TENTATIVE A g e n d a
President and Board of Trustees
Monday, March 12, 2012
Village Hall
123 Madison Street

Special Meeting at 6:30p.m. in Room 130

I. Call to Order

II. Roll Call

III. Agenda Approval

Instructions for Agenda Public Comment

(3 minutes per person; 3 items per person maximum)

Comments are 3 minutes per person per agenda item, with a maximum of 3 agenda items to which you can speak. In addition, the Village Board permits a maximum of three persons to speak to each side of any one topic that is scheduled for or has been the subject of a public hearing by a designated hearing body. These items are noted with a (*).

IV. Public Comment

V. Resolution Authorizing Resolution Authorizing the Execution of a Contract with DeKalb Mechanical for Design/Build Services for a Geothermal HVAC System for Village Hall Council Chambers in an Amount to Exceed $305,000.00

Overview: The Village Board tabled this item from the February 21st Regular Meeting in order to allow time for the Historic Preservation Commission to review the design. The grant funds proposed for this project need to be committed prior to March 19, 2012, therefore this item is posted as a Special Meeting to consider this action. The Finance Committee reviewed this additional cost (to place the system below ground) at the February 9, 2012 Finance Committee. In addition, staff identified approximately $72,000 in grant funds. The current HVAC system for the Council Chambers in Village Hall has had substantial maintenance issues over the past several years. Deteriorating duct work running from the air handling unit (AHU) housed in the east mechanical room in the lower level of Village Hall to the Council Chambers has resulted in significant water infiltration into the supply and return air ducts and onto the east mechanical room floor, as well as the Police Dept. hallway floor outside of the mechanical room during very heavy rainfalls.

VI. Adjourn

For more information regarding Village Board meetings and agendas, please contact the Village Manager's Office at 708.358.5770. If you require assistance to participate in any Village program or activity, contact the ADA Coordinator at 708.358.5430 or e-mail adacoordinator@oak-park.us at least 48 hours before the scheduled activity. Agendas and agenda materials are now available electronically on the village web site. Visit www.oak-park.us mouse-over News, then click on Board Agendas and Minutes.

VILLAGE OF OAK PARK

AGENDA ITEM COMMENTARY

Item Title: Resolution Authorizing the Execution of a Contract with DeKalb Mechanical for Design/Build Services for a Geothermal HVAC System for Village Hall Council Chambers in an amount not to exceed $305,000.00

Resolution or Ordinance No. _____

Date of Board Action: March 12, 2012

Staff Review:

Public Works Director: John P. Wielebnicki

Village Manager's Office: _____

Item History (Previous Board Review, Related Action, History):

The current heating, ventilating and air conditioning system (HVAC) for the Council Chambers in Village Hall was installed as part of the original construction in the mid 1970's. The system has had substantial maintenance issues over the past several years. Deteriorating duct work running from the air handling unit (AHU) housed in the lower level of Village Hall to the Council Chambers has resulted in significant water infiltration. During heavy rain, water runs into the supply and return air ducts and onto the east mechanical room floor, as well as the Police Department hallway floor outside of the mechanical room. In addition, the unit's mechanical components require frequent repair. This project has been on the Department of Public Works Capital Improvement Projects list for the past three years as in need of replacement.

Staff reviewed options and recommends that this issue be resolved by abandoning the existing AHU and installing a new and separate HVAC system (cooling and heating) for the Council Chambers.

Requests for Proposals (RFP) were issued on September 21, 2011 for design/build services for a new HVAC system for the Council Chambers. The RFP was sent to several mechanical firms and was advertised in the Wednesday Journal and on the Demandstar on-line purchasing program.

A pre-proposal meeting was held at Village Hall on Wednesday, September 28, 2011. Seven mechanical firms attended the meeting. A total of five proposals were received on Friday, October 14, 2011.

Proposals were requested for two types of HVAC systems. One RFP was for the installation of a Direct Forced Air (DX), gas fired heating and conventional air conditioning system. The second RFP was for the installation of a Geothermal system.

Item Policy Commentary (Key Points, Current Issue, Bid Process, Recommendation):

Geothermal heating and cooling pumps the constant 55 deg. F subterranean temperature of the earth into the building for heating and cooling. When air temperatures are high, a cooling system uses the earth's temperature to cool the indoor air temperature and when air temperatures are below 55, a heat pump delivers the earth's then warmer air into the building. This would be an opportunity to install the Village's first Geothermal system, taking advantage of energy efficiencies of the earth's temperature for heating and cooling.

Staff compared the costs and benefits for each system (summary attached). The low bid received for the Direct Forced Air system is higher than anticipated. The low bid for the Geothermal system was lower than anticipated. It should be noted however, that the Village does not pay for electricity or gas for Village Hall as part of our franchise agreements with ComEd and Nicor.

Staff submitted an Agenda Item Commentary at the December 5, 2011 Village Board meeting recommending approval of a contract with DeKalb Mechanical to install the new Geothermal HVAC system at a cost not to exceed $215,000.00, including a $10,000.00 contingency to cover unforeseen circumstances during construction. The initial design submitted by DeKalb included a newly-constructed mechanical equipment enclosure outside of the building directly underneath the Council Chambers on the lower level courtyard. This design was preferred because it eliminates the underground piping/ductwork that currently exists. Repair of the underground piping/ductwork may be possible but would be more costly and could lead to similar problems in the future.

The Village Board expressed concern about adding an additional structure to Village Hall that could conflict with the existing architecture. The Board directed staff to look into keeping the mechanical equipment inside Village Hall in the existing east mechanical room in the lower level of Village Hall.

Staff requested that DeKalb Mechanical revise and resubmit their proposal based on the direction provided by the Village Board. Staff received the attached revised DeKalb proposal on Monday, January 23, 2012. The revised cost is $295,000.00, plus a $10,000.00 contingency.

Staff met again with the Village Board on February 21, 2012 to review the DeKalb proposal which would move the mechanical equipment into the lower level of Village Hall. The Board discussed the merits of both DeKalb proposals (above ground or in the lower level) and requested that the Historic Preservation Commission provide input into this issue.

Public Works staff met with the Commission on March 8, 2012. Douglas Kaare, Urban Planner/Historic Preservation staff, provided a summary of the Commission's recommendations. While they would support the concept of an enclosure (above ground), they first "recommend that every consideration be given to finding a solution that would result in the new HVAC equipment being installed in a way that minimizes its impact on the design of the building", including using the existing mechanical room (lower level).

Public Works staff supports the Commission's recommendation to accept the DeKalb

January 23, 2012 proposal to construct the new HVAC system in the lower level of Village Hall.

The installation of a new HVAC unit for the Council Chambers would require the Council Chambers to be closed for possibly four to five weeks while the work is being performed. If the project is approved by the Village Board, the schedule would include construction in 2012 during a period when the Village Board is not in session. Staff would notify all Council Chambers users well in advance of project commencement and would work with Village Hall staff in securing and preparing alternate locations for meetings.

Intergovernmental Cooperation Opportunities (describe if there are opportunities for cost savings or better service with this item by joint participation from other local Oak Park governmental agencies, or regional municipalities):

There are no opportunities for cost savings or better service with this item by joint participation from other local Oak Park governmental agencies, or regional municipalities.

Item Budget Commentary (Account #; Balance; Cost of contract):

The total cost of the contract with DeKalb Mechanical would not exceed $305,000.00. The FY 2011 Building Improvement Fund, account no. 3012-43790-101-540673, Capital Improvements, contained $215,000.00 dedicated for design/build services for a new HVAC system for the Council Chambers, which was carried over to the 2012 CIP Budget. The balance would come from unspent Building Improvement fund monies, and $72,308.90 in EECBG grant funding.

If this project does not move forward and be obligated by March 19, 2012, the Village risks losing the $72,308.90 remaining in EECBG funding since no other projects would be ready for this funding.

Item Action Options/Alternatives (List the alternative actions; list the positive and negative implications of each; if no alternatives, explain why):

The alternative action would be to delay the replacement of the existing HVAC unit that services the Council Chambers until 2013 or later, or to install the Direct Forced Air system instead of a geothermal system. Due to the current condition of the AHU and associated duct work, staff does not recommend delaying this work. The negative implications could involve continued water infiltration into the existing duct work and east mechanical room causing unfavorable conditions and poor IAQ inside the mechanical room and Council Chambers. Due to the energy savings associated with geothermal, staff recommends this as the sustainable alternative over Direct Forced Air.

Furthermore, the Finance Committee discussed this option at their February 9, 2012 meeting and supported moving the mechanical equipment into the lower level of Village Hall, where the existing equipment is, in order to not distract from the architectural features of Village Hall.

Proposed Recommended Action: Adopt the Resolution

RESOLUTION

AUTHORIZING THE EXECUTION OF A CONTRACT WITH DEKALB MECHANICAL FOR DESIGN/BUILD SERVICES FOR A NEW HVAC SYSTEM FOR VILLAG HALL COUNCIL CHAMBERS IN AN AMOUNT NOT TO EXCEED $305,000.00

BE IT RESOLVED by the President and Board of Trustees of the Village of Oak Park, Cook County, State of Illinois, that the Village Manager is hereby authorized and directed to execute an agreement with DeKalb Mechanical of DeKalb, Illinois for the design and installation of a Geothermal HVAC system for the Village Hall Council Chambers in an amount not to exceed $305,000.00. Said contract shall conform substantially to the contract as attached.

THIS RESOLUTION shall be in full force and effect from and after its adoption and approval as provided by law.

ADOPTED this 12th day of March, 2012, pursuant to a roll call vote as follows:

AYES:

NAYS:

ABSENT:

ADOPTED AND APPROVED by me, this 12th day of March, 2012.

_____
David G. Pope
Village President

ATTEST:

_____
Teresa Powell
Village Clerk

Agreement Between the Village of Oak Park and DeKalb Mechanical, 339 Wurlitzer Dr., DeKalb, IL 60115 for

THIS AGREEMENT is made and concluded on March 12, 2012 by and between the Village of Oak Park, 123 Madison St., Oak Park, IL and DeKalb Mechanical, 339 Wurlitzer Dr., DeKalb, IL 60115 (Contractor) for Design/ Build Services for a Geothermal HVAC System for Village Hall Council Chambers.

A. SCOPE OF WORK

DeKalb Mechanical agrees to design and build a geothermal HVAC System for the Oak Park Village Hall Council Chambers, as more particularly described in the Village's Request for Proposals for a Design Build Contract to Install a Complete Geothermal HVAC system (including architectural, mechanical, and electrical) for the Village of Oak Park Village Hall Council Chambers, dated September 21, 2011. The Village's RFP is attached hereto as Exhibit A and incorporated herein.

The contractor will perform all the work, furnish all materials and all labor necessary to complete the work in accordance with the terms of this Agreement and the requirements of the Director of Public Works. In addition to the work described in the RFP, the contractor agrees to provide the Village with a complete set of As Built drawings, and the product manual or other literature.

All work will be performed according to the standards set forth in the applicable Building Codes and standards, including mechanical, fire, plumbing, electric, accessibility, or any other applicable codes in force in the Village of Oak Park and State of Illinois.

B. WORK HOURS

All interior work shall be performed during the hours of 7:30 a.m. to 4 p.m., Monday through Friday, except for Village holidays. Exterior work may be performed between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday.

C. LICENSES AND PERMITS

The Contractor shall be responsible for becoming a licensed contractor with the Village. Contractor shall also be responsible for obtaining any necessary building permits. The Village will issue any necessary building permits for this work at no fee.

D. CONTRACT PRICE

The Contractor agrees to perform the work in an amount not to exceed $295,000 in accordance with Contractor's revised bid dated January 23, 2012, a copy of which is attached hereto as Exhibit B and incorporated into this contract.

To the greatest extent practicable, all equipment and products purchased with funds available under the Grant for this project should be American made. The Contractor certifies and agrees that it will conform with the ARRA Buy American Policy.

The Village of Oak Park is exempt from the payment of Illinois sales tax, Exemption Number E9998-1823-06. Therefore, Contractor certifies that its price does not include the payment of taxes.

Contractor certifies that its price is reflective of all work that needs to be done based on contractor's verification of existing conditions.

Contractor understands that the work is subject to the Illinois Prevailing Wage Act and agrees to pay not less than the general prevailing rate of hourly wages for work of a similar character on public works in Cook County, Illinois, and not less than the general prevailing rate of hourly wages for legal holiday and overtime work, to all laborers, workers and mechanics employed on this project and to otherwise comply with the Illinois Prevailing Wage Act.

Furthermore, the Contractor understands that the work is subject to Davis-Bacon and Related Acts and that the Contractors and all Subcontractors shall pay their laborers and mechanics not less that the prevailing wage rates in compliance with that Act.

E. PAYMENT

The Contractor shall submit monthly request for progress payment. The request shall include the following:

1. An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested;
2. A listing of the amount included for work performed by each subcontractor under the contract;
3. A listing of the total amount of each subcontract under the contract;
4. A listing of amounts previously paid to each subcontractor under the contract;

5. Mechanics lien waivers for the contractor and any subcontractors whose work is part of the request for payment;
6. Contractor's and Subcontractor's certified payroll for the pay request.
7. Additional supporting data in a form and detail required by the Director of Public Works.

The Village will review all requests for progress payments. The Village will pay all approved portions of requests for payment, less a 10% retainage, within 30 days of approval as provided in the Local Government Prompt Payment Act, 50 ILCS 505/1. The Village will make final payment upon acceptance as provided in Paragraph H.

F. CHANGE ORDERS

1. Change Orders: Changes in the Work may be agreed to after execution of the Contract, and without invalidating the Contract, if the Change Order is in writing and signed. Any changes to the scope of work which result in an increase in the contract price will be subject to a contract addendum which must be signed by both parties. Any such Change Order will be prepared by the Village. The Contractor may only proceed with the Change upon receipt of the written Change Order signed by the Village.
2. Emergency Changes: Contractor may perform work not included in the Scope of Work if necessary to remedy a condition that poses an immediate threat to persons or property. Work of this nature shall be carried out only to the extent of bringing the condition under control. The Village shall be notified immediately. A Change Order will then be negotiated and executed for the work performed, and for work remaining, if any.
3. Minor Changes (Field Orders): The Village may verbally authorize minor changes in the Scope of Work in order to prevent a delay in the progression of the Work. These field orders may not involve a change in the contract price or be inconsistent with the Scope of Work.
4. Changes Due to Unknown Conditions: The Contractor is not responsible for Changes in the Work that are due to conditions that were not reasonably observable or conditions that have changed. In such cases, the Contractor shall notify the Village and a Change Order will be negotiated.
5. Any Change which results in a total contract price in excess of $20,000 must be approved by the Village of Oak Park Board of Trustees.

G. JOB SITE RULES

1. To the fullest extent possible, the Contractor will not allow its work to interfere with the ongoing use of the facility. Contractor will take all necessary actions as directed by the Village in that regard.
2. Material Storage: The Contractor shall be responsible for the storage and safety of his own materials. The Village assumes no liability whatever for any material damaged or stolen on the premises where such has not been brought into the building. Any damage to, or loss by theft or vandalism of any material, appurtenance, or appliance, after such has been applied, connected or installed on Village property, shall be the sole responsibility of the Contractor until the project is completed and accepted by the Village.
3. Safety Precautions: The Contractor is solely responsible for implementing effective safety precautions on and around the Work site to protect workers and other persons who might be affected. The Contractor shall not leave any combustible materials or other fire hazards overnight or allowed them to accumulate.
4. Damage to Property: Contractor shall repair, at no additional cost to the Village, all damage to Village property caused by the Contractor resulting from his work. Where repair of existing work is called for, such patching and replacement shall be made to blend with existing work so that the patch or replacement will be inconspicuous after finishing.
5. Daily Clean-up: The Contractor shall keep the premises clean and orderly during the course of the work and all debris shall be removed on a continuous basis.

H. FINAL ACCEPTANCE AND FINAL PAYMENT

The work shall be considered complete upon final written acceptance by the Village, which acceptance shall not be unreasonably withheld or delayed. As soon as practicable after final acceptance, the Contractor shall supply the Village with a final request for payment, which will include the materials described in Paragraph E above. Within 30 days of approval of the work and receipt of the Contractor's request for payment, the Village will pay Contractor the amount withheld as retainage. If the Village does not make timely payment to Contractor, interest shall accrue at the maximum rate of 1% per month, as provided in the Local Government Prompt Payment Act, 50 ILCS 505/4.

I. CORRECTION OF WORK PRIOR TO FINAL PAYMENT

The Village has the right to stop work if the Contractor fails to carry out the work in a manner acceptable to the Village. If the Village deems the Contractor's work unacceptable, at the Village's election, the Contractor shall do one of the following:

1. Promptly repair or replace the defective work, without expense to the Village, including costs associated with repairing any damage to property caused by the replacement work; or
2. If the Village deems it unacceptable to have the Contractor correct work which has been incorrectly done or not done at all, a deduction from the contract price shall be made based on the costs to the Village to have the work performed or repaired. Such a deduction from the contract price shall in no way affect the Village's other remedies or relieve the Contractor from responsibility for defects and related damage occurring as a result of defective or unacceptable work.

J. TIME FOR COMPLETION

The contractor agrees to perform the work so that it will be completed, and the system no later than September 3, 2012 unless that date is extended by agreement of the parties.

K. NO SUBCONTRACTORS

No part of the services may be subcontracted unless approved by the Village in writing. Contractors proposing to use subcontractors shall notify the Village of those subcontractors before executing this agreement. All subcontractors must be licensed and approved by the Village and not be debarred or suspended from doing work for public bodies.

L. HOLD HARMLESS/ INDEMNIFICATION

Contractor agrees to indemnify, save harmless and defend the Village of Oak Park, its agents, servants and employees, from any and all claims, actions, causes of action, demands, damages, costs and attorneys' fees which may accrue, directly or indirectly, for or on account of any and all foreseen and unforeseen bodily and personal injuries to any person, or any death at any time resulting from such injury, or any damage to any property and the consequences thereof, which may arise or which may be alleged to have arisen out of or in connection with the specific work covered by this contract. In addition, the Contractor agrees to indemnify and defend the Village of Oak Park in any action instituted by the Illinois Department of Labor or Illinois Attorney General to enforce the Prevailing Wage Act.

M. INSURANCE

The contractor shall obtain and keep in force at all times during the performance of the contract the following types of insurance. Contractor shall not begin work under the contract until all the required insurance has been obtained and until the Village has been furnished with acceptable evidence of insurance.

1. Worker's Compensation Insurance with amounts of coverage sufficient to provide for all compensation levels and amounts mandated by the Illinois Worker's Compensation Statutes. The insurer shall agree to waive all rights of subrogation against the Village, its officers, employees and volunteers.
2. Comprehensive General Liability in the minimum amount of $1,000,000 per occurrence for both bodily injury and property damage, which policy shall name the Village of Oak Park as a named additional insured. The contractor shall provide the Village with a policy endorsement or other proof that the Village has been named as an additional insured.

N. DISPUTE RESOLUTION

All disputes, including but not limited to actions for breach of contract, payment or collection, shall be brought in the Circuit Court of Cook County, Illinois. This contract shall be interpreted in accordance with the laws of the State of Illinois. In any dispute resolution process, each party shall bear its own costs, including attorneys fees. Any purported agreement between the parties that states terms contrary to this paragraph N will be deemed per se invalid.

O. WARRANTY

The Contractor warrants the labor and materials against defects for 18 months from the date of completion. The date of completion shall be the date of final acceptance of the work.

P. ENTIRE AGREEMENT

The agreed upon terms are set forth in this document, which, together with the Village's Request For Proposals and the Contractor's Proposal, constitute the entire terms of this Agreement. Where any terms in the Contractor's proposal conflict with the terms of this Agreement, this Agreement shall govern.

VILLAGE OF OAK PARK

By: _____
Cara Pavlicek
Interim Village Manager

REVIEWED AND APPROVED
AS TO FORM
MAR 09 2012
LAW DEPARTMENT

DEKALB MECHANICAL

By: _____
Signature

_____
Printed Name

Oak Park

Contract Bond

DeKalb Mechanical, 339 Wurlitzer Dr., DeKalb, Illinois 60115, as PRINCIPAL, and

_____ as SURETY,
is held and firmly bound unto the Village of Oak Park (hereafter referred to as "Village") in the penal sum of **Three Hundred Five Thousand Dollars ($305,000.00)**, well and truly to be paid to the Village, for the payment of which its heirs, executors, administrators, successors and assigns, are bound jointly to pay to the Village under the conditions of this instrument.

WHEREAS, THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that, the Principal has entered into a written contract with the Village, acting through its President and Board of Trustees, for the construction of work, which contract is hereby referred to and made a part hereof as if written herein at length, and whereby the Principal has promised and agreed to perform the work in accordance with the terms of the contract, and has promised to pay all sums of money due for any labor, materials, apparatus, fixtures or machinery furnished to such Principal for the purpose of performing such work, including paying not less than the prevailing rate of wages in Cook County, where the work is for the construction of any public work subject to the Prevailing Wage Act, and has further agreed to save and indemnify and keep harmless the Village against all liabilities, judgments, costs and expenses which may in any manner accrue against the Village in consequence of granting such contract or which may in any manner result from the carelessness or neglect of the Principal, his agents, employees or workmen in any respect whatever; and has further agreed that this bond will inure to the benefit of any person, firm, company, or corporation, to whom any money may be due from the Principal, subcontractor or otherwise, for any such labor, materials, apparatus, fixtures or machinery so furnished and that suit may be maintained on such bond by any such person, firm, company, or corporation, for the recovery of any such money.

NOW THEREFORE, if the Principal shall well and truly perform the work in accordance with the terms of the contract, and shall pay all sums of money due or to become due for any labor, materials, apparatus, fixtures or machinery furnished to it for the purpose of constructing such work, and shall commence and complete the work within the time prescribed in the contract, and shall pay and discharge all damages, direct and indirect, that may be suffered or sustained on account of such work during the time of performance thereof and until the work shall have been accepted, and shall save and indemnify and keep harmless the Village against all liabilities, judgments, costs and expenses which may in any manner accrue against the Village in consequence of granting such contract or which may in any manner result from the carelessness or neglect of the Principal, his agents, employees or workmen in any respect whatever; and shall in all respects fully and faithfully comply with all the provisions, conditions, and requirements of the contract, then this obligation will be void; otherwise it will remain in full force and effect.

IN WITNESS WHEREOF, the PRINCIPAL and the SURETY have caused this instrument to be signed by their respective officers this _____ day of _____, 2012.

NAME OF PRINCIPAL

By: _____
Signature

By: _____
Printed Name

Its: _____
Title

Subscribed to and Sworn before me on the

_____ day of _____, 2012.

_____
Notary Public

NAME OF SURETY

By: _____
Signature of Attorney-in-Fact

Subscribed to and Sworn before me on the

_____ day of _____, 2012.

_____
Notary Public

Approved this _____day of _____, 2012.

VILLAGE OF OAK PARK

_____
Cara Pavlicek
Interim Village Manager

Attest:

_____
Teresa Powell
Village Clerk
(Seal)

Oak Park

123 MADISON STREET, OAK PARK, ILLINOIS 60302

Date: March 9, 2012

To: Vic Sabaliauskas, Superintendent, Building Maintenance
John Wielebnicki, Director, Public Works

From: Douglas Kaarre, Urban Planner/Historic Preservation

CC: Chris Morris, Chair, Historic Preservation Commission
Craig Failor, Village Planner

Re: Village Hall Council Chambers – HVAC Enclosure

Thank you for meeting with the Historic Preservation Commission at their meeting on March 8, 2012 to discuss the proposal to construct an HVAC enclosure beneath the Council Chambers of Village Hall. The HPC would like to recommend the following for the Village Board's consideration:

A) Oak Park Village Hall was constructed in 1974-75 and designed by architect Harry Weese & Associates. The building is a distinctive example of mid-Twentieth century modernism by a nationally recognized Chicago architect. The *Madison Street Corridor Survey* identified the building as "Significant (National Register potential)", which includes the potential for local landmark designation as well. The building may be eligible for listing on the National Register of Historic Places right now, and it will be eligible for local landmark designation once it reaches 50 years in age (2024). The HPC agrees that this is an important building and appreciates the Board and Staff's concern about the potential impact of a mechanical room addition. The proposed location of the enclosure is a distinctive architectural element of the building that is quite visible from both Madison Street and Taylor Avenue, although the HPC recognizes that this area is currently underutilized.

B) The HPC does support the concept of an enclosure in this location. However, they would first recommend that every consideration be given to finding a solution that would result in the new HVAC equipment being installed in a way that minimizes its impact on the design of the building. This could be either within the existing mechanical room, buried underground, or located in such a way as to minimize the appearance of the addition from Madison Street.

C) Should the construction of a visible enclosure be selected as the most practical solution, the HPC feels that the submitted example would have a negative impact on the character of the building based on its size, materials and location. The HPC strongly recommends that the Village Board consider working with an architect who has experience with Modern building to study the proposal and provide designs that are sensitive to the architecture and have the least impact on the building's design.

Please contact me at 358-5417 or kaarre@oak-park.us if you have any questions.

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Council Chambers HVAC System
Cost Summary
February 21, 2012

Low Bidder: DeKalb Mechanical

System Type		Cost		25 year Total Life Cycle Cost
Geothermal - 10/14/11 Bid (Above Ground)	$	205,000.00	$	189,472.00
Direct Forced Air (Dx) - 10/14/11 Bid (Above Ground)	$	154,500.00	$	287,908.00
Geothermal - 01/23/12 Revised Bid (Below Ground)	$	295,000.00	$	200,972.00
Direct Forced Air (Dx) - 02/09/12 (Estimate Only Below Ground) (The above Dx estimate was only for Life Cycle Cost Analysis purposes and is not a Bid)	$	213,000.00	$	296,133.00

Village of Oak Park

Public Works Department

Life-Cycle Cost Analysis for Direct Forced Air (Dx) HVAC System vrs. a Geothermal System for the Village Hall Council Chambers

		Dx	Geo	Notes
1	Installation Cost	$ 154,500.00	$205,000.00	Difference of $50,500
2	Annual Utility Cost	$ 2,495.00	$ 1,246.00	Difference of $1,250 (savings)
3	Life Expectancy (years)	25	25	
4	Total Utility Cost	$ 62,375.00	$ 31,150.00	
5	Total Cost w/ Utility	$ 216,875.00	$236,150.00	
6	Simple Payback Years *	N/A	40	Additional initial investment of $50,500 divided by the difference in annual utility cost savings = 40 years.

* Simple payback information did not take into account future energy rates or inflation over the lifespan of the new equipment. True payback time would obviously be longer (approximately 12-15 years longer) if inflation and increased energy rates were factored in, however, the simple payback makes the point that either way the payback time would be longer than the lifespan of the new equipment.

DeKalb Mechanical

339 Wurlitzer Dr., DeKalb, Illinois 60115
(815) 756-6528 / Fax (815) 756-6529
Sheet Metal, Refrigeration, H.V.A.C., 24-Hour Service

January 23, 2012

Village of Oak Park
Public Works Center
201 South Boulevard
Oak Park, IL 60302

Attention: Vic Sabaliauskas

Reference: New HVAC System for the Village Hall Building

For the sum of $295,000.00 we propose to furnish and install the following HVAC work as per the drawings preliminary laid out from 2010 Engineering.

1. Remove the existing air handling unit located in the public works basement.
2. Reline the existing underground ductwork that goes from the basement to the Village Hall Building. Two at 36" diameter ducts.
3. New 20 ton horizontal heat pump unit located in the basement.
4. New 5 well geothermal field system located on the East side of the existing building in the street parkway. Ground restoration work to grass seed planting.
5. New piping loop work from the well field into the building at the East exterior door. Run the piping inside the building along the wall and into the Mechanical Room. All interior piping to be insulated PVC.
6. New pumps, expansion tank, glycol feeder, Pump VFD.
7. Supply and return ductwork with 1 1/2" insulation from the heat pumps to the existing 36" underground ducts. Tie into the existing outside air and relief air ductwork.
8. New openings in the existing shaft behind the Village Hall Building for duct access including a new door and descending ladder.
9. Stand alone controls from a thermostat located in the Village Hall Building controlling the heat pump and system.
10. Power wiring for all new equipment.
11. Glycol charge and fill.
12. Air and water balance.
13. Engineering Drawings for permit and review.
14. Cleanup and dumpster costs.

Exclusions: Permit or fee costs, finish painting work, ground restoration work after the initial grass seed, overtime or shift work, extra work associated with undocumented underground items in the well field area.

Please review the breakout price below.

Line the underground duct	$69,000.00
Well Field costs	$82,000.00
Demolition of the existing unit	$9,500.00
New heat pump cost	$18,500.00
Piping Equipment	$7,500.00
Glycol	$8,000.00
Electrical Work	$14,500.00
Piping labor and material	$25,500.00
Ductwork labor and material	$14,200.00
Ladder, door and masonry opening	$9,100.00
Temperature controls	$4,200.00
Engineering Costs	$18,000.00
Overhead and markup	$15,000.00

Please feel free to call if you have any questions.

Sincerely,

Steve Doonan
DeKalb Mechanical, Inc.

Proposal Summary for

Village of Oak Park Village Hall Council Chambers Geothermal Design / Build

	Company Name	MBE	WBE	NON-M/WBE	Total Proposal Cost
1	DeKalb Mechanical			X	$ 205,000.00
2	Mechanical Concepts of Illinois			X	$ 343,000.00
3	Sumac Architecture Construction	X			$ 348,450.00
4	Anchor Mechanical			X	$ 401,460.00
5	Walsh Construction			X	$ 585,307.00
6	*Pioneer Geothermal Services **				*$ 54,500.00*

** Pioneer submitted an incomplete proposal and might have misunderstood the scope of work. Clarification pending.*

Proposal Summary for
Village of Oak Park Village Hall Council Chambers Dx Design / Build

	Company Name	MBE	WBE	NON-M/WBE	Total Proposal Cost
1	DeKalb Mechanical			X	$ 154,500.00
2	Mechanical Concepts of Illinois			X	$ 196,000.00
3	Sumac Architecture Construction	X			$ 199,900.00
4	Anchor Mechanical			X	$ 336,820.00
5	Walsh Construction			X	$ 427,929.00

DeKalb Mechanical

339 Wurlitzer Dr., DeKalb, Illinois 60115
(815) 756-6528 / Fax (815) 756-6529
Sheet Metal, Refrigeration, H.V.A.C., 24-Hour Service

October 14, 2011 Page #1

Village of Oak Park
Public Works Center
201 South Boulevard
Oak Park, IL 60302

Reference: 11-202 Design-Build Geothermal System for the
Village of Oak Park Village Hall Council Chambers

Base Bid $205,000.00

1. Furnish and install eight geothermal wells capable of a total of 20 tons of load displacement. Remove the ground spoils and restore the ground to existing.
2. 15 ton geothermal heat pump unit located on a concrete housekeeping pad in a new enclosure adjacent to the shaft base.
3. Loop piping from the well field to the heat pump including expansion tank, pump, pump VFD, air separator, glycol fill system, and glycol water charge.
4. Condensate drain piping from the heat pump unit to spill on grade.
5. Sprinkler head in the new heat pump room.
6. Sump pump and pump basin located within the room to discharge on grade.
7. Stand alone temperature control system including night set back and occupancy schedule.
8. Heat pump enclosure to be a brick structure with a lockable door and roof. Cut an opening in the existing duct shaft for the supply and return ductwork penetrations. Cut an opening in the existing duct shaft for access and install a new lockable door.
9. Provide a new light in the enclosure, outlet and electric baseboard heater.
10. Blank off the existing underground ductwork at the existing air handling unit and at the penetration into the existing air shaft.
11. Insulated supply and return ductwork from the new heat pump unit to the existing ductwork in the shaft.
12. All power wiring as required. Power to come from the existing mechanical room, existing panel breakers.
13. Air test and balance of the new heat pump into the existing duct system.
14. Water test and balance of the new glycol loop.
15. One year maintenance and a three month check and performance review.
16. Permits and fees.
17. Performance Bond Costs
18. Engineering and design fees including a fully engineered set of plans and specifications for permit submission.

Village of Oak Park
Public Works Center
201 South Boulevard
Oak Park, IL 60302

Reference: 11-202 Design-Build Geothermal System Unit for the
Village of Oak Park Village Hall Council Chambers

Alternate Geothermal Heat Pump System avoiding construction of a room:$205,000.00

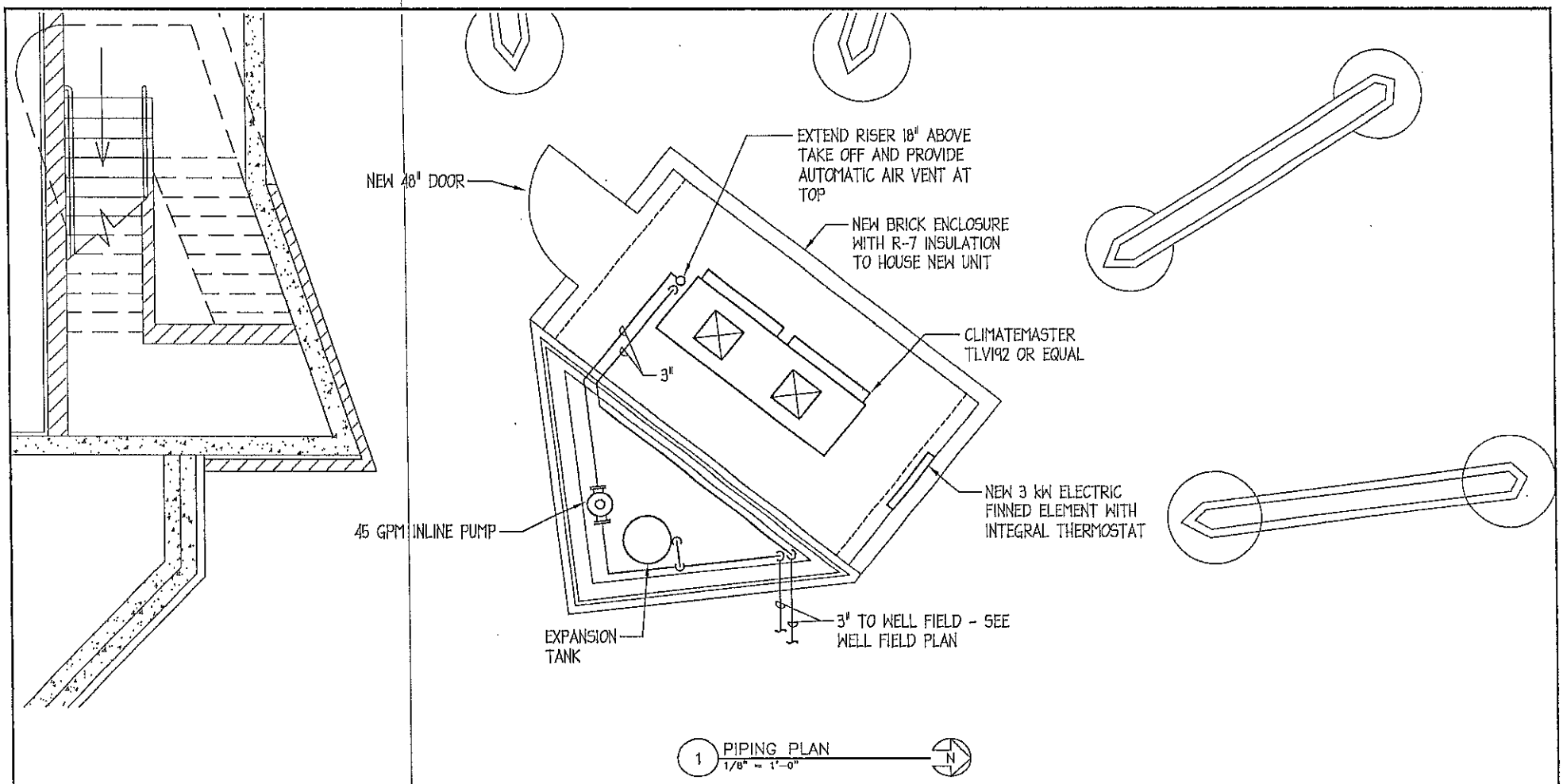
1. Furnish and install eight geothermal wells capable of a total of 15 tons of load displacement. Remove the ground spoils and restore the ground to existing.
2. Three 5 ton geothermal heat pumps unit located in a new soffit constructed adjacent to the shaft base.
3. Loop piping from the well field to the heat pumps including expansion tank, pump, pump VFD, air separator, glycol fill system, and glycol water charge.
4. Condensate drain piping from the three heat pump units to be pumped and discharged to grade.
5. Sprinkler head in the new heat pump soffit area.
6. Stand alone temperature control system including night set back and occupancy schedule.
7. Heat pump soffit enclosure to be an EFIS constructed enclosure around the three heat pump unit with lockable access doors for service access at each unit. Cut an opening in the existing duct shaft for the supply and return ductwork penetrations. Cut an opening in the existing duct shaft for access and install a new lockable door.
8. Blank off the existing underground ductwork at the existing air handling unit and at the penetration into the existing air shaft.
9. Insulated supply and return ductwork from the new heat pump unit to the existing ductwork in the shaft.
10. All power wiring as required. Power to come from the existing mechanical room, existing panel breakers.
11. Air test and balance of the new heat pump into the existing duct system.
12. Water test and balance of the new glycol loop.
13. One year maintenance and a three month check and performance review.
14. Permits and fees.
15. Performance Bond Costs
16. Engineering and design fees including a fully engineered set of plans and specifications for permit submission.

Village of Oak Park
Public Works Center
201 South Boulevard
Oak Park, IL 60302

Reference: 11-200 Installation of a DX Forced Air Handling Unit for the Village of Oak Park Village Hall Council Chambers

Alternate Packaged Ground Mounted Unit: $133,500.00

1. Blank off the existing underground ductwork at the existing air handling unit and at the penetration into the existing air shaft.
2. Stand alone temperature control system including night set back and occupancy schedule.
3. Cut an opening in the existing duct shaft for the supply and return ductwork penetrations. Cut an opening in the existing duct shaft for access and install a new lockable door.
4. New 20 ton ground mounted single package rooftop type unit with 100,000 MBH heat. Insulated supply and return ductwork from the rooftop unit into the existing duct shaft.
5. Concrete equipment pad under the package rooftop unit.
6. Brick enclosure set on a new foundation around the new rooftop unit to act as a screen. The enclosure is to have a lockable door for service access.
7. All power wiring as required. Power to come from the existing mechanical room, existing panel breakers.
8. Air test and balance of the new heat pump into the existing duct system.
9. One year maintenance and a three month check and performance review.
10. Permits and fees.
11. Performance Bond Costs.
12. Engineering and design fees including a fully engineered set of plans and specifications for permit submission.



1 PIPING PLAN
1/8" = 1'-0"

N

ENGINEERING
700 Cherry St, Suite C
Columbia, MO 65201
P. 573-874-5455
F. 573-874-5474

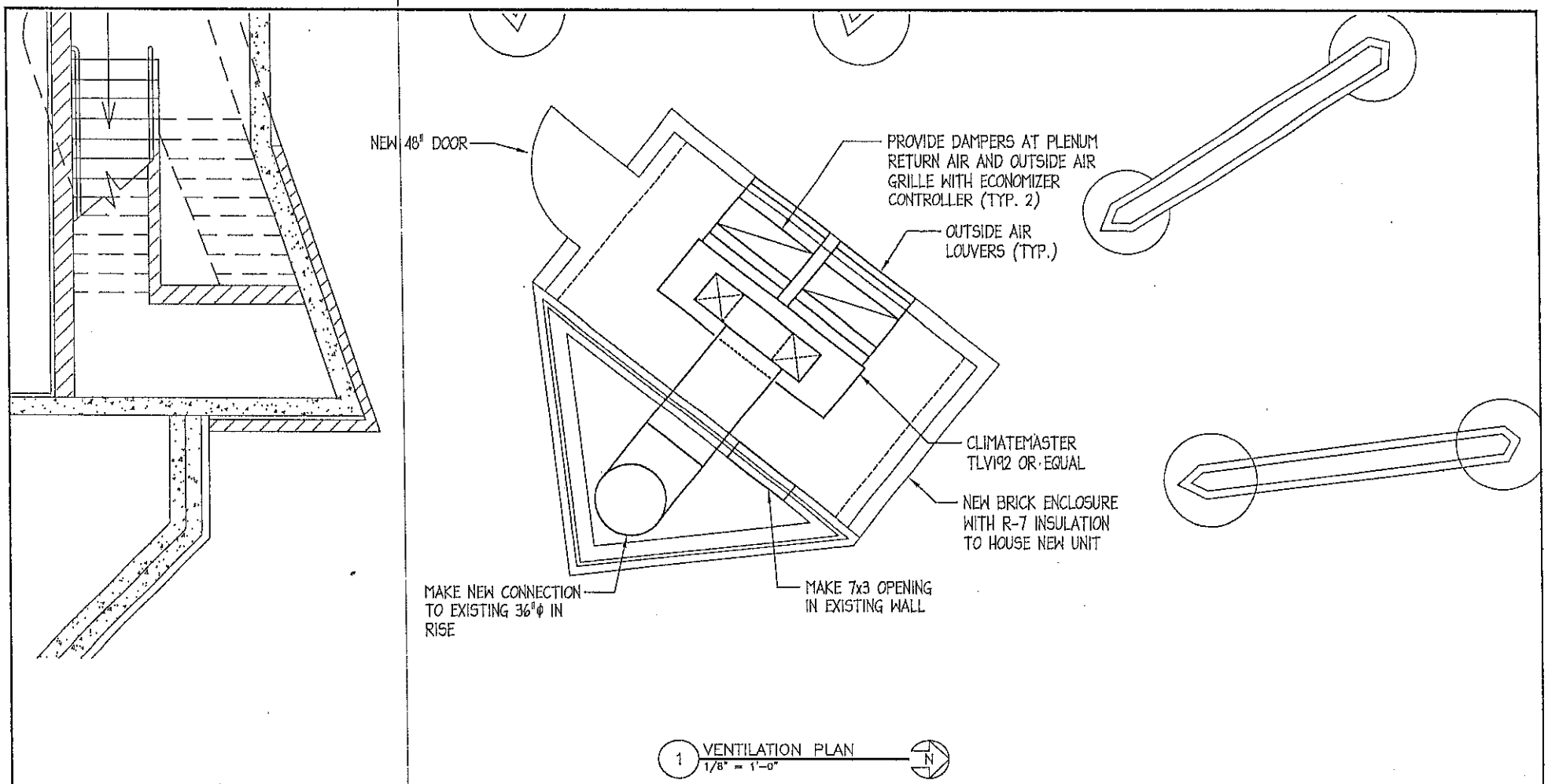
Mechanical - Electrical - Structural Engineers
1216 Tower Road
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201
ENGINEERING GROUP LLC

COUNCIL CHAMBERS – BASE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-1



1 VENTILATION PLAN
1/8" = 1'-0"

N

ENGINEERING
700 Cherry St. Suite C
Columbia, MO 65201
P. 573-874-9455
F. 573-874-9474

Mechanical - Electrical - Structural Engineers
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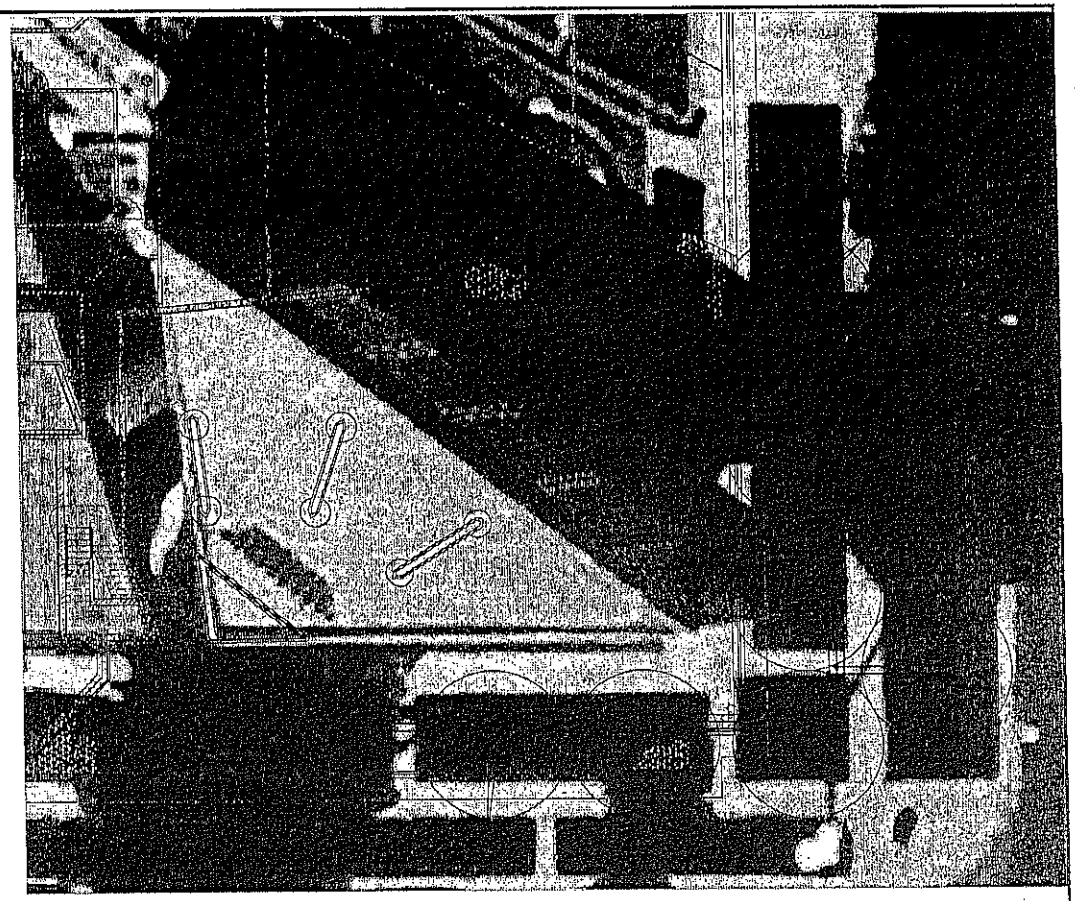
2010 ENGINEERING GROUP LLC

COUNCIL CHAMBERS – BASE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-2



1 HVAC SITE PLAN
1/16" = 1'-0"

N

ENGINEERING
700 Cherry St., Suite C
Columbia, MO 65201
P. 573-874-9455
F. 573-874-8474

Mechanical - Electrical - Structural Engineers
1216 Tower Road
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201

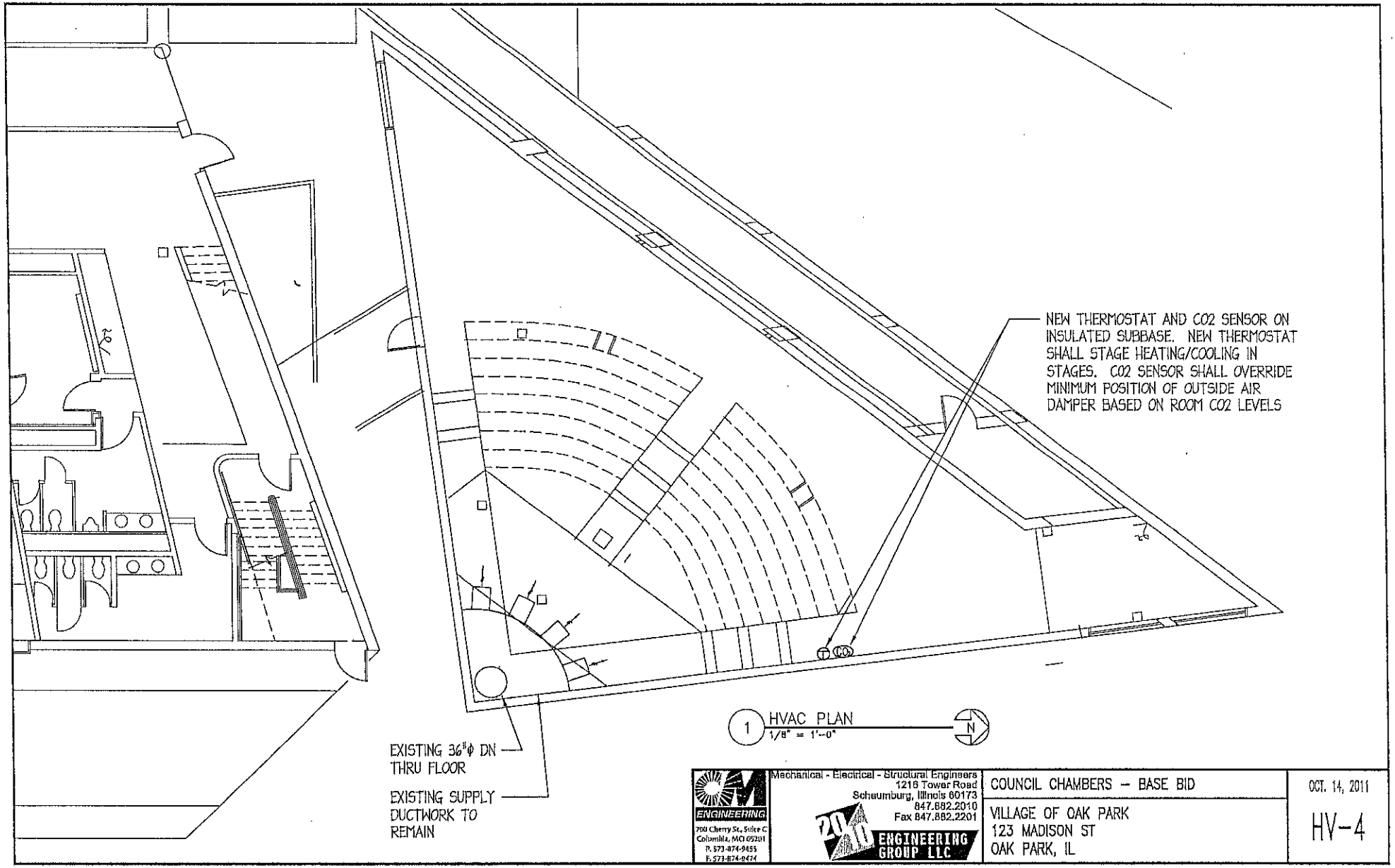
ENGINEERING GROUP, LLC

COUNCIL CHAMBERS – BASE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-3



1 HVAC PLAN
1/8" = 1'-0"

N

ENGINEERING
700 Cherry St., Suite C
Columbia, MO 65201
P. 573-874-9455
F. 573-874-9474

Mechanical - Electrical - Structural Engineers
1216 Tower Road
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201

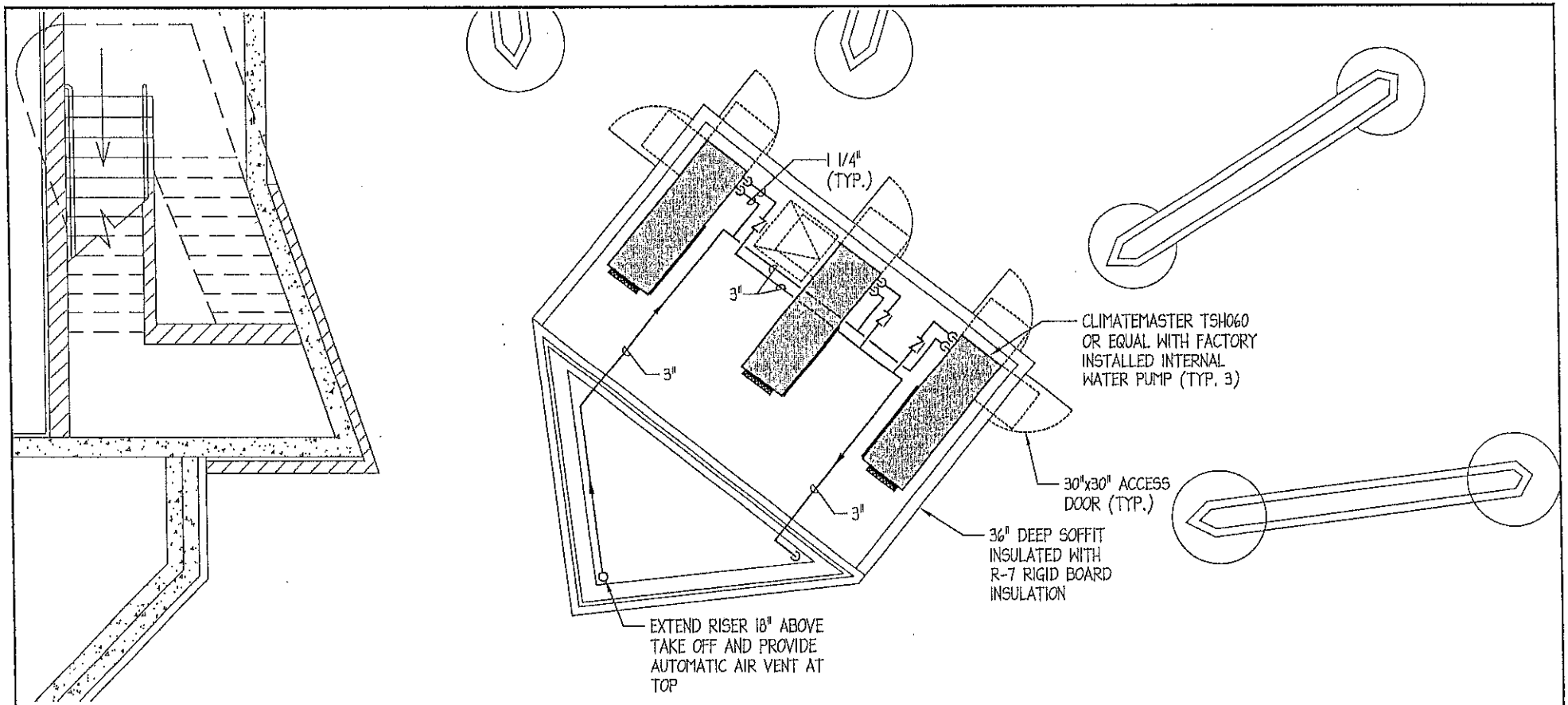
20/10 ENGINEERING GROUP LLC

COUNCIL CHAMBERS – BASE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-4



1 PIPING PLAN
1/8" = 1'-0"

N

ENGINEERING
708 Cherry St., Suite C
Columbia, MO 65201
P. 573-874-9455
F. 573-874-9474

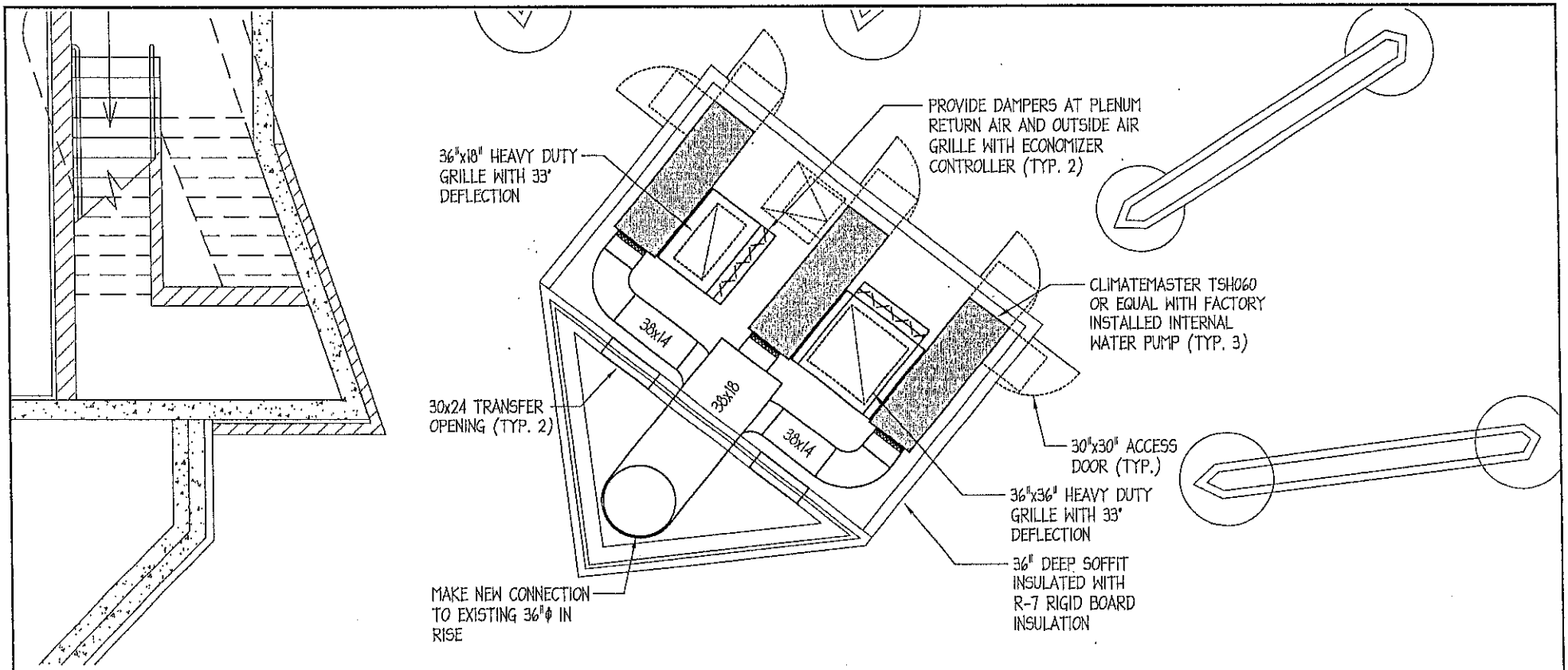
Mechanical - Electrical - Structural Engineers
1216 Tower Road
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201
ENGINEERING GROUP LLC

COUNCIL CHAMBERS – ALTERNATE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-1



1 VENTILATION PLAN
1/8" = 1'-0"

N

ENGINEERING
709 Cherry St., Suite C
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P. 573-874-9155
F. 573-874-9474

Mechanical - Electrical - Structural Engineers
1216 Tower Road
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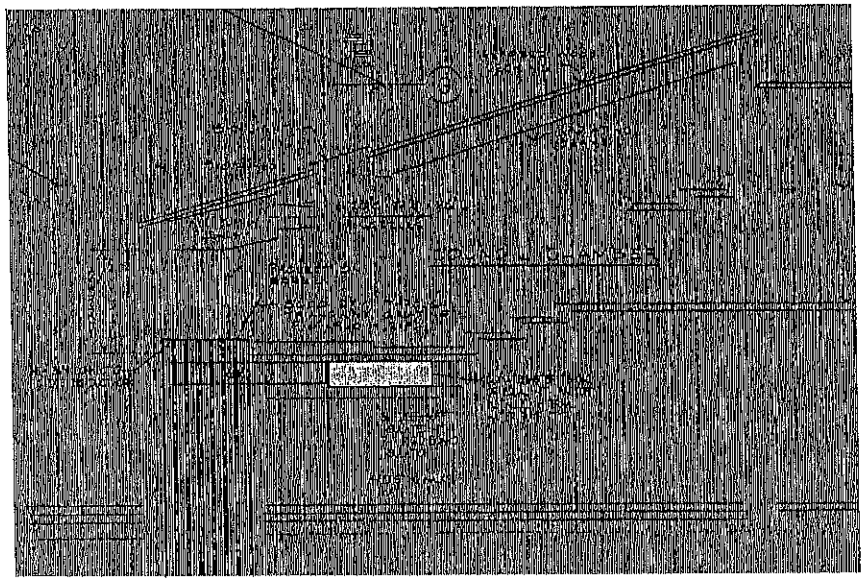
Fax 847.882.2201
ENGINEERING GROUP LLC

COUNCIL CHAMBERS – ALTERNATE BID

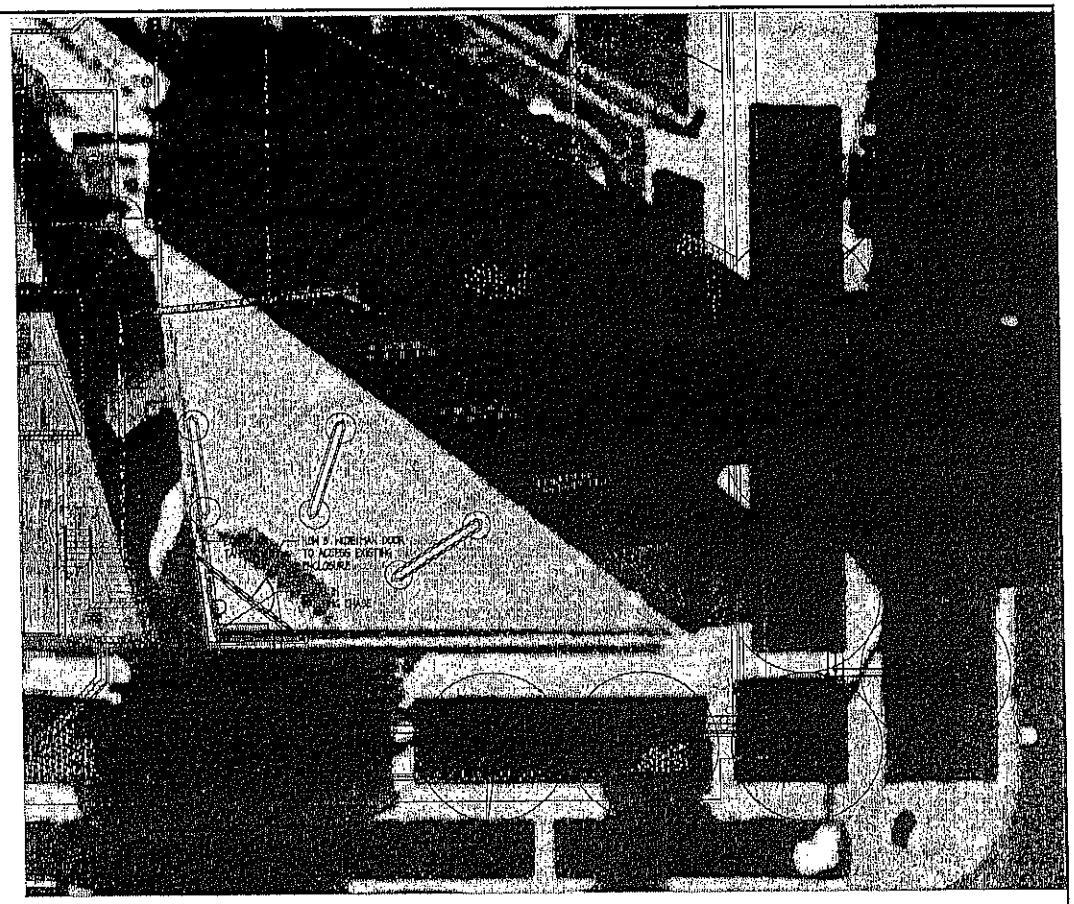
VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-2



1 HVAC SECTION PLAN
1/8" = 1'-0"



1 HVAC SITE PLAN
1/16" = 1'-0"

ENGINEERING
700 Cherry St., Suite C
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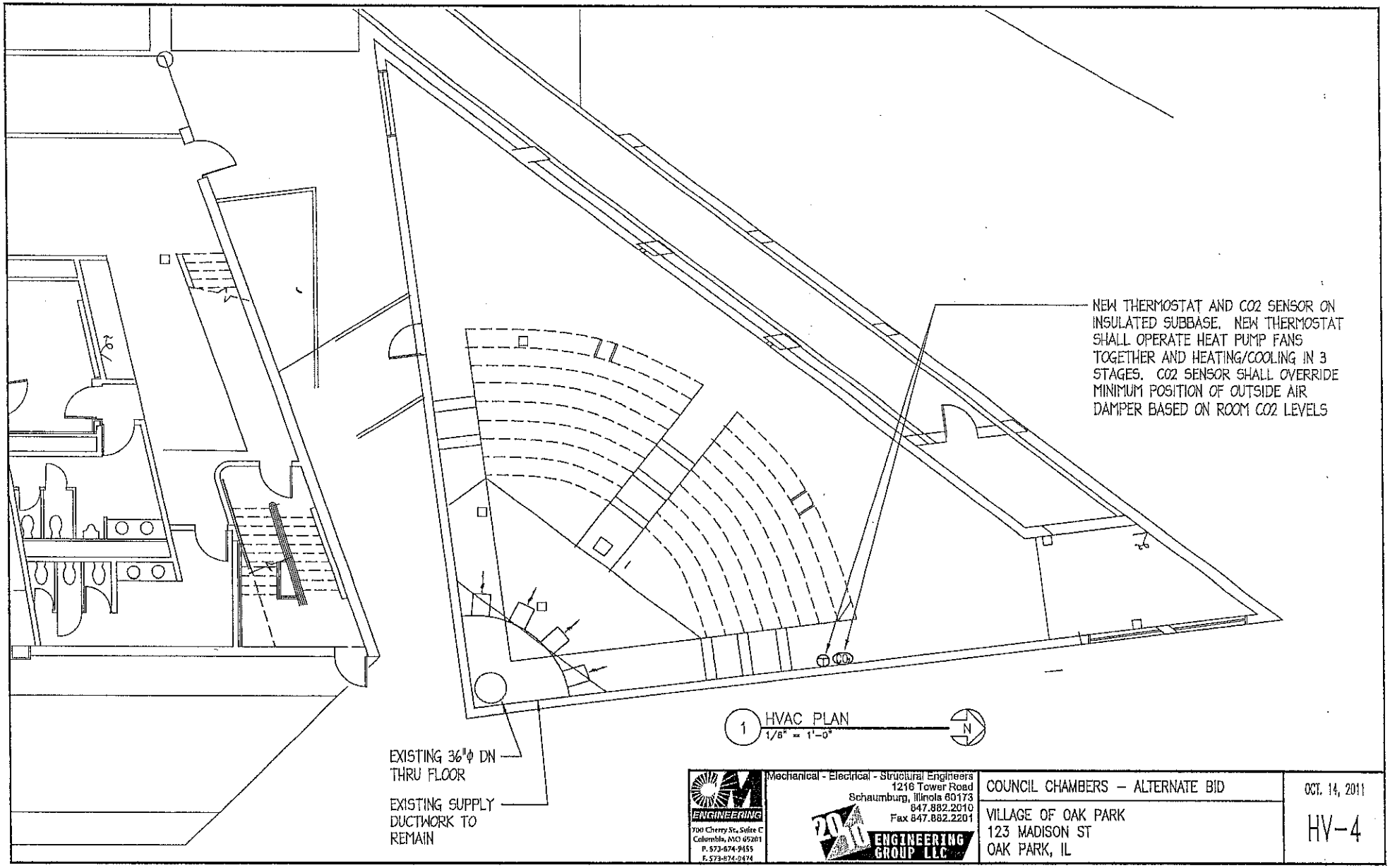
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201
2010 ENGINEERING GROUP LLC

COUNCIL CHAMBERS – ALTERNATE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-3



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1216 Tower Road
Schaumburg, Illinois 60173
847.882.2010
Fax 847.882.2201
PDK ENGINEERING GROUP LLC

COUNCIL CHAMBERS – ALTERNATE BID

VILLAGE OF OAK PARK
123 MADISON ST
OAK PARK, IL

OCT. 14, 2011

HV-4

REQUEST FOR PROPOSALS 11-202

VILLAGE OF OAK PARK

REQUEST FOR PROPOSALS FOR A DESIGN/BUILD CONTRACT TO INSTALL A COMPLETE GEOTHERMAL HVAC SYSTEM (INCLUDING ARCHITECTURAL, MECHANICAL, AND ELECTRICAL) FOR THE VILLAGE OF OAK PARK VILLAGE HALL COUNCIL CHAMBERS

The Village of Oak Park is seeking proposals from qualified mechanical design / build firms to design and build a complete geothermal HVAC system (including architectural, mechanical, electrical, and plumbing) for the Village of Oak Park Council Chambers.

The Village of Oak Park will receive proposals at the Public Works Center, 201 South Boulevard, Oak Park, Illinois 60302, Monday through Friday, 7:30 a.m. to 4:00 p.m. The Village will accept proposals received on or before Friday, October 7th, 2011, 10:00 a.m. Proposals must be enclosed in sealed envelopes and marked: "11-202 Installation of a Geothermal HVAC system for the Village Hall Council Chambers in the Village of Oak Park".

For further information contact:

Vic Sabaliauskas, Building Maintenance Superintendent
Village of Oak Park, Department of Public Works
201 South Blvd.
Oak Park, Illinois, 60302
Tel.: 708/358-5710
Fax: 708/358-5711
E-mail: Sabaliauskas@oak-park.us

There will be a Pre-Proposal meeting at the Village of Oak Park Village Hall, 123 Madison St., Oak Park, IL 60302 on Wednesday, September 28th, 2011 at 10:00 a.m.

The documents constituting component parts of their contract are the following:

I	PROJECT OVERVIEW AND OWNER'S REQUIREMENTS
II	SCOPE OF WORK
III	PROPOSAL REQUIREMENTS
IV	PROPOSAL FORMAT
V	EVALUATION OF PROPOSALS
VI	PROPOSAL INSTRUCTIONS, TERMS AND CONDITIONS
VII	ORGANIZATION OF PROPOSING FIRM
VIII	COMPLIANCE AFFIDAVIT
IX	M/W/DBE STATUS AND E.E.O. REPORT
X	NO PROPOSAL EXPLANATION
XI	EXHIBITS

Do not detach any portion of this document. Upon formal award to the successful Contractor, a written contract will be issued to complete the project.

DATE ISSUED: September 21st, 2011

SECTION I
PROJECT OVERVIEW and OWNER'S REQUIREMENTS

The purpose of this project is to design and build a stand-alone mechanical system based on a geothermal / ground source heat pump (GSHP) for the Village of Oak Park Council Chambers in Village Hall. The Village of Oak Park entered into an agreement with Primera to design the general scope of work and specifications for this project. After proposals are initially evaluated, the Village may interview one or more contractors.

The Council Chambers is a meeting room located in northeast corner of Village Hall and is a completely separate structure from Village Hall. It is a triangular structure and is approximately 2,500 square feet.

The Council Chambers is currently air conditioned and heated by a central air handling unit, S-6, located in the east mechanical room in the basement of Village Hall (B-147). The supply and return ductwork run underground from the mechanical room to the airshaft in the Council Chambers.

The Village has been considering a few different options. The option described in this RFP is: abandon the underground ductwork and AHU S-6, and install a standalone mechanical system based on a geothermal / ground source heat pump (GSHP). This new system shall be installed outside and adjacent to the airshaft in the northeast corner of Village Hall (bidders are encouraged to submit different options).

The current Council Chambers AHU unit, S-6, depends on the central chilled water provided by a 200-ton York water chiller for cooling. Due to its critical functions, the Council Chambers may require year-round cooling while the rest of the Village Hall does not require cooling in the winter season. Therefore, in order to support the Council Chambers functions in winter, the 200-ton chiller has to be kept operational, resulting in low efficiency and energy waste. By installing a dedicated Council Chambers unit, the main 200-ton chiller can be shut down in winter, thus realizing significant energy savings.

The GSHP system could provide much higher energy efficiencies in both cooling and heating seasons. Compared with a traditional heat pump or a typical DX (Direct Expansion) system with an EER (Energy Efficiency Ratio) rating between 10 and 12 Btuh/watt, a GSHP can have an EER as high as 16 Btuh/watt. This is mainly due to the fact that the ground water temperature normally stays around 55°F most the time while the entering water temperature for a regular water source heat pump entirely depends on the atmospheric wet-bulb temperature, and can be as high as 95°F. For a typical air-cooled heat pump, the temperature could be even higher, thus increasing the system lift and reducing the efficiency.

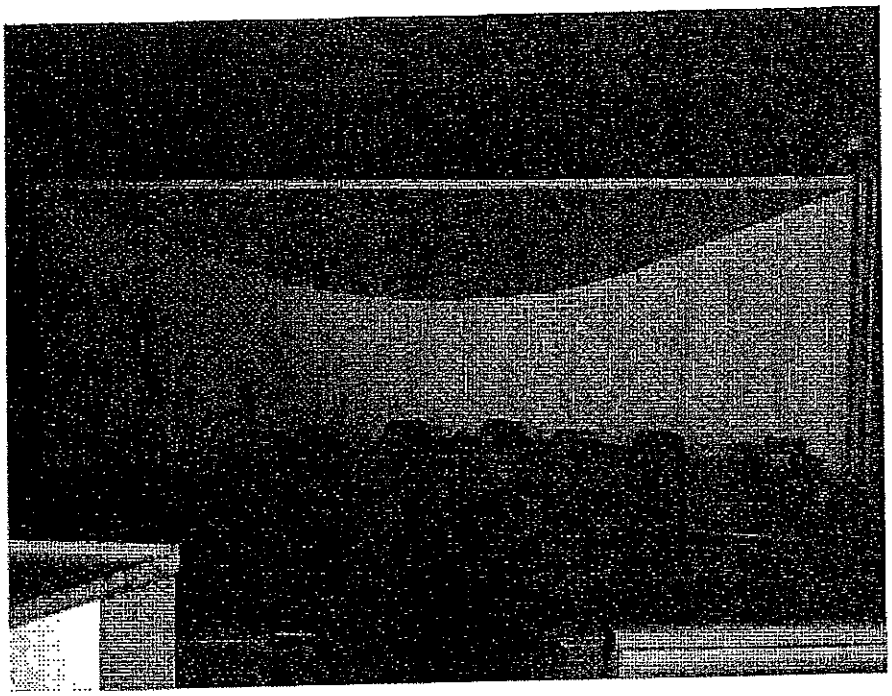
The estimated cooling load for the Council Chambers is 12-ton. However, the existing air handling unit S-6 is an 8,000 cfm unit with an 8-row chilled water coil. Even though the data for the unit is scanty, it is estimated that the existing AHU can provide up to 20-ton of cooling capacity. While the contractor is responsible for the final sizing of the HVAC system, the GSHP size is tentatively set at 20-ton. A typical deep geothermal well can handle 2-3 tons of capacity; therefore, a 20-ton unit would need 7 to 10 wells depending on specific geothermal well contractor. A typical well spacing is 15 to 20 feet. So the maximum length of the well field for this project would be up to 200 feet. This would make it difficult to select a geothermal field to support the project. Contractors are

encouraged to work diligently with Village Engineering Personnel to develop a workable solution for this matter.

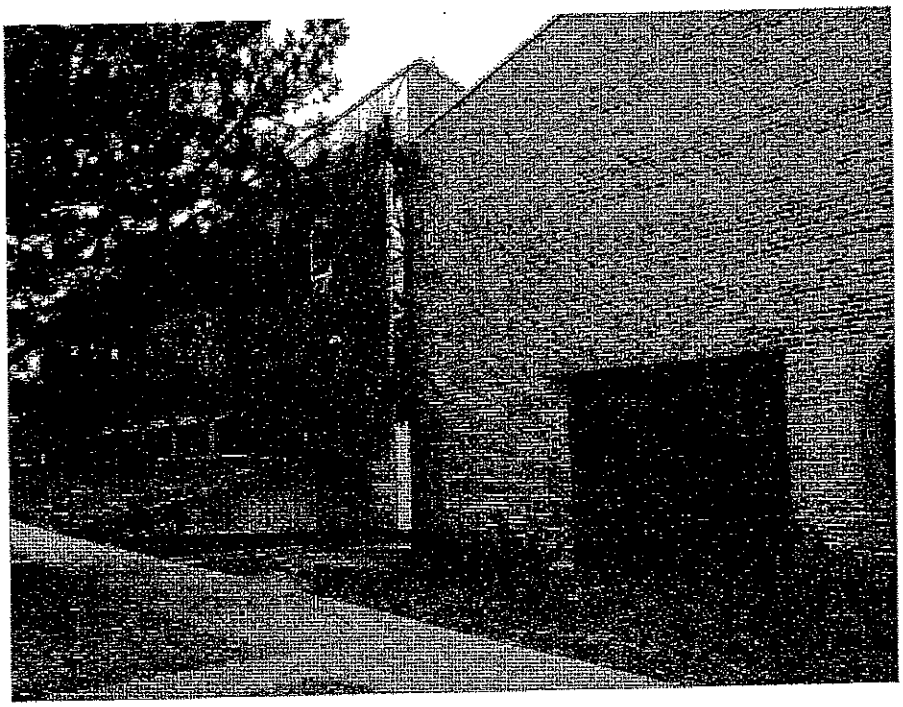
After the Village determines which proposal best suits the needs of the Village and meets the specifications set forth below, the selected company will enter into a contract with the Village to complete the project. The Contractor who is awarded the job shall install the new air handling system according to the general scope of work and specifications developed by the Village's mechanical engineering firm, Primera.

Project Schedule:

Request for Proposals issued:	Wednesday, Sept. 21st, 2011
Pre-Proposal meeting held at Village Hall at 10:00 a.m.:	Wednesday, Sept. 28th, 2011
Proposal due, 10:00 a.m.:	Friday, October 7th, 2011
Proposal review period:	Week of October 10th, 2011
Village Board approval:	Monday, November 7th, 2011



Council Chambers –the supply air is above the gyp board ceiling



The Council Chambers structure (looking from northeast) – Chambers on second level.

OWNER'S REQUIREMENTS:

The Owner's requirements are consistent with the ultimate goal of this project: DESIGN AND BUILD A DEDICATED HVAC / MECHANICAL / GEOTHERMAL SYSTEM TO PROVIDE YEAR-ROUND COMFORT FOR THE COUNCIL CHAMBERS. Specifically:

1. The new HVAC system shall be able to provide comfort and indoor air quality for the Council Chambers year-round. The summer temperature shall be controlled at 75°F +/- 5°F. The winter temperature shall be controlled at 70°F +/- 5°F.
2. The humidity will be incidental to the HVAC controls (i.e., no active humidity controls). However, efforts shall be made to limit summer humidity under 60% RH (relative humidity).
3. The mechanical cooling system efficiency shall meet or surpass the requirements set forth by ASHRAE 90.1-2007.
4. The indoor air quality shall meet the requirements set forth by ASHRAE 62.1-2007.
5. The system shall comply with Building and Mechanical Codes adapted by Village of Oak Park.
6. The system can provide up to 8,000 cfm of ventilation air.

SECTION II
SCOPE OF WORK

The scope of work described below is for general reference and information only. Bidders are encouraged to become thoroughly familiar with the existing conditions and to understand the ultimate goal of this project: DESIGN AND BUILD A DEDICATED HVAC / MECHANICAL / GEOTHERMAL SYSTEM TO PROVIDE YEAR-ROUND COMFORT FOR THE COUNCIL CHAMBERS, and to come up with the best and most cost-effective design concept and build such a system to achieve the ultimate goal. The Village is open-minded to consider various design concepts and award the contract to the bidder with the best overall design and build scheme.

The scope of work below is only intended for a starting point and general guidelines, and is not considered binding, as are the Drawing Diagrams and Specifications. Nevertheless, bidders are required to follow all applicable Village codes and standards, particularly ASHRAE 90.1 and LEED guidelines, and to obtain a construction permit from the Village.

The new work and demolition work associated with this project are described below:

A. Modification of the HVAC Ductwork and Airshaft

1. Cut an opening through the masonry wall from the outside into the existing airshaft to create access to the inside.
2. Install a standard hollow metal door 3'-0" by 6'-8" with door frame and lock on the opening.
3. Disconnect the existing 36" supply and return risers from the horizontal 36" ducts entering the shaft from underground.
4. Disconnect AHU (S6) from the underground ductwork in the east mechanical room in the lower level of the Village Hall.
5. Perform duct cleaning on the 36" supply riser and vacuum the inside thoroughly.
6. Seal (water tight) the openings of the air shaft to the horizontal supply and return duct openings from the underground ducts.
7. Modify the bottom of the 36" supply riser and extend it to the outside of the east side of the airshaft to be later connected to the new packaged unit. Seal the duct penetration water tight.
8. Install a return opening of 30x24 on the east side of the airshaft to be later connected to the new unit.
9. Close up and seal the concrete wall in the fan room after the ductwork has been disconnected from S6.

B. Package Vertical Water Source Heat Pump

1. Install a concrete base on the east side of the airshaft. The concrete base shall have footing to support the weight of various HVAC equipment.
2. Install a house keeping pad for the water source heat pump.
3. Procure and install a packaged water source heat pump with the following:
   a. A supply fan with nominal air volume up to 8,000 cfm and external static up to 2.0" w.c.

b. Multiple scroll type compressors running on R410A. The combined cooling capacity will be 20 ton or sized by the contractor. The rated efficiency shall meet ASHRAE 90.1.
c. An auxiliary electric heat with nominal capacity of 100 MBH.
d. Consideration being given to gas heat with gas fed from existing gas line.

4. Install supply and return ductwork from the new unit to the connections on the outside of the airshaft. Caulk and seal the connections.
5. Install ductwork insulation.
6. Install a 1-1/2" PVC condensate drain from the new unit to the ground drain.
7. Install power wiring from one of existing breakers in the mechanical room to the new unit with a NEMA 1 disconnect switch. The power wiring includes that for the auxiliary electric heater, if electric heat is used.
8. Install control wiring.

C. Piping System

1. Install an expansion tank (approximately 100 gallons acceptance volume).
2. Install a pressure fill system for filling the water loop with 25% propylene glycol brine.
3. Install an air separator.
4. Install an inline pump properly sized for this project.
5. Install all above-ground Schedule 40 carbon steel connecting all aforementioned equipment and the heat pump water connections.
6. Install all piping accessories including shut-off valves, gauges, thermometers, relief valves, vents, regulators, and check valves.
7. Install a VFD for the inline pump.
8. Install power wiring and control wiring to the pump and pressure fill system, and all others designed by Contractor.
9. Install a floor drain to the nearest sanitary drain system.

D. Mechanical Enclosure

1. Install a face-brick enclosure to house all HVAC and piping equipment. The brick type and color are to match the Village Hall exterior in order to blend the structure into the existing building.
2. Install a standard hollow metal door 3'-0" by 6'-8" with door frame and lock on the east side of the enclosure.
3. Install a roofing system for the enclosure.

E. Miscellaneous

1. Install temperature controls and network with Village-wide control system.
2. Perform Testing, Adjusting, and Balancing.

F. Geothermal System

7. Install a piping manifold chamber.
8. Bore geothermal wells and install 40mm diameter SDR 11 HDPE tubing with U-bend in each well. The number and depth of the wells shall be determined by the contractor to ensure proper performance of the system.

9. Connect all loops in the manifold chamber to SDR 11 HDPE headers.
10. Connect the HDPE headers in the mechanical room (enclosure) to the steel piping.

G. Additional Information

Bidders are asked to provide a schematic conceptual design of the geothermal system based on the specifications listed in this RFP, and the layout and conditions at the Village Hall. Bidders are asked to submit a fixed price proposal for the concept. The Village will select the best design which, in its judgment, best suits its purpose. The Village and the Contractor will then enter into a design-build agreement for the work which is subject to approval by the President and Board of Trustees. The Village and the contractor will adjust the proposed price based on the final detailed design specifications and the Village's project budget.

At the conclusion of the project, the Contractor will be required to commission the system to certify that all equipment has been and is operating at its design capacity and is installed in accordance with the plans, specifications and local, state and federal codes.

F. Attachments

The following attachments are provided not as the requirement for the design, but only as information to help Contractors to get started in the design process:

1. Sketch drawing SK-2 for Geothermal Option.
2. Drawing Diagram showing a conceptual level geothermal system.
3. Specifications for general mechanical requirements, HVAC insulation, and water-source (ground source) heat pumps.
    a. SECTION 15010 - GENERAL MECHANICAL REQUIREMENTS
    b. SECTION 15083 - HVAC INSULATION
    c. SECTION 15745 - WATER-SOURCE HEAT PUMPS
    d. SECTION 15747 – GROUND HEAT EXCHANGER (GHEX) DESIGN

SECTION 15010 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Summary:

1. The work to be performed under this Division shall include all labor, materials, equipment, transportation, construction plant and facilities necessary to provide a complete and satisfactory system ready to use. Examine all drawings and all sections of the specifications to ascertain to what extent other contracts affect work.

1.2 QUALITY ASSURANCE

A. Qualifications of contractor: All materials and equipment shall be new and all work shall be executed with the maximum speed consistent with current accepted trade practices. Furnish materials and equipment promptly after authorization to proceed, and proceed with work in progress with the other contractors on the project. Perform all work included in contract in a manner that will not cause interferences or delays to, or interfere with, the progress of other contractors.

B. Requirements of regulatory agencies:

1. Permits: Arrange and pay for all permits, inspections and utility connections required.

C. Referenced standards:

1. Comply with specified codes and standards. If conflict exists between codes or standards and drawings, project manuals or addenda requirements, request clarification from Architect/Engineer.
2. Conform to the installation rules and regulations of the standards listed including all subsequently published amendments thereto issued prior to the date of the bidding documents.
3. Conform to the requirements of all local, state and federal agencies which have authority over this project. Include all items of labor and material required to meet such requirements regardless of the failure to specify in the project manual or indicate on the drawings each individual item.
4. All equipment, apparatus and systems shall be rated, tested, fabricated and installed with the applicable industry standards.
5. The applicable portions of the latest editions of following standards form a part of this project manual to the same force and effect as if repeated herein.

a. American Gas Association, Inc. (AGA)
b. American Society for Testing Materials (ASTM)
c. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
d. American Society of Mechanical Engineers (ASME)
e. American Water Works Association (AWWA)
f. National Electrical Code (NEC)
g. National Electric Manufacturers Association (NEMA)
h. National Fire Protection Association (NFPA)
i. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

j. Underwriters Laboratories, Inc. (UL)
k. Illinois Standard Specifications for Water & Sewer Main Construction.
l. Illinois Environmental Protection Agency (IEPA)
m. Illinois Department of Public Health (IDPH)
n. City of Chicago Building Code, 2009
o. Illinois Plumbing Code, 2004

1.4 COORDINATION & SUBMITTALS

A. All contractors shall provide 1/4" = 1'-0" coordination drawings showing locations, dimensions and height of installation of all major pieces of equipment, ductwork and piping provided under their respective contracts. The contractors shall overlay their respective drawings and resolve all conflicts before actual installation begins.

B. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panel boards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical equipment.

C. Shop Drawings:

1. After receiving approval of equipment manufacturers, prior to delivery of any material to job site, and sufficiently in advance to allow the Architect/Engineer ample time for checking, submit digital copies in portable document format (PDF) of detailed, dimensioned shop drawings or cuts, showing construction, size, arrangement, operation clearances, performance characteristics, and capacity of equipment and material. The Architect/Engineer's review of such submittals shall not relieve the Contractor from responsibility for errors.

D. Operation & Maintenance Manual:

1. At least (3) weeks prior to substantial completion, (1) copy of each manual shall, be submitted for approval by the Architect/Engineer and for review by the Owner / Commissioning Authority, if applicable. Upon approval of all mechanical shop drawings, and at least (3) weeks prior to Owner operation and maintenance staff training, provide the Owner with three (3) approved copies of a hardbound operating manual for all equipment furnished and installed under this work.

E. As-Built Drawings: During the progress of the work, record all changes or deviations from the original drawings and layout of the work and record critical dimensions of buried or concealed work. Submit to Architect/Engineer for approval no later than (2) weeks after substantial completion. Upon approval of As-Built documents by the Architect/Engineer, contractor shall provide the Owner with (2) full-sized hard copies, and (1) copy in electronic *.pdf format on a CD-rom or DVD-rom media. Image for each *.pdf file must have a minimum resolution of 600 dpi. Each disc must be provided with a vinyl case, and case must be labeled with project name, media content and contractor contact information.

1.5 JOB CONDITIONS

A. Existing conditions:

1. In order to become familiar with the scope of the work involved, visit the existing site, before submitting bid, and carefully examine the existing condition in order to have full knowledge and understanding of the conditions and restrictions affecting the performance of the work

required. Include in bid all work which is reasonably inferred by the contract drawings and specifications, whether specifically shown or not, as a result of existing conditions, construction, irregularities and interferences which may affect work. No additional compensation will be considered for misunderstanding the conditions to be met.

1.6 CLEANING

A. Upon completion of the contract all remaining materials and rubbish shall be removed from the building and premises and the work areas shall be left clean and free from stains, mortar, paint spots, etc.

B. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Owner's designated representative to ensure that their function and purpose is understood.

C. Upon completion of the work, put systems into service maintaining responsibility for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.7 WARRANTY

A. Guarantee all work including labor, material and equipment for this project for a period of one (1) year from date of acceptance by Owner as determined by the Construction Manager. Contractor shall extend standard manufacturer's warranty on all equipment utilized during construction for heating and cooling.

B. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

C. Provide extended warranties on equipment (or portion of) as follows:

1. Compressors (parts and labor) - 5 years
3. Valve actuators (parts) - 5 years
4. All sensors (inclusive of calibration) - 3 years

D. Contractor shall provide the Owner with prices for all non-standard additional manufacturer warranties to meet the extended warranties requirements, as listed in 'B' above. The Owner reserves the option to accept, or reject, as desired. If rejected by the Owner, a credit in the amount of the additional warranty price will be due to the Owner.

E. Additional requirements for HVAC maintenance service:

1. At no expense to the Owner, during the one year building warranty period, provide complete service of controls systems, including call backs. Make minimum of two complete normal inspections in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports to the Owner.
2. Minimum response time for service calls MUST BE WITHIN 48 hours of call. Contractor must have a competent service technician available to perform needed service adjustments within a 50 mile radius of the project. Failure by the Contractor to comply with either of these requirements will forfeit any remaining building warranty retainage in accordance with the requirements of the contract documents.

END OF SECTION 15010

SECTION 15083 - HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Resistivity: "R-values" represent the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogeneous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between two exposed faces required to cause one Btu to flow through one square foot of material, in one hour, at a given mean temperature.

E. Density: Is expressed in lb/cu.ft.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thermal resistivity (R-value), thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Containers for Insulation material, coverings, cements, adhesives and coatings shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, maximum use temperature, and fire hazard index.

B. Protect against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation. Remove any such damaged and wet insulation from site.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields.

B. Coordinate clearance requirements with piping installer for piping insulation application, duct installer for duct insulation application, and equipment installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 WARRANTY

A. Provide warranty on materials and labor for 18 months starting from date of delivery, or one year from date of completion, whichever is longer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Flexible Elastomeric:

   a. Aeroflex USA Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2. Mineral-Fiber Blanket Insulation:

   a. CertainTeed Corp.; Duct Wrap.
   b. Johns Manville; Microlite.
   c. Owens Corning; All-Service Duct Wrap.

d. Knauf Insulation.

3. Mineral-Fiber Board Insulation:

   a. CertainTeed Corp.; Commercial Board.
   b. Fibrex Insulations Inc.; FBX.
   c. Johns Manville; 800 Series Spin-Glas.
   d. Knauf Insulation; Insulation Board.
   e. Manson Insulation Inc.; AK Board.
   f. Owens Corning; Fiberglas 700 Series..

4. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is UL tested and certified to provide a 2-hour fire rating. Products:

   a. CertainTeed Corp.; FlameChek.
   b. Johns Manville; Firetemp Wrap.
   c. Nelson Firestop Products; Nelson FSB Flameshield Blanket.
   d. Thermal Ceramics; FireMaster Duct Wrap.
   e. 3M; Fire Barrier Wrap Products.
   f. Unifrax Corporation; FyreWrap.
   g. Vesuvius; PYROSCAT FP FASTR Duct Wrap.

5. Duct Liner:

   a. Knauf Insulation: www.knaufusa.com
   b. Johns Manville Corporation: www.jm.com
   c. Owens Corning Corp: www.owenscorning.com
   d. CertainTeed Corporation: www.certainteed.com

6. Mineral-Fiber, Preformed Pipe Insulation:

   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000 Pipe Insulation.
   d. Owens Corning; Fiberglas Pipe Insulation.

7. Mineral-Fiber, Pipe and Tank Insulation:

   a. CertainTeed Corp.; CrimpWrap.
   b. Johns Manville; MicroFlex.
   c. Knauf Insulation; Pipe and Tank Insulation.
   d. Manson Insulation Inc.; AK Flex.
   e. Owens Corning; Fiberglas Pipe and Tank Insulation.

8. Fire-Rated Blanket:

   a. CertainTeed Corp.; FlameChek.
   b. Johns Manville; Firetemp Wrap.
   c. Nelson Firestop Products; Nelson FSB Flameshield Blanket.
   d. 3M; Fire Barrier Wrap Products.

9. Mineral-Fiber Insulating Cement:

   a. Insulco, Division of MFS, Inc.; Triple I.

b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

10. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement:

a. Insulco, Division of MFS, Inc.; SmoothKote.
b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
c. Rock Wool Manufacturing Company; Delta One Shot.

11. Flexible Elastomeric and Polyolefin Adhesive:

a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.

12. Mineral-Fiber Adhesive:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.

13. ASJ Adhesive, and FSK Adhesive:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80..

14. PVC Jacket Adhesive:

a. Dow Chemical Company (The); 739, Dow Silicone.
b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. Speedline Corporation; Speedline Vinyl Adhesive.

15. Vapor-Barrier Mastic:

a. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Vimasco Corporation; 749.

16. Lagging Adhesives:

a. Childers Products, Division of ITW; CP-52.
b. Foster Products Corporation, H. B. Fuller Company; 81-42.
c. Vimasco Corporation; 136.

17. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products:

a. Childers Products, Division of ITW; CP-76.
b. Foster Products Corporation, H. B. Fuller Company; 30-45.
c. Pittsburgh Corning Corporation; Pittseal 444.
d. Vimasco Corporation; 750.

18. Metal Jacket Flashing Sealants:

a. Childers Products, Division of ITW; CP-76-8.
b. Foster Products Corporation, H. B. Fuller Company; 95-44..
c. Vimasco Corporation; 750.

19. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

a. Childers Products, Division of ITW; CP-76.

20. PVC Jacket:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

21. Metal Jacket:

a. Childers Products, Division of ITW; Metal Jacketing Systems.
b. PABCO Metals Corporation; Surefit.
c. RPR Products, Inc.; Insul-Mate.

22. ASJ Tape:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

23. FSK Tape:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
b. Compac Corp.; 110 and 111.
c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.

24. PVC Tape:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.

25. Bands:

a. Childers Products; Bands.
b. PABCO Metals Corporation; Bands.
c. RPR Products, Inc.; Bands.

26. Insulation Pins and Hangers:

a. AGM Industries, Inc.; CWP-1.
b. GEMCO; Cupped Head Weld Pin.
c. Midwest Fasteners, Inc.; Cupped Head.
d. Nelson Stud Welding; CHP

27. Wire:

a. C & F Wire.
b. Childers Products.
c. PABCO Metals Corporation.
d. RPR Products, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and prepare surfaces to be insulated. Remove materials that will adversely affect insulation application. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

B. Coordinate insulation installation with the trade installing heat tracing, if any. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

Q. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA HVAC Duct Construction Standards – Metal Flexible for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (that are not fire rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Pipe: Install insulation continuously through floor penetrations.
3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

3.5 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

A. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
3. Protect exposed corners with secured corner angles.
4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:

    a. Do not weld anchor pins to ASME-labeled pressure vessels.
    b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
    c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.
    d. Do not overcompress insulation during installation.
    e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
    f. Impale insulation over anchor pins and attach speed washers.
    g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center

openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.

7. Stagger joints between insulation layers at least 3 inches.
8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.

1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
2. Seal longitudinal seams and end joints.

C. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch- diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
2. For Hot Water systems, fabricate boxes from galvanized steel, at least 0.050 inch thick.
3. For Dual Temperature, Chilled Water or Cold Water Systems, fabricate boxes from stainless steel at least 0.050 inch thick.
4. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles. Coordinate with drawings for insulation at locations of pipe expansion.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated on drawings. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches , place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not over-compress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.

6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

F. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.9 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

B. Where Stainless Steel jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.11 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ exposed to view only: Paint jacket with paint system identified below and as specified in Division 9 painting Sections. Coordinate with Architect.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system.
2. Inspect field-insulated equipment, randomly selected by Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation.
3. Inspect pipe, fittings, strainers, and valves, randomly selected by Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation.

C. All insulation applications will be considered defective work if sample inspection reveals noncompliance with requirements. Owner may reject all work if sample work is found to be defective.

3.13 DUCT INSULATION PERFORMANCE , GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, supply and outdoor air.
2. Indoor, concealed return located in non-conditioned space.
3. Indoor, return located in non-conditioned space.
4. Indoor, exhaust between isolation damper and penetration of building exterior.
5. Outdoor, supply, return and air.

B. Items Not Insulated:

1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1 2004.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.
5. Vibration-control devices.
6. Factory-insulated access panels and doors.

3.14 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. INSULATION APPLICATION SCHEDULE

1. General: Abbreviations used in the following schedules include:

a. Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel.

B. DUCT SYSTEMS INSULATION SCHEDULE

DUCT LOCATION	OUTSIDE AIR, SUPPLY AIR , EXHAUST AIR (DOWN STREAM OF DAMPER) INSULATION INSTALLED R-VALUE (H-FT^2-°F)/BTU	RETURN INSULATION INSTALLED R-VALUE (H-FT^2-°F)/BTU
EXTERIOR OF BUILDING (NOTE 5,6,7)	6.5	6.5
DOUBLE WALL DUCTWORK (NOTE 8)	-	-
UNCONDITIONED SPACE (NOTE 2,5,6,7)	6.5	6.5
DUCT LOCATION	OUTSIDE AIR, SUPPLY AIR , EXHAUST AIR (DOWN STREAM OF DAMPER) INSULATION INSTALLED	RETURN INSULATION INSTALLED R-VALUE (H-FT^2-°F)/BTU

	R-VALUE (H-FT^2-°F)/BTU	
CEILING CAVITY / SHAFTS / SOFFITS / MECHANICAL SPACES AND ROOMS (NOTE 4,5,6,7)	3.5	-
EXPOSED LOCATIONS WITHIN CONDITIONED SPACE	-	-

NOTE 1: INSULATION R-VALUES, MEASURED IN (H X FT^2 X F)/BTU, ARE FOR THE INSULATION AS INSTALLED AND DO NOT INCLUDE FILM RESISTANCE. WHERE EXTERIOR WALLS ARE USED AS PLENUM WALLS, WALL INSULATION SHALL BE AS REQUIRED BY THE MOST RESTRICTIVE CONDITION OF ASHRAE 90.1-2004 SECTION 5 OR 6.4.4.2. INSULATION RESISTANCE MEASURED ON A HORIZONTAL PLANE IN ACCORDANCE WITH ASTM C518 AT A MEAN TEMPERATURE OF 75F AT THE INSTALLED THICKNESS.

NOTE 2: INCLUDING CRAWL SPACES (BOTH VENTILATED/NON-VENTILATED), FRAMED CAVITIES IN WALLS, FLOOR AND CEILING ASSEMBLIES WHICH (A) SEPARATE CONDITIONED SPACE FROM UNCONDITIONED SPACE OR OUTSIDE AIR, AND (B) ARE UNINSULATED ON THE SIDE FACING AWAY FROM CONDITIONED SPACE.

NOTE 3: RETURN AIR PLENUMS WITH OR WITHOUT EXPOSED ROOFS ABOVE.

NOTE 4: CAVITY CONTAINED WITHIN THE INSULATED BUILDING ENVELOPE.

NOTE 5: VAPOR BARRIER REQUIRED.

NOTE 6: FIELD APPLIED JACKET (STAINLESS STEEL FOR EXTERIOR APPLICATIONS, PVC FOR INTERIOR EXPOSED LOCATIONS).

NOTE 7: PROVIDE MINERAL FIBER BOARD WITH FIELD APPLIED JACKET (SS EXTERIOR, ALL SERVICE INTERIOR) IN EXPOSED LOCATIONS IN LIEU OF MINERAL FIBER BLANKET.

NOTE 8: DO NOT PROVIDE EXTERNAL FIELD APPLIED INSULATION ON DOUBLE WALL DUCTWORK. INTERSTITIAL SPACE INSULATION TO BE PROVIDED WITH PRODUCT.

3.15 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor and outdoor equipment in paragraphs below that are not factory insulated.

C. Heating-hot-water expansion/compression tank insulation shall be one of the following:

1. Mineral-Fiber Board: 1 inch thick and 3-lb/cu. ft. nominal density. PVC jacket.
2. Mineral-Fiber Pipe and Tank: 1 inch thick. PVC jacket.

D. Heating-hot-water air-separator insulation shall be one of the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density. PVC jacket.
2. Mineral-Fiber Pipe and Tank: 2 inches thick. PVC jacket.

E. Piping system filter-housing (side stream filter) insulation shall be one of the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density. PVC jacket.
2. Mineral-Fiber Pipe and Tank: 2 inches thick. PVC jacket.

3.16 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.17 PIPING INSULATION SCHEDULE

A. General:

B. Abbreviations used in the following schedules include:

1. Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel.
2. Pipe Sizes: NPS - Nominal Pipe Size.

C. Minimum HVAC pipe insulation thickness table:

	FLUID TEMPERATURE RANGE (°F)	INSULATION TYPE AND FIELD-APPLIED JACKET			PIPE SIZE AND INSULATION THICKNESS (INCHES)[5][6]					
HEATING SYSTEMS[1][9] (Hot Water)		GLASS FIBER	POLYISO-CYANURATE	FLEXIBLE ELASTOMERIC		< 1"[4]	1" to < 1-1/2"	1-1/2" to < 4"	4" to 6"	8" and Larger
Low temperature	106-200	X				1	1	1-1/2	1-1/2	1-1/2
COOLING SYSTEMS[1][9]										
Chilled water, refrigerant and brine	40-60	X[2][8]	X[2][3][8]	X[8]		1/2	3/4	1	1	1
	Below 40	X[2][8]	X[2][3][8]	X[8]		1	1-1/2	1-1/2	1-1/2	1-1/2

Notes:

1. Glass fiber insulation only for hydronic piping
2. (P), (A) or (SS) Field-Applied Jacket on outdoor installations, exposed and concealed
3. For outdoor use only
4. Piping insulation is not required between control valve the control valve and coil on runouts when the control valve is within 4ft of the coil and the pipe size is 1" or less.
5. For piping exposed to outdoor air, increase insulation thickness by 1-inch
6. Insulation thickness is based on insulation having a thermal conductivity of 0.22 to 0.25 BTU-inch/(h-ft^2°F) on a flat surface at a mean temperature of 75F.
7. Not used.
8. Vapor barrier.
9. Dual temperature water shall be treated as Low temperature hot water with a vapor barrier.

3.18 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping, Exposed:

1. PVC, Off-White Color: 10 mils thick.

3.19 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches

1. Stainless Steel, Type 304, Smooth 2B Finish: 0.016 inch thick.

C. Ducts and Plenums, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:

1. Stainless Steel, Type 304, Smooth Finish: 0.020 inch thick.

END OF SECTION 15083

SECTION 15745 - WATER-SOURCE HEAT PUMPS

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings.

B. Project Information, Instructions to Bidders, and Execution Documents.

C. Standard Terms and Conditions for Construction Contracts.

4.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each model.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Product Certificates: For each type of water-source heat pump, signed by product manufacturer.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For water-source heat pumps to include in emergency, operation, and maintenance manuals.

F. Warranty: Special warranty specified in this Section.

4.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of water-source heat pumps and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASHRAE Compliance:

1. ASHRAE 15.
2. Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IESNA 90.1-2007 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2007, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Comply with NFPA 70.

F. Comply with safety requirements in UL 484 for assembly of free-delivery water-source heat pumps.

G. Comply with safety requirements in UL 1995 for duct-system connections.

4.4 COORDINATION

A. Coordinate layout and installation of water-source heat pumps and suspension components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components, and partition assemblies.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

4.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water-source heat pumps that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, refrigeration components.
2. Warranty Period: Five years from date of Substantial Completion.

4.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. One set of matched fan belts for each belt-driven fan.
2. One set of filters for each unit.

PART 5 - PRODUCTS

5.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. ClimateMaster, Inc.
2. Trane
3. McQuay

5.2 VERTICAL-STACK WATER-SOURCE HEAT PUMPS

A. Description: Packaged water-source heat pump with temperature controls; factory assembled, tested, and rated according to ARI-ISO-13256-1.

B. Cabinet and Chassis: Manufacturer's standard galvanized-steel casing with the following features:

1. Return-air opening with access panel for access to internal components.
2. Knockouts for electrical and piping connections.
3. Cabinet Insulation: Glass-fiber liner, 1/2 inch thick, complying with UL 181.

4. Condensate Drainage: Stainless-steel drain pan with condensate drain piping projecting to unit exterior and complying with ASHRAE 62.1-2007.
5. Discharge Grille: Double deflection grille for adjustable discharge air pattern.
6. Discharge and Return Grille Color: Selected by Architect from manufacturer's color selection.
7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Fan: Direct driven, centrifugal, with multispeed motor mounted on a removable fan-motor board.

1. General requirements for motors are specified in Division 15 Section "Motors."
2. Motor: Multispeed, permanently lubricated, ECM.

D. Water Circuit:

1. Refrigerant-to-Water Heat Exchanger: Coil-in-shell heat exchanger with copper water tube with enhanced heat-transfer surfaces inside a steel shell; both shell and tube leak tested to 450 psig on refrigerant side and 400 psig on water side. Mount heat exchanger in unit on resilient rubber vibration isolators.
2. Risers: ASTM B 88, Type L (ASTM B 88M, Type B) copper pipe with hose and ball valve for system flushing.

E. Refrigerant-to-Air Coil: Copper tubes with aluminum fins, leak tested to 450 psig.

F. Refrigerant Circuit Components:

1. Sealed Refrigerant Circuit: Charge with R410A refrigerant.
2. Filter-Dryer: Factory installed to clean and dehydrate the refrigerant circuit.
3. Charging Connections: Service fittings on suction and liquid for charging and testing.
4. Reversing Valve: Pilot-operated sliding-type valve designed to be fail-safe in heating position with replaceable magnetic coil.
5. Compressor: Hermetic scroll compressor installed on vibration isolators housed in an acoustically treated enclosure with factory-installed safeties as follows:

    a. Antirecycle timer.
    b. High-pressure cutout.
    c. Low-pressure cutout or loss of charge switch.
    d. Internal thermal-overload protection.

6. Refrigerant Piping Materials: ASTM B 743 copper tube with wrought-copper fittings and brazed joints.
7. Pipe Insulation: Refrigerant minimum 3/8-inch- thick, flexible elastomeric insulation on piping exposed to airflow through the unit. Maximum 25/50 flame-spread/smoke-development indexes per ASTM E 84.
8. Refrigerant Metering Device: Thermal expansion valve to allow specified operation with entering-water temperatures from 65 to 100 deg F.

G. Filters: Disposable, glass-fiber, flat type, 1 inch thick, treated with adhesive, and having a minimum of 80 percent arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value of 5 according to ASHRAE 52.2.

H. Filters: Disposable, pleated type, 1 inch thick and with a minimum of 90 percent arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value of 7 according to ASHRAE 52.2.

I. Control equipment and sequence of operation are specified in Division 15 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation."

J. Controls:

1. Basic Unit Controls:

a. Low- and high-voltage protection.
b. Overcurrent protection for compressor and fan motor.
c. Random time delay, three to ten seconds, start on power up.
d. Time delay override for servicing.
e. Control voltage transformer.

2. Thermostat:

a. Wall-Mounted Thermostat:

1) Heat-cool-off switch.
2) Fan on-auto switch.
3) Automatic changeover.
4) Concealed temperature set point.
5) Concealed temperature indication.
6) Deg F indication.

3. Terminal Controller:

a. Scheduled operation for occupied and unoccupied periods on seven-day clock with minimum four periods per day.
b. Two-hour unoccupied period override period.
c. Backup for volatile memory.

K. Electrical Connection: Single electrical connection with fused disconnect.

5.3 HOSE KITS

A. General: Hose kits shall be designed for minimum 400 psig working pressure, and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.

B. Hose: Length 36 inches. Minimum diameter, equal to water-source heat-pump connection size.

C. Isolation Valves: Two-piece bronze-body ball valves with stainless-steel ball and stem and galvanized-steel lever handle. Provide valve for supply and return. If balancing device is combination shutoff type with memory stop, the isolation valve may be omitted on the return.

D. Strainer: Y-type with blowdown valve in supply connection.

E. Balancing Device: Mount in return connection. Include meter ports to allow flow measurement with differential pressure gage.

1. Automatic balancing valve, factory set to operate within 10 percent of design flow rate over a 40:1 differential pressure range of 2 to 80 psig.

PART 6 - EXECUTION

6.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of water-source heat pumps.

B. Examine roughing-in for piping and electric installations for water-source heat pumps to verify actual locations of piping connections and electrical conduit before installation.

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

6.2 INSTALLATION

A. Concrete Bases: Install floor mounting units on 4-inch- high concrete bases. See Division 15 Section "Basic Mechanical Materials and Methods" for concrete base materials and fabrication requirements.

B. Mount water-source heat pumps on concrete base with vibration isolators. Vibration isolators are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

1. Units with Internally Isolated Fans and Compressors: Support on concrete bases using neoprene pads with minimum 0.125-inch static deflection. Secure units to anchor bolts installed in concrete bases.
2. Floor-Mounted Units: Support on concrete bases using housed-spring isolators with minimum 1-inch static deflection. Secure units to anchor bolts installed in concrete bases.

C. Install wall-mounting thermostats, humidistats, and switch controls in electrical outlet boxes at heights to match lighting controls or as required in Division 15 Section "HVAC Instrumentation and Controls."

6.3 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Connect supply and return hydronic piping to heat pump with unions and shutoff valves.
2. Connect heat-pump condensate drain pan to indirect waste connection with condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.

B. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts. Specific connection requirements are as follows:

1. Connect supply and return ducts to water-source heat pumps with flexible duct connectors.

C. Install electrical devices furnished by manufacturer but not specified to be factory mounted.

D. Install piping adjacent to machine to allow service and maintenance.

E. Ground equipment according to Codes and good practice.

F. Connect wiring according to Codes and good practice.

6.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. After installing water-source heat pumps and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

6.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Adjust vibration isolators.
9. Inspect operation of barometric dampers.
10. Verify bearing lubrication on fan.
11. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
12. Adjust fan belts to proper alignment and tension.
13. Start unit according to manufacturer's written instructions.
14. Complete startup sheets and attach copy with Contractor's startup report.
15. Inspect and record performance of interlocks and protective devices; verify sequences.
16. Operate unit for an initial period as recommended or required by manufacturer.
17. Verify thermostat and humidistat calibration.
18. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
20. Start refrigeration system and measure and record the following:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.

d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

21. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

a. Supply-air volume.
b. Return-air volume.
c. Relief-air volume.
d. Outdoor-air intake volume.

6.6 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

6.7 CLEANING

A. Replace filters used during construction prior to air balance or substantial completion.

B. After completing installation of exposed, factory-finished water-source heat pumps, inspect exposed finishes and repair damaged finishes.

6.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water-source heat pumps.

END OF SECTION 15745

SECTION 15747 – GROUND HEAT EXCHANGER (GHEX) DESIGN

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. GHEX design and piping.

1.2 RELATED SECTION

A. 15745 – Water Source heat pumps

1.3 SUMMARY

A. The GHEX contractor shall comply with IGSHPA Standard as well as all State and local regulations pertaining to the installation.

B. The GHEX contractor is responsible for all aspects involved with the complete GHEX design and installation. All materials, drilling, excavation, hauling of backfill, pumping, soil compaction and labor required shall be included in the bid price.

C. The GHEX contractor shall take note: there is no guarantee to the GHEX contractor that the location of any existing utilities are exactly as indicated on the plans. Some areas may require hand digging to locate that utility. The GHEX contractor must include in the bid price, the repair of any domestic water, electrical, communication or any service line that may be damaged during the construction of this project. Any offsets required to route over or under existing lines shall also be included in the bid price of the project.

1.4 SUBMITTAL

A. Before GHEX construction begins, the GHEX contractor must submit certified and engineer stamped shop drawings to the design engineer. The shop drawings shall include all applicable manufacturer's specifications, warranties, and material safety data sheets for all materials used in the geothermal installation.

1. Submittal shall include following parameters

a. Geological formation thermal conductivity assumption with notes regarding source of assumption (i.e., recent thermal response tests in same region).
b. Geological formation thermal diffusivity assumption with notes regarding source of assumption (i.e., recent thermal response tests in same region).
c. GHEX flow test report (see part 3 below)

B. Submittal shall include calculated values for the following parameters for the first year of system operation, and 25-year look ahead. Parameters shall be based on a detailed computer simulation thermal analysis of the building space conditioning equipment loading of the GHEX. The computer simulation thermal analysis shall, at a minimum, meet the following requirements:

1. The computer energy simulation environment must meet standards defined by ASHRAE Standard 140.
2. The simulation environment must include modular mathematical calculation methodologies designed to model the specific components of the renewable energy system being measured. The building, HVAC equipment and GHEX modules must be contained in the same simulation environment.
3. The model GHEX must be accurately represented geometrically by the simulation tool (depth, spacing and total loop quantity).
4. The simulation environment must be capable of time-steps of less than 10 minutes, and must be capable of reporting process parameters for each time step.
5. In order to assess long-term stability and efficiency of the loopfield, the analysis must include a study of the average process fluid temperature over a period of 25-years.

C. The post process parameters (simulation deliverables) shall be, at minimum:

   a. Source fluid temperatures (supply and return from the GHEX).

      1) Values to be reported for each time step for one (1) year
      2) Values for each 24-hour period over a 25-year look ahead.

   b. Total energy rejected to and extracted from the GHEX in one (1) year.
   c. Total energy contributed by backup heating and/or cooling devices connected to the GHEX controlled per the plan and specs.

D. Alternate designs for the GHEX must be submitted with a thermal analysis of the interaction between the earth and the building space conditioning system. The analysis shall be enacted by a computer simulation environment that meets the requirements defined in Section 1.4.B. The alternate must provide the simulation deliverables as outlined in Section 1.4, C above to the engineer of record for approval. Alternate designs include, but are not limited to, changes in GHEX depth, GHEX spacing, GHEX construction, loop specifications, and number of loops in the GHEX. Alternate designs must stay within the well field footprint limits outlined on the drawings.

1.5 QUALITY ASSURANCE

A. The GHEX contractor must have on this project a certified IGSHPA installer. The GHEX contractor performing this work must have a minimum of two years experience in performing underground closed circuit ground loop work of this project's size or larger.

B. Vertical heat exchanger (VHE) fabricators must be heat fusion certified by an authorized high density polyethylene (HDPE) pipe manufacturer's representative of the brand of pipe used. Certification must include: successful completion of a written heat fusion exam as well as demonstrating proper heat fusion techniques under the direct supervision of the authorized HDPE pipe manufacturer's representative.

PART 2 - PRODUCTS

2.1 PIPE

A. The pipe shall be PE3408 HDPE with a minimum cell classification of 45434C per ASTM D3035-93 and a SDR11 (160 psi) rating for u-bends and header pipe 2 inches or smaller and a minimum of

DR15.5 (110 psi) for header pipe greater than 2 inch in diameter. This pipe will carry a warranty of no less than 50 years.

B. Each pipe shall be permanently indent marked with the manufacturer's name, nominal size, pressure rating, relevant ASTM standards, cell classification number and date of manufacture.

C. All piping used for VHE will have factory hot-stamped lengths impressed on the side of the piping indicating the length of the VHE at that point. The length stamp shall read zero on one end and the actual VHE total length on the other end.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. MuoviTech
2. Charter Plastics
3. Centennial Plastics
4. Isco Industries

2.2 PIPE INSULATION

A. Pipe insulation must be designed for underground applications. For pipe diameter's equal to or greater than 2" the minimum wall thickness is one half (1/2) inch. For pipe diameters smaller than 2" the minimum wall thickness is one quarter (1/4) inch. Acceptable insulation type shall be closed cell polyethylene per ASTM C1427.

2.3 VAULTS / MANIFOLDS

A. A test point vault will be installed between the Loopfield and (the) (each) building's mechanical room. The test point will be the location where the loopfield flow test, and the loopfield and the building flush out will be done. All valves and piping will be sized to match the piping of the loop field.

B. CONCRETE VAULT

1. The vault structure should be a composite structure of steel and concrete. The inner shell consists of a heavy-duty steel frame and base with steel interior walls, ceiling and floor that are specially treated with a rubberized rust resistant coating. The outer shell of the wall and ceiling consists of 8" thick reinforced poured concrete. The vault is shipped from the manufacturer preformed for concrete pour with all reinforcement rods, manifolds, and piping secured in place. The vault is set on an 18" level base of compacted gravel.

C. ATLANTIS POLY VAULT

1. Shall be constructed of high density polyethylene flat stock having a cell classification of 345444 with a UV stabilizer of C. All materials used shall have a minimum thickness of 1". Internal and external seams are heat welded using high density polyethylene welding rods having a cell classification of 345444C. Walls to be 72" high, with a 30" manhole with ladder. The manhole lid is connected with 8 – 3/8" stainless steel counter sunk bolts. Lid to have 5000 pound load bearing capacity. Shall be spaced at a maximum of 30" and constructed of a minimum of 1" thick high density polyethylene flat stock heat welded to the external shell with high density polyethylene welding rods.
2. Shall be constructed of CPChem Performance Driscoplex 5300 Climate Guard™ High Density Polyethylene DR 15.5 pipe having a cell classification of 345444 with a UV stabilizer of C. This internal pipe is constructed in an offset, over and under, model for supply and return lines. All joints to be heat fused. The entire piping system to be tested using 150 psi. The main supply

and return pipe to be shipped with cap butt welded to pipe. All pipe penetrating the vault walls shall be DR 9 and heat welded to external shell.

a. P/T Plugs

1) Shall be constructed of solid brass and have a dual seal core of Nordel, good up to 350°F for water. Plugs shall be rated zero leakage from vacuum to 1000 psig and are capable of receiving a pressure or temperature probe.

b. Butterfly Valve

1) Shall be constructed of a cast iron body, 416 stainless steel stem with a lever shut of system.

c. 90° Elbows

1) Shall be molded out of high density polyethylene resins in accordance with the requirements of ASTM 3261.

d. Branch and Service Saddles

1) Shall be molded out of high density polyethylene resins in accordance with the requirements of ASTM 3261.

3. The vault shall be lowered into a pit 105" deep with a 6" bed of #57 gravel. Once the vault is in its place, concrete is poured 36" deep and 12" thick around the vault to balance buoyancy pressure and allow for anchoring.
4. HDPE pipe, joined together with heat fusion, should be used for all of the vault's circuit and main header piping. This HDPE pipe is non-corrosive and leak proof. All of the vault's circuits include valves and pressure/temperature ports for complete isolation, pressure testing and flow balancing. Acceptable manifolds are manufactured by GHP Systems, Inc.

D. GRADE ACCESSIBLE HDPE VAULT

1. Vault shall be constructed of high density polyethylene (HDPE) with UV stabilizer. The overall height shall be between 32 and 42 inches high with a floating manhole cover and sleeve to interface with the grade. The width or diameter of the enclosure shall be between 30 and 48 inches. The enclosure and cover shall be water tight with an optional drainage port. The vault shall include:

a. Isolation valves for each loop. Valves shall be ball or needle type, with brass, bronze, or stainless steel body.
b. Combination flow meter and balancing valves for each loop. Balancing and calibration valves shall also serve as isolation valves. Valves shall include memory set screw to maintain initial balancing set point.
c. Two additional connection ports with isolation valves to allow independent testing and flushing in each vault.
d. The option of a HDPE access walk-over cover or a heavy duty cast iron access cover designed to be driven over by vehicles.

2. All pipes used for the vault shall be manufactured according to INSTA SBC12201 EN12201:2003 or US standard PE4710.
3. The vault shall be placed in a pit to a depth that allows the access cover to be flush with the finished grade condition according to all GHEX drawings.

4. Insulated horizontal HDPE piping may be raised up from design depths in the area directly surrounding the vault in order to allow connections to the vault.
5. All valves and pipe connections shall not be lower than 4' below grade to allow tooling and hand access.

2.4 FITTINGS

A. Pipe fittings shall meet the requirements of ASTM D2683 (for socket fusion fittings) or ASTM D3261 (for butt/saddle fusion fittings). Each fitting shall be identified with the manufacturer's name, nominal size, pressure rating, relevant ASTM standards and date of manufacturer.

2.5 BENTONITE GROUT

A. The thermally enhanced bentonite grout used to seal the VHE shall have a minimum thermal conductivity of 0.57 Btu/hr-ft°F and a minimum of 43% solids. This grout will also have a permeability rate of less than 1X10-7cm/sec.

2.6 LOCATING TAPE

A. Locating tape must be foil backed, two inches wide or greater, with a continuous message printed every 36 inches or less reading: "CAUTION GEOTHERMAL PIPELINE BURIED BELOW". The tape shall be highly resistant to alkalis, acids, and other destructive agents found in the ground.

2.7 FIELD LOCATION

A. The four outside grid bores should be surveyed after drilling is complete, but before horizontal trenching is done

PART 3 - EXECUTION

3.1 DRILLING

A. All drilling techniques and methods will meet local and State codes for closed-loop geothermal drilling.

B. The vertical boreholes shall be drilled to a depth that allows complete insertion of the VHE to its specified depth. The maximum borehole diameter shall be six and one-half inches nominally. If a larger diameter is required, it must be approved by the design engineer.

C. The GHEX installer must be capable of operating multiple drilling rigs at once in order to satisfy aggressive schedule requirements.

D. The drilling equipment shall be able to drill through consolidated bedrock formations.

E. All drill casing shall be steel permanently installed and sealed into bedrock.

3.2 DRILLING SPOILS AND PROCESS FLUIDS

A. There shall be adequate drilling spoils management equipment on site while drilling to handle predictable spoils and drilling fluid volumes. All drilling spoils and fluids shall be contained within piping systems and construction dumpsters or settling tanks in order to maintain a clean and safe work site.

B. Drilling spoils and excavated material not recycled on site shall be hauled away by a licensed waste hauler according to local regulations.

3.3 Water used or brought to the surface during drilling operations shall not run-off the site or be discharged to sewers or storm drains until filtered using filtration equipment capable of a minimum separation of 15 microns d 50 cut.

3.4 U-BEND PIPE ASSEMBLY

A. U-bend assembly shall have integrated concrete and HDPE weight for overcoming buoyancy and for protection of u-bend fitting during installation. If necessary, an iron (sinker) bar can be attached at the base of each u-bend to overcome buoyancy. This iron bar will have all sharp edges adequately taped to avoid scarring and/or cutting of the polyethylene pipe. No driving rod that is pulled out after u-bend insertion will be allowed. The entire u-bend pipe assembly is inserted to the specified depth in the borehole.

3.5 GROUTING PROCEDURE

A. The VHE is to be grouted from the bottom up, in a continuous fashion, using an HDPE tremie pipe. The tremie pipe will be pulled out during the grouting procedure maintaining the pipe's end just below grout level within the borehole. All State regulations will be met for borehole grouting of the VHE. The VHE shall be pressurized and capped during the grouting procedure and for 4 hours afterwards as the grout sets up.

3.6 HEAT FUSION and ELECTRO-FUSION PIPE JOINING

A. All underground pipe joining will be heat fused or electro-fused by socket, butt or saddle (sidewall) fusion in accordance to ASTM D2610, ASTM D2683 and the manufacturer's heat fusion or electro-fusion specifications. The operator shall be heat fusion or electro-fusion certified and experienced in executing quality fusion joints.

3.7 EXCAVATION AND BACKFILLING FOR PIPING

A. The GHEX contractor shall do all excavating, backfilling, shoring, bailing and pumping for the installation of his work and perform necessary grading to prevent surface water from flowing into trenches or other excavations. Sewer lines shall not be used for draining trenches. All pipe and conduit ends shall be kept sealed and lines left clean and unobstructed during construction. Only material suitable for backfilling shall be piled a sufficient distance from banks of trenches to avoid overloading. Unsuitable backfill material shall be removed as directed by the design engineer.

B. A layer of sand shall be installed to a minimum six inch depth around all HDPE piping, unless noted otherwise.

C. Sheathing and shoring shall be done as necessary for protection of work and personnel safety. Unless otherwise indicated, excavation shall be open cut except for short sections. The GHEX contractor shall install geothermal locating tape at least 18 inches above all horizontal/header piping.

D. Prior to drilling or trenching, the GHEX contractor shall be responsible for reviewing with the general contractor the location of underground utilities. Existing utility lines uncovered during excavation shall be protected from damage during excavation and backfilling.

3.8 PIPE INSTALLATION

A. The u-bend pipe ends will be sealed with fusion caps or tape prior to insertion into the borehole. Reasonable care shall be taken to ensure that the GHEX pipe is not crushed, kinked, or cut. Should any pipe be damaged, the damaged section shall be cut out and the pipe reconnected by heat fusion.

B. The VHEs must be connected as indicated on the plans. The header design accounts for balanced flow as well as flushing and purging flow rates. No variations can be made in the circuit hookup or the pipe sizes that are indicated without approval from the design engineer. The minimum bend radius for each pipe size shall be 25 times the nominal pipe diameter or the pipe manufacturer's recommendations, whichever is greater. The depth of all headers and supply and return piping is indicated on the plans and must be maintained.

C. Install piping per manufacturer's recommendation. Utilize methods as required to maintain manufacturer's warranty.

3.9 TESTING AND CLEANING

A. Cleaning

1. During installation, all debris, and small animals shall be kept out of the pipe. Ends of the HDPE pipe shall be sealed until the pipe is joined to the circuits.

B. Flushing and purging

1. Each supply and return circuit shall be flushed and purged with a water velocity of two feet per second. The lines shall be left filled with clean water and then pressure tested. If connection to the manifold is not immediate, piping must be capped. The GHEX contractor must coordinate with the mechanical contractor on propylene glycol antifreeze installation. The mechanical contractor is responsible for the propylene glycol antifreeze. See mechanical specifications for antifreeze. Propylene glycol antifreeze will not be added to the loopfield until after the loopfield has passed the GHEX Flow Test.

C. GHEX Flow Test

1. A test of the GHEX will be conducted after all piping has been flushed and purged. The test will be done from (the) (each) loopfield test point vault.
2. The PBC, (the) (each) Commissioning Agent and (the) (each) Mechanical Engineer will be notified 3 workdays in advance of the test.
3. The Loopfield Flow Test will consist of a flow rate demonstration showing that the loopfield can achieve 105% of the required gallon per minute flow rate to (the) (each) building as specified for (the) (each) building per (the) (each) Mechanical Engineer's design requirements(s). The flow will be monitored for 30 minutes.
4. The report will note the following information:

a. Location of the loopfield
b. Date and time of the test
c. Person conducting the test
d. Pump and monitoring equipment used at (the) (each) test point
e. Calibration certificate for the flow rate monitoring device(s)
f. Required flow rate to (the) (each) building
g. The lowest flow rate observed to (the) (each) building
h. Witnesses present at the test
i. Temperature of the loopfield water
j. Signed and certified by the person conducting the test

D. Pressure testing

1. At a minimum, the following pressure tests shall be conducted during installation. If leaks are observed, they must be fixed prior to sign off.

   a. Prior to insertion into the borehole each VHE shall be filled with water, purged of air, and pressurized to 100 psi. With a witness present a visual examination of the piping under constant pressure is required. If no leaks are observed a pressure test log form must be signed before the VHE can be inserted into the borehole.
   b. Prior to backfill, all horizontal piping smaller than 2" in diameter shall be filled with water, purged of air and pressurized to 100 psi. A careful visual examination of the piping with a witness present is required. If no leaks are observed a pressure test log form must be signed before the backfill process may commence.
   c. Prior to completion, the entire GHEX field shall undergo an expansion based pressure tested in compliance with the recommended hydrostatic pressure test in Chapter 2 of the Plastic Pipe Institute's *Handbook of Polyethylene Pipe, Second Edition.*

      1) Hydrostatic pressure leak tests of PE pressure piping systems should be conducted in accordance with ASTM F 2164(8). The preferred hydrostatic testing liquid is clean water. Other non-hazardous liquids may be acceptable.
      2) Restraint –The pipeline test section must be restrained against movement in the event of catastrophic failure. Joints may be exposed for leakage examination provided that restraint is maintained.
      3) The testing equipment capacity and the pipeline test section should be such that the test section can be pressurized and examined for leaks within test duration time limits. Lower capacity testing and pressurizing equipment may require a shorter test section.
      4) Test equipment and the pipeline test section should be examined before pressure is applied to ensure that connections are tight, necessary restraints are in place and secure, and components that should be isolated or disconnected are isolated or disconnected. All low pressure filling lines and other items not subject to the test pressure should be disconnected or isolated.
      5) For pressure piping systems where test pressure limiting components or devices have been isolated, or removed, or are not present in the test section, the maximum allowable test pressure for a leak test duration of 8 hours or less is 1.5 times the system design pressure at the lowest elevation in the section under test. If lower pressure rated components cannot be removed or isolated from the test section, the maximum test pressure is the pressure rating of the lowest pressure rated component that cannot be isolated from the test section. Test pressure is temperature dependent and must be reduced at elevated temperatures.
      6) The test section should be completely filled with the test liquid, taking care to bleed off any trapped air. Venting at high points may be required to purge air

pockets while the test section is filling. Venting may be provided by bleed valves or equipment vents.

7) The test procedure consists of initial expansion, and test phases. For the initial expansion phase, the test section is pressurized to test pressure and make-up test liquid is added as required to maintain maximum test pressure for four (4) hours. For the test phase, the test pressure is reduced by 10 psi. This is the target test pressure. If the pressure remains steady (within 5% of the target test pressure) for an hour, leakage is not indicated.

8) If leaks are discovered, depressurize the test section before repairing leaks. Correctly made fusion joints do not leak. Leakage at a butt fusion joint may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered. Leaks at fusion joints require the fusion joint to be cut out and redone.

9) If the pressure leak test is not completed due to leakage, equipment failure, etc., the test section should be de-pressurized and repairs made. Allow the test section to remain depressurized for at least eight (8) hours before retesting.

END OF SECTION 15747

SECTION III
PROPOSAL REQUIREMENTS

Schematic Design:
The Contractor's Proposal shall provide schematic design documents which show the size, quality and character of the Project; the materials to be used and the architectural, structural, mechanical and electrical systems; and such other elements of the Project as will allow the Village to determine the type and quality of the project and its compliance with the specifications in this RFP. Contractor shall include at a minimum, the floor plan of the work to be completed, details and specifications, including catalog cuts of major components, building elevations of work and other information necessary to provide the basis for design. If Contractor proposes deviations from the Scope of Work described in the RFP, Contractor shall disclose those deviations in writing together with its Schematic Design and Proposal.

Contractor's Proposal shall provide a total price to design and construct the system as approved.

Verification of Existing Conditions:
Before submitting the Schematic Design, the Contractor shall carefully study and verify existing field conditions. The Village will cooperate with all bidders in providing such reasonable access to the Village Hall as is necessary for bidders to verify existing conditions. Contractor shall immediately notify the Village of any errors, omissions or inconsistencies in any drawings, information or calculations submitted by the Village with this RFP or in the preconstruction process. Contractor's Proposal must be based on its own verified field conditions.

The Village will provide general architectural plans for Village Hall at the pre-bid meeting.

References:
Contractor shall provide at least four references to other geothermal installations of similar size and quality.

Permits:
Contractor shall obtain the required permits prior to commencing the work. Village of Oak Park permits will waive all permit fees for this project.

Verification and Commissioning:
The Contractor shall complete a system measurement and verification report three months after installation. The Village will be enlisting the services of a Commissioning Agent to review all aspects of design and construction.

Performance Guarantees:
A complete summary of the Performance Guarantees shall be provided in the Proposal.

Maintenance:
The first year of maintenance shall be included in the Contractor's Proposal. A proposal to complete the maintenance for years two through five shall also be included.

Life Cycle Costs:

A life cycle cost analysis with the return on investment summary shall be included. The life cycle cost should include but not limited to: the contractors cost to design and build the project, the annual energy cost savings, grant funding received, years to payoff the investment.

Schedule:

The Proposal shall state if the Contractor can meet the Villages schedule. If this schedule cannot be met, the Contractor shall provide a proposed schedule for completion.

Miscellaneous Requirements:

The Village will not be responsible for any expenses incurred by the Contractor in preparing and submitting a proposal. All proposals shall provide a straightforward, concise delineation of Contractor's capabilities to satisfy the requirements of the request. Emphasis should be on completeness and clarity of content.

The Contractor is prohibited from subcontracting, assigning, transferring, conveying, subletting or otherwise transferring their rights and responsibilities under any contract to any other person or entity without the previous consent and approval in writing by the Village.

SECTION IV
PROPOSAL FORMAT

Provide your proposed cost with a Not To Exceed amount.

Proposals for design and construction services shall be provided in a bound document with sections limited to the requirements below:

A. Company Description

1. Firm - Identify the name and address of the firm's principal office and any branch offices, and provide a brief history of the firm. If the firm has more than one office, specify which office will be responsible for the contemplated project (the "contact office"). Indicate the year the contact office was established.

2. Organization - Specify the type of organization (partnership, corporation or other), the year established and the Construction Manager's license number. State the number of years the firm has been involved in ongoing work in the location or the immediate vicinity of the project.

3. Contact Office - State the size and adequacy of the firm's contact office to perform the proposed work. List the disciplines represented by your staff and any areas of specialized expertise.

B. Proposed Project Team

A. List specific personnel proposed for the project team. Indicate the project assignment, role or area of responsibility of each individual. Also, state the current assignments for personnel proposed for the Project.

B. Provide an organizational chart graphically indicating how the firm would staff and structure the proposed team for pre-construction and construction phases of the project. Include delegation of responsibility and assignment of authority, and interaction points with the Village and architect. Differentiate between contact office and field personnel.

C. Self-Performed Work

Indicate which elements of work your firm would propose to perform with its own forces if authorized by the Village. Describe your experience at performing similar self-performed work within the last five years.

D. Similar Project Experience

Specific Project List - Provide the following information for a minimum of four projects completed by the contact office in the last five years that are similar to the proposed project.

1. Project name and address

2. Owner and engineer/architect, address, contact name and telephone numbers.

3. Type of project, size of building components, site and construction area.

4. Scope of service performed on the project, including pre-construction services. Differentiate between work performed by your own forces and subcontracted work. Indicate whether your contract was prime or involved a joint venture with another firm and whether construction management, general contracting, a combination or other services were involved.

5. Project cost information:
   a. Pre-contract estimate
   b. Contract award amount
   c. Total change order amount
   d. Final project cost
   e. Briefly explain any factors affecting construction cost, change orders or performance, etc.
   f. State whether Grant funding was provided on the project.

6. Project schedule information:
   a. Construction phase - scheduled vs. actual.
   b. Actual start, completion and occupancy dates.

7. Construction format (lump sum, GMP, cost plus, etc.)

8. Identify the basis on which your firm was selected (bid, negotiated).

9. Indicate the names of your Project Manager and Superintendent on each project.

10. Indicate what percentage of the work was accomplished with your own forces and in what trades.

E. Proposal Forms

All forms as part of this request for proposals must be completed and included with Proposal.

F. Proposed Cost of Services

The proposal shall include a detailed breakdown of the proposed cost for the services to be provided by the Design/Builder. Proposal shall include, but not be limited to, design fee, construction cost and estimated general conditions.

SECTION V
EVALUATION OF PROPOSALS

The Village reserves the right to accept or reject any or all proposals, to waive technicalities, and to award the contract to whichever bidder it deems, in its sole discretion, to be the most advantageous to the Village. In order to best inform the Village, contractors should be sure to provide the following information:

1. Number of projects and size completed in last five (5) years.
2. Specific similarity of project (i.e. type of HVAC equipment, size of system, etc.)
3. Experience in Design-Build Construction for public entities comparable to the Village of Oak Park.
4. Qualifications of:
   a. Project Manager.
   b. Superintendent.
5. Demonstrated ability to meet project schedule.
6. Demonstrated ability to maintain quality and control costs.
7. Experience with Grant processes and requirements.
8. Project approach including:
   a. Type of structure to enclose exterior equipment
   b. Proposed HVAC equipment.
   c. Site logistics.
   d. Construction phasing & staging.
9. Demonstrated ability to complete design services.
10. Change-order history & ratio of bid to final cost for recent comparable projects.
11. Cost to complete design and construction.

SECTION VI
PROPOSAL INSTRUCTIONS, TERMS AND CONDITIONS

Preparation and Submission of Proposal:
All proposals must be delivered to the Public Works Center by the specific time indicated on the cover page. Proposals arriving after the specified time will not be accepted. Mailed proposals that are received by the Village after the specified hour will not be accepted regardless of the post-marked time on the envelope. The proposal must be signed by an officer of the company who is authorized to enter into contracts on behalf of the company. Proposals shall be sealed in an envelope and marked as stated on the cover page.

Costs of Preparation:
The Village will not be responsible for any expenses incurred by the Contractor in preparing and submitting a Bid.

Taxes not Applicable:
The Village of Oak Park as a municipality pays neither Illinois Sales Tax nor Federal Excise Tax (State Tax Exemption Identification Number E9998-1823-06.) Contractors should exclude these taxes from their prices.

Withdrawal of Proposals:
Any Contractor may withdraw its proposal at any time prior to the time specified in the advertisement as the closing time for the receipt of proposals, by signing a request therefore. No Contractor may withdraw or cancel its proposal for a period of sixty (60) calendar days after the advertised closing time for the receipt of proposals. The successful Contractor may not withdraw or cancel its proposal after having been notified that the proposal was accepted by the Village Board of Trustees.

Investigation of Contractors:
The Village will make such investigations as are necessary to determine the ability of the Contractor to fulfill proposal requirements. If requested, the Contractor should be prepared to present evidence to the Village of Oak Park of ability and possession of necessary facilities and financial resources to comply with the terms of the attached specifications and proposals. In addition, the Contractor shall furnish the Village with any information the Village may request, and shall be prepared to show completed work of a similar nature to that included in its proposal. The Village reserves the right to visit and inspect the premises and operation of any Contractor.

Rejection of Contractor:
The Village will reject any proposal from any person, firm or corporation that appears to be in default or arrears on any debt, contract or the payment of any taxes. The Village will reject any proposal from a Contractor that failed to satisfactorily complete work for the Village under any previous contract.

Conditions:
Contractors are advised to become familiar with all conditions, instructions and specifications governing the work. Contractors shall be presumed to have investigated the work site, conditions and scope of the work before submitting a proposal.

Verification of Dimensions and Elevations:
The Village will use the best available data to indicate any dimensions, elevations and existing conditions indicated on any drawings, but does not guarantee the accuracy of this information. The Contractor shall verify all dimensions, grades, lines, levels or other conditions or limitations at the site prior to developing any design documents or contract submittals.

Subletting of Contract:
No contract awarded by the Village of Oak Park shall be assigned or any part subcontracted without the written consent of the Village of Oak Park or as noted in the Contractor's proposal. In no case shall such consent relieve the Contractor from its obligations or change the terms of the contract.

Interpretation of Contract Documents:
Any Contractor with a question about this RFP may request an interpretation thereof from the Village. If the Village changes the RFP, either by clarifying it or by changing the specifications, the Village will issue a written addendum, and will mail a copy of the addendum to all prospective Contractors. The Village will not assume responsibility for receipt of such addendum. In all cases, it will be the Contractor's responsibility to obtain all addenda issued. Contractors will provide written acknowledgment of receipt of each addendum issued with the proposal submission.

Minority Business and Women Business Enterprise Requirements:
The Village of Oak Park, in an effort to reaffirm its policy of non-discrimination, encourages the efforts of contractors and subcontractors to take affirmative action in providing for Equal Employment Opportunity without regard to race, religion, creed, color, sex, national origin, age, handicap unrelated to ability to perform the job or protected veteran's status.

Licenses and Permits:
The Contractor shall be responsible for becoming a licensed contractor in the Village. The contractor shall also be responsible for obtaining any necessary building permits. The Village will issue any necessary building permits for this work at no fee to the contractor.

Contract:
The selected company will enter into a Design/Build contract with the Village to complete the project. The Contract shall be executed by the Contractor and returned, together with the Contract Bond within ten (10) calendar days after the Contract has been mailed to the Contractor. The Contractor shall execute three copies of the Contract. One fully executed copy will be returned to the Contractor

Contract Bond:
The successful bidder shall, within ten (10) calendar days after award of Contract, furnish a Contract Bond in the amount of one hundred percent (100%) of the contract price. The bond shall insure faithful performance of the work, and the payment for materials, labor and of the subcontractors. The bond shall be with a surety or sureties with a rating of "A" or better by A.M. Best and Company and such sureties shall be approved by the Village. Bonds in the form of certified or cashiers check shall be made payable to the Village of Oak Park, Illinois. The Contract Bond shall be furnished in the same number of copies as the number of copies of the contract to be executed.

Hold Harmless:
Contractor will be required to agree, to the fullest extent permitted by law, to indemnify, save harmless and defend the Village of Oak Park, its elected officials and employees (the indemnified parties), against and hold it and them harmless from any and all claims, actions, causes of action, demands, rights, damages, costs, loss of service, expenses, compensation, court costs and attorneys' fees which the indemnified parties may accrue, directly or indirectly, for or on account of any and all known and unknown, foreseen and unforeseen, bodily and personal injuries, including death to any person, including contractor's employees, or any damage to any property and the consequences thereof, which may arise or which may be alleged to have arisen out of or in connection with the contractor's performance of the work contracted as a result of this RFP.

Contractor shall hold the Village harmless from any loss arising due to injury or accident to the public or its workers, or from theft of materials stored at the job site.

Insurance:
The Contractor will be required to obtain and maintain in force during the performance of the contract insurance as required herein. Contractors shall not begin work until all the required insurance has been obtained and until the Village has received proof, acceptable to the Village Attorney, of the Contractor's insurance as required herein.

1. Worker's Compensation Insurance with amounts of coverage sufficient to provide for all compensation levels and amounts as mandated by the State of Illinois Worker's Compensation Statutes. The insurer shall agree to waive all rights of subrogation against the Village, its officers, employees and volunteers.

2. Commercial General Liability Insurance with a minimum limit per occurrence of $1,000,000 for personal injury and $1,000,000 for property damage. The policy will name the Village of Oak Park as an additional insured with respect to liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Village, its officers, officials, employees or volunteers.

3. Contractors shall include all subcontractors as insureds under its policies, or shall furnish separate certificates and endorsements for each subcontractor. All subcontractors will also be required to purchase and maintain the insurance required herein.

4. Any deductibles or self-insured retention must be declared to and approved by the Village. At the option of the Village, either: the insurer shall reduce or eliminate such deductibles or self-insured retention as respects the Village, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claims administration and defense expenses.

5. Insurance is to be placed with insurers with a Best's rating of no less than A: VII.

Prevailing Wage Act:

This Proposal calls for the maintenance, repair or construction of an improvement to a fixed public work or equipment, and is therefore a public work within the meaning of the Illinois Prevailing Wage Act, 820 ILCS 130/.01 et. seq. Contractor is therefore required to pay a wage of no less than the general prevailing hourly rate as paid for work of a similar character in Cook County to all laborers, workers and mechanics and to provide to the Village and maintain a monthly certified payroll and to otherwise comply with the Illinois Prevailing Wage Act. Contractor is also required to comply with the Davis-Bacon and Related Acts Requirements as noted below.

SECTION VII
ORGANIZATION OF PROPOSING FIRM

Please fill out the applicable section:

A. Corporation:
The Contractor is a corporation, legally named DEKALB MECHANICAL INC and is organized and existing in good standing under the laws of the State of ILLINOIS. The full names of its Officers are:

President STEPHEN J DOONAN

Secretary JAMES BRANNICK

Treasurer JAMES BRANNICK

Registered Agent Name and Address: DONALD SHRIVER, ROCKFORD IL

The corporation has a corporate seal. (In the event that this proposal is executed by a person other than the President, attach hereto a certified copy of that section of Corporate By-Laws or other authorization by the Corporation that permits the person to execute the offer for the corporation.)

B. Sole Proprietor:
The Contractor is a Sole Proprietor. If the Contractor does business under an Assumed Name, the

Assumed Name is N/ A, which is registered with the Cook County Clerk. The Contractor is otherwise in compliance with the Assumed Business Name Act, 805 ILCS 405/0.01, et. seq.

C. Partnership:
The Contractor is a Partnership which operates under the name N/A.

The following are the names, addresses and signatures of all partners:

N/A

Signature

Signature

(Attach additional sheets if necessary.) If so, check here ____.

If the partnership does business under an assumed name, the assumed name must be registered with the Cook County Clerk and the partnership is otherwise in compliance with the Assumed Business Name Act, 805 ILCS 405/0.01, et. seq.

D. Affiliates: The name and address of any affiliated entity of the business, including a description of the affiliation: N/A

Signature of Owner

SECTION VIII
COMPLIANCE AFFIDAVIT

I, STEPHEN J DOONAN, (Print Name) being first duly sworn on oath depose and state:

1. I am the (title) PRESIDENT of the Proposing Firm and am authorized to make the statements contained in this affidavit on behalf of the firm;

2. I have examined and carefully prepared this proposal based on the request and have verified the facts contained in the proposal in detail before submitting it;

3. The Proposing Firm is organized as indicated above on the form entitled "Organization of Proposing Firm."

4. I authorize the Village of Oak Park to verify the Firm's business references and credit at its option;

5. Neither the Proposing Firm nor its affiliates[1] are barred from proposing on this project as a result of a violation of 720 ILCS 5/33E-3 or 33E-4 relating to Proposal rigging and Proposal rotating, or Section 2-6-12 of the Oak Park Village Code relating to "Proposing Requirements".

6. The Proposing Firm has the M/W/DBE status indicated below on the form entitled "EEO Report."

7. Neither the Proposing Firm nor its affiliates is barred from contracting with the Village of Oak Park because of any delinquency in the payment of any debt or tax owed to the Village except for those taxes which the Proposing Firm is contesting, in accordance with the procedures established by the appropriate revenue act, liability for the tax or the amount of the tax. I understand that making a false statement regarding delinquency in taxes is a Class A Misdemeanor and, in addition, voids the contract and allows the Village of Oak Park to recover all amounts paid to the Proposing Firm under the contract in civil action.

8. I am familiar with Section 13-3-2 through 13-3-4 of the Oak Park Village Code relating to Fair Employment Practices and understand the contents thereof; and state that the Proposing Firm is an "Equal Opportunity Employer" as defined by Section 2000(E) of Chapter 21, Title 42 of the United States Code Annotated and Federal Executive Orders #11246 and #11375 which are incorporated herein by reference. Also complete the attached EEO Report or Submit an EEO-1.

9. I certify that the Contractor is in compliance with the Drug Free Workplace Act, 41 U.S.C.A, 702

Signature: Stephen J Doonan

[1] Affiliates means: (i) any subsidiary or parent of the contracting business entity, (ii) any member of the same unitary business group; (iii) any person with any ownership interest or distributive share of the contracting business entity in excess of 7.5%; (iv) any entity owned or controlled by an executive employee, his or her spouse or minor children of the contracting business entity.

Name and address of Business: DEKALB MECHANICAL INC

Telephone 815-756-6528 E-Mail sdoonan@dekalbmechanical .com

Subscribed to and sworn before me this 14 day of OCTOBER, 2011.

Maureen A Moran

Notary Public

OFFICIAL SEAL
MAUREEN A MORAN
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:11/19/12

SECTION IX
M/W/DBE STATUS AND EEO REPORT

Failure to respond truthfully to any questions on this form, failure to complete the form or failure to cooperate fully with further inquiry by the Village of Oak Park will result in disqualification of this proposal. For assistance in completing this form, contact the Department of Public Works at 708-358-5700.

1. Contractor Name: DEKALB MECHANICAL INC

2. Check here if your firm is:

- ☐ Minority Business Enterprise (MBE) (A firm that is at least 51% owned, managed and controlled by a Minority.)
- ☐ Women's Business Enterprise (WBE) (A firm that is at least 51% owned, managed and controlled by a Woman.)
- ☐ Owned by a person with a disability (DBE) (A firm that is at least 51% owned by a person with a disability)
- ☒ None of the above

[Submit copies of any W/W/DBE certifications]

3. What is the size of the firm's current stable work force?

60 Number of full-time employees

2 Number of part-time employees

4. Similar information will be requested of all subcontractors working on this contract. Forms will be furnished to the lowest responsible Contractor with the notice of contract award, and these forms must be completed and submitted to the Village before the execution of the contract by the Village.

Signature: _____

Date: 10/14/2011

EEO REPORT

Please fill out this form completely. Failure to respond truthfully to any questions on this form, or failure to cooperate fully with further inquiry by the Village of Oak Park will result in disqualification of this proposal. An incomplete form will disqualify your proposal. For assistance in completing this form, contact the Purchasing Department at 708-358-5473.

An EEO-1 Report may be submitted in lieu of this report

Contractor Name ~~DEKALB MECHANICAL~~ INC
Total Employees 62

Job Categories	Total Employees	Total Males	Total Females	Males				Females				Total Minorities
				Black	Hispanic	American Indian & Alaskan Native	Asian & Pacific Islander	Black	Hispanic	American Indian & Alaskan Native	Asian & Pacific Islander	
Officials & Managers	3	3	0									
Professionals	2	1	1									
Technicians	44	44	0	1			1					
Sales Workers	1	1	0									
Office & Clerical	4	1	3									
Semi-Skilled												
Laborers												
Service Workers	3	3	0									
TOTAL												
Management Trainees												
Apprentices	5	5	0		1							

This completed and notarized report must accompany your Proposal. It should be attached to your Affidavit of Compliance. Failure to include it with your Proposal will be disqualify you from consideration.

STEPHEN J DOONAN, being first duly sworn, deposes and says that he/she is the PRESIDENT
(Name of Person Making Affidavit) (Title or Officer)

of DEKALB MECHANICAL that the above EEO Report information is true and accurate and is submitted with the intent that it be relied upon. Subscribed and sworn to before me this 14 day of OCTOBER, 2011.

(Signature) 10/14/2011 (Date)

Maureen A. Moran

OFFICIAL SEAL
MAUREEN A MORAN
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:11/19/12

DeKalb Mechanical

Sheet Metal, Refrigeration, H.V.A.C., 24-Hour Service

October 14, 2011

Vic Sabaliauskas
Village of Oak Park
Department of Public Works
201 South Blvd.
Oak Park, IL 60302

Re: Request For Proposal No. 11-200 & 11-202
Design-Build DX RTU & Geothermal Project for Council Chambers
Village of Oak Park Village Hall
Oak Park, Illinois

Dear Mr. Sabaliauskas:

We appreciate the opportunity and are pleased to present the following proposal on the above referenced project. We understand the project to be a design-build solution for a complete (including architectural, mechanical, plumbing, electrical) for the Village of Oak Park Council Chambers. Per the RFP, we have provided our response in the format requested below.

Section III - Proposal Requirements

Schematic Design documents are included at the end of this proposal in 11x17 format. We have included an Annual Cost Summary showing the anticipated energy savings of the geothermal system.

Section IV - Proposal Format

A. Company Description:

1. **Firm:** DeKalb Mechanical is located at 339 Wurlitzer Dr., DeKalb, Illinois 60115. We are an HVAC company specializing in commercial and institutional work. We have a vast history of public sector projects including schools, police stations, libraries, meeting rooms and fire stations. Many of the projects include the design build type of construction format.

2. **Organization:** Our firm is a corporation in Illinois and was established in 1991.

3. **Contact Office:** We have approximately 55 union tradesmen supported by a staff of project managers and design professionals. We sub-contract for engineering design services which allows us to utilize individual expertise best suited for the project. We have a full shop and fabricate all of our material in house. We utilize the most advanced technology available with plasma cutting tables, coil line duct fabrication, laser field locating of hangers and equipment, 3D modeling and coordination software.

B. Proposed Project Team:

1. DeKalb Mechanical, Inc., DeKalb, IL
   Design-Builder & Mechanical Contractor
   Project Manager - Steve Doonan

2. Mascal Electric, DeKalb, IL
   Electrical Contractor
   Project Manager - Daniel Hagar

3. Swedberg & Associates, Sycamore, IL
   General Contractor
   Project Manager - Steven Swedberg

4. Geothermal Solutions, Maple Park, IL
   Geothermal Well Driller
   Project Manager - Jay Trout

5. CM Engineering, Columbia, MO
   Geothermal Design Engineering
   Project Manager and Project Engineer - Kirk Mescher, PE, LEED-AP

6. 20/10 Engineering Group, LLC, Schaumburg, IL
   Mechanical, Electrical, Plumbing, and Structural Engineering
   Project Manager - Jeffrey C. Chamberlin, PE, LEED-AP
   Project Structural Engineer - James A. Barrett, SE
   Project Mechanical Engineer - Keith G. Christian, PE, LEED-AP
   Project Electrical Engineer - Rudy J. Ruleas, PE, LEED-AP
   Project Plumbing Engineer - William J. Bauer, PE, LEED-AP

C. Self-Performed Work:

1. All anticipated Mechanical construction work will be performed by DeKalb Mechanical, Inc. All other work will be performed by our sub-contractors and engineering consultants.

D. Similar Project Experience:

The following are Geothermal projects recently completed by DeKalb Mechanical:

1. Kirkland High School Addition, Kirkland, IL. Delivery method was Design-Build in association with Kirk Mescher of CM Engineering, Columbia, MO.
2. Scott Eye Care, Sugar Grove, IL. New Facility
3. Moraine Valley Community College, Tinley Park Campus, Tinley Park, IL
4. Gail Borden Library, Elgin, IL
5. Choices Mental Health Facility, Ottawa, IL

Our firm has extensive experience in mechanical contracting and design-build projects. Our goal is to provide quality construction and project management services so that all our projects serve as references.

E. Proposal Forms:

1. Please see following pages for the completed proposal forms provided in Section VII. of the Request for Proposal.

F. Proposed Cost of Services:

1. Please see pages following the Proposal forms for the cost of services.