

March 8, 2018

## ADDENDUM #1

### NOTICE TO ALL BIDDERS FOR CITY OF WINCHESTER

#### ITB #201901 – Strothers Lane Ground Storage Tank Replacement

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This Addendum forms a part of the Contract Documents and modifies the original bidding documents for ITB #201901 dated January 2019. *Bidders shall acknowledge receipt of the Addendum in the space provided on the Bid Form and return a signed copy with your bid.*

This Addendum must be signed and returned to the Finance Department – Purchasing Division, 1<sup>st</sup> Floor Rouss City Hall, 15 North Cameron Street, Winchester, VA 22601 by **3:00pm local time on March 19, 2019** with your BID.

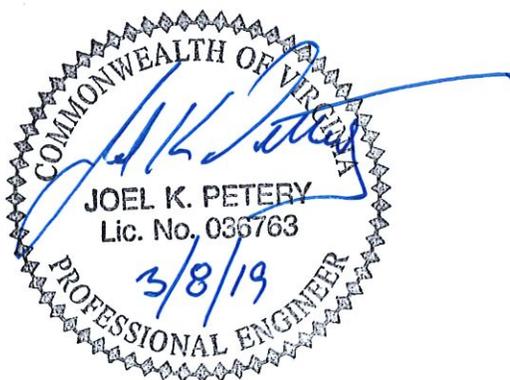
Receipt of Addendum #1 to Invitation to Bid #201901 is acknowledged by my signature below:

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

Authorized Representative: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ FAX: \_\_\_\_\_



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**This Addendum consists of 38 total pages. The following information shall modify and clarify the Contract Documents:**

#### **CHANGES TO TABLE OF CONTENTS**

1. **Add** Section 02052 - Lead Containing Paint Abatement
2. **Add** Section 16670 - Lightning Protection Systems

#### **CHANGES TO BID FORM**

1. **Add** Section 02052 - Lead Containing Paint Abatement
2. **Add** Section 16670 - Lightning Protection Systems
3. **Delete** page 6 and 7 in their entirety and **Add** attached Page 6 and 7

#### **CHANGES TO THE CONTRACT**

1. **Add** Attached Contract

#### **CHANGES TO THE SPECIFICATIONS**

1. Section 01025 Paragraph 1.04 **Add**
  - D. Item 4 – Excavation and Disposal of Oil Impregnated Sand
    1. Measurement: The quantity for excavation and disposal of oil impregnated sand will be the tonnage actually disposed at a qualified disposal facility as indicated by delivery tickets and verified by the Engineer.
    2. Payment: The Unit price for Item 5 will be full compensation for excavating hauling and disposal of Oil Impregnated Sand at a qualified disposal facility
2. Section 01025 Paragraph 1.04 **Replace** “C. Item 4 – Allowance” with “E. Item 5 Allowance”
3. **Add** attached Section 02052 - Lead Containing Paint Abatement
4. Section 02200 Paragraph 3.06 **Delete** Subparagraph A its entirety and **Add** “A. Compaction of materials shall be as indicated on the drawings.”
5. Section 02510 Paragraph 2.01.A **Delete** Design/Builder and **Add** Contractor
6. Section 02604 Paragraph 3.04.A **Delete** Design/Builder and **Add** Contractor (two locations)
7. Section 02604 Paragraph 3.04.C **Delete** Design/Builder and **Add** Contractor (three locations)
8. Section 02604 Paragraph 3.04.D **Delete** Design/Builder and **Add** Contractor
9. Section 02604 Paragraph 3.04.F **Delete** Design/Builder and **Add** Contractor

10. Section 02604 Paragraph 3.04.G **Delete** Design/Builder and **Add** Contractor (three locations)
11. Section 02710 Paragraph 3.04.A. **Delete** Design/Builder and **Add** Contractor
12. Section 02910 Paragraph 2.02.A **Delete** Design/Builder and **Add** Contractor
13. Section 02910 Paragraph 2.04.A **Delete** Design/Builder and **Add** Contractor (two locations)
14. Section 02910 Paragraph 2.05.A **Delete** Design/Builder and **Add** Contractor
15. Section 02910 Paragraph 2.12.B **Delete** Design/Builder and **Add** Contractor
16. Section 02910 Paragraph 3.02. A **Delete** "4-inch consolidated depth" and **Add** "6-inch consolidated depth"
17. Section 02910 Paragraph 3.03 **Delete** Design/Builder and **Add** Contractor (two locations)
18. Section 02910 Paragraph 3.06 **Delete** Design/Builder and **Add** Contractor
19. Section 03452 Paragraph 2.01.A **Delete** "12'-0" X 20'-0" X 8'-0" high" and **Add** "20'-0" X 20'-0" X 12'-0" high"
20. Section 03452 Paragraph 2.01.H **Delete** paragraph in its entirety and **Add**
  - H. Electric Unit Heater - EUH 1&2
    1. Provide 5Kw unit heater with integral thermostat and premium ¼ HP 240 VAC single phase motor.
    2. Provide INDEECO IUH Series, Catalog number 238-UT05J or equal.
21. Section 11730 Paragraph 2.02.D **Add** "8. Provide 316 stainless steel lifting cable or chain to allow removal/replacement of mixer without draining the tank. Cable shall be secured from the tank dome adjacent to the access hatch. Contractor shall coordinate mounting with Tank manufacturer."
22. Section 13026 Paragraph 3.09.A. **Delete** paragraph in its entirety and **Add**  
Tank exterior shall be painted in accordance with Para 2.09.B and Section 09900.
23. Section 15100 Para 1.01.B **Delete** paragraph in its entirety and relabel subsequent paragraphs accordingly.
24. Section 15100 Para 1.01.C **Delete** paragraph in its entirety and **Add**
  - C. The electric valve actuators shall meet the signal requirements as shown and described in section 16903 Part 3.

25. **Add** attached Section 16670 – Lightning Protection Systems

**CHANGES TO THE DRAWINGS**

1. Drawing C1, **Delete** note 4 in its entirety and **Add**
  4. REMOVE EXISTING STEEL TANK AND ALL ASSOCIATED APPURTENANCES. REMOVE CONCRETE RINGWALL (TOP EL 824.8+/-, BOTTOM EL 815.8+/-) TO EXTENT REQUIRED TO INSTALL NEW TANK. REMOVE EXISTING OIL-IMPREGNATED SAND LAYER AND DISPOSE. SEE BID ITEM 5
  
2. Drawing C1, **Delete** note 4 in its entirety and **Add**
  5. UPON COMPLETION OF DEMOLITION SHALL EXCAVATE A MINIMUM OF 24-INCHES BELOW THE PROPOSED TANK FOUNDATION, REMOVE ANY ROCK PINACLES, BACKFILL WITH VDOT 21B STONE IN LIFTS, AND COMPACT AT THE DIRECTION OF AN INDEPENDENT TESTING CONSULTANT. THIS WORK WILL BE PAID FOR UNDER BID ITEM 1. IF UNSUITABLE SOIL IS DISCOVERED TO EXTEND BELOW THIS INITIAL POINT, CONTRACTOR SHALL EXCAVATE THE UNSUITABLE SOIL AND BACKFILL WITH VDOT 21B STONE IN LIFTS AT THE DIRECTION OF THE INDEPENDENT TESTING CONSULTANT. THIS WORK WILL BE PAID FOR UNDER BID ITEMS 2 & 3.
  
3. Drawing C2, 18" Drain Profile, **Delete** callout "50 LF 18" Corrugated HDPE @1.00 %" and **Add** "50 LF 18" RCP @1.00 %"
  
4. Drawing M3, Section B, Callout for 18" Bend **Delete** "W/FRP companion flange and 316SS 20/20 insect mesh" and **Add** "Duckbill check valve, Tideflex Series 37G or equal"
  
5. Drawing M6 Detail 1509405R **Add** following schedule:

PIPE SIZE	A	B	C	D DIA X LG
4-12	3	7 1/2	2 1/2	5/8 x 5
18-20	6	11	3 1/2	3/4 x 6

NOTE: ALL DIMENSION IN INCHES

6. Drawing E2, Mixer Power One Line Diagram **Delete** callout "Mounted In".
  
7. Drawing E4 **Delete** Note 4.
  
8. Drawing E5 **Delete** conduit P-008 from schedule.
  
9. Drawing E5 **add/change** schedules as follows:

CONDUIT SIZE	SIZE	FROM	TO	CONDUCTORS	REMARKS
I-003	3/4"	MAIN CONTROL PANEL	TANK LEVEL SENSOR	VENDOR	

I-004	3/4"	MAIN CONTROL PANEL	NEW SECURITY CAMERA	CAT-6	
FIXTURE TYPE	LAMP/FIXTURE WATTAGE	DESCRIPTION		MFR AND MODEL	
LL1	50	<p>POLE-MOUNTED, 120-277 VAC, LED LIGHT FIXTURE, COLOR TEMPERATURE OF 4000 K, PRISMATIC BOROSILICATE GLASS LENS, IESNA TYPE 5 HIGH ANGLE DISTRIBUTION, CORROSION-RESISTANT GRAY CAST ALUMINUM HOUSING, 5000 LUMEN MINIMUM, , AND WET LOCATION LISTED.</p> <p>ROUND BRONZE, BASE MOUNTED, TAPERED, 14 FT. ANODIZED ALUMINUM POLE.</p>		<p>HOLOPHANE PETROLUX PLED2 SERIES, CROUSE-HINDS PMV SERIES, OR GE H2 SERIES.</p>	
LL1	210	<p>POLE-MOUNTED, 120-277 VAC, LED LIGHT FIXTURE, COLOR TEMPERATURE OF 4000 K, PRISMATIC BOROSILICATE GLASS LENS, AREA LIGHTING DISTRIBUTION, CAST ALUMINUM HOUSING, 23000 LUMEN MINIMUM, AND WET LOCATION LISTED.</p> <p>ROUND BRONZE, BASE MOUNTED, TAPERED, ANODIZED ALUMINUM POLE.</p> <p>MOUNTING HEIGHT:  SITE LIGHTING           14 FT.  TANK MOUNT               8 FT.</p>		<p>HOLOPHANE MONGOOSE LED AREA LIGHT, OR EQUAL</p>	

TAG NUMBER	SERVICE DESCRIPTION	STATE/SPAN	TYPE	SOURCE
AIT-120	CHLORINE RESIDUAL	0 - 10 MG/L	AI	MAIN CONTROL PANEL (AIT)
AIT-121	pH	2-12	AI	MAIN CONTROL PANEL (AIT)

## **ATTACHMENTS**

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**City of Winchester**  
**Strothers Lane Ground Storage Tank Replacement – ITB #201901**  
**BID TABLE**

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
<b>General Construction</b>					
1	General Construction of the Work as Shown and Specified Under Divisions 1 Through 16	1	Lump Sum		
<b>Additional Excavation</b>					
2	Additional Excavation of Unsuitable Materials, Including Disposal [Only as directed by City]	2500	Cubic Yard		
<b>Additional Backfill With VDOT 21B Stone</b>					
3	Additional Backfill of Excavated Areas [Only as directed by City]	2500	Cubic Yard		
<b>Excavation &amp; Disposal of Oil Impregnated Sand</b>					
4	As required	750	Ton		
<b>Allowance</b>					
5	For SCADA programming by M.C. Dean	1	Lump Sum	\$20,910.00	\$20,910.00
<b>TOTAL FOR ALL – BASE BID</b>					

TOTAL BASE BID:     \$ \_\_\_\_\_

IN WORDS:  
 \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

BY: (SIGNATURE) \_\_\_\_\_

NAME AND TITLE: \_\_\_\_\_

\_\_\_\_\_

DATE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TELEPHONE: \_\_\_\_\_

CURRENT VIRGINIA CONTRACTOR REGISTRATION NUMBER: \_\_\_\_\_

**NOTE: REQUIRED BID GUARANTEE MUST BE ENCLOSED WITH THIS BID PROPOSAL.**

**Strothers Lane Ground Storage Tank Replacement- ITB # 201901**

**CONTRACT**

THIS CONTRACT, made and entered into in triplicate originals this \_\_\_\_ day of \_\_\_\_\_, 2019, by and between the **City of Winchester, Virginia**, Party of the First Part, hereinafter referred to as the "**Owner**" and \_\_\_\_\_, Party of the Second Part, hereinafter referred to as the "**Contractor**".

WITNESSETH, That the Contractor and the City for the consideration stated herein agree as follows:

ARTICLE I, SCOPE OF WORK - The Contractor shall perform everything required to be performed and shall provide and furnish all of the labor, materials, necessary tools, expendable equipment and all utility and transportation services required to perform and complete in a workmanlike manner all the work required in connection with:

**ITB #201901 – Strothers Lane Ground Storage Tank Replacement**

all in strict accordance with the Contract Documents prepared by the Public Services Department, City of Winchester, Virginia. The Contractor shall do everything required by this Contract and other Documents constituting a part thereof.

ARTICLE II, CONTRACT PRICE - The City shall pay to the Contractor for the performance of this Contract, subject to any additions or deductions provided therein, in current funds, the Contract Price computed as follows:

**TOTAL CONTRACT PRICE= \_\_\_\_\_**

ARTICLE III. PAYMENTS - Payments are to be made to the Contractor in accordance with and subject to provisions embodied in the Documents made a part of this Contract.

ARTICLE IV. CONTRACT TIME - Work under this Contract shall commence no later than the date to begin work set forth in a written Notice to Proceed from the City or its authorized representative, to the Contractor. The Contractor shall complete all work under this Contract within 365 calendar days following the Notice to Proceed issued for the project.

The Work shall be prosecuted (performed) regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. **It is expressly understood and agreed by and between the Contractor and the City that**

**the time for the completion of the Work described herein is a reasonable time for the completion of the same.**

ARTICLE V. ENGINEER – The project has been designed by Hazen and Sawyer, 1555 Roseneath Road, Richmond VA 23230, who is hereinafter called ENGINEER and who is to act as OWNER’s representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE VI. HOLD HARMLESS CLAUSE - Bids shall provide that during the term of the Contract, including warranty period, for the successful bidder indemnifying, defending, and holding harmless the City, its officers, employees, agent and representatives thereof from all suits, actions, claims of any kind, including attorney's fees, brought on account of any personal injuries, damages, or violation of rights sustained by any person or property in consequence of any neglect in safeguarding contract work, or on account of any act or omission by the Contractor or his employees, or from any claims or amounts arising from violation of any law, bylaw, ordinance, regulation or decree. The Contractor agrees that this clause shall include claims involving infringement of patent or copyrights.

ARTICLE VII. LIQUIDATED DAMAGES AND INCENTIVES - **It is hereby fully understood and agreed that the time is of essence in the performance of this Contract.** For each and every calendar day that elapses between the Contract Completion Dates specified in Article IV of this Contract and the date on which the work covered by such Contract is actually completed, including the removal of all plant and obstructions from the site of such work, the Contractor shall pay to the City as liquidated damages and not as a penalty, the sum of ONE THOUSAND DOLLARS PER CALENDAR DAY (\$1,000.00). The total amount so payable by the Contractor as liquidated damages either may be deducted from any moneys due or payable to the Contractor by the City or so much thereof as is not so deducted shall be chargeable to and will be payable promptly by such Contractor and his Surety, or either of them, to the City. Such liquidated damages shall be payable to reimburse or compensate, at least in part, the City for (1) the administration of the work covered by such Contract and any other contract or contracts beyond the Contract Completion Date, including the additional expense to the City for supervision, inspection, and superintendence; (2) expenditures resulting from the inability of the City (and the general public) to use the improvement being constructed from and after such Contract Completion Date until the actual date of completion; (3) other miscellaneous obligations and expenditures incurred by the City directly as a result of the failure to complete the Work covered by such Contract on or before the Contract Completion Date.

ARTICLE VIII. COMPONENT PARTS OF THIS CONTRACT - That this Contract consists of the following component parts which are made a part of this agreement and Contract as fully and absolutely as if they were set out in detail in this Contract:

**BIDDING DOCUMENTS**

- Invitation to Bid
- Instructions to Bidders
- Bid Form
- Contractor Qualification Data Sheet
- Bid Bond
- Non-Collusion Affidavit
- Contract
- Performance Bond
- Labor and Material Payment Bond
- Notice of Intent to Award
- Notice of Award
- Notice to Proceed
- City of Winchester Required General Terms and Conditions
- General Conditions
- Supplement to General Conditions
- Special Terms and Conditions

**TECHNICAL SPECIFICATIONS**

**TECHNICAL SPECIFICATIONS**

<u>Division</u>	<u>Section</u>	<u>Title</u>
1		<u>GENERAL REQUIREMENTS</u>
	01010	Summary of Work
	01025	Measurement and Payment
	01070	Abbreviations
	01090	Reference Standards
	01200	Project Meetings
	01300	Submittals
	01400	Quality Control
	01510	Temporary Utilities
	01520	Maintenance of Utility Operations During Construction
	01530	Protection of Existing Facilities
	01540	Demolition and Removal of Existing Structures and Equipment
	01550	Site Access and Storage
	01700	Project Closeout

2		<u>SITWORK</u>
	02050	Demolition
	02052	Lead Containing Paint Abatement
	02200	Earthwork
	02202	Excavation by Blasting
	02276	Erosion and Sediment Control
	02510	Paving and Surfacing
<u>Division</u>	<u>Section</u>	<u>Title</u>
2		
	02604	Utility Structures
	02710	Storm Drains
	02831	Steel Fencing
	02910	Final Grading and Landscaping
3		<u>CONCRETE</u>
	03100	Concrete Formwork
	03200	Reinforcing Steel
	03230	Stressing Tendons
	03250	Concrete Accessories
	03290	Joints in Concrete
	03300	Cast-in-Place Concrete
	03350	Concrete Finishes
	03360	Shotcrete
	03370	Concrete Curing
	03400	Precast Concrete
	03452	Architectural Precast Concrete Utility Buildings
	03600	Grout
5		<u>METALS</u>
	05050	Metal Fastening
7		<u>THERMAL AND MOISTURE PROTECTION</u>
	07900	Joint Fillers, Sealants and Caulking
9		<u>FINISHES</u>
	09900	Painting
11		<u>EQUIPMENT</u>
	11000	Equipment, General Provisions
	11730	Submersible Mixers

13		<u>SPECIAL CONSTRUCTION</u>
	13206	Prestressed Concrete Tank
	13212	Water Storage Tank Disinfection
15		<u>MECHANICAL</u>
	15000	Basic Mechanical Requirements
	15006	Ductile iron Pipe
	15095	Valves, General
	15100	Valve Operators and Electric Valve Actuators
	15101	Butterfly Valves
	15105	Check Valves
	15108	Gate Valves
16		<u>ELECTRICAL</u>
	16000	Basic Electrical Requirements
	16111	Conduit
	16118	Underground Electrical
	16123	Low Voltage Wire and Cable
	16130	Boxes
	16170	Grounding and Bonding
	16190	Supporting Devices
	16195	Electrical Identification
	16440	Disconnect Switches
	16470	Panelboards
	16500	Lighting
	16670	Lightning Protection Systems
	16902	Electrical Controls and Relays
	16903	Control Panels and Enclosures
	16940	Ultrasonic Liquid Level Measurement
	16941	Chlorine Analyzers

## DRAWINGS

Cover

- G1 Index General Notes, Symbols, and Abbreviations
- C1 Demolition and Erosion and Sediment Control Plan
- C2 Site Plan
- C3 Profiles
- C4 Valve Building Plans and Elevations
- C5 Notes and Details
- C6 Erosion and Sediment Control Notes and Details
- C7 City Standard Details

- M1 Ground Storage Tank - Bottom and Top Plan
- M2 Ground Storage Tank – Sections I
- M3 Ground Storage Tank – Sections II
- M4 Valve Building - Plans and Sections
- M5 Typical Details I
- M6 Typical Details II
- E-1 Legend
- E-2 Power One-Line Diagram and Notes Electrical Site Plan
- E-3 Electrical Site Plan
- E-4 Valve Building Plan, Elevation, and Details
- E-5 Details and Schedules

**ADDENDA:**

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>DATE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Above components are complimentary and what is called for by one shall be binding as if called by all.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the date first written above.

CONTRACTOR:

CITY OF WINCHESTER, VIRGINIA:

\_\_\_\_\_

\_\_\_\_\_

CITY MANAGER

NAME AND TITLE

ATTEST

ATTEST

## SECTION 02052

### LEAD CONTAINING PAINT ABATEMENT

#### PART 1 - GENERAL

##### 1.01 THE REQUIREMENT

###### A. Scope:

1. CONTRACTOR shall provide all labor, equipment, tools, materials, and permits required to remove and dispose of lead-containing paint as required to complete the Work.
2. This specification details minimum acceptable requirements for demolition activities affecting materials and structures coated with lead-containing paint. All environmental work under this Contract shall be performed using methods demonstrated to prevent lead emissions outside the lead control area when used in accordance with manufacturer's recommendations. Contract work shall be performed to minimize the creation of airborne dust and vapors; minimize the quantity of hazardous waste generated; protect the health and welfare of all site personnel and the public; and, avoid adverse environmental impacts.

###### B. Related Divisions and Sections:

1. Section 02050, Demolition.

###### C. Lead Paint Locations:

1. Lead paint is known to exist in areas required for work under this Contract. Strothers Lane Tank Final Evaluation Report is provided as a reference document for Contractor's use in recognizing the extent of lead based paint to be removed and disposed of under the project. This report may not define the extent of all lead-containing material. CONTRACTOR shall use the above information as a guide but shall not hold the OWNER liable for potential omissions and errors.

##### 1.02 DEFINITIONS

- A. Abatement: Abatement of lead-containing paint involves demolition of materials and structures coated with lead-containing paint or lead-containing structures and materials.
- B. Action Level: The Occupational Safety and Health Act (OSHA) Construction Standard 29 CFR 1926.62 defines the action level as the employee exposure, without regard to use of respirators, to airborne concentrations of lead equal to or above 30 micrograms per cubic meter of air (30  $\mu\text{g}/\text{m}^3$ ), 8-hour time-weighted average.
- C. Amended Water: Water containing at least one ounce of five percent (5%) trisodium phosphate per gallon of water.
- D. Area Monitoring: Air sampling to determine lead concentrations within and outside the lead control area for the purpose of determining compliance with the Action Level.

- E. Atomic Absorption Spectroscopy: An analytical method of determining the lead content of a given sample.
- F. Physical Boundary: Area physically roped or partitioned off around a lead control area to limit unauthorized entry of personnel. As used in this section, "outside boundary" shall mean the same as "outside lead control area."
- G. Certified Industrial Hygienist (CIH): As used in this Section, refers to an Industrial Hygienist employed by CONTRACTOR and certified by the American Board of Industrial Hygiene in comprehensive practice.
- H. Change Rooms: Rooms within the designated physical boundary around the lead control area set up to prevent cross-contamination and equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes.
- I. Competent Person: Means one who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective action to eliminate them.
- J. Decontamination Area: Area for removal of contaminated personal protective equipment (PPE).
- K. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.
- L. High Efficiency Particulate Air (HEPA) Filter Equipment: Vacuuming equipment containing a UL 586 HEPA filter system capable of preventing passage of lead contaminated paint dust with an efficiency of 99.97 percent of all particulates greater than 0.3 micron size.
- M. Inductively Coupled Plasma Atomic Emission Spectrometry: An analytical laboratory method of determining the lead content of a given sample.
- N. Lead - Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
- O. Lead Control Area: An emission control area to prevent the spread of lead dust, paint chips or debris from projects disturbing lead-containing paint or materials. The lead control area is isolated by physical boundaries to warn unauthorized personnel against entry.
- P. Lead-Containing Material: Any component, paint or surface coating material containing detectable concentrations of lead by weight in the dry solid (16 CFR 1303).
- Q. Lead Waste: Miscellaneous waste, dust or debris generated during removal of lead-containing materials, cleanup of a lead control area, or decontamination activities.
- R. Permissible Exposure Limit (PEL): 50 micrograms per cubic meter of air as an 8-hour TWA. If an employee is exposed for more than 8 hours in a workday, the allowable exposure limit shall be calculated by the following formula:

allowable exposure limit = 400 micrograms per cubic meter of air/hours worked per day.

- S. Personal Monitoring: Personal air sampling, performed within the breathing zone of an employee, by a qualified individual to determine the 8-hour time weighted average concentration in accordance with NIOSH Method 7600. Samples shall be taken on individuals who are representative of each of CONTRACTOR'S job categories.
- T. Wipe Sampling: Testing procedures to confirm the effectiveness of controls to prevent the release of lead-containing dust outside the lead control area. Whatman filters moistened with deionized water shall be used to sample a one-square foot area.
- U. Trigger Activities: Activities that involve the disturbance of lead-containing materials will trigger requirements under the OSHA Lead In Construction standard for conducting personnel exposure assessment sampling, training, medical monitoring, respiratory protection and other requirements as specified in 29 CFR 1926.62. Examples of trigger activities include abrasive blasting, welding, cutting, torch burning, manual demolition of structures, manual scraping, manual sanding, heat gun application, rivet busting, and power tool cleaning.

### 1.03 QUALITY ASSURANCE

- A. Standards: The publications listed below form a part of this Specification to the extent referenced. CONTRACTOR asserts by submission of a bid on this Contract that all persons assigned to work on this Contract are familiar with and will adhere to all standards referenced.
  - 1. American National Standards Institute (ANSI):
    - a. ANSI Z88.2 - 1980 Respiratory Protection.
  - 2. Code of Federal Regulations (CFR):
    - a. 29 CFR 1910 – Occupational Safety and Health Standards.
    - b. 29 CFR 1926 - Safety and Health Regulations for Construction.
    - c. 40 CFR 50 - National Primary & Secondary Ambient Air Quality Standards.
    - d. 40 CFR 60 - Standards of Performance for New Stationary Sources.
    - e. 40 CFR 117 - Determination of Reportable Quantities of Hazardous Substances.
    - f. 40 CFR 171 - Standards for Transportation of Hazardous Materials.
    - g. 40 CFR 172 - Hazardous Materials Tables and Hazardous Materials Communications Regulations.
    - h. 40 CFR 173 - General Requirements for Shipments and Packaging.
    - i. 40 CFR 178 - Shipping Container Specifications.
    - j. 40 CFR 260 - Hazardous Wastes Management Systems General.
    - k. 40 CFR 261 - Identification and Listing of Hazardous Waste.
    - l. 40 CFR 262 - Generators of Hazardous Wastes.
    - m. 40 CFR 263 - Transporters of Hazardous Wastes.
    - n. 40 CFR 264/265 - Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
    - o. 40 CFR 268 - Land Disposal Restrictions.
    - p. 40 CFR 302 - Designation, Reportable Quantities and Notification.
    - q. 40 CFR 745-225 - U.S. Department of Health and Human Services National Institute for Occupational Safety & Health (NIOSH).
    - r. 40 CFR 745 -Lead; Identification of Dangerous Levels of Lead

3. U.S. Environmental Protection Agency (EPA):
    - a. Method 7082 - Test Methods for Evaluating Solid Wastes.
    - b. SW-846 - Test Methods for Evaluating Soil Waste Physical/Chemical Methods.
    - c. EPA Method 3050 Acid Digestion of Sediments, Sludge, and Soils.
  4. Underwriters Laboratory Inc. (UL):
    - a. UL 586 - 1990 High-Efficiency, Particulate, Air Filter Units.
  5. National Institute of Building Sciences (NIBS):
    - a. Guideline Specifications for Reducing Lead-Based Paint Hazards.
  6. American Society for Testing & Materials (ASTM):
    - a. ASTM D3335 - Test Method for Low Concentration for Lead, Cadmium and Cobalt in Paint by Atomic Absorption Spectroscopy; Compilation of ASTM Standard Guides, Test Methods and Practices on Lead-Based Paint Abatement.
  7. Steel Structures Painting Council (SSPC):
    - a. SSPC GUIDE 6 (CON) - Guide for Containing Debris Generated During Lead Removal Operations.
    - b. SSPC GUIDE 7 (DIS) - Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.
    - c. SSPC SP-11 - Surface Preparation Specification Power Tool Cleaning to Bare Metal.
- B. Qualifications:
1. CONTRACTOR shall have on staff and assigned to this Contract a Lead Paint Abatement Supervisor accredited in the Commonwealth of Virginia who will supervise all lead paint activities, and who is a Competent Person, as defined in 29 CFR 1926(b), with a minimum of 2 years experience in lead project work, at least 5 years experience in construction trades, and who has served as a Competent Person on at least three lead projects of comparable scope and methodology to this project. This shall be documented by providing the name of the Competent Person and proof of training to the OWNER.
  2. As applicable for lead removal work, CONTRACTOR/Subcontractor must have a Lead Contractors license in the Commonwealth of Virginia and shall have successfully completed at least two abatement projects of comparable scope to this Contract within the past three years, utilizing the same methods to be employed on this project. This shall be documented by identifying the owner of the facility (including name, address and phone number of owner/project manager), type of facility, volume of material abated, specific tools/technology employed, method of abatement, name of CONTRACTOR and Competent Person supervising work.
- C. Health and Safety Compliance: In addition to the detailed requirements of this Specification, CONTRACTOR shall comply with all applicable laws, ordinances, rules, and regulations of federal, state, and local authorities pertaining to removal, handling, storage, transportation, and disposal of lead waste materials. CONTRACTOR shall also comply with the applicable requirements of 29 CFR 1926.62. All matters regarding interpretation of standards shall be submitted in writing to the OWNER for resolution before starting work. Where specifications, requirements, and the referenced documents vary, the most stringent requirement shall apply.
- D. Appropriate Waste Containers: Containers for the storage of all waste shall be DOT-approved and shall be provided by CONTRACTOR.

## 1.04 SUBMITTALS

- A. CONTRACTOR shall submit the following to the OWNER:
1. Testing Laboratory Qualifications for Air Samples: Submit the name, address, and telephone number of the testing laboratory selected to perform the analyses of all air monitoring. The testing laboratory shall be accredited by the American Industrial Hygiene Association (AIHA) and be accredited by the Environmental Lead Laboratory Accreditation Program (ELAPP). Provide AIHA and ELAPP documentation along with date of accreditation/reaccreditation.
  2. Independent CIH: Submit the name of the Independent CIH selected to conduct personnel and area/environmental air sampling, and document evidence that the Independent CIH is currently certified in comprehensive practice by the American Board of Industrial Hygiene, including certification number and date. Contractor shall submit certification that the Independent CIH is in no way affiliated with CONTRACTOR. A qualified technician under direct supervision of the Independent CIH may perform Independent CIH tasks specified herein. The Independent CIH shall include a list of tasks to be performed by the technician under the supervision of the Independent CIH and the name and qualifications of technician. The use of an Independent CIH and technician shall not relieve CONTRACTOR of responsibility for ensuring a safe working environment for lead paint removal.
  3. Lead Control Plan: CONTRACTOR shall submit a detailed job-specific plan of work procedures to be used during activities affecting lead-containing paint and materials. The plan shall include a sketch showing the details of the lead control area, location and details of decontamination rooms including showers (if required), change rooms, eating, drinking, smoking, and restroom areas. The plan shall include interface of trades, sequencing of lead-related work, collected wastewater and paint debris disposal plan, air sampling plan, proposed respirators, protective equipment, and a detailed description of the method of emissions control which will be used to ensure that airborne lead concentrations of 30  $\mu\text{g}/\text{m}^3$  of air are not exceeded outside the lead control area. The plan shall be prepared in accordance with 29 CFR 1926.62 and signed by a CIH meeting the qualifications set forth in Article 2052.04.A.2. above. The Competent Person shall be responsible for oversight of the plan during construction.  
Additionally, the Plan shall include:
    - a. A description of each activity in which lead is emitted; e.g. equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices.
    - b. A description of the specific means that will be employed to achieve compliance and, where controls are required, plans and studies used to determine methods selected for controlling exposure to lead.
    - c. A report of the technology considered in meeting the PEL.
    - d. A detailed schedule for implementation of the program.
    - e. A work practice program which includes a protective work clothing plan, a housekeeping plan, and a hygienic facilities and practices plan.
    - f. An administrative control schedule, as applicable.
    - g. The schedule for a compliance-monitoring program to be made by the Independent CIH.
  4. Rental equipment notification as defined in Article 2052.06.A.3.
  5. Hazardous Waste Management Plan as defined and detailed in Article 1.4.E.
  6. Chemical Analysis and Material Safety Data Sheets: Provide Chemical

Analysis and Material Safety Data Sheets for all chemical stripping products to be used in the work. Show by copy of transmittal form that a copy of each MSDS has been transmitted to Contractor's Competent Person.

7. Equipment List: Identify the equipment that will be used to control, remove, collect and containerize the lead and lead wastes generated during demolition activities, and the procedures that will be followed to clean the lead control area.
  8. Training: For all activities that result in airborne lead concentration equal to, or in excess of the Lead Action Level, or for those activities that take place within a Lead Control Area, CONTRACTOR shall submit for this Contract a sufficient number of properly trained and experienced lead-trained workers each of whom shall (a) be licensed in the Commonwealth of Virginia, (b) have completed training as a lead worker as per 29 CFR 1926.62 subpart (I); (c) have completed respirator training per 29 CFR 1910.134; (d) have completed initial medical monitoring and have blood lead levels below 35 micrograms per deciliter ( $\mu\text{g}/\text{dl}$ ): if the worker's blood lead level (BLL) is in excess of 35  $\mu\text{g}/\text{dl}$ , the worker shall show medical approval for this work.
  9. Documentation: Documentation for each employee (as required per federal and Commonwealth of Virginia regulations) shall be provided to the OWNER including: (a) dates and proof of licensing in the Commonwealth of Virginia, (b) dates and proof of lead training; (c) dates and proof of respirator training and fit testing; (d) dates and proof of initial medical surveillance by Contractor or other employer in the past year and participation in present employer's ongoing medical surveillance; (e) proof of BLL prior to assignment under 35  $\mu\text{g}/\text{dl}$  (if the worker's BLL is in excess of 35  $\mu\text{g}/\text{dl}$ , the worker shall show medical approval for this work).
  10. Contractor shall submit a signed notarized statement disclosing all OSHA and EPA citations on lead projects in the past 3 years.
- B. Field Test Reports and Records: During all lead removal operations under this Contract, CONTRACTOR shall maintain and provide the following documentation:
1. All air monitoring results, area clearance surface wipe results, and daily reports shall be provided to the OWNER within three working days of the date the samples are taken, signed by the testing technician performing the air monitoring and surface sampling and the employee that analyzed the sample. All laboratory results shall be accompanied by complete chain-of-custody documentation.
- C. Hazardous Waste Disposal Documentation: Completed and signed hazardous waste manifests from treatment or disposal facility shall be provided to the OWNER within 10 days of disposal.
- D. Hazard Communication Program: CONTRACTOR shall submit proof of the establishment and implementation of a Hazard Communication Program as required by 29 CFR 1910.1200.
- E. Hazardous Waste Management: The Hazardous Waste Management Plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and address:
1. Identification of hazardous wastes associated with the work as defined in 40 CFR 261.
  2. Estimated quantities of wastes to be generated and disposed of.
  3. Names and qualifications of each vendor that will be transporting, storing,

testing, and disposing of the wastes. Include the disposal facility location and a 24-hour phone contact. Furnish copies of EPA, state and local hazardous waste permit applications, permits, and EPA identification numbers prior to start of operations.

4. Names and qualifications (experience and training) of personnel who will be responsible for on-site management of hazardous wastes prior to start of operations.
5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
6. Spill prevention, containment, and cleanup contingency measures to be implemented.
7. Details of on-site hazardous waste storage, removal, and disposal. Hazardous wastes shall be collected and containerized daily. CONTRACTOR shall inspect storage areas weekly, and the inspections documented.

## PART 2 – PRODUCTS – (NOT USED)

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. Commencement of Work: Five days prior to the proposed start of work at each separate location, CONTRACTOR shall notify the OWNER and the VPA on-site safety staff. No work may proceed at each location until authorized by the OWNER.
- B. CONTRACTOR shall submit any required equipment shutdown plans to the OWNER 14 days prior to starting the work.
- C. CONTRACTOR shall inform the OWNER in writing of proposed access restrictions to other personnel (i.e., areas or items of equipment which will not be accessible during the proposed lead work), giving the estimated time frames and dates of such proposed access restrictions.
- D. In the event that OWNER personnel must enter the lead control area for reasons unrelated to the supervision or inspection of work under this Contract (under emergency conditions), CONTRACTOR shall stop work and immediately clean-up any loose debris, so as to permit safe entry by OWNER personnel. Abatement work shall not proceed until OWNER personnel have left the control area.

### 3.02 MATERIALS

- A. General Equipment:
  1. Respirators: Select respirators approved by the National Institute for Occupational Safety and Health (NIOSH) for use in areas containing lead-contaminated dust and fumes. Provide personnel within the lead control area with adequate and appropriate respiratory protection until the Competent Person establishes the workplace exposure concentration for the specific operation. Once the concentration has been determined, CONTRACTOR may modify respiratory protection as outlined in 29 CFR 1926.62 and the Lead Control Plan.

2. Special Protective Clothing: Furnish personnel who have a potential to be exposed to lead-contaminated dust or fumes with appropriate disposable protective whole body clothing, head covering, gloves, and foot coverings. Tape sleeves at the wrist and secure foot coverings at the ankles. Furnish appropriate disposable plastic or rubber gloves to protect hands.
  3. Rental Equipment Notification: If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. All data demonstrating compliance with the performance requirements of Article 1.6.B must be presented to and approved by the OWNER prior to use.
  4. Filter Certifications: HEPA Filters used in filtered vacuuming equipment must meet or exceed UL 586 requirements and cutting tools manufacturers specifications and recommendations.
- B. Lead Paint Removal Equipment:
1. CONTRACTOR may only use products and tools meeting the performance specifications outlined below:
    - a. CONTRACTOR shall utilize a vacuum assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces to the SSPC SP-II standard and with demonstrated effectiveness in maintaining lead emissions below 30  $\mu\text{g}/\text{m}^3$  during abatement operations. Such systems may include dustless needle guns, dustless automatically recirculating wheel blast (rotopeens), and right angle grinders which capture all dust and debris at the cutting tool edge and transport the material under vacuum conditions to an air tight disposal container. Dustless needle guns shall be utilized on metal surfaces only.
    - b. The system shall be designed so as to permit the removal and replacement of collection containers under negative pressure so as to prevent the release of dust during removal and replacement operations and shall be equipped with an automatic shut off in the event of vacuum failure.
    - c. Recovery/abrasive action tool shall be monitored at all times by a device capable of determining recovery at the face of each tool and automatically disabling the tool in the event recovery levels are insufficient. The monitor, as a minimum, shall have the following features: remote warning light, adjustable recovery set point, automatic equipment disabling capabilities, sensing range of 0-5 psi, solid-state photohelic instrumentation, and remote sensing at the tool face. The safe recovery point shall be calibrated each day before start up, or each time a new tool or vacuum source is used. All of the manufacturer's recommendations shall be followed with respect to set-up and use of the monitor. A daily log shall be maintained and available for inspection by the OWNER identifying all calibrations of recovery levels and down time as a result of insufficient recovery levels. Manufacturer's operations manual shall be on site at all times.
    - d. The system may not use any products containing crystalline silica, nor introduce any non-recoverable materials, nor utilize any cutting material that introduces toxic or hazardous materials.
    - e. The cutting head for use on flat surfaces must be capable of cutting to within 1-1/2 inch of any inside corner, molding or edge and may include rotopeen scalers, and dustless needle guns. Tools for corners and moldings must be specifically designed for that purpose and conform to all inside corners, outside corners, curved, flat and angled surfaces to be

abated under this Contract while maintaining vacuum control at the work surface/cutting head interface. Shrouded HEPA vacuum fitted needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum assisted finishing tools such as right angle grinders may be used to achieve the SSPC SP-11 standard but may not be used for primary removal.

### 3.03 PROCESS AND PROCEDURES

- A. Protection of Existing Work to Remain: All lead removal work must be conducted without damage to, or contamination of adjacent areas, equipment or surfaces within the Lead Control Area or contamination of existing work or previously cleaned surfaces. CONTRACTOR shall correct all such damage or contamination immediately at CONTRACTOR'S expense.
- B. Decontamination: Provide a "decontamination area" within the physical boundary around the designated lead control area. The decontamination area shall include washing facilities for personnel use prior to eating, drinking, or smoking.
- C. Hygiene Facilities and Practices: CONTRACTOR shall provide clean change areas for employees engaged in lead work. The change areas shall be equipped with separate storage facilities for protective work clothing and equipment and for street clothes to prevent cross-contamination.
  - 1. CONTRACTOR shall assure that employees do not leave the immediate work area wearing any protective clothing or equipment that is required to be worn during the work shift.
- D. Showers. CONTRACTOR shall provide shower facilities for use by employees whose airborne exposure to lead is above the PEL. When shower facilities are necessary, employees are required to shower at the end of the work shift and CONTRACTOR is required to provide an adequate supply of cleansing agents and towels for use by affected employees.
- E. Warning Signs and Labels: Provide conspicuous warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.
  - 1. The warning signs shall be posted at each control area and at all approaches to the control area so that employees and/or public may read signs before entry and take necessary protective action.
- F. Air Monitoring: Monitoring of airborne concentrations of lead and other toxic metals, as applicable, shall be in accordance with 29 CFR 1926.62 and as specified herein. A CIH or the qualified technician working under the direct supervision of the Independent CIH shall perform air monitoring, testing, and reporting.
  - 1. Obtain personal air monitoring samples from employees who are anticipated to have the greater risk of exposure as determined by the CIH or Competent Person. In addition, obtain a minimum of two air-monitoring samples outside the lead control area on a daily basis for the duration of the lead work.
  - 2. Obtain final air monitoring samples when the lead abatement work is complete. The CIH should perform final air sampling before the area is turned back over to VPA. The results must be less than the action level of 30  $\mu\text{g}/\text{m}^3$ . Should any of the final samples indicate a higher value, CONTRACTOR shall

take appropriate actions to re-clean the area and shall repeat the sampling and analysis at CONTRACTOR'S expense.

3. Submit results of air monitoring samples to the OWNER within three days after the air samples are taken, at or within 24 hours from receipt of analytical results, which are in excess of the action level of 30  $\mu\text{g}/\text{m}^3$ .

G. **Monitoring Employees:** Personal air monitoring shall be carried out during every work shift on at least one employee for each task for the entire shift. Complete documentation on the shift, date, employee hours, hours of abatement work, hours of monitoring and task performed should be provided with each sample and shall accompany the laboratory transmission and be returned by the laboratory with results. The task performed shall be fully described on the sample submission. If the area air monitoring indicates an emission level in excess of 30  $\mu\text{g}/\text{m}^3$  of air outside the lead control area, lead work shall be stopped. CONTRACTOR shall take immediate corrective action to reduce area emission levels below 30  $\mu\text{g}/\text{m}^3$  of air, and CONTRACTOR shall clean adjacent areas at no cost to OWNER.

H. **After Final Clean-Up (Clearance Examination):** Perform a clearance examination (i.e., visual evaluation and sampling) to determine if levels of lead above EPA standards remain following cleaning. After final clean up of the abatement area has been performed, the CIH (or qualified technician under the supervision of the CIH) shall perform a visual evaluation to insure that the control and work area is free of accumulations of dirt, dust or debris. In addition, the examination will include surface wipe sampling and soil sampling (if applicable) to verify that remaining lead levels are below EPA lead hazard standards prior to turning the site over to OWNER. These standards include the following:

1200 milligrams of lead per kilogram (parts per million) of soil

Should any of the final samples indicate a higher value, CONTRACTOR shall take appropriate actions to re-clean the area and shall repeat the sampling and analysis at CONTRACTOR'S expense.

### 3.04 CLEANUP AND DISPOSAL

A. **Cleanup:** Maintain all surfaces, including protective tarps and coverings within the lead control area, free of accumulations of paint chips, dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to cleanup the area. Perform housekeeping at the end of each shift, and when paint removal operations have been completed, by cleaning the lead control area of visible paint chips using a HEPA-filtered vacuum.

B. **Testing of Lead Waste:** Test lead waste in accordance with 40 CFR 261 for hazardous waste. Submit a minimum of four randomly collected samples to a certified ELAPP laboratory to determine if it is hazardous waste. Test all samples for the eight toxicity characteristic leaching procedure (TCLP) metals.

C. **Collection of Debris:** Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, separating waste by type (i.e., contaminated clothing, used containers, drop cloths, and surface materials should be separated).

1. Do not fill any container or roll-off in excess of the capacity marked on the container. Cover all containers immediately after filling.

2. Store removed lead waste, lead-contaminated clothing and equipment, dust, and debris in U.S. Department of Transportation (DOT)-approved container systems. Label each container to identify the waste and the date wastes were first put into the container and ensure that labels remain intact and legible.
  3. No water mixed with or contaminated by hazardous or toxic debris may be released into any drain or sewer. CONTRACTOR is advised that discharge of more than 10 pounds of lead into the water within a 24-hour period shall be considered a violation of the Clean Water Act and treated as a reportable quantity in accordance with 40 CFR 117. Such release shall be grounds for immediate termination of this Contract and CONTRACTOR shall be liable for any fines, penalties or remediation costs.
  4. Disposal shall be at a site approved by the U.S. Environmental Protection Agency (and the State) to accept lead waste. Notify the OWNER at least 14 days prior to removal of the containers to inspect the containers and the hazardous waste manifest. As necessary, dispose of lead wastes to ensure containers do not remain on the job site longer than 90 calendar days from the initial loading date affixed to the container.
  5. Handle, label, store, transport, and dispose of lead or lead-contaminated waste in accordance with 40 CFR 261, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- D. Non-hazardous Waste: Store non-hazardous waste separate from hazardous wastes. Provide all necessary containers, transportation, and disposal in accordance with federal, state and local regulations.
- E. Disposal Documentation: Submit written evidence that the receiving lead waste treatment, storage, or disposal facility (TSD) is approved to accept lead waste by the federal and district or local regulatory agencies. Submit one copy of the complete manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

- END OF SECTION -

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## SECTION 16670

### LIGHTNING PROTECTION SYSTEMS

#### PART 1 – GENERAL

##### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, test, and place in satisfactory operation a complete lightning protection system as specified herein. This is a performance specification. The Drawings do not show a complete lightning protection system design. The Contractor shall retain the services of a firm specializing in the design, installation, and testing of lightning protection systems.

##### 1.02 CODES AND STANDARDS

- A. The system shall comply with the following codes and standards:
  - 1. Underwriters Laboratories, Inc. (U.L.):
    - a. U.L. 96 - Lightning System Components
    - b. U.L. 96A - Installation Requirements for Lightning Protection Systems
    - c. U.L. 467 – Grounding and Bonding Equipment
  - 2. National Fire Protection Association (NFPA):
    - a. ANSI/NFPA 780 - Lightning Protection Code
  - 3. Lightning Protection Institute (LPI):
    - a. LPI-175 - Standard of Practice

##### 1.03 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01300, Submittals, the Contractor shall obtain from the equipment manufacturer and submit the following:
  - 1. Shop Drawings
  - 2. Operation and Maintenance Manuals
  - 3. Spare Parts List
  - 4. Test Reports

5. UL Master Label Certification

1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings for each lightning protection system shall include, but not be limited to:
  - 1. Product data sheets.
  - 2. Complete U.L. approved, full size layout and installation drawings/details with clearly marked dimensions. Drawings shall indicate the exact location of all system components. Drawings shall be signed by a full-time employee of the lightning protection system manufacturer who is in responsible charge of this project and has been engaged in the business for at least ten (10) years.
  - 3. Weights of major all components.
  - 4. Bill of material list for each lightning protection system.
  - 5. Manufacturer's installation instructions.
  - 6. Manufacturer's and installer's standard warranty.
  - 7. Evidence of the designer/installers UL listing.
- D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1. The manuals shall include:
  - 1. Instruction books and/or leaflets.
  - 2. Recommended spare parts list.
  - 3. Final as-built construction drawings included in the shop drawings incorporating all changes made during the installation.

4. All other information that was included in the shop drawing submittal.

#### 1.06 SPARE PARTS

- A. The lightning protection system shall be furnished with all spare parts as recommended by the equipment manufacturer.

In addition to the manufacturer recommended spare parts, the Contractor shall furnish the following minimum spare parts for each structure provided with a lightning protection system under this Contract:

<u>No. Required</u>	<u>Descriptions</u>
1	Air Terminals
1	Point Tip Protectors

- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same part number.

### PART 2 -- PRODUCTS

#### 2.01 MANUFACTURERS

- A. The lightning protection systems covered by this Specification shall be furnished using standard components of proven performance as manufactured by reputable concerns. The systems shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed.
- B. The lightning protection systems shall be furnished and installed by A-C Lightning Security, Inc., Thompson Lightning Protection, Inc, Lightning Elimination and Consultants, Modern Lightning Protection Company, Inc. or approved equal.
- C. System designer/supplier qualifications shall be as follows:
1. System components shall be manufactured by a company specializing in lightning protection equipment with a minimum of 5 years documented experience. Company shall be listed in the Section entitled "Lightning Conductor, Air Terminals and

Fittings" of the U.L. "Electrical Construction Materials Directory" for at least 5 years previous to this Contract's bid opening date.

2. The system designer/installer shall be an authorized installer of manufacturer with a minimum of 5 years of documented experience. Designer/Installer shall be listed in the section entitled "Lightning Protection Installation" of the U.L. "Electrical Construction Materials Directory" for at least 5 years previous to this Contract's bid opening date.

## 2.02 LIGHTNING PROTECTION SYSTEMS

### A. General

1. All components and parts of the lightning protection system shall be as specified herein. The materials used shall meet or exceed the material specification requirements of the Underwriters Laboratories, Inc. All materials shall be marked with a UL label or stamp.
2. The complete lightning protection system shall be inspected and included in the Master Label certification.

### B. Conductors

1. Conductors shall be copper cable, consisting of a minimum of 29 strands of No. 17 AWG wire. Copper conductors shall be furnished and installed only where required and when in contact with the earth. Where termination of copper conductors is required to aluminum parts, suitable bi-metallic connectors approved for the purpose shall be furnished and installed.

### C. Fittings

1. Fittings shall be the bolted type with stainless steel bolts, nuts, and washers. Fittings shall be of cast metal construction specifically designed for the application. Crimp-type fittings are not acceptable. Bi-metallic type fittings shall be furnished where required.

### D. Fasteners

1. Fasteners shall be manufactured from non-corrosive material of ample strength and rigidity for the application.

### E. Bases

1. Bases shall be bolted style provided with the model to suit the application (i.e. parapet, standing seam, etc.). Bolts, nuts, and washers shall be made of stainless steel. Bases shall be of aluminum or bronze construction, compatible with the material of the surface to which it is attached. Crimp-type bases are not acceptable.

### F. Ground Rods

1. Ground rods shall be 3/4-inch by 10-foot 0-inch sectional type copper-clad steel rods; as specified in Section 16170, Grounding and Bonding; quantity as required. Ground rods and all associated hardware shall be UL 467 listed.

#### G. Air Terminals

1. Air terminals shall be 3/8" copper. Air terminals shall be tapered or blunt tip type to suit the application and furnished with air terminal bases and safety tips (ball or bullet type) for impalement protection.

#### H. Thru-Roof Hardware

1. Thru-roof penetrations shall have stainless steel nuts, bolts, and washers. Sealing washers and sealing boots shall be provided as required and shall be compatible with the roofing material. Conductor connections to this roof hardware shall be by bolted connection. Crimp type connections are not acceptable.

### PART 3 -- EXECUTION

#### 3.01 INSTALLATION

- A. The lightning protection system shall be furnished and installed in accordance with the manufacturer's installation instructions. One (1) copy of these instructions shall be included with the system components at time of shipment. The system components shall be suitably protected until accepted by the Owner.
- B. The equipment shall be installed in accordance with the manufacturer's recommendations. This shall include, but not be limited to the following:
  1. Course all main down conductors to maintain a downward or horizontal run free of pockets or sags. Maintain an eight-inch (8") minimum radius and make no bend greater than 90 degrees. Follow the most direct route with inductance bonding conductors maintaining the horizontal or downward course of the main conductor. Interconnect roof conductors to provide at least two paths to ground from each terminal and to form closed loops. Follow the most direct path possible with down conductors between roof conductors and ground terminals. All down conductors for new occupiable buildings shall be placed in a concealed manner. Down conductors for existing occupiable structures, tanks, basins, and other non-occupiable structures may be installed exposed.
  2. Install ground connections at no less than 60-foot intervals and at each down conductor on perimeter. If the structure has a ground grid, the ground rods from that grid may be used for connection to the down conductors. At each ground connection, determine the extent of the grounding arrangement according to the volume and type of soil encountered and the lowest expected moisture content. Have the Owner's representative observe each ground connection. Bond together all electrical service, telephone service, and lightning protection grounds to all underground metallic piping systems as required by Article 250 of the NEC.

3. The structural steel frame (where provided) may substitute for main down conductors provided the frame is electrically continuous and of adequate cross-section. Where the steel frame is utilized, connect the roof conductor to steel at least as often and at the same column as the ground connections. Make connections to steel with exothermic welds wherever possible. Provide bonding as required to make the entire metal frame continuous.
4. Bond all sizable metal objects within 6-feet of down, roof, or grounding conductors to the system. Use only approved fittings and conductors.
5. Wherever possible problems with corrosion are encountered, use substitute approved materials and/or provide corrosion protection. Use bimetallic or other specially designed and approved connectors where dissimilar metals are to be joined.
6. Install air terminals within 2-feet of the edge of structure and at intervals not greater than 20-feet along perimeter and peak. Provide additional terminals to limit spacing across roof to 50-feet maximum. Bond any exposed metallic object or surface to the roof conductor. Flash all terminal or conductor penetrations in the roof to conform to the roofer's requirements.
7. Record each ground connection location and mark up a reproducible copy of the approved shop drawings with their location. Also, indicate any substantial field modifications on these drawings. These drawings shall be included in the O&M manual.
8. Log all continuity tests of metal framing, ground grid connections, bonding, and similar connections. Indicate the location of tests or plans. Include test results in the O&M manual.
9. Retain U.L. to make an inspection of the completed installation and issue a Master Label Certification. Furnish a copy of the Certification to the Owner upon receipt.

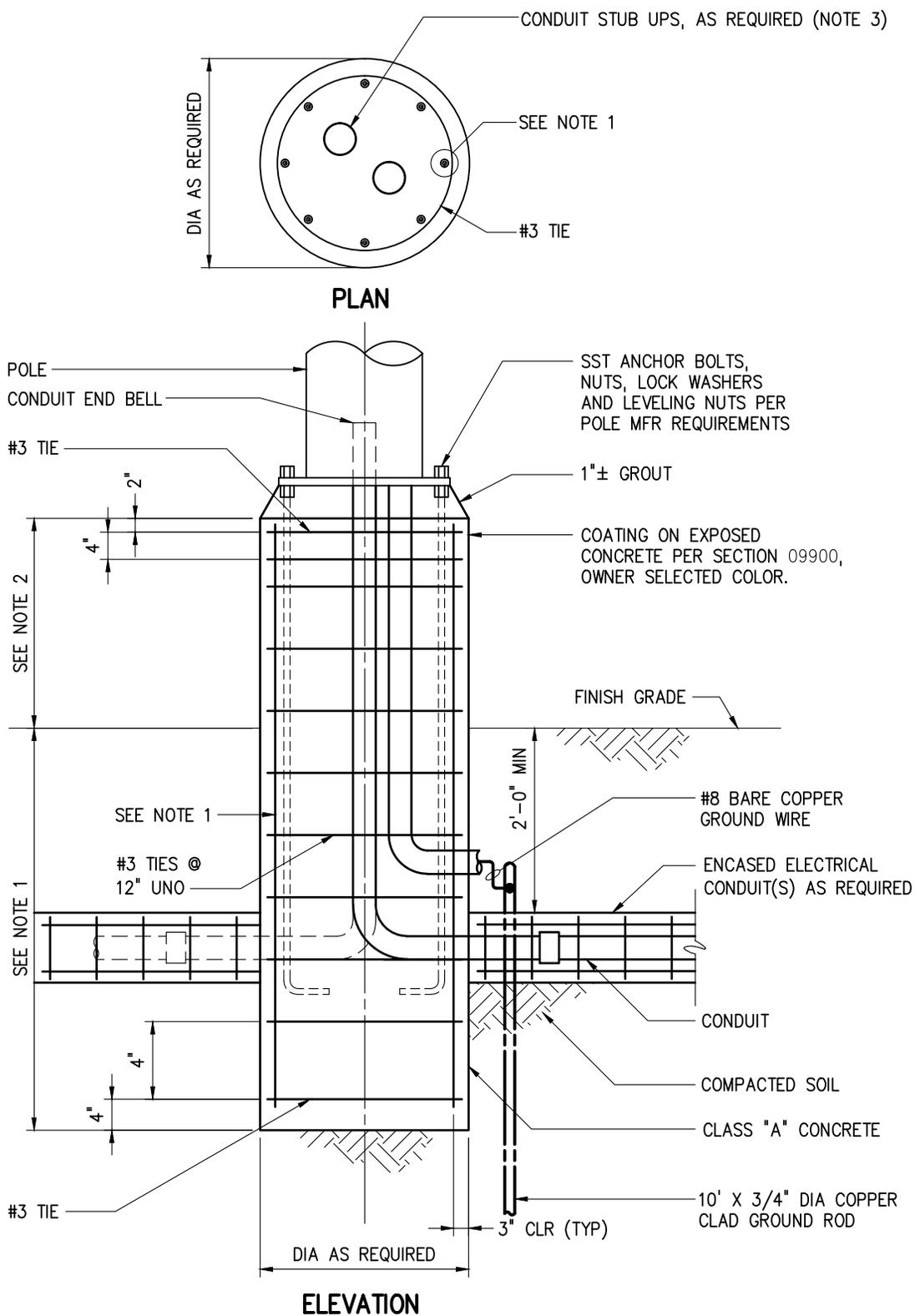
### 3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:
  1. Certified Shop Tests and Reports
    - a. None Required.
  2. Field Tests
    - a. After installation, the lightning protection system shall be tested for continuity to the ground grid. The tests shall be made by the lightning protection system installer. Test shall be as follows:
      - i. Record the resistance between each down conductor and the ground grid to ensure a suitable low-resistance connection. All resistance

values shall be 1 ohm or less. Test shall be made after the ground grid has been installed and tested per the requirements of Section 16170, Grounding and Bonding.

-END OF SECTION-

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**NOTES:**

1. DEPTH AND REINFORCEMENT SHALL BE DETERMINED BY POLE MANUFACTURER IN ACCORDANCE WITH SECTION 16500. LOADING SHALL BE IN ACCORDANCE WITH SECTION 16500.
2. PROJECTED HEIGHT ABOVE GRADE SHALL BE 36" FOR POLES NOT OTHERWISE PROTECTED BY A CURB OR BOLLARDS. HEIGHT ABOVE GRADE SHALL BE 6" FOR POLES WHERE PROTECTION IS ALREADY PROVIDED BY CURB OR BOLLARDS. FINAL DETERMINATION OF REQUIRED BASE HEIGHT FOR INDIVIDUAL POLES SHALL BE MADE BY THE ENGINEER.
3. CONTRACTOR SHALL CAREFULLY COORDINATE LOCATION AND QUANTITY OF CONDUITS IN THE BASE SO THAT WHEN POLE IS INSTALLED, IT WILL FIT OVER THE CONDUITS.

**CAST-IN-PLACE POLE-MOUNTED LIGHTING FIXTURE BASE (RAISED BASE)**

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