



# ANN ARBOR HOUSING COMMISSION (AAHC)

727 MILLER AVENUE, ANN ARBOR, MICHIGAN 48103

## AAHC GEOTHERMAL PROJECT



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**HILLSIDE MANOR SITE PLAN**  
SCALE: NONE

**MALLET'S CREEK SITE PLAN**  
SCALE: NONE

**UPPER PLATT COLONIAL SITE PLAN**  
SCALE: NONE

### SCOPE OF WORK

IN GENERAL, THIS PROJECT INVOLVES INSTALLING NEW GROUND SOURCE HEAT PUMPS IN THE RENTAL UNITS INDICATED AT THESE SITES. CONTRACTOR TO PROVIDE COMPLETE SITE SURVEY, WORKING GROUND SOURCE HEAT PUMP SYSTEM THAT MEETS THE HEATING AND COOLING NEEDS OF EACH RENTAL UNIT, ADDRESS MISCELLANEOUS MAINTENANCE ISSUES OUTLINED ON DRAWINGS, AND RETURN ALL SITE LANDSCAPING BACK TO PRE-CONSTRUCTION CONDITION.

### DRAWING INDEX

SPECIFICATIONS	
T1.0	TITLE SHEET
SP1.0	PROJECT SPECIFICATIONS
SP1.1	PROJECT SPECIFICATIONS
SP1.2	PROJECT SPECIFICATIONS
SP1.3	PROJECT SPECIFICATIONS
S1.0	HILLSIDE MANOR SITE PLAN
S1.1	MALLET'S CREEK SITE PLAN
S1.2	UPPER PLATT COLONIAL SITE PLAN
S2.0	PIPING DIAGRAMS AND DETAILS

### SPECIFICATION INDEX

#### SPECIFICATIONS

##### DIVISION 2 - EXISTING CONDITIONS

024119 SELECTIVE DEMOLITION

##### DIVISION 22 - MECHANICAL

220500	BASIC MECHANICAL REQUIREMENTS
220519	THERMOSTATS, GAGES AND METERS
220719	MECHANICAL SYSTEMS INSULATION
230593	TESTING, ADJUSTING, AND BALANCING
232116	HYDRONIC PIPING
232120	HYDRONIC PIPING SPECIALTIES
232123	HVAC PUMPS
232513	CHEMICAL WATER TREATMENT - CLOSED LOOP
233100	HVAC DUCTWORK
233300	DUCT ACCESSORIES
237323	WATER SOURCE HEAT PUMPS

##### DIVISION 26 - ELECTRICAL

260500	COMMON WORK RESULTS FOR ELECTRICAL
260526	GROUNDING AND BONDING
260700	HANGERS AND SUPPORTS

### GENERAL NOTES

- ALL WORK MUST COMPLY WITH THE REQUIREMENTS OF LOCAL CODES AND ORDINANCES. INSPECTIONS ARE REQUIRED BY AUTHORITIES HAVING JURISDICTION AND THEREFORE WORK WILL NOT BE CONSIDERED COMPLETE UNTIL SYSTEMS HAVE BEEN TESTED, INSPECTED, AND ACCEPTED.
- DRAWINGS ARE BASED ON AVAILABLE DOCUMENTS AND SITE INSPECTION. DRAWINGS MAY NOT REFLECT A COMPLETE AS BUILT CONDITION.
- DRAWINGS DIAGRAMMATICALLY INDICATE THE GENERAL WORK SCOPE BUT DO NOT PROVIDE EXACT SCALE OR LOCATIONS. PROPER INSTALLATION OF ALL SYSTEMS, AFTER COORDINATION WITH OTHER TRADES, IS THE CONTRACTOR'S RESPONSIBILITY. FIELD ROUTE PIPING TO AVOID INTERFERENCE, AND ALLOW ADEQUATE CLEARANCES FOR ACCESS AND MAINTENANCE.
- CONTRACTOR SHALL USE BID WALK-THROUGH AND FIELD OBSERVATIONS TO ENHANCE PROJECT UNDERSTANDING BEFORE BIDDING ON PROJECT.
- NO DEMOLITION SHALL TAKE PLACE WITHOUT APPROVAL FROM THE OWNER'S REPRESENTATIVE.
- TEMPORARY REMOVAL OF ANY AND ALL EXISTING MISCELLANEOUS ITEMS (I.E. CONDUIT, SMALL PIPING, LIGHTING, ETC.) FOR THE PURPOSE OF PERFORMING THIS WORK SHALL BE REINSTALLED BACK TO PRE-CONSTRUCTION LEVEL AS PART OF THIS PROJECT. NO ADDITIONAL FEES WILL BE AWARDED.
- CONTRACTOR TO TEMPORARILY SUPPORT ALL DUCTWORK AND PIPING DURING THE DEMOLITION AND CONSTRUCTION PHASES.
- CONTRACTOR TO PROTECT ALL UTILITIES PIPING, PIPE INSULATION, CONDUITS, AND OTHER MISCELLANEOUS ITEMS DURING THE EXCAVATION AND DEMOLITION PHASE. ANY DAMAGE RESULTING FROM THE CONTRACTOR'S OPERATIONS MUST BE REPAIRED OR REPLACED WITH EQUAL AND TO THE OWNER'S SATISFACTION AND AT NO ADDITIONAL COST TO THE OWNER.
- MAINTAIN SECURITY, LIFE SAFETY, FIRE AND SMOKE CONSTRUCTION INTEGRITY, FIRE ESCAPES AND EGRESS PATHS AT ALL TIMES.
- REFER TO CONTRACT DOCUMENTS AND PROJECT SPECIFICATIONS FOR ADDITIONAL SCOPE AND INFORMATION.
- CONTRACTOR SHALL PROVIDE ALL REQUIRED ACCESSORIES, INCLUDING MISCELLANEOUS SUPPORT STEEL, REQUIRED FOR PROPER INSTALLATION.
- THE CONTRACT DOCUMENTS REFLECT A SYSTEM DESIGNED AROUND BASE BID PRODUCTS. IF ALTERNATE PRODUCTS ARE OFFERED, CONTRACTOR MUST COORDINATE ALL DIFFERENCES, AND INCLUDE ASSOCIATED INSTALLATION COST DIFFERENCES, TO ENSURE NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR TO TURN OVER ALL DEMOLISHED EQUIPMENT TO OWNER FOR FIRST SALVAGE RIGHTS. CONTRACTOR TO PROPERLY DISPOSE OF ALL UNWANTED ITEMS.
- ALL PIPING SHALL BE INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS AND IN ACCORDANCE WITH ASHRAE AND IGSHPA RECOMMENDATIONS. PIPING IS TO BE PRESSURE TESTED AT ALL STAGES OF CONSTRUCTION TO ENSURE THAT THE SYSTEM IS FREE OF LEAKS. CONTRACTOR TO NOTIFY OWNER'S REPRESENTATIVE PRIOR TO TESTING AND ALSO PROVIDE TEST REPORTS FOR EACH SYSTEM ONCE COMPLETED.

### GENERAL NOTES

- ALL INSTALLATIONS SHALL BE INSPECTED BY OWNER'S REPRESENTATIVE AND AUTHORITY HAVING JURISDICTION PRIOR TO BACKFILLING AND/OR COVERING ABOVE GROUND PIPING.
- CONTRACTOR TO PROVIDE DEWATERING SYSTEM DURING CONSTRUCTION PHASE TO ENSURE ALL EXCAVATIONS AND BOREHOLES ARE FREE FROM STANDING WATER.
- CONTRACTOR TO INSTALL FLEX CONNECTIONS ON MAIN SUPPLY AND RETURN DUCTS FROM HEAT PUMPS.
- ALL GROUND LOOPS PIPING SHALL BE HEAT FUSION JOINTS.
- CONTRACTOR TO PROPERLY DISPOSE ALL EXCAVATED MATERIALS.
- CONTRACTOR IS RESPONSIBLE FOR FINAL GRADING, SEEDING AND LANDSCAPING.
- CONTRACTOR IS RESPONSIBLE FOR PULLING ALL PERMITS.
- GROUND LOOP NOTES:
  - ALL GROUND LOOPS SHALL HAVE THE SAME LENGTH.
  - U-BEND OR EQUIVALENT BOTTOM FITTING ON ALL GROUND LOOPS. CONTRACTOR TO GET APPROVAL FROM OWNER BEFORE ORDERING GROUND LOOP PIPING.
  - LOOPS SHALL BE FILLED AND PRESSURIZED BEFORE INSTALLING GROUT TO PREVENT PIPING FROM COLLAPSING.
  - INSTALLER OF GROUND LOOP AND HEAT PUMP SYSTEM MUST BE IGSHPA CERTIFIED.

### GROUND HEAT EXCHANGER SUMMARY INFORMATION

#### GROUND HEAT EXCHANGER (GHX) INFORMATION

CONFIGURATION	INDIVIDUAL VERTICAL CLOSED LOOP FOR EACH UNIT PARALLEL. INDIVIDUAL SEE SITE DRAWINGS
FLOW TYPE SYSTEM	250 FEET / 4" (ESTIMATED)
NUMBER OF BOREHOLES	20 FEET FROM EACH OTHER
BOREHOLE DEPTH / SIZE	10 FEET BOREHOLE AWAY FROM PROPERTY LINE.
BOREHOLE SEPARATION	10 FEET FROM UNDERGROUND UTILITIES AND PIPING
UG UTILITIES AND PIPING	3 FEET (MINIMUM) VERTICAL COVER FROM GSHX PIPING AND LATERAL WATER OR SEWER PIPING. SEE SITE DRAWINGS
PROPERTY NO. OF CIRCUITS	1.40 BTU/(H*FT**F)(ESTIMATED)
THERMAL CONDUCTIVITY	0.95 FT**2/DAY(ESTIMATED)
SOIL DIFFUSIVITY	50°F (ESTIMATED)
UNDISTURBED GROUND TEMP.	SEE SITE DRAWINGS
GHX PRESSURE DROP (ESTIMATED)	

#### FLUID INFORMATION

FLUID TYPE	25% PROP. GLYCOL
FLOW RATE	SEE SITE DRAWINGS
UNIT INLET FLUID TEMP (MIN/MAX)	40°F / 90°F

#### GROUT INFORMATION

GROUT TYPE	THERMALLY ENHANCED BENTONITE
MIN THERMAL CONDUCTIVITY	0.88 BTU/H-FT-F

#### FLUSH & PURGE INFORMATION

MIN FLUID VELOCITY	2 FT/SEC. PER IGSHPA
MIN PURGE FLOW (PER CIRCUIT)	SEE SITE DRAWINGS

#### GHX CAPACITY INFORMATION

PEAK HEATING	SEE SITE DRAWINGS
PEAK COOLING	SEE SITE DRAWINGS
HEATING EFLH	SEE SITE DRAWINGS
COOLING EFLH	SEE SITE DRAWINGS

**NOTE:** THE ABOVE INFORMATION IS PROVIDED TO CONVEY PROJECT INTENT. CONTRACTOR IS RESPONSIBLE FOR VERIFYING SITE CONDITIONS AND PROVIDING A COMPLETE AND WORKING GROUND SOURCE HEAT PUMP SYSTEM FOR THESE SITES.

### PROJECT DIRECTORY

OWNER: ANN ARBOR HOUSING COMMISSION  
727 MILLER AVENUE  
ANN ARBOR, MI 48103

OWNER CONTACT: LANCE MITCHELL  
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PROJECT ENGINEER: DALE NIETHAMMER  
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### APPLICABLE CODES

BUILDING CODE: MICHIGAN BUILDING CODE/2009  
MECHANICAL CODE: MICHIGAN MECHANICAL CODE/2012  
ELECTRICAL CODE: NATIONAL ELECTRICAL CODE/2011  
PLUMBING CODE: MICHIGAN PLUMBING CODE/2012

APPLICABLE CITY OF ANN ARBOR RULES AND REGULATIONS  
NATIONAL ELECTRICAL SAFETY CODE (NECS), 2002

### ASBESTOS NOTE

THESE PROJECT AREAS ARE CONSIDERED ASBESTOS FREE. IF THE CONTRACTOR SHOULD ENCOUNTER ANY ITEMS SUSPECTED TO CONTAIN ASBESTOS, CONTACT THE PROJECT MANAGER IMMEDIATELY.

### ABBREVIATIONS

OA	OUTSIDE AIR
PD	PRESSURE DROP
SP	STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
EAT	ENTERING AIR TEMPERATURE
LAT	LEAVING AIR TEMPERATURE
EER	ENERGY EFFICIENCY RATIO
SEER	SEASONAL ENERGY EFFICIENCY RATIO
COP	COEFFICIENT OF PERFORMANCE
FLA	FULL LOAD AMPS