



To the applicant;

Please be advised that the use of a “heat pump system” shall be prohibited on properties located within a subdivision without first obtaining a Hydro geological report.

Applicants that propose heat pump systems that utilize new or existing wells shall be required to provide a well record, geotechnical report and potable water certificates.

Any systems proposed within a Flood Plain, Fill Regulated areas or affecting a Natural watercourse, require a written approval of the Rideau Valley Conservation Authority (613) 692-3571.

Material Systems Data Sheets shall be provided for all types of heat transfer fluids.

Open loop system applications require Certification of Licensing forms to be completed by the well driller and contractor agreement.



Building Permit Application for Heat Pump System Installation

Owners Name:		Phone:	
Mailing Address:			
Contractors Name:			
Lot:	Con:	Plan #:	Part:
Road/Street:			
On the	side between	and	

Brief Description of Work:

Estimated Cost: \$ Are other permits required? Yes No

Has any property which may be affected by this application been designated under the *Ontario Heritage Act*?

All of the statements and representations contained in the attached documents filed in support of this application shall be deemed part of this application for all purposes. Sufficient information shall be submitted with each application to enable the Chief Building Official to determine whether or not the proposed work will conform with the *Building Code Act* and regulations thereunder and any other applicable law.

DECLARATION:

I, the undersigned, _____ am the authorized owner/agent of owner named in the above application and I certify the truth of all the statements or representations contained therein.

I understand that the issuance of a permit shall not be deemed a waiver of any of the provisions of any by-laws or requirements of the *Building Code Act* or regulations made thereunder, notwithstanding anything included in or omitted from the plans or other material filed in support of or in connection with the above application.

I acknowledge that in the event a permit is issued, any departure from plans, specifications or building locations proposed in the above application is prohibited and such could result in the permit being revoked.

I further acknowledge that in the event the permit is revoked for any cause or irregularity or non-conformity with by-laws or requirements of the *Building Code Act*, or regulations made thereunder, there shall be no right of claim whatsoever against the municipal corporation or any official thereof and any such claim is hereby expressly waived.

North Grenville, Ontario _____, 20____
Date

Signature of Owner/Agent

Signature of Building Inspector

* Builder's Registration Number as required by the *Ontario New Home Warranties Plan Act*, R.S.O. 1990, c. O.31, s. 6.

Personal information contained on this form, collected pursuant to the *Building Code Act*, will be used for the purposes of that Act. Questions should be directed to the Freedom of Information and Privacy Coordinator at the Institution conducting the procedures.



Annex B (Informative)

Site Survey Worksheet

Note: This Annex is not a mandatory part of this Standard.

Customer _____ Date _____
 Address _____ Phone _____
 Legal Description _____
 Performed by _____ (Name) Phone _____
 Company Name _____ Signature _____
 New Construction Retrofit Construction Permit and Number _____
 Heat Loss and Energy Analysis by _____
 Soil/Rock Types and Conditions _____
 Drill Regulations _____
 Special Requirements _____

SERVICE LOCATE CHECKLIST

- POWER LINES
Overhead
Underground
- NATURAL GAS
- PROPANE
- PUBLIC WATER
- WATER WELL
_____ Depth, m (ft)
- PUBLIC SEWER
- ON-SITE SEWER
- TELEPHONE LINE
Overhead
Underground
- TV CABLE
- FUEL LINES
- EASEMENTS
- SPRINKLER
- TILE DRAIN
- BUILDING ENTRANCE
- UNIT LOCATION
- POND
Size _____
Avg. Depth _____
Min. Depth _____
- OTHER _____
- ELEVATION
POND/HOUSE
- FUTURE BUILDING
(Buildings, pools, etc)

Acknowledged By: _____
 Owner/Agent _____
 (Date) _____
 Installation Date _____
 Scale _____ = _____

SITE PLAN COMPANY HEADING

Locate property lines, existing structures or obstructions, future consideration sites, utilities and services, heat pump unit, circulating pump kit where it enters structure, slopes (% and direction), and equipment access routes.

A large grid for site plan drawing, consisting of approximately 20 columns and 30 rows of squares.

Annex A (Informative) Installation Checklist for Open- and Closed-Loop Earth Energy Heat Pump Systems

Note: This Annex is not a mandatory part of this Standard.

(Two Copies Are to Be Provided to the Owner)

Owner's Name _____ Date _____
 Address _____
 Province _____ Postal Code _____ Phone _____
 Contractor's Name _____ Date _____
 Address _____
 Province _____ Postal Code _____ Phone _____
 System Type: Open-Loop Closed-Loop House Size _____
 Design Heat Load (Building) _____ Design Method _____
 Design Cooling Load _____ Method _____
 Domestic Hot Water Load (Met By System) _____
 Total Heating Load _____
 Type Of Distribution System: Forced-Air Hydronic
 Heat Pump Make _____ Model/Serial No. _____
 Heating Capacity _____ Cooling Capacity _____
 Check off appropriate entering water temperatures Heating EWT: 0°C (32°F) 10°C (50°F)
 (EWT). (Refer to CSA Standard CAN/CSA-CT3256-1) Cooling EWT: 25°C (77°F) 10°C (50°F)

If A Closed-Loop System:

Heat Exchanger Length, if Horizontal _____
 Heat Exchanger Type, if Horizontal Single-Pipe Two-Pipe
 Four-Pipe Other
 Borehole Depth and Number, if Vertical _____
 Heat Exchanger Sized According to: Manufacturer

If Software, Program Used:

Backfill Materials, Horizontal Trenches _____
 Borehole Fill Material, if Vertical _____
 Type Of Antifreeze/Inhibitors _____ Quantity _____
 Antifreeze Protection Level _____ Loop Test Pressure _____
 System Static Pressure _____

If An Open-Loop System:

Attach copy of water well record or well pump test and include the number and specifications of wells, intake, and pumps.

Marking/Instructions Checklist

If A Closed-Loop System:

Supply and Return Valves Marked Accordingly
 Submerged Heat Exchanger Position Marked at Shoreline
 Label at Loop Charging Valve Showing Antifreeze Type, Concentration, Contractor Information
 Owner Given Manufacturer Documentation and Warranty on System
 Owner Given Site Survey Worksheet of Installed System (Including Dimensions/Locations of all Piping,
 Diameter, Depths and Lengths of Loops, Septic Systems, Water Inlet Lines, Lot Lines, etc.)

If An Open-Loop System:

Supply and Return Lines to be Identified by Marker at Point of Entry to Water Wells
 Inform Owner of Possible Effects on Supply Water Well of Open-Loop System — Water Quality, Quantity, etc.
 Ensure Water Supply Well is Sealed in Accordance with Approved Well Construction Practices
 Ensure Water Well Yields Water to Supply Both Domestic and Heat Pump Requirements at Time of Installation

This installation was done in accordance with CSA Standard C448.2, *Design and Installation of Earth Energy Systems for Residential and Other Small Buildings*, and currently applicable regulations.

Name: (Please Print or Type) _____ Signature _____
 Date _____

Schedule "A" to By-law 28-98

Agreement for the use of a Performance Deposit

I, _____, the applicant for a building permit to _____ a building on Part Lot _____, Concession _____, Plan _____, Sublot _____, hereby agree that as a condition precedent to the validity of any permit issued to me by the Municipality of North Grenville for the said work, and in consideration of the issuance of a permit for me, hereby deposit with the Municipality of North Grenville a performance deposit, in the form of cash/certified cheque/certified letter of authorization, in the amount of \$_____ as security for:

1. Completion of all work authorized and/or required by the said building permit;
2. Completion or repair of any deficiency noted on any Work Order filed in relation to the property;
3. Repair of any damages to municipal property;
4. Payment for cleaning of municipal streets as provided for by the By-Laws of the Municipality as may be required at the discretion of the Manager of Public Works or Road Superintendent (to which exercise of discretion I hereby irrevocably submit)

I further agree and consent to the adoption of such procedures as may be necessary by the Municipality in event of any failure to perform all of my obligations, including unrestricted entry upon my property to complete the said works, repair any damage and/or for cleaning of municipal streets all as set out in the said By-Law of the Municipality.

All expenses incurred by the Municipality while carrying out such procedures and all amounts outstanding thirty (30) days from the date of invoicing with respect to lot grade control charges, shall be deducted from the said performance deposit and the balance, if any, will be refunded to me.

I hereby completely release the Municipality and its agents, employees and workmen from any and all claims for damages or otherwise, which may arise as a result of the procedure herein authorized and taken by them.

DATED AT _____, THIS _____
DAY OF _____, 20_____.

WITNESS

APPLICANT

THE CORPORATION OF THE TOWNSHIP OF NORTH GRENVILLE

Schedule "A" to By-Law No. 11-03

CERTIFICATION OF LICENSING

I, _____ do hereby certify that I am licenced to drill water
(Name of Contractor/Company)
wells in the Province of Ontario.

AND FURTHERMORE THAT I will supervise the drilling of a well on the property of
_____, located at _____ in the
(Name of Landowner) (Municipal Address)
geographic Township of North Grenville.

AND FURTHERMORE THAT I am aware of the well drilling requirements of the Township of North Grenville and the regulations of the Ministry of Environment as they govern well installations in the Province of Ontario.

AND FURTHERMORE THAT I acknowledge that each registered plan of subdivision may have different well drilling requirements.

AND I DO HEREBY CERTIFY THAT the said well shall be drilled, cased and grouted to the standards as specified in the applicable Well Construction Agreement.

Signed this _____ day of _____, 20____.

Well Contractor

Licence No.

Well Technician

Licence No.

Pump Installer

Licence No.



WELL CONSTRUCTION AGREEMENT

Re: Part Lot ____ Concession _____
Geographic Township of _____
Municipality of North Grenville
Part ____ On Plan 15R- _____

In consideration of the Municipality waiving the requirement for a hydro-geological report in respect of the above noted property; I _____ (being the owner, agent of the owner), hereby agree to construct any water wells on this property in accordance with the attached specifications, or those specifications as provided for in the subdivision agreement.

Dated at _____, this _____ day of _____ 20 ____

Signed: _____

Witness: _____

**SCHEDULE
TO WELL CONSTRUCTION AGREEMENT
BETWEEN**

**and
THE CORPORATION OF THE TOWNSHIP OF
NORTH GRENVILLE**

PART LOT CONCESSION ; BEING PART ON PLAN 15R-

WELL DESIGN SPECIFICATIONS

All wells shall be located and constructed in accordance with the following specifications:

The well shall be completed into a bedrock aquifer to ensure that the water supply can be adequately protected from surface contaminants. Completed wells shall be a minimum of 150 mm (6 inch) diameter. The annular space shall be 50 mm (2 inches) in diameter larger than the outside diameter of the casing, for the entire length of the casing. The well shall be drilled for a depth of 6 m from surface or for 2 m into competent bedrock, whichever is deeper, using standard well drilling equipment.

A 150 mm (6 inches) interior diameter steel casing with a drive shoe shall be seated into the bedrock. The remainder of the well shall be completed as a 150 mm diameter open hole to whatever depth is required in order to obtain an adequate supply of potable water. Wells shall be constructed by a properly licensed water well contractor and in accordance with Ontario Regulation 903 and as per the attached sketch.

The casing shall be pressure grouted with cement, for the entire length of casing. Neat cement grout shall be a mixture of 100 lbs. of cement to 5 or 6 gallons of clean water. Hydrated lime may be added to a maximum of 10% of the volume of cement. Not more than 2 parts (by weight) of sand to one part of cement may be used. Cement grout shall be allowed to set a minimum of 24 hours (high early cement) or 72 hours (normal cement) before drilling continues.

The final depth of the wells will be dependant on the yield. Well drilling and construction operations shall be inspected, and the Township shall be notified for inspection 24 hours prior to the following stages;

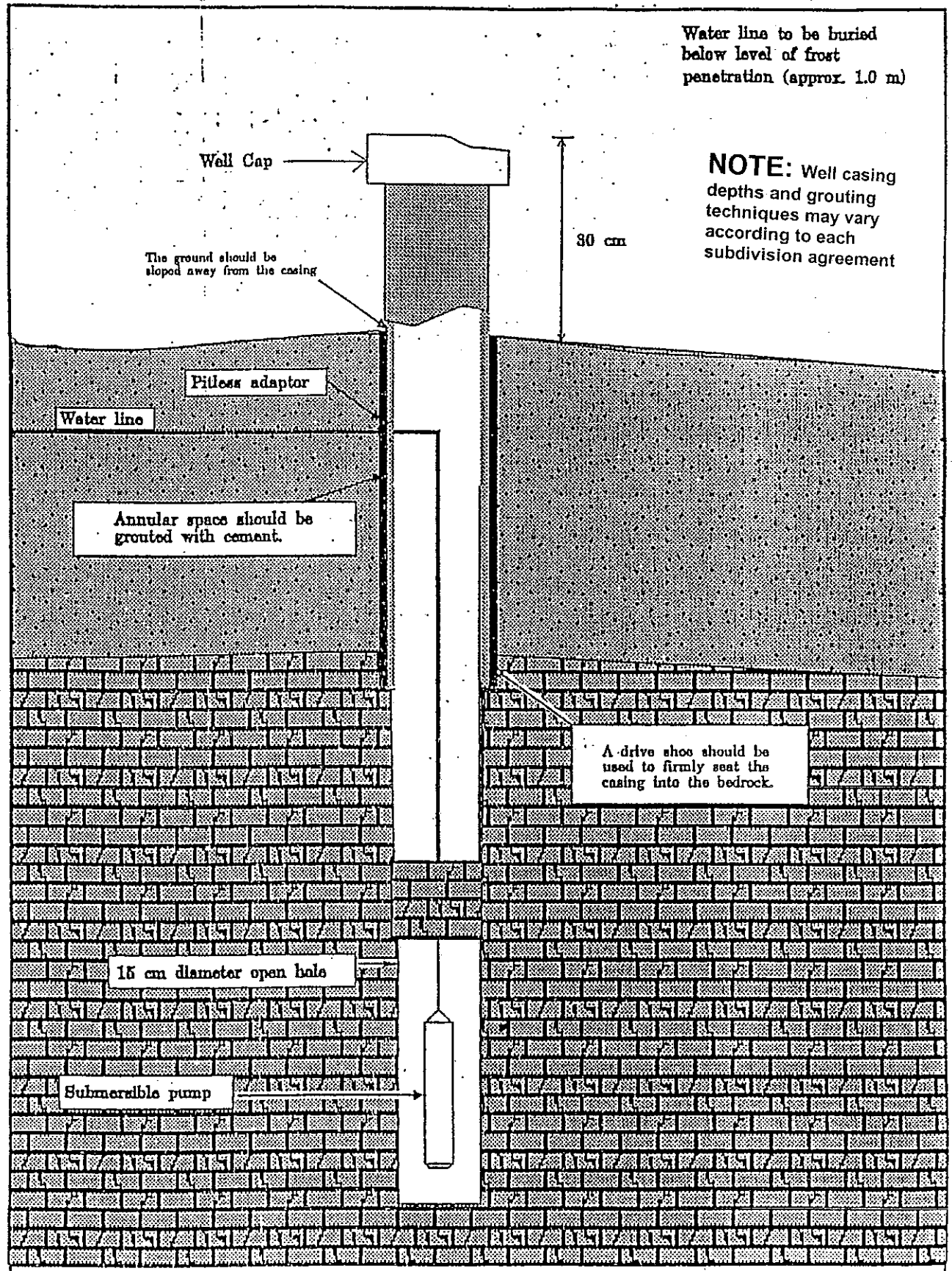
- prior to commencement of pressure grouting
- prior to backfilling of service trench

MOE recommended cement grouting methods No. 3, 4 or 5 shall be followed, in order to ensure that all void spaces are filled. Wells shall be completed with a pitless adaptor to ensure ease of maintenance of well pumps and equipment. Holes in the well casing shall be cut with a hole saw, not a torch. Tiles and other drainage collecting structures are not permitted around the well head.

Since current Municipal By-laws do not permit flowing wells or ground-source heat pumps to be discharged into road ditches or Municipal Drains; therefore when flowing artesian conditions exist (i.e. the static water level is above the ground surface), it will be required that the well casing be extended above grade to a height above the highest static water elevation.

Finished casing shall extend a minimum of 0.3 meters above finished grade.

Water line to be buried below level of frost penetration (approx. 1.0 m)



The ground should be sloped away from the casing

30 cm

NOTE: Well casing depths and grouting techniques may vary according to each subdivision agreement

Pitless adaptor

Water line

Annular space should be grouted with cement.

A drive shoe should be used to firmly seat the casing into the bedrock.

15 cm diameter open hole

Submersible pump

WELL DESIGN

Overview of Ground Source Heat Pumps & the OBC

P. Gerrard
29 February 2008

[**NOTE:** These notes represent an overview of the requirements for ground source heat pumps (“earth energy systems”) for residential and other small buildings, and do not cover all of the design and installation provisions. Reference should be made to the CSA Standards for a complete understanding of the provisions.]

1. The generic term “*ground source heat pumps*” includes both “*open loop*” and “*closed loop*” types of systems:
 - a) “*open loop*” systems extract heat from ground water taken from a well
 - b) “*closed loop*” systems consist of buried piping, laid either horizontally or vertically in bore-holes, which is charged with a heat transfer medium (antifreeze), to extract heat from the surrounding ground.

2. Heat pumps are a building service system, and are captured in the definition of a “*building*” in the Building Code Act as “...*service systems appurtenant thereto.*” This interpretation has been confirmed by the Courts. Therefore, all heat pump systems require a building permit.

3. The Building Code Regulation provides design criteria for heat pump systems (“earth energy systems”) in **Articles 6.2.1.4 (3) and (4)**. Those Articles reference the **CSA-C448.1** (Commercial and Institutional Buildings) and **CSA-448.2** (Residential and Small Buildings) Standards.

4. Ground source heat pump systems must be designed and constructed in accordance with the CSA-C448 Standards referenced above. Consequently, in order to be deemed complete, the building permit application should have supporting documentation, which addresses the various design and installation provisions of those Standards. In order to determine compliance with the referenced Standards, it is suggested that documentation such as listed below, should be filed in support of any application:
 - a) **Open Loop Systems:**
 - i) a hydrogeology report prepared by a qualified hydrogeologist, which addresses the following issues:
 - review of any associated hydrogeology report (i.e. provided as part of a privately-serviced subdivision);
 - assessment of water supply aquifer for water quantity, and possible impact on local potable water supply;
 - assessment of water supply aquifer for water quality (i.e. water chemistry which could affect the system design or operation);

- recommendation for system discharge (i.e. into roadside ditch, natural watercourse or rejection (“dump”) well and possible impacts;
- construction details for supply and rejection wells.

- ii) a site plan which identifies the following:
 - location of existing / proposed buildings, structures, well and septic system;
 - property lines and location of any easements or right-of ways;
 - location of proposed supply and rejection (dump) wells;
 - distance of all wells from septic systems on adjacent properties;
 - location of existing buried services (i.e. gas, hydrdo, etc);
 - proposed location of service trenches to new supply and rejection wells.

- iii) Heat pump system design and specifications, including:
 - heat loss / gain calculations;
 - heat exchanger manufacturer’s specifications;
 - depth of trench excavation;
 - backfill material.

- iv) Specific (as-built) documentation to be provided upon completion of the installation:
 - water well records of the new supply and rejection wells;
 - fully dimensioned site survey and worksheet for the installed system in accordance with Annex ‘B’ of the CSA Standard.

- v) Inspections should pay particular attention to the following:
 - grout around the well casing (although this is governed by Regulation 903 under the Ontario Water Resources Act, there is no mandated inspection of well construction by any public agency);
 - pitless adaptor installation at piping connection to the well casing;
 - piping entrance at foundation wall;
 - piping material and jointing;
 - pipe bedding and backfill material;
 - pump and heat exchanger unit installation;
 - interior ductwork sizing and connections.

b) **Closed Loop Systems:**

- i) a hydrogeology report prepared by a qualified hydrogeologist, which addresses the following issues:
 - review of any associated hydrogeology report (i.e. provided as part of a privately-serviced subdivision);

- assessment of water supply aquifer for any potential impact on the local potable water supply;
 - assessment of water supply aquifer for water quality (i.e. water chemistry which could affect the system design or operation);
 - geotechnical analysis and projected depth of frost penetration;
 - depth of all aquifers and water table below grade.
- ii) a site plan which identifies the following:
- location of existing / proposed buildings, structures, well and septic system;
 - property lines and location of any easements or right-of ways;
 - location of proposed distribution piping trenches / bore-holes;
 - distance to all wells on adjacent properties;
 - location of existing buried services (i.e. gas, hydro, etc);
- iii) Heat pump system design and specifications, including:
- heat loss / gain calculations;
 - length of distribution piping;
 - heat exchanger manufacturer's specifications;
 - pipe and jointing specifications;
 - pipe bedding material and specifications;
 - heat transfer medium (antifreeze solution) specification and associated Material Safety Data Sheets (MSDS);
 - depth of excavation (horizontal loops) or bore-holes (vertical loops);
 - backfill material.
- iv) Specific (as-built) documentation to be provided upon completion of the installation:
- water well records of the bore-holes;
 - results of distribution piping pressure test
 - fully dimensioned site survey and worksheet for the installed system in accordance with Annex 'B' of the CSA Standard.
- v) Inspections should pay particular attention to the following:
- system verification and testing in accordance with protocol in CSA Standards;
 - grout around the piping in the vertical bore-holes;
 - length of distribution piping;
 - piping material and jointing;
 - pipe bedding and backfill material;
 - piping entrance at foundation wall;
 - pump and heat exchanger unit installation;
 - interior ductwork sizing and connections.