DOCUMENT 00912

ADDENDUM NUMBER 2

Issued: December 3, 2009

Geothermal Heat Pump Retrofit at 404 Aviation Boulevard, Santa Rosa, CA

FROM: Sonoma County Water Agency
404 Aviation Blvd.
Santa Rosa, CA 95403-9019

TO: Prospective Bidders

This Addendum forms a part of and modifies the Project Manual dated November 2009. Bidder shall acknowledge receipt of this Addendum in the space provided in Document 00400 (Bid Form).

Modified text is indicated as follows: Double-underline designates text to be inserted; ~~strikethrough~~ designates text to be deleted.

Addendum Number 2 consists of 20 pages as follows:
This Document 00912: 6 pages
Revised Bid Form: 5 pages
Specifications for Nested Piezometer: 2 pages
New Section 15820 (Duct Cleaning): 7 pages

I. General Changes

A. No changes.

II. Changes to Prior Addenda

A. No changes.

III. Changes to Introductory Information and Bidding Requirements

A. Document 00010 (Table of Contents):
   1. Insert the following after Section 15815 (Ductwork and Accessories):
      15820 Duct Cleaning

B. Document 00200 (Instructions to Bidders):
   1. Modify paragraph 14, fourth sentence, as follows:
      a. Owner may not answer questions received less than ~~ten~~ eight Days prior to the date for opening Bids.

C. Document 00400 (Bid Form):
   1. Paragraph 4, Schedule of Bid Prices, add Bid Item 20, renumber accordingly.

20.	Duct Cleaning	XXXXXX	Lump Sum	XXXXX	$

   1. Paragraph 4, Schedule of Bid Prices, delete last line, which is blank.

2. Bidder shall use the revised Document 00400 (Bid Form) attached, marked "REVISED 12/3/09," in its Bid.

IV. Changes to Contracting Requirements

A. No changes.

V. Changes to Conditions of the Contract

A. No changes.

VI. Changes to Specifications

A. Section 01100 (Summary):
   1. Insert the following as Bid Item 20 after Paragraph 1.4D.19:
      20. Duct Cleaning. The lump sum price paid under this item shall be full payment for duct cleaning as described in Section 15820 (Duct Cleaning).

B. Section 15600 (Ground Heat Exchanger):
   1. Add paragraph 1.3B.4
      4. Verification of Professional Geophysicist registration in California
   2. Modify Paragraph 3.1E, as follows:
      E. ~~Construct and Install~~ Provide one nested piezometer with three discrete well screen intervals according to the attached specifications.
   3. Insert attached document "Specifications for Nested Piezometer" after the last page of Section 15600.

C. Section 15745 (Water-Source Heat Pumps):
   1. Modify Paragraph 2.2C.1, as follows:
      C. Water Circuit:
         1. Refrigerant-to-Water Heat Exchangers:
            a. Provide cupronickel coaxial heat exchanger~~Coaxial heat exchangers with copper water tube~~ with enhanced heat-transfer surfaces inside a steel ~~shell~~outer tube; both shell and tube ~~leak tested to 625~~ designed working pressure of at least 450 psig on refrigerant side and ~~500~~ 400 psig on water side.
            b. Factory mount heat exchanger in unit on resilient rubber vibration isolators.
            c. Extended Range Insulation: Closed cell insulation applied to internal water lines, refrigerant lines, and coaxial heat exchanger.

D. Section 15820 (Duct Cleaning):
   1. Insert new Section 15820 (Duct Cleaning), attached, after Section 15815 (Ductwork and Accessories) of the Project Manual.

VII. Changes to Drawings

A. Modify Drawing M0.5 as described below:
   1. Move the expansion joint shown on the ½" CW pipe from the ½" CW to the 6"C penetrating the east wall of the pump enclosure.

B. Modify Drawing E0.3 as described below:
   1. On the single line diagram, relabel "Panel HVAC-3" with "Panel HVAC-4".

2. On the single line diagram, relabel "Panel HVAC-4" with "Panel HVAC-3".
3. Replace Note 6 with, "Provide new conduit and conductor to Panel HVAC-4. Panel HVAC-4 shall have feed-through lugs for connection to Panel HVAC-3."
4. Replace Note 7 with, "Panel HVAC-3 shall have a 250Amp main breaker."

C. Modify Drawing E2.6 as described below:

1. At building coordinate Q7, replace the callout that states "Replace (e) Panel 'H4A' with HVAC-3" with "Replace (e) Panel 'H4A' with Panel HVAC-4 and Panel HVAC-3."

VIII. Question(s)/Answer(s)

Owner's responses to Bidder questions shall be for the purposes of interpretation and clarification of the Contract Documents only, and shall not be construed as changing, superseding, or contradicting any express term in the Contract Documents. If any Bidder believes that a response to a question warrants a change in any term in the Contract Documents, the Bidder shall so request the change be made in writing addressed to Owner and received no later than the latest date for submitting Bidder questions. In the absence of a change in any term of the Contract Documents, the express terms of the Contract Documents shall have precedence. Bidder questions are listed below verbatim.

A. RE Corporation:

1. DWG# D3.2

   Spec Section(s) 15010 (page 6) Part 3.5 - B

   On sheet D 3.2 notes refer to some equipment being removed. No notes attached to the AC units number 1 thru 13, yet in the spec book as noted above it says to remove the AC units. Please clarify if AC 1 thru 13 (small units are to be removed… I understand the two large AC units also number AC 1 & 2 are to be removed… Plus on sheet D 3.2 you have two AC3 units

   Owner's response:

   Bid per Bid Documents.

2. Spec Section(s) 15815 (page 8) Part 3.1, W

   The above spec section states what duct systems are to be insulated. Nothing said about type, or thickness.. Please Carlify [sic]

   Owner's response:

   Bid per Bid Documents.

3. Spec Section(s) 15815

   Part 3 Cleaning. Please be more specific on the procedure for cleaning the ducts, and is all the existing duct systems to be cleaned.????

   Owner's response:

   Answered in this Addendum above.

4. The single line drawings sho [sic] panel HVAC3 & HVAC4 paired together plans show 2 HVAC3's one located @Q7 and 1 located @ J6 and no HVAC4 panel. Please clarify. Note 7 sheet E0.3 "HVAC-4 to have 250 Main Breaker" Panel Schedule says 400A MLO.

Owner's response:

Answered in this Addendum above.

B. Peterson Mechanical, Inc.:

1. SUBJECT: Vibration Isolation of Mechanical Duct

   Specification section 15050, 2.9A.6, calls for, "All air ducts with a cross section of 2ft2 or larger shall be isolated from the building structure by acoustical hangers or floor supports, installed per Mason Industries (or Approved Equal) recommendations, with a minimum deflection of 0.75." Does this apply to existing ducts not being removed?

   Owner's response:

   Bid per Bid Documents.

C. A&K Drilling:

1. Will there be a water source available on site to use while drilling the geothermal wells? We would need roughly around 2000 gallons per hole.

   Owner's response:

   This is in the Bidding Documents.

2. Does the owner have a drilling spoils dump site off site?

   Owner's response:

   Bid per Bid Documents.

3. If any contamination is found durring [sic] drilling does owner take responsibility of drill spoils and clean up?

   Owner's response:

   Bid per Bid Documents.

4. What is the progress payment schedule look like? Payments by week? Month?

   Owner's response:

   This is in the Bidding Documents.

D. Schram Construction Inc.:

1. Section 15088, para 1.1 A. requires insulation for "condenser-water piping"; Dwg MO.2 Mechanical Legend indicates C = Ground Loop Supply and CR = Ground Loop Return. Is condenser-water piping the same as ground loop supply and return? B. condensate drain is not mentioned as requiring insulation -is this correct?

   Owner's response:

   Bid per Bid Documents.

2. Section 09510, para 1.6 states that acoustic work shall not be installed until the HVAC system is operational. Section 01100, para 1.7 C. requires acoustic tiles to be reinstalled prior to the business day. Which is correct?

   Owner's response:

   Bid per Bid Documents.

3. Section 09900, para 2.1.c.l requires Stucco be painted. Section 09223, para 2.2 E. requires that stucco have a stucco color coating and fog coating. Which is correct?

   Owner's response:

   Bid per Bid Documents.

4. 15600, para 3.1 E. requires installation of one nested Piezometer according to the attached specs. A. Spec was not attached. B. What is location of this item?

   Owner's response:

   Answered in this Addendum above.

5. 15745, para 2.3 B Hose Kits to be 2' long -need to be much longer to match drawing requirements. Para 2.3 C-E: devices do not match drawing detail on MO.4.

   Owner's response:

   Bid per Bid Documents.

6. Section 15181, para 2.4 F requires wought [sic] steel fittings wall thickness to match adjoining pipe. Schedule 10 fittings are not readily available, are use of thicker fittings acceptable?

   Owner's response:

   Bid per Bid Documents.

7. Dwg MO.5 shows 6" Expansion Joint on ½" CW line instead of 6" line. Is this correct?

   Owner's response:

   Answered in this Addendum above.

8. Section 02763 Pavement Markings, para 3.1 D states "to dimensions indicated" and "at locations as indicated" Where are these indicated?

   Owner's response:

   Bid per Bid Documents.

9. Dwg M2.2 does not show location of new GV-l, where does it install?

   Owner's response:

   Bid per Bid Documents.

10. Dwgs D2.4 thru D2.6 and M2.4 thru M2.6: What are the bold dark lines @ K to L/7 to 8, L to M/3 to 5, M to N/6 and P to Q/6?

    Owner's response:

    Bid per Bid Documents.

E. Carrier:

1. Written Div.15 specification does not spell out or call for extended range heat exchangers on any scheduled WSHP's (this entails having an insulated coaxial coil and refrigerant and water piping internal to the WSHP to not only prevent condensation issues, but also any potential dripping problems) yet it's a ground water loop application specified with entering water temperatures of 90* F cooling/45* F heating

loop temperatures. This is beyond standard range operating characteristics for all WSHP's (standard range is typically entering water temperatures of 95* F cooling/60* F heating loop temperatures). Does the project require cupro-nickel heat exchangers in lieu of standard copper heat exchangers (to prevent fouling due to the water in the loop being outside the standard contaminant limits and for corrosion protection in a ground-source loop application, typically a 10-15% price premium on the equipment) ? Does the project require the WSHP's to contain the extended range package (typically a 7-10% price premium on the equipment) ? These may be necessary components for the project which have not been specified by the engineer.

Owner's response:

Answered in this Addendum above.

END OF DOCUMENT

DOCUMENT 00400

BID FORM REVISED 12/3/09

To be submitted as part of Envelope "A" by the time and date specified in Document 00200 (Instructions to Bidders), paragraph 1.

TO THE HONORABLE BOARD OF DIRECTORS OF THE SONOMA COUNTY WATER AGENCY

THIS BID IS SUBMITTED BY:

_____

(Firm/Company Name)

Re: CONTRACT NUMBER 71-80-7 #1, GEOTHERMAL HEAT PUMP RETROFIT AT 404 AVIATION BOULEVARD, SANTA ROSA, CA

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the Sonoma County Water Agency, a public agency of the State of California ("Owner") in the form included in the Contract Documents, Document 00520 (Agreement), to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Sum and within the Contract Time indicated in this Bid and in accordance with all other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Contract Documents, Document 00100 (Advertisement for Bids), and Document 00200 (Instructions to Bidders), including, without limitation, those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for 90 Days after the day of Bid opening.

3. In submitting this Bid, Bidder represents:

   (a) Bidder has examined all of the Contract Documents and the following Addenda (receipt of all of which is hereby acknowledged).

Addendum Number	**Addendum Date**	**Signature of Bidder**

   (b) Bidder acknowledges receipt of Pre-Bid Conference minutes.

(c) Bidder has visited the Site and performed all tasks, research, investigation, reviews, examinations, and analysis and given notices, regarding the Project and the Site, as set forth in Document 00520 (Agreement), Article 5.

(d) Bidder has given Owner prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and as-built drawings and actual conditions and the written resolution thereof through Addenda issued by Owner is acceptable to Contractor.

4. Based on the foregoing, Bidder proposes and agrees to fully perform the Work within the time stated and in strict accordance with the Contract Documents for the following sums of money listed in the following Schedule of Bid Prices:

SCHEDULE OF BID PRICES

All Bid items, including lump sums and unit prices, must be filled in completely. Bid items are described in Section 01100 (Summary of Work). Quote in figures only, unless words are specifically requested.

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
1.	Bonds	XXXXXX	Lump Sum	XXXXX	$
2.	Insurance	XXXXXX	Lump Sum	XXXXX	$
3.	Safety Program	XXXXXX	Lump Sum	XXXXX	$
4.	Storm Water Pollution Prevention Plan	XXXXXX	Lump Sum	XXXXX	$
5.	Mobilization/ Demobilization	XXXXXX	Lump Sum	XXXXX	$
6.	Demolition of Existing HVAC	XXXXXX	Lump Sum	XXXXX	$
7.	Geothermal Heat Pumps	XXXXXX	Lump Sum	XXXXX	$
8.	Mechanical Work	XXXXXX	Lump Sum	XXXXX	$
9.	Building Management System	XXXXXX	Lump Sum	XXXXX	$
10.	Geothermal Ground Loop Wells	120	Each		$
11.	Geothermal Ground Loop Headers and Looping	XXXXXX	Lump Sum	XXXXX	$
12.	Electrical Work	XXXXXX	Lump Sum	XXXXX	$
13.	Power and Communications Conduits Through Parking Lot	XXXXXX	Lump Sum	XXXXX	$

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
14.	Architectural and Structural Work	XXXXXX	Lump Sum	XXXXX	$
15.	Repair t-bar	5,400	Square Foot		$
16.	Civil Work	XXXXXX	Lump Sum	XXXXX	$
17.	Starting, Adjusting, Commissioning, and Training	XXXXXX	Lump Sum	XXXXX	$
18.	Installation, Operation, and Maintenance Manuals	XXXXXX	Lump Sum	XXXXX	$
19.	All Other Work	XXXXXX	Lump Sum	XXXXX	$
20.	Duct Cleaning	XXXXXX	Lump Sum	XXXXX	$
				TOTAL BID PRICE	$
21.	Contingency Reserve	XXXXXX	XXXXXX	XXXXX	$25,000
				TOTAL	$

Total: _____

(Words)

5. Subcontractors for work included in all Bid items are listed on the attached Document 00430 (Subcontractors List).

6. The undersigned Bidder understands that Owner reserves the right to reject this Bid.

7. If written notice of the acceptance of this Bid, hereinafter referred to as Notice of Award, is mailed or delivered to the undersigned Bidder within the time described in paragraph 2 of this Document 00912 or at any other time thereafter unless the Notice of Award is withdrawn, the undersigned Bidder will execute and deliver the documents required by Document 00200 (Instructions to Bidders) within the times specified therein. These documents include, but are not limited to, Document 00520 (Agreement), Document 00610 (Construction Performance Bond), and Document 00620 (Construction Labor and Material Payment Bond).

8. Notice of Award or request for additional information may be addressed to the undersigned Bidder at the address set forth below.

9. The undersigned Bidder herewith encloses cash, a cashier's check, or certified check of or on a responsible bank in the United States, or a corporate surety bond furnished by a surety authorized to do a surety business in the State of California, in form specified in Document 00200 (Instructions to Bidders), in the amount of ten percent (10%) of the Total Bid Price and made payable to "Sonoma County Water Agency."

10. The undersigned Bidder agrees to commence Work under the Contract Documents on the date established in Document 00700 (General Conditions) and to complete all work within the time specified in Document 00520 (Agreement). The undersigned Bidder acknowledges that Owner has reserved the right to delay or modify the commencement date. The undersigned Bidder further acknowledges Owner has reserved the right to perform independent work at the Site, the extent of such work may not be determined until after the opening of the Bids, and that the undersigned Bidder will be required to cooperate with such other work in accordance with the requirements of the Contract Documents.

11. The undersigned Bidder agrees that, in accordance with Document 00700 (General Conditions), liquidated damages for failure to complete all Work in the Contract within the time specified in Document 00520 (Agreement) shall be as set forth in Document 00520 (Agreement).

12. The names of all persons interested in the foregoing Bid as principals are:

(IMPORTANT NOTICE: If Bidder or other interested person is a corporation, give the legal name of corporation, state where incorporated, and names of president and secretary thereof; if a partnership, give name of the firm and names of all individual co-partners composing the firm; if Bidder or other interested person is an individual, give first and last names in full).

NAME OF BIDDER: _____
licensed in accordance with an act for the registration of Contractors, and with license number: _____ Expiration: _____.

_____ _____
Where incorporated, if applicable

_____

_____
Principals

I certify (or declare) under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____
Signature of Bidder

_____
Date of Execution

_____
Place of Execution

NOTE: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If Bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

Business Address: _____

_____

_____

Contractor's Representative(s), (name, title): _____

_____

Officers authorized to sign contracts: _____

_____

_____

_____
Signature of Officer

_____
Title

_____
Date of Execution

_____
Place of Execution

Telephone Number(s): _____

Fax Number(s): _____

Email address(es): _____

Date of Bid: _____

END OF DOCUMENT

Specifications for Nested Piezometer

Borehole Drilling, Piezometer Construction, and Development: Provide the following:

- Drill one 400 foot exploratory boring and collect drilling cuttings every ten feet, classify materials according to the Unified Soil Classification System, and prepare a lithologic log during drilling
- Conduct one borehole geophysical log
- Ream borehole to 12-inch diameter to 400 feet and sequentially construct three 2-inch diameter Schedule 80 PVC piezometer casings in the 12-inch borehole, based on piezometer design
- Develop each nested piezometer casing
- Provide surface completion

Drilling and Sampling Program: The exploratory borehole for the nested piezometer shall be drilled to a diameter of 6-inches using a direct- or reverse-rotary circulation drilling rig. The drilling fluid and soil cuttings returned to the surface during drilling shall be pumped through a self-contained system consisting of mechanical shakers, screens, and sanding cones designed to separate the drilling fluids from the formation cuttings.

During drilling, collect in sealed, clear plastic bags or other approved containers, samples of all formations during drilling. Samples shall be of at least one-pint size and shall be taken at 10-foot intervals and at each formation change within the intervals. Lithology and well construction information shall be recorded on a well completion log during field activities.

Borehole Geophysical Logging: Following completion of the exploratory boring, retain a professional geophysical logging company to conduct down-hole geophysical logging. Geophysical logging shall include spontaneous potential, resistivity (single-point and 16-inch and 64-inch normal), natural gamma, and caliper logs. Ensure that the borehole is filled with fluid prior to conducting the geophysical survey.

Ream Borehole and Construct Nested Piezometer: Upon Owner authorization, the exploratory borehole shall be reamed to 12 inches in diameter, and three separate piezometer casings with 10 to 20-foot well screens shall be installed sequentially in the borehole. For bidding purposes, assume the following construction details for installation of the nested piezometer:

- It is anticipated that the nested piezometer shall be constructed with flush-threaded 2-inch diameter Schedule 80 PVC casing and PVC well screen (approximate screened intervals of 60 to 80 feet bgs, 200 to 220 feet bgs, and 340 to 360 feet bgs) with a 5-foot sump, bottom cap and locking well cap.
- Prior to installing the piezometer casing and annular material, the borehole shall be prepared to receive the casing by circulating drilling fluids through a tremie pipe to ensure the removal of residual cuttings and formation material.
- As the piezometer casings are installed, a Monterey sand filter pack shall be placed adjacent to each piezometer screen interval extending 2 feet below and 3 to 5 feet above each screened interval, with an upper fine sand spacer of 2 feet thickness.
- Following the placement of each sand filter pack, the piezometer screen will be surged using a mechanical surge block to initially develop and settle the sand filter pack prior to placement of the bentonite seal.
- The bentonite seal shall then be placed, no less than five feet on top of the fine sand spacer. Once the bentonite seal has hydrated, an annular seal of neat cement or sand-cement slurry shall be placed in the annular space between bentonite seals and up to ground surface.

Piezometer Development: Piezometers shall be developed initially by using a surge block and air lifting to immediately begin to clear up the wells and clean up the borehole wall from the drilling process. Each piezometer casing shall be subsequently developed fully by swabbing, airlifting, bailing, and/or jetting to remove fine sediments from the filter pack and formation, and any residual drilling fluids from the screen intervals. Development shall continue until there is no circulation of sand, silt, or drilling fluid in the discharge water, to the extent feasible.

Install Wellhead Surface Completion: Following well construction and development provide a traffic-rated box as specified in paragraph 2.1A of Section 15600 (Ground Heat Exchanger). Each well shall be permanently marked with well identification number and State reference number.

SECTION 15820

Duct Cleaning

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Cleaning requirements for Existing Ductwork to Remain.
2. Cleaning requirements for Existing Air Distribution Devices to Remain.

B. Related Sections

1. Section 01100 (Summary)
2. Section 15815 (Ductwork and Accessories)

1.2 REFERENCES

A. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62-89, "Ventilation for Acceptable Indoor Air Quality".

B. Environmental Protection Agency (EPA): "Building Air Quality," December 1991.

C. National Air Duct Cleaners Association (NADCA): "Assessment, Cleaning & Restoration of HVAC Systems (ACR 2005)," 2004.

D. National Air Duct Cleaners Association (NADCA): "Understanding Microbial Contamination in HVAC Systems," 1996.

E. National Air Duct Cleaners Association (NADCA): "Introduction to HVAC System Cleaning Services," 2004.

F. National Air Duct Cleaners Association (NADCA): Standard 05 "Requirements for the Installation of Service Openings in HVAC Systems," 2004.

G. North American Insulation Manufacturers Association (NAIMA): "Cleaning Fibrous Glass Insulated Air Duct Systems," 1993.

H. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "HVAC Duct Construction Standards - Metal and Flexible," 1985.

I. SMACNA 1966, HVAC Duct Construction Standards - Metal and Flexible.

J. Underwriters' Laboratories (UL): UL Standard 18

1.3 DEFINITIONS

A. Existing Ductwork to Remain: Existing ductwork which will not be removed during the Work at 404 Aviation Blvd. This includes duct which will be relocated within the building.

B. Existing Air Distribution Devices to Remain: Includes Registers, Grilles, and Diffusers which will not be removed during the Work at 404 Aviation Blvd. This includes air distribution devices which will be relocated within the building.

1.4 SUBMITTALS

A. Cleaning Plan:

1. Location of all ductwork and accessories which are to be cleaned.
2. This plan shall be based on the D2 & M2 series sheets of the Mechanical Drawings.

B. Protection Plan: Contractor to provide plan detailing how the following shall be protected:

1. Interior Office surfaces.
2. Office equipment.
3. Air quality.

C. Quality Assurance/Quality Control Submittals

1. Certificates:

   a. Provide proof of membership to the National Air Duct Cleaners Association (NADCA), or other membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.
   b. Provide proof for one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full time basis, or staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.

D. Final Report

1. Summary of the cleaning project, as verified through inspections.
2. Areas where biological contaminants where found.
3. Areas of the system found to be damaged and/or in need of repair.
4. Location of duct openings created; indicate openings which can be re-opened.
5. Photo or video proof of cleaned duct.

1.5 PROJECT CONDITIONS

A. Existing Conditions

1. Qualified personnel should perform the HVAC cleanliness inspection to determine the need for cleaning.

2. At minimum, such personnel should have an understanding of HVAC system design, and experience in utilizing accepted indoor environmental sampling practices, current industry HVAC cleaning procedures, and applicable industry standards.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Perform pre-cleaning inspection with the Owner to determine the need for cleaning.

3.2 GENERAL DUCT CLEANING REQUIREMENTS

A. Items to be Cleaned:

1. All existing ductwork to remain.
2. All existing air distribution devices to remain.

B. Complete cleaning shall be performed on each system before any new ductwork, accessories, or HVAC equipment is connected to the existing ductwork to prevent contamination of new components.

C. Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.

D. Particulate Collection:

1. Particulate Collection Equipment exhausting inside the building: Provide HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used.
2. Particulate Collection Equipment exhausting outside the building:

    a. Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system.
    b. Precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.

3. Conform to all requirements in ASHRAE Standard 62-89.

E. Controlling Odors: Measures shall be employed to control odors and/or mist vapors during the cleaning process.

F. Air-Volume Control Devices:

1. Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.

G. Component Cleaning:

1. Employ cleaning methods such that all HVAC system components must be Visibly Clean as defined in NADCA Standards for Cleanliness Verification.
2. Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.

H. Service Openings:

1. Utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.

    a. Utilize the existing service openings already installed in the HVAC system where possible.
    b. Other openings shall be created where needed and they must be created so they can be sealed in accordance with Section 15815 (Ductwork and Accessories) and with industry codes and standards.
    c. Closures must not significantly hinder, restrict, or alter the airflow within the system.
    d. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.
    e. Openings must not compromise the structural integrity of the system.
    f. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable SMACNA 1966 and NADCA Standard 05.
    g. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
    h. Rigid fiber glass duct systems shall be resealed in accordance with NAIMA recommended practices for fiberglass. Only closure techniques that comply with UL Standard 181 or UL Standard 181a are suitable for fiber glass duct system closures.
    i. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the Owner in project report documents.

2. Close and seal all openings as stated above at the end of each working period per Section 01100 (Summary), unless approved by Owner.

I. Acoustical Ceiling Sections (tile):

1. Remove and reinstall acoustical ceiling sections to gain access to HVAC systems during the cleaning process.
2. Return tiles to their original location after each working period per Section 01100 (Summary).

J. Air Distribution Devices:

1. Clean all which will remain.
2. Clean all which are directly connected to ductwork to be cleaned.

3.3 HEALTH AND SAFETY

A. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.

B. Disposal of Debris: All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

3.4 MECHANICAL CLEANING METHODOLOGY

A. Source Removal Cleaning Methods:

1. Clean by use of Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility.
2. Methods of cleaning used to ensure the duct is Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements.
3. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.

B. Use of Cleaning Devices:

1. Vacuum Cleaning Devices

a. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning.
b. Connect to the downstream end of the section being cleaned through a predetermined opening.
c. Provide sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment are assured.
d. Exhaust:

1) Exhausting air inside the facility: Device shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
2) Exhausting air outside the facility:

a) Devices shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system.
b) Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility.

c) Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.

2. Agitation devices:

   a. Use to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices.
   b. Do not damage the integrity of the ductwork or damage porous surface materials such as liners inside the ductwork or system components.

C. Methods of Cleaning Fibrous Glass Insulated Components

1. Thoroughly clean with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure.
2. Ductwork shall not be exposed to moisture.
3. Cleaning methods used shall not cause damage to fibrous glass components.

D. Damage to Ductwork, Accessories, or System Components

1. Contractor shall be responsible for any damage caused by improper cleaning techniques.
2. If damage is found to be the fault of the Contractor, the damaged ductwork, accessory, or system component shall be replaced at no cost to the Owner.

E. Biological Contaminants: If mold, fungal growth, or other biological contaminants are found, notify Owner.

3.5 CLEANLINESS VERIFICATION

A. General: Verification of HVAC System cleanliness shall be determined after mechanical cleaning.

B. Visual Inspection: The HVAC system shall be inspected visually to ensure that no visible contaminants are present.

1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean.
2. The Owner reserves the right to further verify system cleanliness by means of Visual Inspection.
3. The Owner may also perform additional Surface Comparison Testing or the NADCA vacuum test, as specified in the NADCA standards for Cleanliness Testing, if cleanliness is still suspect.

   a. NADCA vacuum test analysis should be performed by a qualified third party experienced in testing of this nature, and shall be done at the Owner's expense.

4. If contaminants are evident through any of the above inspection methods, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.

3.6 POST-CLEANING PROCEDURES

A. All cleaned ductwork shall be kept clean of contaminants up to and during connection to new ductwork.

END OF SECTION