufacturer.
 - 3. Maximum air flow through filters: Not exceeding manufacturer's published rated capacity but not exceeding 500 feet per minute at 0.10-inch w.g.
 - 4. Designed to fit within space available and constructed so as to prevent passage of unfiltered air.

5. Filter frames constructed of 18-gauge galvanized steel with air-tight access panels for filter inspection, cleaning and replacement.
 6. Filters are UL 900 Class I listed.
- C. Controls:
1. Control panels factory wired.
 - a. Adjustable pressure-differential sensing device and wiring for remote surveillance.
 - b. Pressure range of 0.02-inch w.g. to 1.0-inch w.g. Accuracy of plus-or-minus 0.03-inch w.g.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Fit equipment and appurtenances within the space provided and make readily serviceable.
- B. Examine each bag filter's media before installation for seepage and adhesive to surface of container.
- C. Replace bag filters showing evidence of seepage.
- D. After final testing and cleaning of fans and ductwork, replace pre-filters and final filter media with new, clean media.
- E. Contractor shall provide two sets of spare filters of each type.

END OF SECTION

SECTION 15900A

HVAC INSTRUMENTATION AND CONTROLS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. See specification Section 15186A – Water Treatment System which is part of the Chiller Plant Monitoring System.
- C. See specification section 15625 – Chillers: Status, Alarm and Control points described are part of the Chiller Plant Monitoring System.
- D. Refrigerant Monitoring and exhaust system.

1.02 QUALITY ASSURANCE:

- A. Provide a complete Chiller Plant Monitoring and Control System integrated with Water Treatment System – Monitoring as specified with all necessary hardware and software; programming, training, etc. in order to process the Sequence of Operation of Chiller Plant, Air-handling unit and Water Treatment Installation. Provide all necessary input and output points for a complete system operation. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher-level computer for execution.
- B. This section includes control equipment for HVAC – Air Handling Units and other systems and components as indicated. The DDC system shall accept signals from the fire alarm system to implement the smoke management as required. The contractor shall coordinate this work with the existing fire alarm system.
- C. In addition to other work described herein, the Automatic Temperature control work shall include working with the Testing and Balancing Contractor during his TAB operations. Work shall include, but not be limited to providing DDC controlled damper set points based on TAB requirements for both normal and smoke control mode conditions.

D. DEFINITIONS

- 1. Provide: Furnish and install complete and ready for use.
- 2. Install: Erect, mount and connect complete with related accessories.
- 3. Furnish: Purchase, procure, acquire and deliver complete with related accessories.
- 4. Work: Labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation and acceptable operation.
- 5. Wiring: Raceway, trunking, conduit, wire trays, fitting, wire, boxes and all related items.
- 6. CPU: Central Processor Unit.
- 7. DDCP: Direct Digital Control Panel with DDC logic, communication card for network communication and a display and keypad where indicated. Reference to Direct Digital Control Panel (DDCP) in the specification is synonymous with the identification of Temperature Control Panel (TCP). In this project, DDCP is referring to the Chiller Plant Monitoring Panel which also contains Water Treatment System Monitoring Controller, etc.

1.03 SYSTEM DESCRIPTION:

- A. Control system consists of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on network and programmed to control mechanical systems.
- B. The Building Automation System (BMS) shall be a totally Integrated System Network (ISN) installed as a complete package of controls and instrumentation. The system shall include all computer software and hardware, operator input/output devices, sensors and controls required for complete operation. Provide all wiring, conduit, installation, supervision and labor, including calibration, adjustment, and operator training and full operating system.
- C. The system shall be a complete stand-alone building management system, modular in construction and not requiring a central computer for operation or programming. All programming shall be possible from a keypad/display on any field panel or from a remote computer. Systems which do not have keypad/display capabilities shall furnish a minimum of three (3) portable interfaces with required cables and software.
- D. The basic elements of the BMS structure shall be built up of only standard components kept in inventory by the BMS supplier. The components shall not require customizing other than setting jumpers and switches, adding firmware modules, software modules or software programming to perform required functions.
- E. The system shall be a true distributed processing system. All software control functions are to be performed by the Direct Digital Control Panel (DDCP). Each DDCP shall be a stand-alone controller, master/slave panel arrangements, except for I/O expansion cabinets, are not acceptable.
- F. The BMS shall possess a fully modular architecture, permitting expansion through the addition of more DDCP units, sensors, actuators, operator terminals. Expansion beyond this must be able to be done in additional panels or expansion modules without abandoning any initial equipment.
- G. WMATA AUTOMATED ENERGY MANAGEMENT SYSTEM (AEMS):
 - 1. Provide new AEMS sensor and controls for Refrigerant monitoring system. The input to the AEMS shall be from the Chiller plant monitoring panel (DDCP) system.
 - 2. Provide new sensors for the Chillers, Chilled water and Condensing water pumps, Cooling Towers, Water Treatment System. The input to the AEMS shall be from the Chiller plant control panel (CPCP) system.
 - 3. The provision of sensors shall not be limited to items described in the above paragraphs, and shall be provided as required based on field verification and WMATA requirement.

1.04 SUBMITTALS:

- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
 - 1. Each control device labeled with setting or adjustable range of control.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Schematic flow diagrams showing chillers, fans, pumps, coils, dampers, valves, and control devices. Interface with Water Treatment Monitoring System and Refrigerant Leak Monitoring System. Interface with Chiller Operating Panels (MicroTech II or approved equal).
 - 2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - 3. Details of control panel faces, including controls, instruments, and labeling.
 - 4. Written description of sequence of operation.
 - 5. Schedule of dampers including size, leakage, and flow characteristics.
 - 6. Schedule of valves including leakage and flow characteristics.
 - 7. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
 - 8. Listing of connected data points, including connected control unit and input device.
 - 9. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
 - 10. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
- C. Software and Firmware Operational Documentation: Include the following:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On a compact disc, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
 - 5. Software license required by and installed for DDC workstations and control systems.
- D. Software Upgrade Kit: For Owner to use in modifying software to suit future power system revisions or monitoring and control revisions.
- E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- F. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
 - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 - 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
 - 4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 - 5. Calibration records and list of set points.
- G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- H. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.05 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer who is an authorized representative of the automatic control system manufacturer for both installation and maintenance of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.07 COORDINATION:

- A. Coordinate location of thermostats, refrigerant gas monitor sensor, water flow devices, water treatment devices, temperature sensors, and other exposed control sensors with plans and room details before installation.
- B. Coordinate equipment with the Fire Alarm system to achieve compatibility with equipment that interfaces with that system.
- C. Coordinate supply of conditioned electrical circuits for control units and operator workstation.
- D. Coordinate equipment with the Panelboards to achieve compatibility with starter coils and annunciation devices.
- E. Coordinate equipment with the Motor-Control Centers to achieve compatibility with motor starters and annunciation device.
- F. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.08 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Maintenance Materials: 5 Thermostat adjusting Keys; Control Panel Keys.

PART 2 – PRODUCTS

2.01 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance requirements for standardization of HVAC direct digital controllers and associated communication protocol to the operations control center of the WMATA Metrorail system, manufacturers offering products that may be incorporated in the Work are limited to the following:
- B. Programmable Automation Controller (PAC) – Automation Direct or approved equal.

2.02 CHILLER PLANT MONITORING CONTROL EQUIPMENT:

A. Direct Digital Control (DDC) Equipment to monitor Chiller Plant:

1. DDC shall be of a solid-state design using PRODUCTIVITY 3000 SYSTEM or an approved equivalent system.
2. Productivity 3000 System shall be a programmable automation controller that combines the features and capabilities of a PC-based control system with that of a typical programmable logic controller (PLC). Provide ModBus TRU Gateway or approved equivalent which shall be compatible with Honeywell EBII 7.5 or approved equal.
3. Provide Human Machine Interface (HMI) Panel, C-MORE made or approved equal.
4. A serial or USB port shall be provided for connection to a laptop PC.
5. The Controller and all associated equipment shall be housed in a NEMA 4X rated hinged cabinet manufactured by Hoffman or approved equal.
6. DDC shall have capability to interface for an existing Automated Energy Management System (AEMS) as follows: (If, applicable)
 - a. Provide RS-485 wiring in conduits to the existing Automated Energy Management System Remote Terminal Units (AEMS RTU) which are located in AC Switchboard Rooms.
 - b. The Communication protocol shall be Modbus RTU.
7. All hardware and software necessary to fully program the controllers shall be provided by the Contractor. The sequence of operations shall be provided as indicated on the drawings and specified.

B. Air Conditioning Unit or Fan Coil Unit located in Chiller Plant Room:

1. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
2. Units monitor or control each input/output point; process information; and download from or upload to operator station.
3. Stand-alone mode control functions operate regardless of network status. Meeting the Sequence of Operation for the Air Conditioning Unit. ModBus interface with the PRODUCTIVITY 3000 SYSTEM
4. Provide Local Key Pad and Display.
5. Provide 120V power source, control transformer, disconnect switch and surge protection for each panel mounted controller.
6. Provide all hardware and software to program the controllers and the Sequence of Operation as indicated on the drawings. All DDC components shall be installed in a gasketed dust tight enclosure.

2.03 CHILLER PLANT MONITORING/ CONTROL PANELS:

A. Direct Digital Control Panel (DDCP) for Chiller Plant Monitoring and Water Treatment System:

1. HMI and display for operator interface to all points in the system. HMI and display and Water Treatment Controllers shall be mounted on the controller cover. See spec Section 15186 for Water Treatment Controller.
2. Direct Digital Control Panels shall be UL listed. All panels shall, as a minimum, have the following features:
 - a. One (1) RS 485 port operating at a minimum of 19.2 KB for LAN communication.
 - b. One (1) RS 232 port for local terminals, modem, chiller interface card or printer.

- c. Application program shall be stored in battery backed RAM, with the option to back up the application program in on board EPROM, or in non-volatile Flash memory.
 - d. Meet FCC part 15, Subpart J, Class A requirements for electrical emission.
 - e. Battery backed real time clock and RAM. Data to be retained for minimum of one (1) years by battery backup. Time clocks are synchronized between DDCP's.
 - f. Watchdog relay with both normally open and normally closed contacts that switches state on either a power or a hardware or fatal software error. On DDCPs lacking a dedicated Watchdog relay, a dedicated output programmed to act as a Watchdog will suffice.
 - g. Watchdog timer circuit to automatically initiate "Reboot" on detection of processor malfunction.
 - h. Automatic reboot feature to restart the processor after power failing.
 - i. Universal inputs to accept inputs of 0-10 VDC, 4-20 mA, resistance, thermistor, or binary input, selectable with a factory installed jumper.
 - j. Universal outputs, individually fused, suitable for either 0-10 VDC analog or digital outputs.
 - k. Each DDCP shall contain predefined controller software enabling the user to configure:
 - 1) User Reports
 - 2) Sequencing
 - 3) Histories
3. Control panels for water treatment systems shall comply with the reference drawings shown as part of the contract drawings package.
- B. Terminal Unit Controllers:
1. Terminal unit controllers shall be UL listed and have, as a minimum, the following:
- a. Pre-packaged differential pressure sensor and damper actuator
 - b. Flash memory - eliminating the need for back-up battery
 - c. Permanent storage of changeable parameters
 - d. One (1) RS 485 port operating at 19.2 or 50 kB for LAN communication, computer or modem
 - e. One (1) universal RS 232 port for connecting of a local terminal computer or modem
 - f. Universal inputs to accept inputs of 0-5 VDC, 0-10 VDC, 4-20mA, resistance, thermistor or binary, selectable with a jumper
 - g. Digital outputs
 - h. Watchdog timer and circuitry to monitor both hardware and software. If either a fatal hardware or software error is detected, the watchdog circuitry will initiate a system reboot.
 - i. Each having its own addressable node making it part of the ISN
 - j. The ability to upgrade or modify software via the network, eliminating the need to physically access the unit
- C. Unitized cabinet with suitable brackets for wall or floor mounting, located adjacent to each system under automatic control. Provide common keying for all panels.
- 1. Fabricate panels of 0.06-inch thick, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish.
 - 2. Panel-Mounted Equipment: Controllers, relays, and automatic switches.

2.04 SENSORS:

- A. Temperature Sensors- sensors to be Resistance Temperature Device (RTD) type and contain an integral 4-20mA signal conditioner, manufactured by Honeywell C7041 or approved equal:
1. Well sensors shall be thermistor type enclosed in a 304 stainless steel tube with thread brass fitting. Sensor shall fit a ½" threaded saddle or Thredolet®. Sensor shall be furnished with a brass well suitable for 250 psig. If operating pressure is above 250 psig, a stainless steel well shall be supplied. Sensors shall be a Honeywell C7041D or approved equal. The sensor shall have weather- proof utility box
 2. Space sensors shall be thermistor type mountable on a standard handy box. All hardware required for mounting on a handy box shall be included. Sensor shall be accurate to $\pm 0.36^{\circ}\text{F}$ between 32°F and 100°F . Sensors shall be a Honeywell C7041C or approved equal. Sensor range shall be 0°F to 100°F and be furnished with all hardware for hand box mounting.
 3. For ducts greater than 10 square feet or where stratification is likely, sensor shall be averaging thermistor, RTD or 1000 Ohm resistance elements. Sensor shall be a Honeywell C7041R or equivalent.
- B. Humidity Sensors:
1. Humidity sensors shall have $\pm 3\%$ accuracy using ceramic technology. It shall be possible to change sensing elements without recalibrating the sensor. Indoor units shall have an operating range of 0-95% RH non-condensing over a 40°F to 110°F range, Honeywell H7635A2012 or equivalent. Outdoor Honeywell H7635C2015 or equivalent and duct Honeywell H7365B2018 or equivalent humidity sensors shall have a range of 0-95% RH non-condensing and be temperature compensated to operate from -40°F to 240°F .
- C. Pressure Transducer/Sensors - Water:
1. Sensor and signal conditioner shall be mounted in NEMA 4X enclosure. Output of sensor shall be 4-20 mA. All sensor wetted parts shall be 316 stainless steel. Accuracy shall be $\pm 0.1\%$ of span, stability $\pm 0.1\%$ of URL.
- D. Differential Air Pressure Sensors:
1. Sensor shall be a two-wire 4-20 mA device with a static error of $\pm 0.5\%$ of full scale.
 2. Sensor shall be Honeywell P7640U or approved equal. Accuracy shall be $\pm 1\%$ of full scale.
- E. Differential Pressure Switches - Water:
1. Differential pressure switches shall be Honeywell PWT100 or approved equal. Switch shall be mounted in a NEMA 4 enclosure. Temperature compensated range 32°F to 122°F . All sensor wetted parts shall be 316 stainless steel.
- F. Temperature Limit Controllers:
1. Temperature limit controller shall be two-position controllers meeting the following requirements:
 - a. Low limit thermostats shall be of the manual reset type with two electrical switches. One set of contacts shall provide a binary input to the ISN controller, the other set of contacts shall be wired to break the safety circuit of the fan starter and prevent fan operation when the starter is in either the "Hand" or "Auto" position. Elements shall be vapor pressure type, responding to the lowest temperature sensed by any 12 inch section. Minimum element length shall be 20 ft. or 1 ft. per square foot of coil face,

whichever is greater. Multiple controllers shall be used on large coils where a single element cannot meet the coverage requirements.

- b. High limit cut-out controllers not furnished as an integral part of an air handling unit shall be two-position manual reset devices wired to shut down the supply fan (and return fan when not used for fire/smoke evacuation) and signal the ISN controller of a critical alarm. Supply air limit controls shall be set at 180°F for supply air and 125°F for return air.

G. Duct Smoke Detectors:

1. Duct smoke detectors shall be UL listed under UL268A. Detectors shall have dual contacts and signal the ISN controller of a critical alarm. Detectors shall be ionization type and operate at air velocities from 300 to 4000 FPM. Visual indication of alarm and pilot must be provided on the front cover of the detector. Contacts shall be provided for remote trouble indication. Sampling tube shall be provided to span the width of duct. Duct smoke detectors shall be compatible with existing upgraded microprocessor controlled fire and intrusion alarm (FIA) system using ADT addressable type detectors manufactured by Edwards System Technology (EST3).

H. Level Transmitter:

1. Level transmitter shall be non-contact ultrasound level transmitter where sump volume is greater than 45 gallons. Smaller sumps shall be non-mercury float type switch or conductivity probes.

I. Interface Panels:

1. Interface panels shall be NEMA 12 with subpanels as manufactured by Hoffman or approved equal. Panels shall be assembled and wired by skilled electricians. All wires shall be labeled using heat shrink machine printed sleeves and terminated on terminal strips.

J. Equipment Operation Sensors as Follows:

1. Status Inputs for Fans: Differential-pressure switch with adjustable range of 0 to 5 inches wg.
2. Electric Motors Operating Condition: Current-Transducer True RMS.

K. Horn/ Strobe Combination:

1. Self-contained enclosure rated for indoor/ outdoor siren and strobe, with a sturdy aluminum back plate, polycarbonate housing, dual tamper protection.
2. 120 db sound output, ability to mount directly on the wall or 4" square back box, strobe color as required by owner.

2.05 ACTUATORS:

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action as indicated.

1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
2. Spring-Return Motors for Valves: Size for running and breakaway torque of 150 in. x lbf.
3. Spring-Return Motors for Dampers: Size for running and breakaway torque of 150 in. x lbf.
4. Run time: 60 seconds

B. Damper Actuators:

1. Damper actuators shall be electronic type direct coupled (over the shaft), enabling it to be mounted directly to the damper shaft without the need of a connecting linkage. Where noted in the sequence of operation, actuators shall be furnished with end switches. Where used for outside air, damper actuators shall be spring return for failsafe operation. Actuators shall be UL 873 listed and manufactured under ISO 9001.

2.06 CONTROL VALVES:

- A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated. Unit Control valves shall be electronic type Butterfly valves, 3-way as required. Both valve and actuator shall be manufactured under ISO 9001. Valve bodies shall be rated for 600 PSI and shall incorporate a blow-out proof stem design. All valves shall have a minimum range ability of 250 to 1.
- B. Globe and Check Valves NPS 2 and Smaller: Bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
- C. Globe and Check Valves NPS 2-1/2 and Larger: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
- D. Hydraulic system globe valves shall have the following characteristics:
 1. Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.
 2. Internal Construction: Replaceable plugs and seats of stainless steel or brass.
 - a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
 - b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
 3. Sizing: 3-psig maximum pressure drop at design flow rate.

2.07 CONTROL WIRING:

- A. Electronic Cable for Control Wiring shall be as required by the manufacturer of the equipment being installed.
- B. Provide a source 120 volts or less, 60 Hz, two pole, three wire with ground. All devices shall be UL listed or FM approved.
- C. Transformers shall conform to UL 506. Provide a fuse on the secondary side of the transformer.
- D. Surge Protection: Surge and transient protection shall consist of devices installed external to digital controllers.
- E. Power Line Surge suppressors shall be installed on all incoming A/C power. Provide surge suppressors external to the digital controllers. Surge suppressors shall be rated by UL 1449, and shall have a clamping voltage rating below the following levels:
 1. Normal mode (line to neutral): 350 volts.
 2. Common mode (line to ground): 350 volts.

- F. Sensor and Control Wiring Surge Protection: Controllers shall have sensor and control wiring surge protection with optical isolation, metal oxide varistor, or silicone avalanche devices. Fuses are not permitted for surge protection.
- G. Wiring: Provide complete electric wiring for temperature control apparatus, including wiring to transformer primaries. Control circuit conductors that run in the same conduit as power conductors shall have the same insulation level as the power conductors. Circuits operating at 100 volts or more shall be in accordance with the provisions of Division 16. Circuits operating at less than 100 volts shall be defined as low voltage. All cable installed outside of the Control Panels shall be installed in rigid steel conduit. Provide circuit and wiring protection as required by NFPA 70. Conduit and boxes shall be in accordance with division 16 provisions.
- H. AC Control Wiring:
1. Wiring for 24 volts circuits shall be insulated copper, minimum 18 AWG, and shall be rated for 300 volts AC service. Insulation shall be non-PVC material. Jacket shall be low smoke and shall be free of PVC and PVC-based compounds.
 2. Wiring for 120 volts AC service shall be minimum 14 AWG and shall be rated for 600 volts AC service. See Section 16120, Wire and Cable, for cable insulation and low smoke jacket requirements.
- I. Analog Signal Wiring between Sensors and ACU Direct Digital Control Equipment: Signal wiring for analog inputs and analog outputs shall be 18 AWG single or multiple twisted pair. Each pair greater than one shall be 100% shielded and have a 20 AWG drain wire. The exception is direct connected RTD wiring which shall be 18 AWG minimum twisted pair, 100% shielded and with a 20 AWG drain wire. Each wire shall have non-PVC insulation rated at 300 volts AC. Cables shall have an overall aluminum- polyester or tinned-copper cable-shield tape, overall 20 AWG tinned copper drain wire, and overall cable jacket. Jacket shall be low smoke and shall be free of PVC and PVC- based compounds. Install analog signal wiring in conduit separate from AC power circuits.
- J. Low Capacitance RS-485 Cable Between ACU Direct Digital Control Equipment and Existing Automated Energy Management System Remote Terminal Unit in AC Switchboard Room:
1. Description:
 - a. Pairs, 24AWG stranded (7x32) tinned copper conductors, twisted pairs FEP insulation, overall 100% shield, 22 AWG stranded tinned copper drain wire, overall tinned copper braid shield (90% coverage), FEP jacket.
 2. Conductor:
 - a. Number of Pairs: 2
 - b. Total Number of Conductors: 4
 - c. AWG: 24
 - d. Stranding: 7x32
 - e. Conductor Material: TC - Tinned Copper
 3. Insulation:
 - a. Insulation Material: FEP - Fluorinated Ethylene Propylene
 4. Pair:
 - a. Pair Lay Length: 2 in.
 - b. Pair Twists/ft.: 6
 - c. Pair Color Code: Pair#1: Blue/White with Blue Stripe
 - d. Pair#2: Orange/White with Orange Stripe

5. Outer Shield:
 - a. Outer Shield Type: Tape/Braid
 - b. Outer Shield Material: Aluminum Foil-Polyester Tape 100% Coverage Braid TC
- Tinned Copper Braid 90% Coverage
6. Outer Shield Drain Wire:
 - a. Outer Shield Drain Wire AWG: 22
 - b. Outer Shield Drain Wire Stranding: 7x32
 - c. Outer Shield Drain Wire Conductor: TC - Tinned Copper
7. Outer Jacket:
 - a. Outer Jacket Material: FEP - Fluorinated Ethylene Propylene
 - b. Outer Jacket Color: Gray
8. Mechanical Characteristics:
 - a. Operating Temperature Range: -40degC To +150degC
 - b. Min. Pulling Tension: 50 lbs.
 - c. Min. Bend Radius (Install): 2.75 in.
9. Applicable Specifications and Agency Compliance:
 - a. NEC/(UL) Specification CMP
 - b. CEC/C(UL) Specification CMP
10. Flame Test:
 - a. UL Flame Test: UL910 Steiner Tunnel
 - b. C(UL) Flame Test: FT6
11. Electrical Characteristics
 - a. Nominal Characteristic Impedance: 120Ohms
 - b. Nominal Capacitance Conductor to Conductor @ 1 KHZ: 12pF/ft
 - c. Nominal Cap. Cond. To Other Cond. & Shield @ 1 KHZ: 22pF/ft
 - d. Nominal Velocity of Propagation: 76%
 - e. Nominal Conductor DC Resistance @ 20 Deg. C: 24 Ohms/1000ft
 - f. Nominal Outer Shield DC Resistance @ 20 Deg. C: 2.4 Ohms/1000ft
 - g. Operating Voltage: U 300 V RMS
12. Put-ups:
 - a. Put-ups: 2000 ft.
13. Submittal:
 - a. Submit cable specifications and test certifications.

PART 3 – EXECUTION:

3.01 EXAMINATION:

- A. Verify that power supply is available to control panels.
- B. Verify that duct-, pipe-, and equipment-mounted devices and wiring are installed before proceeding with installation.

3.02 INSTALLATION:

- A. Install equipment level and plumb.
- B. Install software in Direct Digital Control Panels (DDCP). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- C. Connect and configure equipment and software to achieve sequence of operation specified.
- D. Verify location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. Locate all 60 inches above the floor.
- E. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
- F. Install guards on space temperature sensors. Provide security hardware and fasteners.
- G. Install labels and nameplates to identify control components according to Division 15 Section "Basic Mechanical Materials and Methods."
- H. Install labels and nameplates to identify control components according to Division 15 Section "Mechanical Identification."
- I. Install hydronic instrument wells, valves, and other accessories according to Division 15 Section "Piping Systems."

3.03 ELECTRICAL WIRING AND CONNECTION INSTALLATION:

- A. General Requirements:
 - 1. All wiring between DDCP's, sensors, control devices and necessary conduit for the wiring shall be provided under this section of the specification. All control wiring which is provided under this section of the specification shall be in accordance with requirements set forth in Division 16 - Electrical and the National Electrical Codes.
 - 2. Provide control wire and cable including communication media required for successful operation of the BAS. All wiring and cable shall comply with national and local electrical codes.
- B. Wire and Cable:
 - 1. Low capacitance RS-485 Communication cable shall be twisted, shielded, and a minimum of 24 AWG. Shielding shall be grounded to the signal ground. The cable shall conform to Belden 9272 or equal. RS-485 cable and conduit shall be installed between the DDCP and the existing AEMS RTU cabinet in the AC Switchboard Room with minimum of 10 feet of coiled cable left in the AEMS RTU cabinet for termination to internal components by WMATA personnel.
 - 2. Sensor Wiring: Sensor wiring shall be 18 AWG as specified, shielded (if necessary), 2 or 3 wire to match analog function hardware.
 - 3. Control wiring for digital functions shall be 22 AWG minimum, the insulation must be rated at 300 volt minimum.
 - 4. Control wiring for analog functions shall be 22 AWG minimum, the insulation must be rated at 300 volt minimum, shielded (if required), 2 or 3 wire to match analog function hardware.

- C. Conduit: All wiring within the mechanical space shall be installed in galvanized rigid steel conduit with threaded fittings. Wiring to sensors mounted on air conditioning units and associated chilled water piping shall be installed in a minimum 18-inch long length of liquid tight flexible metal conduit at the sensor location. Existing conduits for control wiring shall be retained and reused where the routing for existing conduits is suitable for new conduit routing requirements for new control wiring work subject to approval by the Contracting Officer Representative (COR).
- D. Labeling: All wiring, including input/output identifications, components and enclosures shall be clearly labeled and documented. All labeling shall be in a logical consecutive order. All labeling shall appear on the as-built drawings clearly and precisely duplicating the actual installation.
- E. All work shall be installed in accordance with both national and governing codes. Where the drawings and job specifications conflict with code requirements, the contractor shall make the necessary adjustments and shall base his bid on an installation which complies with those codes. Where plans and specifications exceed code requirements, the plans and specifications shall govern.
- F. Install raceways, boxes, and cabinets according to Division 16 Section "Raceways and Boxes."
- G. Install building wire and cable according to Division 16 Section "Wire and Cable."
- H. Install signal and communication cable according to Division 16 Section "Wire and Cable" with the following additional requirements:
 - 1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - 2. Install exposed cable in galvanized rigid steel conduit.
 - 3. Install concealed cable in galvanized rigid steel conduit.
 - 4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 - 5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 - 6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
- I. Make connection using RS-485 cable between the DDCP and the existing AEMS RTU located in the Chiller Plant Room. Field verify exact conditions and provide a compatible system.
- J. Connect manual-reset limit controls independent of manual-control switch positions.
- K. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.
- L. Connect electrical components to wiring systems and to ground as indicated and as instructed by the manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.
- M. Grounding: Ground controllers and cabinets to a good earth ground. Ground controller to a ground in accordance with Division 16 provisions. Grounding of the green ac ground wire at the breaker panel is not adequate. Run metal conduit from controller panels to adequate building ground. Ground sensor drain wire shields at controller end.
- N. The Contractor shall be responsible for correcting all associated ground loop problems.

- O. Perform installation under supervision of competent technicians regularly employed in the installation of DDC systems. Provide components for a complete and operational DDC system. Provide all power and signal wiring to controlled devices such as valve and damper actuators. Source of power wiring shall be extended from the DDC panels. A control power source for each DDC panel is indicated on the electrical drawings. The DDC panel is identified as Temperature Control Panel (TCP) on the electrical drawings.

3.04 CONNECTIONS:

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 1. Install piping adjacent to machine to allow service and maintenance.
- B. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL:

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections.
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove malfunctioning units, replace with new units, and retest.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment, and retest.
 - 3. Calibration test electronic controllers by disconnecting input sensors and simulating operation with compatible signal generator.
- B. Engage a factory-authorized service representative to perform startup service.
- C. Replace damaged or malfunctioning controls and equipment.
 - 1. Start, test, and adjust control systems.
 - 2. Demonstrate compliance with requirements, including calibration and testing, and control sequences.
 - 3. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified.
- D. Verify DDC as follows:
 - 1. Verify software including automatic restart, control sequences, scheduling, reset controls, and occupied/unoccupied cycles.
 - 2. Verify operation of operator interface via a laptop computer.
 - 3. Verify local control units including self-diagnostics.
 - 4. Verify operation of annunciator panels.
 - 5. Verify successful transmission of specified data points through the digital interface between the DDC and the existing Automated Energy Management System, Remote Terminal Unit (AEMS RTU).

3.06 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train WMATA maintenance personnel to adjust, operate, and maintain control systems and components.
 - 1. Train WMATA maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 - 2. Provide operator training on data display, alarm and status descriptors, requesting data, executing commands, calibrating and adjusting devices, resetting default values, and requesting logs. Include a minimum of 40 hours' dedicated instructor time on-site.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Contract Closeout."
 - 4. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - 5. Schedule training with COR with at least seven days' advance notice.

3.07 ON-SITE ASSISTANCE AND TRAINING:

- A. Occupancy Adjustments: Within one year of date of Substantial Completion, provide up to three Project site visits, when requested by COR, to adjust and calibrate components and to assist WMATA personnel in making program changes and in adjusting controls to suit actual conditions.
- B. A minimum of two (2) days of operator training shall be provided for four (4) system operators.
- C. Submit lesson plans to the COR for the training phases to include type of training to be provided and a list of reference material for review and approval by the COR.
- D. Provide the services of competent instructors who will give full instruction to designated personnel in the operation, maintenance, and programming of the BAS. Coordinate the training specifically to the system installed. Instructors shall be thoroughly familiar with the installed system. The number of training days of instruction furnished shall be as specified. Provide a training manual for each student at each training phase which describes in detail the data included in each training program. Provide four (4) additional copies to the Owner. Training shall include but not be limited to:
 - 1. Operation of equipment
 - 2. Programming
 - 3. Diagnostics
 - 4. Failure recovery procedures
 - 5. Alarm response

END OF SECTION

SECTION 15950

SYSTEM BALANCING AND TESTING

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies air systems and water systems balancing, adjusting, and performance-testing of heating, exhaust, air-conditioning, and ventilating systems with ductwork, chillers, cooling towers and fan coil units.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards, and Specifications:
 - 1. NEBB: Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
 - 2. ASHRAE III: Practices for Measurement, Testing, Adjusting, and Balancing of Building HVACR Systems.
- B. Instrument Calibration:
 - 1. Calibrate instruments required for water balance within six months prior to use on this project.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings:
 - a. Test and instrument location plans.
 - b. After initial balancing measurements, submit shop drawings for additional equipment such as pressure taps and balancing cocks necessary to effect proper water balance.
 - 2. Certification:
 - a. Complete air and water-balance report certified by professional engineer licensed in the jurisdiction where the work is to be performed. Water balancing and testing includes only the chillers and cooling towers in this project. Air balancing on exhaust air and air conditioning systems.
 - b. Collect data in accordance with referenced standards.
 - c. Submit complete data on standard NEBB testing and balancing report forms without omissions or on approved report forms bearing identical data. Data to include types, serial numbers and calibration dates of instruments.
 - 1) Air-conditioning units: Section 15733A
 - d. Air and Water-balance test reports to include data covering the following:
 - 1) Air-conditioning units: Section 15733A

- 2) Chillers: Section 15625.
- 3) Cooling Towers: Section 15640.
- 4) Hydronic Pumps: Section 15185.
- 5) Fans: Section 15830
- 6) Control Valves: Section 15900.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Provide, as specified in Section 15205, additional equipment, such as balancing dampers, pressure taps, and balancing cocks necessary to effect proper air and water balance.

PART 3 – EXECUTION

3.01 BALANCING AND PERFORMING TESTING:

- A. After completion of installation of heating, exhaust and air-conditioning systems, chillers, cooling towers, pumps, and prior to acceptance by the Engineer, adjust and balance air-handling systems, water systems, and appurtenances applicable to those systems to deliver the air and water quantities as specified and as shown. Make final tests after modifications are completed. Seal instrument test holes upon completion of balancing operation.
- B. Air and Water balance:
 1. Perform testing in accordance with referenced NEBB Standard, ASHRAE III or other approved standard.
 2. Perform tests, adjust, and balance when outside conditions approximate design conditions as shown for heating and cooling functions.
 3. Balancing cock: Provide reference mark to permit reset after shutoff.

END OF SECTION

SECTION 16060
GROUNDING AND BONDING

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing complete grounding and bonding system.
- B. Related Work Specified Elsewhere:
 - 1. Wire, cable and busways: Section 16120.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Electrical Code (NEC)
 - 3. ANSI/IEEE 80-2000, IEEE Guide for Safety in AC Substation Grounding.
 - 4. UL 467, Grounding and Bonding Equipment.
 - 5. American Standards of Testing and Materials (ASTM) B187-00, Standard Specification for Copper Bar, Bus Bar, Rod and Shapes.
 - 6. ITS: Directory of ITS Listed Products.
- B. Source Quality Control:
 - 1. Each item, except for exothermic-welded electrical connections, listed per referenced UL or ITS directory.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Mark each item in accordance with applicable reference standard.
- B. Ship each unit securely packaged and labeled for safe handling and to avoid damage.
- C. Store equipment in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. Grounding and Bonding Equipment:

1. General Requirements:

- a. UL 467.

2. Grounding conductor:

a. Grounding electrode conductors:

- 1) Insulated or bare conductor, as shown, in accordance with the following:

- a) Insulated conductor: As specified in Section 16120 for single-conductor cable.
- b) Bare conductor: Section 16120.

- 2) Size:

- a) For grounding electrode conductors: In accordance with NEC Table 250-66.

b. Equipment grounding conductor:

- 1) Sized in accordance with NEC Article 250-122 unless otherwise shown.
- 2) Insulated equipment grounding conductor: Single-conductor cable as specified in Section 16120.
- 3) Bare equipment grounding conductor integral with multiple-conductor cable: Section 16120.

c. Bonding conductor for stray current and cathodic protection and electrical continuity:

- 1) Insulated or bare conductors, as shown, in accordance with the following:

- a) Insulated conductors: As specified in Section 16120 for single-conductor cable.
- b) Bare conductor: Section 16120.

- 2) Size: As shown or as specified.

3. Terminal lugs:

- a. For 4/0 AWG and smaller conductors: Copper compression terminal lugs.
- b. For 250 MCM and larger: Long-barrel, copper, double-compression terminal lugs.

4. Jumpers: Copper braided or leaf-type flexible jumper, size as necessary.

5. Exothermic welded electrical connections:

- a. Exothermic process using powdered metals contained in a mold to form a molecular bond between materials to be connected without application of an external source of heat or power in accordance with ANSI/IEEE 80-2000.

6. Molds, weld metal and associated accessories designed for making electrical connections between copper and copper, copper and steel, copper and cast iron and copper and ductile iron as required.

- a. Welding system designed for making connections suitable for the application as follows:
 - 1) Connections made outdoors for grounding using the standard process and not containing phosphorous or any caustic, toxic or explosive materials.
 - 2) Connections made indoors or in confined spaces for grounding using a low-smoke, low-emission process.
 - 3) Connections made specifically for cathodic protection applications using the standard process.
- b. Molds made of graphite with permanent marking indicating name of manufacturer, model, conductor size, and type and size of welding mixture compatible with the welding process. Mold connection type suitable for making connections between various configurations of items as shown or specified.
- c. Weld metal consisting of copper oxide and aluminum contained in a moisture-resistant container along with other necessary materials required for the specific application as determined by the manufacturer. Container for applications other than low-smoke, low-emission process to also include suitable starting material.
- d. Container for weld metal identified with part number, type of metals to be connected and application such as standard outdoor, low emission or cathodic application.

PART 3 – EXECUTION

3.01 GROUNDING:

A. Ground Connections:

- 1. Use terminal lug to connect grounding conductor to equipment enclosure. Use ground connector to connect grounding conductor to ground bus. Secure connector or terminal lug to the conductor so as to engage all strands equally. Install terminal lug using tools and pressure recommended by the manufacturer. Indent mark terminal lug with the number of die used for installation.
- 2. Exothermically weld connections to ground rods in handholes, junction boxes and manholes, frame columns of bus passenger and bus supervisor shelters and station entrance pylon (type B) and light poles.
- 3. Splices in grounding conductor are prohibited.
- 4. For making ground connections located indoors and in confined spaces located outdoors such as manholes, use exothermic welds with low-smoke, low-emission process.

B. Equipment Grounding Conductor: Provide insulated equipment grounding conductor for following services and as shown:

- 1. Feeders.
- 2. Branch circuits.

C. Grounding of Service Equipment:

- 1. Ground in accordance with NEC.
- 2. Ground enclosure and ground bus in switchgear, switchboard, motor-control center or panelboard to ground bus provided in substation or room using insulated grounding electrode conductor.
- 3. Install copper bonding jumper between neutral and ground bus as shown.

D. Grounding of Separately Derived AC System:

1. Ground in accordance with NEC.
2. Ground secondary neutral and enclosure of transformers to nearest ground bus or sub-bus using insulated grounding electrode conductor.
3. For transformer located outside of building, install additional grounding connector between transformer secondary neutral/enclosure and ground bus or grid using insulated grounding electrode conductor.

E. Grounding for Personnel Safety:

1. In substation, electrical and mechanical rooms, tie-breaker stations, chiller plants, fan shaft and pumping stations, bond exposed metallic structure, motor frame, ac-equipment enclosure, ductwork and metallic piping to local ground bus, using minimum of 6AWG insulated grounding conductor as follows:
 - a. Ground multiple items of exposed metallic structure to local ground bus using a separate grounding conductor for each item or by using series-connected grounding conductors to connect two or more items.
 - b. Ground each ac equipment enclosure to local ground bus using a separate grounding conductor.
 - c. Connection of grounding conductor for ac equipment enclosure in series with grounding conductor for exposed metal structure is prohibited.

3.02 **FIELD QUALITY CONTROL:**

- A. Test metallic conduits and raceways, metallic enclosures for equipment, metallic cable troughs, fences, metallic hand railings, metallic safety walk gratings, metallic structures, metallic covers, and junction boxes, for continuity to grounding system.
- B. Conduct tests in presence of Engineer.
- C. Inspect and test exothermic welds as follows:
 1. Inspect finished exothermic welds for visual characteristics that are consistent with a properly made connection in accordance with the manufacturer's instructions and recommendations. Remove welds that do not meet minimum visual requirements as acknowledged by the Engineer, and reweld after cleaning the area to be welded.
 2. Test mechanical strength of exothermic weld by applying three sharp blows to the weld with a two-pound hammer using 15-inch strokes. Acceptable welds to sustain the blows without cracking the weld metal or the bond between the two connecting materials. Remove defective welds and reweld after cleaning the area to be welded.

END OF SECTION

SECTION 16120

WIRE, CABLE AND BUSWAYS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing wire, cable and busways.
- B. Definitions:
 - 1. Cable: Cable having low flammability and low smoke zero halogen generating characteristics.
- C. Requirements for single-conductor cable and for multiple-conductor cable: Tested in accordance with the requirements of NFPA 130, 2014, Chapter 12.
- D. Related Work Specified Elsewhere:
 - 1. Wire connection accessories: Section 16125.
 - 2. Raceways, boxes and cabinets: Section 16130.

1.02 QUALITY ASSURANCE:

- A. Qualifications: Select a manufacturer who is engaged in production of similar wire, cable and busways.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Electrical Code (NEC).
 - 3. Insulated Cable Engineers Association (ICEA): S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692, S-81-570.
 - 4. IEEE: 1202-1991 IEEE Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies, 383-1974 IEEE Standard for Type Test of Class 1E Electrical Cables, Field Splices, and Connections for Nuclear Power Generating Stations.
 - 5. National Electrical Manufacturers Association (NEMA): BU1, WC70, WC71, WC74.
 - 6. American National Standards Institute (ANSI): C37.20.1, Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear; C37.20.2, Metal-Clad and Station-Type Cubicle Switchgear; C37.20.3, Metal-Enclosed Interrupter Switchgear; Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
 - 7. UL: 44, Rubber-Insulated Wires and Cables Thermoset-Insulated Wires and Cables; 62, Flexible Cord and Fixture Wire; 857, Electric Busways and Associated Fittings; and 1581, Standard for Electrical Wires, Cables, and Flexible Cords.
 - 8. American Standards of Testing and Materials (ASTM): B3-95, Standard Specification for Soft or Annealed Copper Wire; B8-99, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; D471-98e1, Standard Test Method for Rubber Property-Effect of Liquids, E662-97, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 9. ITS: Directory of ITS Listed Products

C. Source Quality Control:

1. Cable and busways: Listed or labeled per UL or ITS directory.
2. Certified Test Reports from tests conducted in accordance with NFPA 130, 2014.

1.03 **SUBMITTALS:**

A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

1. Shop Drawings.
2. Samples:
 - a. Smoke-density test sample for jacket material: Specified sample will become property of the Authority.
3. Certification:
 - a. Certified flame-retardancy test reports (VW-1, IEEE 383, and IEEE 1202, Article 18) and data for tests performed not more than 12 months prior to submittal, for materials which are identical to those of cable furnished. Include test reports with submittal of shop drawings.
 - b. Submit smoke-density test reports and data for tests performed on the jacket material not more than 12 months prior to the submittal, for materials which are identical to those of the furnished cable. Include test reports with submittal of shop drawings.
 - c. Certified test reports demonstrating that cable complies with specified requirements and those of referenced ICEA Standards. Submit test reports prior to cable shipments.
 - d. Certificates from manufacturers verifying that products conform to specified requirements. Include certificate with submittal of shop drawings and with each cable shipment.

1.04 **PRODUCT DELIVERY, STORAGE AND HANDLING:**

- A. Mark each single-conductor cable, each multiple-conductor cable and each busway to show label per referenced UL or ITS directory, size, voltage, manufacturer and number of conductors or phases in accordance with NEC requirements.
- B. Ship each unit securely packaged and labeled for safe handling and shipment.
- C. Store products in a dry and secure facility.

PART 2 – PRODUCTS

2.01 **PRODUCTS AND MATERIALS:**

A. General Requirements for Single-Conductor and Multiple-Conductor Cable:

1. Type and size: As shown.
2. Rated voltage: 600 volts.
3. Conductors:
 - a. ASTM B3 or B8 annealed copper.
 - b. Size 10 AWG and smaller: Solid or Class B or Class C stranded.
 - c. Size 8 AWG and larger: Class B stranded.

4. Standards: Except as modified, wires and cable complying with the following standards:
 - a. Cross-linked polyethylene (XLPE) insulated cable: ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692, S-81-570.
 - b. Other cable: ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692, S-81-570.
5. Non-metallic jacket for single-conductor cable and an overall covering on multiple-conductor cable:
 - a. Chlorosulfonated polyethylene or cross-linked polyolefin.
 - b. Cross-linked polyolefin complying with the following physical requirements. Properties tested in accordance with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692, and S-81-570 if ethylene-propylene-rubber (EPR) insulation is used, or with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, and S-105-692 if cross-linked polyethylene insulation is used. Jacket material free of PVC and PVC-based compounds.
 - 1) Tensile strength, minimum pounds per square inch: 1,800.
 - 2) Elongation at rupture, minimum percent: 150.
 - 3) Aging requirement: After 168 hours in air oven test at 100C, plus-or-minus one degree C:
 - a) Tensile strength, minimum percentage of unaged value: 100.
 - b) Elongation at rupture, minimum percentage of unaged value: 80.
 - 4) Oil immersion: 18 hours at 121C, plus-or-minus one degree C, ASTM D471, Table 1, No. 2 oil:
 - a) Tensile strength, minimum percentage of unaged value: 80.
 - b) Elongation at rupture, minimum percentage of unaged value: 80.
 - c. Jacket materials other than cross-linked polyolefin complying with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692. Jacket material free of PVC and PVC-based compounds.
6. Flame retardancy: Single-conductor and multiple-conductor cable tested by independent agency demonstrating flame retardancy in accordance with the following:
 - a. Single-conductor cable and individual conductors of multiple-conductor cable passing vertical wire (VW-1) flame test in accordance with UL1581 or ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692. Cable size for testing: 14AWG.
 - b. Single-conductor cable, size 1/0 AWG and larger, passing vertical tray flame test, using ribbon gas burner in accordance with IEEE 1202 or IEEE 383. Cable size for testing: 1/0 AWG.
 - c. Multiple conductor cable passing vertical tray flame test using ribbon gas burner in accordance with IEEE 383 or IEEE 1202. Cable size for testing: 7/C or 9/C with No. 12 AWG or No. 14 AWG conductors.
7. Smoke generation: Single and multiple-conductor cable jacket materials demonstrating low-smoke generation when tested in accordance with ASTM E662 by independent, nationally recognized testing agency.
 - a. Conduct tests on specimens of overall jacket material for multiple-conductor cable and of jacket material for single-conductor cable.
 - b. Prepare slab specimens for each material .100 inch, plus-or-minus .005-inch thick, identical to those of finished cables and meeting minimum physical requirements specified.

- 1) Prior to testing, submit six-inch square portion of each specimen. Tag sample with manufacturer's jacket or insulation identification code or number.
- c. Test values for chlorosulfonated polyethylene not to exceed the following:
 - 1) Flaming mode:
 - a) Uncorrected maximum specific optical density during first four minutes of test: 325.
 - b) Uncorrected maximum specific optical density for entire 20-minute test: 400.
 - 2) Nonflaming mode:
 - a) Uncorrected maximum specific optical density during first four minutes of test: 325.
 - b) Uncorrected maximum specific optical density for entire 20-minute test: 480.
- d. Test values for cross-linked polyolefin not to exceed the following:
 - 1) Flaming mode:
 - a) Uncorrected maximum specific optical density during first four minutes of test: 150.
 - b) Uncorrected maximum specific optical density for entire 20-minute test: 300.
 - 2) Nonflaming mode:
 - a) Uncorrected maximum specific optical density during first four minutes of test: 150.
 - b) Uncorrected maximum specific optical density for entire 20-minute test: 300.
8. Applied voltage testing:
 - a. Single-conductor cable and individual conductors of multiple-conductor cable to be given applied ac voltage dielectric-strength test, i.e., six-hour water-immersion test.
 - b. For single conductors of multiple-conductor cable, conduct tests prior to assembly as multiple-conductor cable.
 - c. Test procedures:
 - 1) Polyethylene-insulated conductors: In accordance with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, and S-105-692.
 - 2) Other conductors: In accordance with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, S-105-692, and S-81-570.
- B. Single-Conductor Cable:
 1. Insulated with ethylene-propylene-rubber with non-metallic jacket as specified. UL-Labeled as Type RHW-2.
 2. Color coding: In accordance with paragraphs 200-6, 200-7 and 210-5 of the NEC.
- C. Multiple-Conductor Cable:
 1. Individual conductors:

- a. Number of conductors: As shown.
 - b. Construction: Complying with one of the following:
 - 1) Insulated with ethylene-propylene-rubber, with or without non-metallic jacket.
 - 2) Insulated with composite compound of ethylene-propylene-rubber and polyethylene, without outer jacket.
 - 3) Insulated with filled cross-linked polyethylene without jacket.
 - c. Phase and neutral conductors: Individually insulated.
 - d. Neutral conductors: Same size as phase conductors.
 - e. Bare ground conductors: Sized in accordance with the NEC, unless otherwise shown.
 - f. UL Listed as Type RHW-2 or XHHW-2.
2. Conductors assembled with nonwicking, flame-retardant filler to form cable of circular cross section.
 3. Metallic sheath:
 - a. Provide one of the following:
 - 1) Size 1 AWG and larger:
 - a) Interlocked aluminum-tape armor.
 - b) Continuous corrugated aluminum sheath conforming to ICEA S-19-81, Table 4-26A.
 - 2) Size 2 AWG and smaller: As specified for 1 AWG and larger or continuous smooth aluminum sheath conforming to ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, and S-105-692.
 - b. Metallic covering not required for multiple-conductor TC cable with overall non-metallic jacket when installed in cable tray.
 4. Multiple-conductor cable provided with overall non-metallic jacket as specified.
 5. Cable UL-listed as follows:
 - a. Non-metallic-sheathed cable: Type TC, suitable for wet and dry locations.
 - b. Metallic-sheathed cable: Type MC, suitable for wet and dry locations.
 6. Color coding:
 - a. Power cables: In accordance with paragraphs 200-6, 200-7 and 210-5 of the NEC.
 - b. Control cables: In accordance with ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, and S-105-692.
- D. Fixture Wire: UL 62, with the following additional requirements:
 1. Type: SF-2 silicone-rubber insulated or as necessary to suit temperature rating of lighting fixture, minimum 90C.
 2. Conductor: Stranded copper conductor 16AWG or larger as shown.
 - E. Bare Conductors: ASTM B3 or B8, annealed copper conductor; 8AWG and larger, Class B stranded, unless otherwise shown or specified.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install type cable as specified.
- B. Install single-conductor cable in conduit, underfloor duct or wireway. Install UL Type TC multiple-conductor cable in cable trays only. Install UL Type MC multiple-conductor cable and ground cable on channel inserts, cable trays, racks, trench or trough using straps and fasteners as specified in Section 16130. Install UL Type MC multiple-conductor cable in conduit where shown or required. On walls or ceilings, fasten cable and bus duct directly to channel inserts, or use expansion-bolt anchors to attach to concrete and toggle bolts to attach to concrete masonry unit walls. Splice cable only when unavoidable.
- C. Install motor feeders, service connections and extensions in accordance with reference codes. Install motor feeder in 18-inch minimum length liquid-tight flexible conduit at motor conduit box.
- D. Use nylon straps to bundle and secure wire and cable located in panelboards, cabinets, switchboards, motor control centers and switchgear.
- E. Minimum bending radius 12 times outer diameter of cable. Where shown, use shorter bending radius as permitted by NEC, ICEA S-95-658, S-96-659, S-93-639, S-94-649, S-97-682, and S-105-692, and cable manufacturer.
- F. To facilitate pulling cable, use listed per UL or ITS directory lubricant recommended by cable manufacturer.
- G. In damp and dusty indoor locations, tunnel areas, manholes and outdoor locations, seal cable at conduit termination using duct-sealing compound.
- H. Where shown or necessary, install cable-seal fitting specified in Section 16130 to prevent entry of water into electrical facilities. Where approved, use seal compound specified in Section 16130.

3.02 IDENTIFICATION:

- A. Identify cable terminations, feeders and power circuits using non-metallic fiberboard tags or plastic labels. Attach tags to cable with slip-free plastic lacing or nylon bundling straps. Use designation shown.

3.03 FIELD QUALITY CONTROL:

- A. Furnish equipment required to perform tests. Prior to insulation and high-potential tests, disconnect instruments and equipment which might be damaged during such tests. Conduct tests in presence of the Engineer.
- B. Submit test procedure for approval and perform approved tests including, but not limited to, the following:
 - 1. Single-conductor cable and multiple-conductor cable:

- a. Test continuity of cable conductors using ohmmeter.
 - b. Proof-test insulation resistance to ground and between insulated conductors for minimum of one minute using 1,000-volt megger. Insulation resistance: 200,000 ohms minimum.
 - c. When cable shows unsteady insulation resistance of less than 200,000 ohms, perform high-potential test at 80 percent of factory ac test voltage or as recommended by cable manufacturer.
- C. Submit certified test reports.

END OF SECTION

SECTION 16125

WIRE CONNECTION ACCESSORIES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing wire-connection accessories, such as connectors, terminal lugs and fittings, bundling straps, insulating tape and resin.

1.02 QUALITY ASSURANCE:

- A. Qualifications: Select a manufacturer who is engaged in production of similar wire connection accessories.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Electrical Code (NEC).
 - 3. UL: 486A, Wire Connectors and Soldering Lugs for Use With Copper Conductors.
 - 4. American Standards of Testing and Materials (ASTM): D149-97a, Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies; D257-99, Standard Test Methods for DC Resistance or Conductance of Insulating Materials; D412-98a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension; D570-98, Standard Test Method for Water Absorption of Plastics; D638-00, Standard Test Method for Tensile Properties of Plastic; D696-98, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer; D792-00, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; D1000-99, Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications; D1518-85(1998)e1, Standard Test Method for Thermal Transmittance of Textile Materials; D5034-95, Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test); D5035-95, Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method); D2240-00, Standard Test Method for Rubber Property-Durometer Hardness; and G21-96, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
 - 5. American National Standards Institute (ANSI): C119.1, Sealed Insulated Underground Connector System 600V
 - 6. ITS: Directory of ITS Listed Products.
- C. Source Quality Control:
 - 1. Connectors, terminal lugs and fittings listed, per referenced UL or ITS directory.
 - 2. Factory testing: Submit certified copies of test report for cable splice and tap-insulation/sealing kits as specified.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.

2. Certification.

1.04 **PRODUCT DELIVERY, STORAGE AND HANDLING:**

- A. Mark each item in accordance with applicable reference standard.
- B. Ship each unit securely packaged and labeled for safe handling in shipment and to avoid damage.
- C. Store products in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 **PRODUCTS AND MATERIALS:**

- A. Connectors, Terminal Lugs and Fittings:
 - 1. In accordance with UL 486A.
 - 2. For 10AWG and smaller conductor cable: Tin-plated copper pressure connectors with nonflammable, self-extinguishing insulation grip with temperature rating equal to that of conductor insulation.
 - 3. For 8AWG to 4/0 AWG conductor cable: Tin-plated copper compression connectors and terminal lugs with nylon insulating sleeve for insulation grip.
 - 4. For 250 Kcmil and larger conductor cable: Long-barrel, double-compression tin-plated copper connectors and terminal lugs with two-hole pad.
 - 5. For multiple-conductor cable: Watertight aluminum fittings with stainless-steel pressure ring and set screws or compression cone for grounding of aluminum sheath of MC cable.
- B. Bundling Straps:
 - 1. Self-locking steel barb on one end, with tapered strap of self-extinguishing nylon, temperature rating minus 40F to plus 185F.
 - 2. For outdoor use: Ultraviolet-resistant.
- C. Insulating Tape:
 - 1. Plastic tape: Vinyl plastic tape with rubber-based pressure-sensitive adhesive, pliable at zero degree F with the following minimum properties when tested in accordance with ASTM D1000-99:
 - a. Thickness: 8.5 mils.
 - b. Breaking strength: 20 pounds per inch width.
 - c. Elongation: 200 percent.
 - d. Dielectric breakdown: 10,000 volts.
 - e. Insulation resistance, indirect method of electrolytic corrosion: 1,000,000 megohms.
 - 2. Rubber tape: Silicone-rubber tape with silicone pressure-sensitive adhesive, with the following minimum properties when tested in accordance with ASTM D1000-99:
 - a. Thickness: 12 mils.
 - b. Breaking strength: 13 pounds per inch width.
 - c. Elongation: 525 percent.
 - d. Dielectric breakdown: 13,000 volts.
 - e. Insulation resistance, indirect method of electrolytic corrosion: 1,000,000 megohms.

3. Arcproof tape: Flexible, coated one side with flame-retardant flexible elastomer, self-extinguishing, non-combustible, with the following minimum properties:
 - a. Thickness, ASTM D1000: 30 mils.
 - b. Breaking strength, ASTM D5034-95 and D5035-95: 50 pounds per inch width.
 - c. Thermal conductivity, ASTM D1518-85: 0.0478 BTU per hour per square foot per degree F.
 - d. Electrical arc resistance: Withstand 200 amperes arc for 30 seconds.
4. Glass tape: Woven-glass fabric tape with pressure-sensitive thermosetting adhesive, with the following minimum properties when tested in accordance with ASTM D1000-99:
 - a. Nominal width: 3/4 inch.
 - b. Thickness: Seven mils.
 - c. Breaking strength: 170 pounds per inch width.
 - d. Elongation: Five percent.
 - e. Dielectric breakdown: 2,500 volts.
 - f. Insulation resistance, indirect method of electrolytic corrosion: 5,000 megohms.
- D. Epoxy Resin: Suitable for insulating and moisture sealing cable splices, with the following minimum properties:
 1. Dielectric strength, ASTM D149-97a: 400 volts per mil.
 2. Volume resistance, ASTM D257-99: 2.8×10^{15} ohm per centimeter cube at 30C.
 3. Water absorption, ASTM D570-98:
 - a. 0.193 percent in 24 hours at 23C.
 - b. 0.62 percent in 24 hours at 53C.
 4. Tensile strength, ASTM D638-00: 8,000 psi.
 5. Elongation, ASTM D638-00: 2.4 percent.
 6. Coefficient of expansion, ASTM D696-98: 6.8×10^{-5} inch per inch per degree C.
- E. Cable splice and tap-insulation/sealing kit: Suitable for use on 600-volt, 90C cables, material compatible with cable insulation and jacket, meeting the seal test requirements of ANSI C119.1.
 1. Heat-shrinkable tubing or wraparound heat-shrinkable sleeve: approved per referenced UL or ITS directory, flame-retardant, corrosion-resistant thick-wall tubing with factory-applied sealant for field insulation on in-line splices and taps or wraparound-type sleeve for retrofit installation on existing splices and taps to provide a watertight seal and insulating encapsulation, with the following additional requirements:
 - a. Material: Cross-linked polyolefin.
 - b. Shrink ratio: 3 to 1 minimum.
 - c. Physical properties:
 - 1) Ultimate tensile strength: 2,350 psi, ASTM D412-98a.
 - 2) Ultimate elongation: 350 percent, ASTM D412-98a.
 - 3) Hardness, Shore D: 42, ASTM D2240-00.
 - 4) Water absorption: 0.050 percent, ASTM D570-98, Method 6.1.
 - 5) Specific gravity: 1.28, ASTM D792-00.
 - d. Electrical properties:
 - 1) Dielectric strength: 450 volts per mil, ASTM D412-98a.
 - 2) Volume resistivity: 1×10^{14} ohm cm, ASTM D257-99.

e. Thermal properties:

- 1) Continuous operating temp.: -55C to +135C.
- 2) Air oven aging (14 days at 175C):
 - a) Tensile strength: 2,680 psi.
 - b) Elongation: 375 percent.
- 3) Low temp. flexibility (4 hours at -55C): No cracking when flexed.
- 4) Heat shock (4 hours at 250C): No cracking, flowing or dripping.

f. Chemical properties:

- 1) Corrosivity: Non-corrosive.
- 2) Fungus resistance: Non-nutrient, ASTM G21-96.
- 3) Flammability: Self-extinguishing.

PART 3 – EXECUTION

3.01 SPLICES AND TERMINATIONS:

- A. Make wire and cable splices in outlet, junction or pull boxes, in cable troughs or in equipment cabinets. Splices in conduit are prohibited.
- B. Secure connectors or terminal lugs to conductor so as to engage all strands equally.
- C. Do not rupture insulation nor expose bare conductors.
- D. Install compression connectors and terminal lugs using tools and pressure recommended by manufacturer. Indent mark connectors and terminal lugs with number of die used for installation.
- E. Apply anti-corrosion joint compound to connectors, terminal lugs and bolting pads before installation.
- F. Wrap ½-lapped layer of arcproof tape, glass tape overall on cable splices installed in air tunnels, ducts and shafts.
- G. Install terminal fittings on multiple-conductor cable in accordance with manufacturer's recommendation. Completely seal cable from moisture.

3.02 INSPECTION:

- A. Have splices and taps in junction and pull boxes inspected by the Engineer or the manufacturer's representative, when available.

END OF SECTION

SECTION 16130

RACEWAYS, BOXES AND CABINETS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing conduit, raceways, cable trays, boxes and cabinets to form raceway and support system for power, communication and control cables.
- B. Related Work Specified Elsewhere:
 - 1. Grounding and bonding: Section 16060.
 - 2. Firestopping: Section 07841.

1.02 QUALITY ASSURANCE:

- A. Qualifications: Select a manufacturer who is engaged in production of similar raceways, boxes and cabinets.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Electrical Code (NEC).
 - 3. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1000 Volts Maximum); VE 1, Metallic Cable Tray Systems; TC-2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 4. American National Standards Institute (ANSI): C80.1, Rigid Steel Conduit - Zinc Coated; C80.5, Aluminum Rigid Conduit - (ARC); and Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
 - 5. UL: 5, Surface Metal Raceways and Fittings; 6, Rigid Metal Conduit; 50, Enclosures for Electrical Equipment; 94, Test for Flammability of Plastic Materials for Parts in Devices and Appliances; 360, Liquid Tight Flexible Steel Conduit; 514A, Metallic Outlet Boxes; 514B, Fittings for Conduit and Outlet Boxes; 514C, Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers; 651, Schedule 40 and 80 Rigid PVC Conduit; 884, Underfloor Raceways and Fittings; and 1684, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - 6. Federal Specifications (FS): FF-S-325C, FF-S-760, TT-S-227.
 - 7. American Standards of Testing and Materials (ASTM): A47/A47M-99, Standard Specification for Ferritic Malleable Iron Castings; A123/A123M-00, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; A185-97, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement; A276-00a, Standard Specification for Stainless Steel Bars and Shapes; A507-00, Standard Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled; A532/A532M-93a(1999)e1, Standard Specification for Abrasion-Resistant Cast Irons; A536-84(1999)e1, Standard Specification for Ductile Iron Castings; A615/A615M-00, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; A653/A653M-00, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; B138-96, Standard Specification for Manganese Bronze Rod, Bar and Shapes; B455-96, Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes; B584-00, Standard Specification for Copper Alloy Sand Castings for General Applications; B633-98, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; C109/C109M-99, Standard Test Method for Compressive Strength of Hydraulic

Cement Mortars (Using 2-in. or [50-mm] Cube Specimens); C173-94a¹, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; C231-97e¹, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method; D149-97a, Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies; D495-99, Standard Test Method for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation; D570-98, Standard Test Method for Water Absorption of Plastics; D638-00, Standard Test Method for Tensile Properties of Plastics; D648-00a, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position; and D790-00, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

8. American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges (SSHB).
 9. ITS: Directory of ITS listed products.
- C. The following items to be listed or labeled per referenced UL or ITS directory:
1. Conduit and fittings.
 2. Boxes.
 3. Cabinets.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
1. Shop Drawings.
 2. Certification.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Mark each item in accordance with applicable reference standard.
- B. Ship each unit securely packaged and labeled for safe handling in shipment and to avoid damage or distortion.
- C. Store products in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. General Requirements for Conduit, Raceways, Cable Trays, Boxes, Cabinets and Fittings:
1. Size: As shown, minimum conduit size 3/4 inch.
 2. Materials:
 - a. Steel sheet: ASTM A507-00.
 - b. Zinc-coated steel sheet: ASTM A653/A653M-00.
 - c. Cast iron: ASTM A532/532M-93a(1999)e1.
 - d. Ductile iron: ASTM A536-84(1999)e1.
 - e. Malleable iron: ASTM A47/A47M-99.
 - f. Bronze extrusion: ASTM B455-96, Alloy C38500.
 - g. Bronze casting: ASTM B584-00, Alloy C83600.

- h. Rigid fiberglass reinforced epoxy: UL 1684.
 - i. Stainless steel: ASTM A276-00a, Type 304.
 - 3. Zinc coating:
 - a. Hot-dip galvanizing: ASTM A123/A123M-00.
 - b. Electro galvanizing: ASTM B633-98.
- B. Galvanized-Steel Rigid Conduit and Fittings: UL 6 and ANSI C80.1, zinc coating tested in accordance with reference test in appendix.
- C. Liquid-Tight Flexible Conduit and Fittings:
 - 1. Applicable requirements of UL 360.
 - 2. Flexible galvanized-steel core with extruded liquid-tight neoprene or PVC jacket overall.
 - 3. Sizes up to 1-1/4 inch provided with continuous copper bonding conductor, spiral wound between convolutions.
 - 4. Sizes 1-1/2 inch and above provided with separate grounding conductor.
- D. Conduit Expansion Fittings and Expansion and Deflection Fittings:
 - 1. Materials:
 - a. For galvanized-steel rigid conduit:
 - 1) Expansion fittings: Steel or malleable iron, hot-dip galvanized.
 - 2) Expansion/deflection fittings: Bronze or ductile iron end couplings, neoprene sleeve and stainless steel clamping bands.
 - 2. Conduit expansion fitting: Weatherproof.
 - 3. Conduit expansion and deflection fitting: Watertight.
 - 4. Metallic fittings equipped with bonding jumper cable to provide electrical continuity.
- E. Conduit Connector Fittings:
 - 1. UL 514B, material and finish similar to that of conduit with which they are to be used.
 - 2. For enclosures, cabinets, boxes and gutters in electrical rooms and aboveground indoor locations: Threaded nylon-insulated bushing and locknuts.
 - 3. For enclosure, cabinets, boxes and gutters with hub in outdoor, tunnel and underground locations, except electrical rooms: Threaded watertight hub fitting with gasket.
 - 4. For enclosure having punched or formed knockout for conduit entry in outdoor and underground locations, except electrical rooms: Threaded watertight fitting with gasket, nylon-insulated throat and sealing locknut.
- F. Conduit and Cable-Seal Fittings:
 - 1. Conduit seal:
 - a. To provide watertight seal between concrete and conduit where it penetrates wall, floor or ceiling.
 - b. Size as shown or necessary.
 - c. Materials: Body and pressure clamp of malleable or cast iron with a neoprene sealing grommet and PVC-coated or galvanized-steel pressure rings, oversized sleeve of FPE or galvanized steel.
 - d. Seal between conduit and concrete to withstand pressure from 50-foot head of water without leakage.

2. Cable seal:
 - a. To provide watertight seal between cable and conduit for use with single-conductor or multiple-conductor cable as necessary.
 - b. Size as necessary, drilled to accommodate cable.
 - c. Pressure discs of PVC-coated steel and sealing ring of neoprene.
 - d. Seal between cable and conduit to withstand water pressure of 50 psi without leakage.
 3. Seal compound:
 - a. FS TT-S-227, two-component, fast-setting, polymeric sealing compound to provide watertight seal between concrete and conduit, between cable and conduit.
 - b. Pour-type for horizontal and gun-grade for vertical or overhead application.
 - c. When cured, sealant to have rubber-like flexibility allowing minimum movement of conduit and cable in temperature range of minus 40F to plus 150F without loss of watertight seal.
 - d. Pot life: 15 minutes.
 - e. Minimum ambient temperature for application: 35F.
 - f. Initial cure: 15 minutes.
 - g. Final cure: Seven days.
 - h. Hardness, Durometer A: 20-35.
 - i. Seal between conduit and concrete to withstand pressure from 50-foot head of water without leakage.
 - j. Seal between conduit and single-conductor or multiple-conductor cable to withstand water pressure of 70 psi without leakage.
 - k. Fox Industries, Type FX-571G or approved equal.
- G. Conduit and Cable Supports:
1. Retaining straps and fasteners: FS FF-S-760, with the following additional requirements:
 - a. Type, style and size: As necessary.
 - b. Material and finish: Stainless steel, Type 304, or approved equal.
 - c. For separating conduit from masonry surface: Hot-dip galvanized malleable-iron spacer assembled with Style A strap.
 - d. For vertical run of metallic-sheath cable: Basket-weave cable support.
 - e. For fastening conduit or cable to channel inserts: Stainless steel, Type 304, or approved equal.
 2. Multiple pipe hangers (trapeze-type): Consisting of two or more hanger rods, horizontal member, U-bolt clamp and other attachment necessary for securing hanger rods and conduit, with the following additional requirements:
 - a. Material and finish: Stainless steel, Type 304, or approved equal.
 - b. Hanger rod: Not smaller than 3/8-inch diameter, threaded for sufficient distance at each end to permit at least 1-1/2 inches of adjustment.
 - c. Horizontal member: Channel, 1-1/2 inches square or 1-5/8 inches square by 12 gauge or heavier. Weld two or more channels together for greater strength if necessary.
 - d. Design: Capable of supporting load equal to sum of weights of conduit, cable and hanger plus 200 pounds. At design load, stress at root of thread on hanger rod 9,500-psi maximum; stress in horizontal member 12,500-psi maximum.
- H. Boxes and Cabinets:
1. Outlet boxes:
 - a. UL 514A, capable of accommodating conduit as shown.

- b. Material and finish:
 - 1) Steel, malleable iron, cast iron or ductile iron.
 - 2) Hot-dip galvanized or electro galvanized after fabrication.
 - c. For aboveground indoor locations and electrical rooms: Punched or formed knockouts.
 - d. For wall receptacles and switches, single or double devices: Outlet boxes 4-11/16 inch square by 1-1/2 inch deep.
 - e. For recessed wall-mounted receptacles: Watertight cast-iron outlet box, three-inch diameter, of suitable depth and complete with the following:
 - 1) Bronze faceplate with flush-mounted screw plug, without exposed fasteners, M32 finish.
 - 2) Screw plug attached to outlet-box assembly by chain or other approved means, M32 finish.
 - 3) Bronze faceplate flange, five inches in diameter, extending beyond box, M32 finish.
 - 4) One special screw-plug removal tool with every 10 receptacles.
2. Junction and pull boxes:
- a. Internal volume up to 100 cubic inches, metallic boxes: UL 514A, non-metallic boxes: UL514C; internal volume above 100 cubic inches, UL 50.
 - b. Flush-mounted or surface-mounted as shown.
 - c. Size: Suitable to accommodate conduit, raceways, ducts, number of cables and splices shown.
 - d. Material and finish:
 - 1) Metallic boxes:
 - a) Steel, malleable iron, cast iron or ductile iron.
 - b) Hot-dip galvanized or electro galvanized after fabrication.
 - c) Stainless steel in tunnel areas.
 - 2) Non-metallic boxes:
- I. Expansion Bolt Anchors: FS FF-S-325C Group II, stainless steel, Type 304, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. General:

- 1. Use size, type, general routing, location of conduit, raceways, boxes and cabinets as shown and specified.
- 2. Install metallic raceway, fittings, boxes and cabinets free from contact with reinforcing steel.
- 3. Where aluminum is placed in contact with dissimilar metal or with concrete, separate contact surfaces by means of gasket, nonabsorptive tape or coating to prevent corrosion.
- 4. Make metallic conduit, raceways, ducts and cable trays, electrically and mechanically continuous and ground them in accordance with Section 16060.

B. Conduit:

- 1. Run exposed conduit parallel to building lines.
- 2. Install exposed conduit to avoid interference with other work.

3. Traction-power substations, tie-breaker stations, ac-switchboard, electrical, train-control, communication and mechanical rooms: Where shown or where necessary to prevent seepage of subsoil or water into such areas, seal where conduits in contact with concrete and seal cable inside conduit using cable seal or sealing compound in accordance with the following requirements:
 - a. Where shown and as necessary, install cable seal and conduit seal in accordance with the manufacturer's recommendations.
 - b. Use sealing compound where approved and in accordance with manufacturer's recommendations, with the following additional requirements:
 - 1) Before applying sealing compound, prime concrete, conduit and cable surface using primer recommended by manufacturer.
 - 2) Pour or inject compound to prevent voids inside seal and to keep cable centered in conduit.
 - c. In empty conduit installed for future use, install blank cable seal inside conduit to prevent seepage of water.
 - d. All conduits free of water before conduit seals are installed.
4. Apply lead-free conductive anti-seize compound to threaded-conduit joints.
5. In outdoor and underground locations, except electrical rooms, use threaded-conduit hub to attach conduit to equipment enclosure. Use watertight conduit fitting with gasket, nylon-insulated throat and sealing locknuts for attachment of conduit to enclosure having punched or formed knockout.
6. In aboveground indoor locations and electrical rooms, use locknut and nylon-insulated bushing to attach conduit to enclosure.
7. Install suitable caps or plugs in empty conduit for future extension. Leave approved nylon or polyester pull line in each conduit.
8. Thread and ream ends of field-cut conduit to remove rough edges. Use bushing at conduit entrance to boxes, cabinets and equipment enclosures.
9. Bends:
 - a. Unless otherwise shown or specified, install conduit bends in accordance with reference codes.
 - b. Install bends in buried conduit in accordance with the following:

Size of Conduit (in inches)	Minimum Radius of Factory-Bend (in inches)	Minimum Radius of Field-Bend (in inches)
3	18	24
4	24	30
5	48	48
6	48	48

- c. Bend conduit so that field-made bend is free from cuts, dents and other surface damage.
10. Support conduit during construction to prevent distortion and to ensure independent support.
11. Support horizontal conduit with one-hole pipe straps or individual pipe hangers.
12. Secure conduit supported on multiple-hangers (trapeze) or channel inserts by fasteners suitable for such purpose.

13. Where conduit is attached to masonry surface, use malleable-iron spacers with Style A pipe straps.
14. Support and secure vertical conduit spanning open areas at intervals not exceeding 10 feet.
15. Support conduit above suspended ceiling using applicable specified methods.
16. Install conduit so as to drain moisture to nearest outlet or pull box.
17. Use minimum of 18-inch long liquid-tight flexible-conduit connection for equipment enclosure subject to vibration.
18. Do not use wire for support of conduit and cable.
19. Install expansion fitting in exposed conduit runs longer than 300 feet and where shown. Install expansion/deflection fittings where embedded conduits cross structural expansion joints. Where embedded conduits cross a structural contraction joint, paint the external surface of conduit with linseed oil or other compatible bond breaker for two feet on each side of contraction joint.

C. Surface Raceways:

1. Install as shown.

D. Outlet, Junction and Pull Boxes:

1. Mount outlet boxes as shown.
2. Arrange front of box or attached plaster cover flush with finished wall or ceiling.
3. Keep number of knock-outs to minimum.
4. Clean boxes thoroughly after installation and correct damage to boxes and to finish.
5. Install covers on boxes mounted on walls and ceilings.
6. Measure height of wall-mounted outlet box from finished floor to horizontal centerline of cover plate.
7. Fasten floor boxes securely in place.
8. Install junction and pull boxes so that covers are readily accessible.
9. Do not install boxes above suspended ceilings except where ceilings are removable or definite provision is made for access to boxes.

E. Cabinets:

1. Fasten cabinet securely using expansion bolts, toggle bolts or mounting ears.
2. Touch-up damaged painted finish.

F. Use expansion-bolt anchors to secure equipment to concrete surfaces.

3.02 FILLING OF OPENINGS:

- A. Where conduit and raceway pass through fire-rated walls, ceilings or floors, provide seals to prevent passage of fire and fumes and to maintain integrity of fire-rated structure in accordance with Section 07481.
- B. Where openings are provided for passage of conduit and raceways in walls, ceilings or floors, use fire-resistant fibrous-glass safing or similar material to seal unused openings to prevent passage of fire and fumes in accordance with Section 07841.
- C. Close unused openings or spaces in floors, walls and ceilings. Plug or cap unused conduit and sleeves.

3.03 IDENTIFICATION:

- A. At end of each run, use stainless steel or aluminum tags, minimum 1-1/2 inch diameter, with stamped markings, minimum 1/4-inch high lettering, and tag holders attached to conduit using a stainless steel band with worm screw clamping device to establish identification of conduits and raceways in accordance with designations shown. Where conduits are terminated flush with concrete structure, install three-ply laminated phenolic plate, engraved through black face to white core and attached adjacent to conduits' entrance by means of non-metallic screws. Engrave conduits' designations within circles arranged in pattern similar to that of conduits.

3.04 FIELD QUALITY CONTROL:

- A. Arrange with the Engineer for inspection and approval of embedded conduit and boxes prior to concrete placement.
- B. Arrange with the Engineer for inspection by electrical utility company representative of incoming-service conduit prior to placing concrete.
- C. Test metallic conduit and boxes for electrical continuity. Conduct tests in presence of Engineer.
- D. Test not less than 0.5 percent of total installed channel inserts and spot inserts as directed for compliance with specified pullout-load rating. Replace and retest inserts which fail. Conduct tests in presence of Engineer.
- E. Arrange with the Engineer for inspection and approval of direct-buried conduits for future train control circuits prior to backfilling.

END OF SECTION

SECTION 16145

WIRING AND CONTROL DEVICES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing switches, cover plates, limit switches, occupancy sensors, receptacles, plugs, magnetic contactors, automatic transfer switches, photoelectric controls and time switches.
- B. Related Work Specified Elsewhere:
 - 1. Wire connection accessories: Section 16125.
 - 2. Grounding and bonding: Section 16060.
 - 3. Raceways, boxes and cabinets: Section 16130.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. National Electrical Code (NEC).
 - 3. National Electrical Manufacturers Association (NEMA): WD1, General Color Requirements for Wiring Devices; KS1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); ICS 2, Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; ICS 12, Profiles of Networked Industrial Devices--Part 1: General Rules; NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 4. American National Standards Institute (ANSI): Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
 - 5. UL: 98, Enclosed and Dead-Front Switches; 198D, Class K Fuses; 198E, Class R Fuses; 508, Industrial Control Equipment; 773, Plug-In Locking-Type Photocontrols for Use with Area Lighting; 1008, Transfer Switch Equipment.
 - 6. American Standards of Testing and Materials (ASTM): A47/A47M-99, Standard Specification for Ferritic Malleable Iron Castings; A276-00a, Standard Specification for Stainless Steel Bars and Shapes; and A507-00, Standard Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.
 - 7. ITS: Directory of ITS Listed Products
- B. Source Quality Control:
 - 1. Following items listed per referenced UL or ITS directory:
 - a. Snap switches.
 - b. Disconnect switches.
 - c. Receptacles and plugs.
- C. Qualifications: Select a manufacturer who is regularly engaged in the production of automatic transfer switches.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification:
 - a. Certified test reports of factory tests performed on each automatic transfer-switch unit in accordance with reference standards.
 - b. Furnish certificate from manufacturer verifying that automatic transfer switches conform to specified requirements. Include certificate with submittal of shop drawings.
 - 3. Documentation for Automatic Transfer Switch:
 - a. Submit field test plan within 60 days after award with accompanying documentation in the form of test data recording sheets and list of proposed test equipment for approval prior to testing.
 - b. Submit certified copies of test data, dated and clearly identified within two weeks after completion of testing.
 - 4. Operation and Maintenance Manuals for Automatic Transfer Switch.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Mark each item in accordance with applicable reference standard.
- B. Ship each unit securely packaged and labeled for safe handling and to avoid damage
- C. Store products in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. Snap Switches:
 - 1. NEMA WD1, specification grade.
 - 2. Rating:
 - a. Twenty amperes at 120-277 volts ac.
 - b. Horsepower-rated when used as disconnecting device for motor circuit.
 - 3. Body and base: Fully enclosed, brown, fire-resistant, non-absorptive thermosetting urea or nylon.
 - 4. Contacts: Silver alloy.
 - 5. Mounting yoke: Corrosion-resistant metal with plaster ears.
 - 6. Poles: Single-pole, double-pole, three-way or four-way as shown.
- B. Disconnect (Safety) Switches:
 - 1. UL 98, NEMA KS1, heavy-duty, fusible or non-fusible as shown.
 - 2. Voltage rating: 240 volts ac, 480 volts ac or 250 volts dc as shown and as necessary.
 - 3. Number of poles and current rating: As shown and as necessary.

4. Fuses:
 - a. UL 198D.
 - b. For fused disconnect switch associated with motor load: UL Class RK5 with time delay or as shown.
 - c. For fused disconnect switch associated with other loads: UL Class RK1 or as shown.
 - d. Current rating: As shown.
 5. Enclosure: (NEMA 250)
 - a. Type:
 - 1) For aboveground indoor locations and electrical rooms: Type 1.
 - 2) For tunnel and underground locations, except electrical rooms: Type 4.
 - 3) For outdoor locations: Type 3R.
 - b. Materials:
 - 1) Steel sheet: ASTM A507-00.
 - 2) Malleable iron: ASTM A47/A47M-99.
 - c. Finish: Metallic surface cleaned, degreased, primed with zinc primer and finished with light-gray enamel, ANSI Z55.1, Color 61; minimum dry-film thickness, two mils.
 6. Quick-make/quick-break switching mechanism with operating handle external to enclosure with positions labeled ON/OFF and capable of being padlocked in OFF position, defeatable interlock to prevent opening of enclosure door when switch is closed.
- C. Cover Plates:
1. Wall plates:
 - a. NEMA WD1, suitable for specified receptacles and switches, size suitable for recess-mounted or surface-mounted associated outlet box, stainless steel, ASTM A276-00a, Type 304, or approved equal.
 - b. For above ground and underground indoor service areas and electrical rooms: Steel, stainless steel or aluminum plate, as standard with the manufacturer.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install switches as shown and in accordance with referenced codes and standards in Article 1.2, and manufacturer's instructions.
- B. Install cover plate on switch and receptacle.
- C. Ground Disconnect switches and snap switches in accordance with Section 16060.
- D. Make power cable connections to snap switches by means of integral mechanical connectors. If such items are not furnished with integral mechanical connectors, make connections using compression connectors in accordance with Section 16125.

- E. Make power cable connections to snap switches using their side screw wiring connection terminals.
- F. Apply matching touch-up paint as necessary.

3.02 **FIELD QUALITY CONTROL:**

- A. Furnish necessary test equipment and perform the following in the presence of the Engineer, in accordance with approved procedures:
 - 1. Test equipment enclosure for continuity to grounding system.
 - 2. Check tightness of cable connections of snap switches and disconnect switches.
 - 3. Test operations of circuits and controls of switches.
- B. Submit certified test reports for compliance with field quality control requirements.

END OF SECTION

SECTION 16225

MOTORS

PART 1 – GENERAL

1.01 DESCRIPTIONS:

- A. This section specifies providing motors.
- B. Related Work Specified Elsewhere:
 - a. Grounding and bonding: Section 16060.
 - b. Wire connection accessories: Section 16125.
 - c. Raceways, boxes and cabinets: Section 16130.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - a. Comply with codes and regulations of jurisdictional authorities.
 - b. NEC.
 - c. IEEE: 85, 112.
 - d. NEMA: MG1.
 - e. ANSI: Z55.1.
 - f. ASTM: A582.
 - g. OSHA: 1910.95.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - a. Shop Drawings:
 - b. Outline dimensions.
 - c. Cross section showing internal construction and weight.
 - d. Connection diagram.
 - e. Certification.
 - f. Operation and Maintenance Manuals.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Ship each motor securely packaged and labeled for safe handling in shipment and to avoid damage or distortion.
- B. Store motors in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. Motors:

- a. NEMA MG1, squirrel-cage, induction-type, unless otherwise shown.
- b. Rating:
- c. Horsepower: As shown.
- d. Voltage and frequency:
 - 1) Motors, 1/2 HP and smaller: 115-volt, single-phase, 60 Hertz.
 - 2) Above 1/2 HP: 460-volt, three-phase, 60 Hertz, unless otherwise specified or shown.
 - 3) For motors in air-conditioning units:
 - a) For units up to and including 10,000 BTUH: 115-volt, single-phase, 60 Hertz.
 - b) For units from over 10,000 BTUH up to and including 36,000 BTUH: 208-volt, single-phase, 60 Hertz.
 - c) For units over 36,000 BTUH: 460-volt, three-phase, 60 Hertz.
- e. RPM: As shown.
- f. Time rating: Continuous, unless otherwise shown.
- g. Nominal full-load efficiency: Premium Efficiency when tested in accordance with NEMA MG1 and IEEE 112.
- h. Design:
- i. Single-phase motors: Design N, suitable for full-voltage across-the-line starting.
- j. Three-phase motors: Design B, unless otherwise shown, with the following additional requirements:
 - 1) Up to and including 50-HP motors: Suitable for full-voltage across-the-line starting.
 - 2) Above 50-HP motors: Suitable for reduced-voltage starting.
- k. Service factor:
- l. Motors, one HP and smaller: In accordance with NEMA MG1.
- m. Above one-HP up to and including 200-HP motors: 1.15.
- n. Above 200-HP motors: 1.00.
- o. Insulation: Class and allowable temperature rise above average ambient temperature of 30C and maximum ambient temperature of 40C as follows:
- p. Integral-horsepower motors:
 - 1) Dripproof motors: Class B insulation with Class B temperature rise.
 - 2) Totally enclosed motors: Class F insulation with Class B temperature rise, unless otherwise shown or specified.
- q. Fractional-horsepower motors: In accordance with NEMA MG1.
- r. Noise level: NEMA MG1-12.49 but not to exceed requirements of OSHA 1910.95 when measured in accordance with IEEE 85.
- s. Enclosure:
- t. Dripproof, fully guarded; totally enclosed fan-cooled guarded; or totally enclosed air-over as specified.
- u. Heavy-duty steel or cast-iron frame.
- v. End bell:
 - 1) Up to 10HP: With cast-iron or aluminum end bells.
 - 2) 10HP and above: With cast-iron end bells.

- w. Mounting: Foot-mounted on pad or adjustable pad, if necessary or as otherwise shown.
- x. Provision for grounding.
- y. Finish: Red-oxide zinc-chromate primer with finish coat of light-gray enamel, ANSI Z55.1, Color 61; minimum dry-film thickness, two mils.
- z. Totally enclosed air-over:
 - 1) Variation to totally enclosed fan-cooled machines with air flow for cooling supplied by fan specified elsewhere.
 - 2) Fan/motor application factory-engineered for air flow shown or specified.
- aa. Conduit box:
- bb. Diagonally split, suitably gasketed.
- cc. Type:
 - 1) Up to 10HP: Steel, cast iron or aluminum with threaded or punched conduit holes.
 - 2) 10HP and above: Cast iron with threaded conduit holes.
- dd. Size suitable to accommodate motor and line leads including taping.
- ee. Capable of rotation in each 90-degree position.
- ff. Bearings:
- gg. Unless otherwise specified, average life 15 years, but not less than three years at continuous operation, with double shields.
- hh. Integral-horsepower motors:
 - 1) Five HP and smaller: Sealed ball bearings or roller bearings.
 - 2) Above five HP: Ball bearings or roller bearings with grease fittings and pressure-relief fittings for in-service lubrication.
- ii. Fractional-horsepower motors:
 - 1) 1/6 HP and larger: Sealed ball bearings.
 - 2) Below 1/6 HP: Sealed ball bearings or sleeve.
- jj. Motors for hermetically sealed and semi-hermetically sealed compressors: NEMA MG1, 18.076 through 18.093.
- kk. Motors for close-coupled pumps: Stainless-steel shaft in accordance with ASTM A582, Type 303.
- ll. Provide nameplate on each motor in accordance with NEMA MG1-10.37.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install motors where shown and in accordance with the NEC.
- B. Install conduit in accordance with Section 16130.
- C. Connect power cable as shown and in accordance with Section 16125.
- D. Ground motor enclosure in accordance with Section 16060.

3.02 FIELD QUALITY CONTROL:

- A. Furnish necessary equipment and perform the following tests:

- a. Check and test wiring connections in accordance with wiring diagram.
 - b. Test to ensure that insulation resistance of motor winding is 10 megohms minimum.
 - c. Test motor enclosure for continuity to grounding system.
 - d. Test motors for proper operation with their associated controls.
- B. Submit certified test reports.

END OF SECTION

SECTION 16270

TRANSFORMERS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing transformers and automatic voltage regulators.
- B. Related Work Specified Elsewhere:
 - 1. Wire connection accessories: Section 16125
 - 2. Grounding and bonding: Section 16060.
- C. Design Criteria:
 - 1. Floor loading: Transformer base compatible with floor design-loading of 250 pounds per square foot.

1.02 QUALITY ASSURANCE:

- A. Qualifications: Select a manufacturer who is regularly engaged in the repetitive production of transformers and automatic voltage regulators of the types and ratings described in these specifications using the latest technology and who has a proven record of successful manufacturing and testing of same or similar type equipment. The equipment manufacturer shall have and maintain ISO 9001 or ISO 9002 certification.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of jurisdictional authorities.
 - 2. NEC.
 - 3. NEMA: ST1, ST20, 107, 250.
 - 4. ANSI: C57.12.50, C57.12.51, Z55.1.
 - 5. ASTM: D3487.
 - 6. ANSI/IEEE: C57.12.00, C57.12.90, C57.12.91, C57.15, C57.94, C57.113, C57.124, C62.11.
 - 7. IEEE: C57.12.01.
 - 8. UL: 506, 1561, 1562.
- C. Factory Testing:
 - 1. General requirements for distribution transformers:
 - a. Perform design tests and short-circuit tests on one transformer of each type and rating furnished in this Contract.
 - b. Perform routine tests, impulse test and partial discharge test on each transformer furnished in this Contract.

2. Dry-type transformers: Perform design and routine tests in accordance with IEEE C57.12.01 and ANSI/IEEE C57.12.91 and the following additional tests:
 - a. Perform impulse test without using surge arrestors to protect the transformer.
 - b. Perform partial discharge test to establish partial discharge inception and extinction voltage during induced voltage test in accordance with ANSI/IEEE C57.124 and the following requirements:
 - 1) Measure partial discharge in pico-coulombs at 10-percent increments when the voltage is raised from 70 percent to 200 percent and lowered from 200 percent to 70 percent of rated voltage during the induced voltage test to verify the following requirements:
 - a) Inception of partial discharge occurs above 120 percent of rated voltage when voltage is raised from 70 percent to 200 percent. At 120 percent, the partial discharge reading shall be 10 pico-coulombs or less.
 - b) Extinction of partial discharge occurs above 120 percent of rated voltage when voltage is lowered from 200 percent to 70 percent and partial discharge level is below 10 pico-coulombs.
 - c. Perform short-circuit tests in accordance with IEEE C57.12.01 and ANSI/IEEE C57.12.91.
3. Perform design and routine tests for general-purpose transformers in accordance with NEMA ST20.
4. Notify the Engineer not less than 14 days prior to factory testing to allow witnessing of tests.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 1. Shop Drawings: In accordance with Section 16360.
 2. Certification:
 - a. Furnish certified test report of all design and short-circuit tests performed on one transformer of each type and rating furnished in this Contract or on identical transformers built by same manufacturer within the last five years.
 - b. Furnish certified test report of all routine, impulse and partial discharge tests performed on each transformer furnished in this Contract.
 - c. Furnish certificates from manufacturers verifying that products conform to specified requirements. Include certificates with submittal of shop drawings.
 3. Documentation:
 - a. Field-testing plan: In accordance with Section 16360.
 4. Operation and Maintenance Manuals: In accordance with Section 16360.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Ship each unit securely packaged and labeled for safe handling in shipment and to avoid damage or distortion.

- B. Temporary Bracing: Where necessary, brace transformer for hoisting, lowering and skidding into position. Label temporary internal bracing: TEMPORARY - REMOVE BEFORE OPERATION.
- C. Protection Against Concealed Damage: Include within shipping container mechanical impact recorder of rating recommended by manufacturer for shipment by railroad and submit impact-record chart with manufacturer's instructions for disposition of damaged materials.
- D. Store transformers in secure and dry storage facility.

1.05 **OPERATION AND MAINTENANCE TRAINING:**

- A. In accordance with the General Requirements.

PART 2 – PRODUCTS

2.01 **PRODUCTS AND MATERIALS:**

- A. Not Used
- B. Not Used
- C. General-Purpose and Specialty Transformer:
 - 1. NEMA ST20 and ST1, UL 506 and 1561, indoor, dry, double-wound with insulated copper conductor, suitable for operation on 60 Hertz.
 - 2. Rating:
 - a. kVA rating: As shown.
 - b. Voltage rating:
 - 1) Three-phase transformers: 480 volts primary to 208Y/120 volts secondary with secondary neutral brought out.
 - 3. Enclosures:
 - a. Above 9 kVA: Ventilated, NEMA 250, Type 2 drip-proof enclosure with removable front panel and louvers to prevent entrance of falling dirt and accidental access to live parts, and with lifting brackets or holes.
 - b. 45 kVA and below: Wall-mounted unless otherwise shown.
 - 4. Insulation system as specified below, capable of withstanding full-wave impulse of 10 kV.

kVA Rating	Insulation System
3-30	185C

- 5. Maximum allowable temperature rise under continuous full-load above an average ambient temperature of 30C and maximum of 40C.

kVA Rating	3 -30
By winding resistance	115C
By hottest spot in winding	145C

6. Taps:

- a. Tap-changing links providing taps as follows, capable of delivering rated output in each position.
- b. Three-phase transformers: Provide taps on primary side in accordance with the following:

kVA Rating	Quantity		Taps Size:	Percent-age of rated voltage
9 - 15	2		5	below

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install each transformer in position shown and in accordance with manufacturer's recommendations and NEC requirements.
- B. Make power-conductor and control-wire connections in accordance with manufacturer's drawings, Section 16125 and as shown.
- C. Ground each transformer and automatic voltage regulator as shown and in accordance with Section 16060.
- D. Connect space heater circuit to prevent condensation during installation.

3.02 FIELD QUALITY CONTROL:

- A. Prior to testing, check transformer installation in accordance with ANSI/IEEE C57.94.
- B. Submit field-testing plan including, but not limited to, the following tests. Furnish equipment and perform the following tests in the presence of Engineer, in accordance with approved procedure:
 1. General-purpose and specialty transformers:
 - a. Perform insulation-resistance tests winding-to-winding and winding-to-ground. Record and correct resistance value to temperature.
 - b. Perform ac high-voltage tests between high-voltage winding and low-voltage winding, between high-voltage winding and ground and between low-voltage winding and ground. Perform tests at 65 percent of factory test voltage for one-minute duration.

- c. Test voltage ratio of each tap. Results not to deviate more than 0.5 percent from calculated ratio. Set taps as directed.
 - d. Check polarity by means of vector check.
- C. Submit certified test reports.

END OF SECTION

SECTION 16425
MOTOR STARTERS AND CONTROL CENTERS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section specifies work pertaining to motor starters and control centers.

1.02 QUALITY ASSURANCE

- A. A. Codes, Regulations, Reference Standards and Specifications:
1. Comply with codes and regulations of the Authority Having Jurisdiction.
 2. National Electrical Code (NEC) 2011.
 3. NEMA AB1, ICS-2, ICS-2.3, 250.
 4. ANSI: Z55.1.
 5. ASTM: A47/A47M-99/06, A653/A6 (3M-07), B187/B187M-06.
 6. UL: 845, Electrical Construction Materials Directory
 7. ITS: Directory of ITS Listed Products.
 8. The equipment manufacturer shall maintain an ISO 9001 or ISO9002 certification.
 9. National Fire Protection Association (NFPA) 130, 2014 Edition.
- B. The following items to be listed or labeled per referenced UL or ITS directory.
1. Motor starter.
 2. Combination starters.
 3. Motor circuit protectors.
 4. Motor control centers.

1.03 SUBMITTALS

- A. Refer to the Contract Documents.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ship each unit securely packaged and labeled for safe handling in shipment and to avoid damage or distortion.
- B. Store motor starters and control centers in secure and dry storage facility.
- C. The Contractor shall coordinate and participate with the overall commissioning activities in accordance with the Contract Documents.

1.05 COMMISSIONING

- A. The Contractor shall coordinate and participate with the overall commissioning activities in accordance with the Contract Documents.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS

A. Variable Frequency Drives:

1. As specified in Section 16480.

B. Motor Control Centers:

1. NEMA ICS-2.3, Class 1, Type B, rated 480-volt, three-phase, 60 Hertz, totally enclosed, deadfront, free-standing, modular assembly having vertical and horizontal buses, wireways, compartments equipped with circuit breakers, MCP and starters as shown.
2. Motor starter: Across-the-line magnetic or autotransformer starter, as shown and specified, with tin-plated stub assembly for connecting to vertical buses in unit compartment.
3. Circuit breaker:
 - a. Branch circuit breaker: One 480-volt, three-pole MCP for each unit compartment.
4. Indicator light: One red light mounted on each unit compartment showing ON position of circuit breaker.
5. Nameplate:
6. Each motor control center labeled with 1-1/2-inch-wide nameplate showing designation in one-inch high characters.
7. Each compartment labeled with one-inch wide nameplate showing function and number of the motor controlled in 1/2- inch high characters.

PART 3 – EXECUTION

3.01 INSTALLATION

- A.** Embed iron sills for anchoring motor control center flush with raised concrete pad. The Contractor shall coordinate location of iron sills with pouring of concrete pad.
- B.** Install motor control center devices as shown in accordance with manufacturer's recommendations, the NEC and Section 16225.
- C.** Install conduit in accordance with Section 16130 and the NEC.
- D.** Application:
1. Across-the-line starter permitted only for motors less than 25 HP.
 2. Use VFD's for vent shaft fans and pump motors.
- E.** Connect power cable and control wire as recommended by manufacturers and as follows:
1. Make power-cable and control-cable connections to circuit breakers and across-the-line magnetic starters by means of integral mechanical connectors. If such items are not furnished with integral mechanical connectors, make connections using compression connectors in accordance with Section 16125.
- F.** Ground complete motor control center in accordance with Section 16060.
- G.** Apply touch-up paint as necessary.

3.02 **TESTING**

- A. Refer to the Contract Documents.

END OF SECTION

SECTION 16435
LOW-VOLTAGE SWITCHGEAR AND SWITCHBOARD

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies providing 480-volt switchgear and switchboard.
- B. Related Work Specified Elsewhere:
 - 1. Raceways, boxes, and cabinets: Section 16130.
 - 2. Wire connection accessories: Section 16125.
 - 3. Grounding and bonding: Section 16060.
 - 4. Circuit breakers, panelboards, and load centers: Section 16440.

1.02 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. Select manufacturer regularly engaged in production of switchgears and switchboards.
 - 2. Furnish low-voltage switchgear, switchboard, and their main components from one manufacturer.
- B. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of jurisdictional authorities.
 - 2. NEC.
 - 3. NEMA: PB2.
 - 4. ANSI: C37.16, C37.17, C37.50, Z55.1.
 - 5. UL: 891.
 - 6. ASTM: B187.
 - 7. ANSI/IEEE: C37.13, C37.20.1, C57.13.
- C. Factory Testing: Submit design tests or certified copies of test reports on identical units performed for each type and rating of circuit breakers as assembled in its complete switchgear or switchboard unit including bus compartment.
 - 1. Circuit breaker tests in accordance with requirements of ANSI C37.50 and including the following:
 - a. Design test:
 - 1) Trip-device calibration-check test.
 - 2) AC dielectric withstand-voltage test.
 - 3) Continuous-current test.
 - 4) Overload-switching test.
 - 5) Endurance tests.
 - 6) Short-circuit current tests.
 - 7) Short-time current test.
 - b. Production tests: All applicable tests in accordance with the requirements of ANSI C37.50.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings: In accordance with Section 16360.
 - 2. Certification: Certified test reports for specified factory testing.
 - 3. Documentation:
 - a. Short-circuit calculations and system coordination study: In accordance with Section 16360.
 - b. Field-testing plan: In accordance with Section 16360.
 - 4. Operation and Maintenance Manuals: In accordance with Section 16360.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Ship each unit securely packaged, braced and labeled for safe handling in shipment and to avoid damage and distortion.
- B. Protection Against Concealed Damage: Include within shipping container mechanical impact recorder of rating recommended by manufacturer for shipment by railroad and submit impact-record chart with manufacturer's instruction for disposition for damaged material.
- C. Assembly for Shipment:
 - 1. Removable circuit-breaker elements packaged separately.

1.05 OPERATIONS AND MAINTENANCE TRAINING:

- A. In accordance with the General Requirements and Section 16360.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

- A. General Requirements for Switchboards:
 - 1. NEMA PB2, UL 891.
 - 2. Ratings:
 - a. Normal voltage: 480 volts.
 - b. Frequency: 60 Hertz.
 - c. Rated continuous current: As shown.
 - d. Short-circuit rating: As shown.
 - 3. Molded-case circuit breakers: Section 16440.
 - 4. Control wiring:
 - a. Insulation rated 600 volts, Type SIS, copper, No. 14 AWG minimum. Flexible, Class C or higher, stranded wire used for wiring across hinged joints.
 - b. One continuous length of wire used between terminals without splices or taps.
 - c. Connections made at terminal of device, on terminal blocks or at control bus, using tinned copper-ring compression terminals with insulated sleeve.
 - d. Interconnect wiring between compartments terminated on terminal blocks before being wired to components.

- e. Terminal blocks: With screw-type terminals, circuit-marking strips for indicating wire number, phenolic-laminated dustcover and 10-percent minimum spare terminal points.
- f. For each individual wire, same identification used on each terminal block marking strip.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install conduits and raceways as shown and in accordance with the Section 16130.
- B. Make power-cable and control-wire connections as shown and as follows:
 - 1. Make power-cable and control-wire connections to circuit breakers by means of integral mechanical connectors. If such items are not furnished with integral mechanical connectors, make connections using compression connectors in accordance with Section 16125.
- C. Make grounding connections as shown and in accordance with Section 16060.

END OF SECTION

SECTION 16440

CIRCUIT BREAKERS, PANELBOARDS AND LOAD CENTERS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies furnishing, installing, connecting and testing of circuit breakers, panelboards and load centers.
- B. Related Work Specified Elsewhere:
 - 1. Raceways, boxes and cabinets: Section 16130.
 - 2. Wire, cable and busways: Section 16120.
 - 3. Wire connection accessories: Section 16125.
 - 4. Grounding and bonding: Section 16060.
 - 5. Field painting: Section 09920.

1.02 QUALITY ASSURANCE:

- A. Codes, Regulations, Reference Standards and Specifications:
 - 1. Comply with codes and regulations of the jurisdictional authorities.
 - 2. NEC.
 - 3. NEMA: AB1, PB1, ST20, 250.
 - 4. ANSI: Z55.1.
 - 5. UL: 50, 67, 198C, 489, 891, Electrical Construction Materials Directory.
 - 6. ASTM: A276, B187.
 - 7. ITS: Directory of ITS Listed Products.
- B. Source Quality Control:
 - 1. Each item listed per referenced UL or ITS directory.

1.03 SUBMITTALS:

- A. Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:
 - 1. Shop Drawings.
 - 2. Certification.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Mark each circuit breaker, panelboard and transformer in accordance with applicable reference standard.
- B. Ship each unit securely packaged and labeled for safe handling and to avoid damage or distortion.
- C. Store products in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS:

A. General Requirements:

1. Interchangeability: Components of the same type, size, rating, functional characteristics and make are to be interchangeable.
2. Finish for enclosures for enclosed circuit breakers, panelboards, emergency-service panelboards and load centers:
 - a. Clean and degrease metallic surfaces.
 - b. Prime with zinc primer.
 - c. Finish with one coat of light-gray enamel, ANSI Z55.1, Color 61. Minimum dry-film thickness: Two mils.

B. Circuit Breaker: NEMA AB1, UL 489, molded-case, bolt-on, quick-make/quick-break, mechanically trip-free switching mechanism, with thermal trip for inverse time-delay overcurrent protection and magnetic trip for instantaneous short-circuit protection. Shunt-trip device for tripping by ground-fault relay as shown. Frame size 225 amperes and above equipped with interchangeable thermal trip and adjustable magnetic-trip unit. Designed to carry continuous rating in ambient temperature of 40C with the following parameters as shown:

1. Number of poles.
2. Rated voltage.
3. Rated interrupting current.
4. Trip setting.
5. Frame size.

C. Panelboard:

1. NEMA PB1, UL 67.
2. Enclosure:
 - a. UL 50.
 - b. Galvanized steel, surface-mounted unless otherwise shown.
 - c. Type:
 - 1) Aboveground indoor locations and electrical rooms: NEMA 250, Type 1.
 - 2) Tunnel areas and underground locations, except electrical rooms: NEMA 250, Type 12.
 - 3) Outdoor locations: NEMA 250, Type 3R.

d. Gutter size:

Main Bus Rating Amperes	Minimum Top and Bottom Gutter Size in Inches	Minimum Side Gutter Size in Inches
100 and below	4	4
225	6	4
400 and over	8	4

- e. Interior components mounted on backplate of reinforced steel for rigid support and accurate alignment.
- f. Provide latch and handle in accordance with UL 50; screw fastenings will not be accepted in lieu of latch.
- g. Provision for enclosure grounding.

3. Busbars:

- a. ASTM B187.
- b. 98-percent-conductivity copper.
- c. Contact surface silver-plated or tin-plated.
- d. Rating of neutral and ground bus: Equal to that of phase bus.
- e. Neutral bus mounted on insulating block.
- f. Neutral and ground busbars equipped with integral mechanical connectors.

4. AC panelboards:

- a. Type of service: Three-phase, four-wire, 277/480 volt or 120/208 volt or as shown.
- b. Type of main: Main lugs or circuit breakers or integrally fused circuit breakers as shown, conforming to requirements specified, located at top or bottom as necessary
- c. Branch circuit: Circuit breakers or integrally fused circuit breakers as shown, conforming to requirements specified, number of circuits as shown.
- d. Circuit breaker: Trip device coordinated with that of upstream circuit breakers to provide selective tripping.
- e. Suitable for service entrance where necessary.

- 5. Fuse time-current characteristic coordinated with upstream fuse time-current characteristic to provide selective overcurrent tripping.

D. Nameplates:

- 1. Three-ply, laminated phenolic plates, engraved through black face to white core and attached by stainless-steel rivets or screws.
- 2. Lettering: Vertical gothic using round or square cutter. V-shape groove is prohibited.
- 3. Each panelboard labeled with nameplate one-inch high bearing ½-inch high inscriptions as appropriate.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install panelboards at locations shown, with bottom not less than 12 inches above floor. Use multiple-section panelboards to meet such spacings if necessary.
- B. Mount panelboards and load centers with front straight and plumb.
- C. Install single and/or multiple-conductor cable in accordance with Section 16120. Connect branch circuit wires as shown. Connect neutral wire of branch circuit to neutral bar in panelboard.
- D. Make conduit connections in accordance with Section 16130.
- E. Make power cable connections to circuit breakers, integrally fused circuit breakers, fused switch units, neutral and ground bus bars in panelboard and load centers and enclosed circuit breakers by means of integral mechanical connectors. If such items are not furnished with integral mechanical connectors, make connections using compression connectors in accordance with Section 16125.
- F. Ground panelboards in accordance with Section 16060 and the NEC.
- G. Apply matching touch-up paint where necessary.

3.02 DIRECTORY OF CIRCUITS:

- A. Furnish each panelboard and load center with legibly printed circuit directory located on inside of enclosure.

3.03 FIELD QUALITY CONTROL:

- A. Furnish necessary equipment and perform the following tests:
 - 1. Molded-case circuit breakers: Perform pole-to-pole and pole-to-ground insulation resistance tests with 1,000V dc megger. Insulation resistance to be 50 megohms minimum.
 - 2. Panel boards: Perform insulation-resistance tests of each bus section phase-to-phase and phase-to-ground for one minute using 1,000V megger. Insulation resistance to be not less than manufacturer's recommended minimum or two megohms minimum.
 - 3. Test circuit connections in accordance with wiring diagram.
 - 4. Test panelboard enclosures for continuity to grounding system.
 - 5. Check cable connections to circuit breakers and fused switch unit for tightness.
 - 6. Check setting of adjustable magnetic trips for compliance with approved coordination study.
- B. Submit certified test reports.

END OF SECTION

SECTION 16480
VARIABLE FREQUENCY DRIVES

PART 1 – GENERAL

1.01 SUMMARY:

- A. This Section includes furnishing and installing variable speed drives for operation of 480V, 3 phase, 60 Hz, centrifugal pump and fan motors (HP as required).
- B. The work shall also include drawings in AutoCAD 2014 format that show the installation of the new VFDs along with power wiring.
- C. The VFDs shall have provisions to be controlled and operated from an existing SCADA system; the Contractor that furnishes and installs the VFDs shall verify their compatibility with said system.
- D. The VFDs installation shall use new power wiring and conduit which shall meet all existing code requirements. Any devices, wiring, cabling, conduit or other appurtenances that are required for a complete installation other than connection to the SCADA system shall be provided by the Contractor at no additional cost to the Authority.

1.02 REFERENCES:

- A. Provide equipment in full accordance with the latest rules, Regulations, and standards of:
 - 1. Institute of Electrical and Electronic Engineers (IEEE)
 - a. Standard 519-1992, IEEE Guide for Harmonic Content and Control.
 - 2. Underwriters laboratories
 - a. UL508C
 - 3. National Electrical Manufacturer's Association (NEMA)
 - a. ICS 7.0, AC Adjustable Speed Drives
 - 4. IEC 16800 Parts 1 and 2
 - 5. National Electric Code (NEC)
 - a. NEC 430.120, Adjustable-Speed Drive Systems
 - 6. International Building Code (IBC)
 - a. IBC 2006 Seismic – referencing ASC 7-05 and ICC AC-156
- B. Qualifications:
 - 1. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. VFDs with red label UL stickers, requiring additional branch circuit protection are not acceptable. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.

2. Acceptable Manufacturers
 - a. ABB ACS550 Series
 - b. Danfoss VLT AQUA Series.
 - c. Allen-Bradley Power Flex 700 Series.
 - d. Cutler Hammer
3. The VFD manufacturer shall have available a comprehensive, Drive Computer Based Training (CBT) product. The CBT product shall include detailed, interactive sections covering VFD unpacking, proper mechanical and electrical installation, and programming. The CBT product shall allow the user to provide just-in-time training to new personnel or refresher training for maintenance and repair personnel on the user's site. The CBT product shall be repeatable, precise and shall include record keeping capability. The CBT product shall record answers to simulations and tests by student ID number. The CBT product must be professionally produced and have interactive sections, student tests, and include video clips of proper wiring and installation.

1.03 SUBMITTALS

- A. Submittals shall include the following information:
 1. Outline dimensions, conduit entry locations and weight.
 2. Customer connection and power wiring diagrams.
 3. Complete technical product description include a complete list of options provided. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.
 4. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).
 - a. The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input and output filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors, **no exceptions**.

PART 2 – PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

- A. The VFD package as specified herein shall be enclosed in a UL Listed Type enclosure, exceeding NEMA enclosure design criteria (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.
 1. Environmental operating conditions: VFDs shall be capable of continuous operation at 0 to 50° C (32 to 122° F) ambient temperature as per VFD manufacturers documented/submittal data or VFD must be oversized to meet these temperature requirements. Not acceptable are VFD's that can only operate at 40° C intermittently (average during a 24 hour period) and therefore must be oversized.

Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.

2. Enclosure shall be rated UL Type 4X and shall be UL listed as a plenum rated VFD. VFD's without these ratings are not acceptable. NEMA only type 4X enclosures are not acceptable (must be UL Type 4X).

B. All VFDs shall have the following standard features:

1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
2. The keypad shall include Local and Remote selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between Local and Remote modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
3. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery back up with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. Capacitor back-up is not acceptable. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output Form-C relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.
4. The VFD's shall utilize pre-programmed application macros specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.
5. The VFD enclosure shall be equipped with the following climate control features:
 - a. Breather and Drain assemblies, to maintain interior pressure and release condensation.
 - b. Space Heaters, with NC auxiliary contacts, to mitigate condensation in enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
 - c. Cooling Fan and Exhaust System, designed to comply with NEMA 250, Type 4X enclosure rating. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, the VFD shall cycle the cooling fans on and off as required. Fan power shall be obtained from integral CPT.
6. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).
7. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

8. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
9. The VFD shall have internal 5% equivalent impedance to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add an AC line reactor.
10. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120. Input and output current ratings must be shown on the VFD nameplate.
11. The VFD shall include a coordinated AC transient surge protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.
12. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.
13. The VFD shall have user programmable underload and overload curve functions to allow user defined indications of broken belt or mechanical failure / jam condition causing motor overload
14. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.
15. The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.
16. The VFD shall have the ability to program local currency and provide display of energy saved as well as tons of CO₂ reduced.

C. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed. The lockout range must be fully adjustable, from 0 to full speed.
2. Two (2) PID Set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed-loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two independent parameter sets for the PID controller and the capability to switch between the parameter sets via a digital input, serial communications or from the keypad. The independent parameter sets are typically used for night setback, switching between summer and winter set points, etc.
3. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (ie. valves, dampers, etc.). All set points, process variables, etc. to be accessible from the serial communication network.

4. Two (2) programmable analog inputs shall accept current or voltage signals.
 5. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback, and other data.
 6. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC or 24VAC.
 7. Three (3) programmable, digital Form-C relay outputs. The relay outputs shall include programmable on and off delay times and adjustable hysteresis. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating of 2 amps RMS. Outputs shall be true Form-C type contacts; open collector outputs are not acceptable.
 8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display "start enable 1 (or 2) missing". The safety input status shall also be transmitted over the serial communications bus.
 9. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal a plenum damper is open. This will allow the damper to be driven open before the motor operates. The time delay shall be field programmable from 0 – 120 seconds. Start delay shall be active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.
 10. Seven (7) programmable preset speeds.
 11. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
 12. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise. The VFD shall have selectable software for optimization of motor noise, energy consumption, and motor speed control.
 13. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows higher carrier frequency settings without derating the VFD.
 14. The VFD shall include password protection against parameter changes.
- D. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words. The keypad shall include a minimum of 14 assistants including:
1. Start-up assistant
 2. Parameter assistants
 - a. PID assistant

- b. Reference assistant
 - c. I/O assistant
 - d. Serial communications assistant
 - e. Option module assistant
 - f. Panel display assistant
 - g. Low noise set-up assistant
 - 3. Maintenance assistant
 - 4. Troubleshooting assistant
 - 5. Drive optimizer assistants
- E. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
- a. Output Frequency
 - b. Motor Speed (RPM, %, or Engineering units)
 - c. Motor Current
 - d. Motor Torque
 - e. Motor Power (kW)
 - f. DC Bus Voltage
 - g. Output Voltage
- F. Serial Communications
- 1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, [Optional protocols for Profibus, EtherNet, and DeviceNet shall be available.] Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable.
 - 2. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.
 - 3. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass valve control, chilled water value / hot water valve control, etc. Both the VFD PID control loop and the independent PID control loop shall continue functioning even if the serial communications connection is lost. As default, the VFD shall keep the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.
- G. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level with up to 100 feet of motor cable. No Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, First Environment.

- H. All VFD's through 75HP at 480 V shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad. The VFD shall not sustain damage from this power mis-wiring condition.
- I. **OPTIONAL FEATURES** – Optional features to be furnished by the drive manufacturer. All optional features shall be UL Listed as a complete assembly and carry a UL508 label. The VFD with bypass and/or disconnect means enclosure door must be interlocked such that input power is turned off before the enclosure can be opened. The VFD with bypass and/or disconnect means as a package shall have a UL listed short circuit rating of 100,000 amps and shall be indicated on the UL data label.
- J. The following shall be provided where bypass is required:
 - 1. A complete factory wired and tested bypass system consisting of output and bypass contactors, a motor overload relay, a control power transformer with primary and secondary fusing, a cover mounted DRIVE-OFF-BYPASS selector switch, a service (isolation) switch and fast acting, current limiting VFD input fuses are required. Bypass designs, which have no VFD only fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted
 - 2. An input circuit breaker with a door mounted external operating handle, interlocked with the enclosure door and lockable in the OFF position with up to three padlocks, to disconnect all input power from the drive and all internally mounted options.
 - 3. Motor overload protection for the bypass mode is to be provided by a motor overload relay connected in both the drive and bypass modes of operation. The motor overload relay shall be an adjustable trip, bimetallic overload relay with a class 20 trip characteristic.
 - 4. The drive output contactor and the bypass contactor are to be electrically interlocked to prevent simultaneous operation.
 - 5. The bypass system shall NOT depend on the VFD for bypass operation. The bypass shall be completely functional even if the VFD has been removed from the enclosure for repair / replacement.
- K. VFD with Bypass and/or Disconnect Means enclosures shall be UL Type/NEMA 4X.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.
- B. Power wiring shall be completed by the electrical contractor, to NEC code 430.122 wiring requirements based on the VFD input current. Caution: VFDs supplied without internal reactors have substantially higher input current ratings, which may require larger input power wiring and branch circuit protection. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.02 START-UP

- A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.

3.03 PRODUCT SUPPORT

- A. Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available at both the specifying and installation locations. A toll free 24/365 technical support line shall be available.
- B. A computer based training CD or 8-hour professionally generated video (VCR format) shall be provided to the owner at the time of project closeout. The training shall include installation, programming and operation of the VFD, bypass and serial communication.

3.04 WARRANTY

- A. The VFD Product Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available.

END OF SECTION