JULY 2025

TOWNHOUSE LOT

District Energy Sharing System Design Guide

Blatchford Renewable Energy

Edmonton

Contents

1. Introduction

1.1 Blatchford Renewable Energy Overview

Blatchford Renewable Energy (BRE) plays a major role in helping to put Blatchford on the path to achieving the ambitious and exciting vision to be a 100% renewable, carbon-neutral community.

Blatchford Renewable Energy is a City of Edmonton utility that provides thermal energy services to the Blatchford community. The utility owns and operates the District Energy Sharing System.

All buildings in Blatchford must be designed and constructed to connect to the District Energy Sharing System (DESS) for all heating, cooling and domestic hot water (DHW) needs. Certain buildings may be exempt from this requirement if they are designed, built and certified to a net-zero carbon standard, to the satisfaction of Blatchford Renewable Energy.

Since buildings will use renewable district energy, they will not need to be equipped with traditional systems related to the production of thermal energy, such as furnaces and hot water heaters.

1.2 Purpose

The purpose of this design guide is to ensure townhouse lots within the development meet Blatchford Renewable Energy's design requirements for connecting to the DESS.

This design guide presents the technical specifications for DESS compatible systems. Mechanical systems must be designed in accordance with these specifications. The guide also establishes an inspections and approvals framework for the Blatchford Renewable Energy office to assess whether the buildings meet the criteria.

Additional requirements and information on the District Energy Sharing System and Blatchford Renewable Energy can be found in the following documents found at BlatchfordUtility.ca:

- Customer Terms and Conditions
- Blatchford District Energy Utility Fiscal Policy
- Bylaw 17943 - Blatchford Renewable Energy
- District Energy Sharing System Service Requirements for Townhouse Lots

2. Design Review and Approvals Process

2.1 Design Approval Authority

Blatchford Renewable Energy will be the approving authority for adherence to the guideline. The enforcement, administration and interpretation of the guidelines will be at the sole discretion of Blatchford Renewable Energy. The design and construction of all buildings and site development must be in compliance with current Federal, Provincial and City of Edmonton codes, bylaws, standards and regulations. Approval of plans and specifications by Blatchford Renewable Energy does not constitute any warranty or representation that such plans and specifications comply with government regulations or requirements and/or good and prudent design, engineering and construction practices. Responsibility for obtaining appropriate approvals from Government Authorities and complying with their various regulations, policies and standards will at all times be that of the builder. If a conflict arises between documents, the most stringent will govern.

2.2 Submission and Review Process Overview

Final Design

After entering into the sales agreement, builders will be required to submit a final design package to ensure the building's heating, ventilation and air conditioning (HVAC) systems are compatible with the DESS. BRE will review the final design submission for compliance with this guide.

A list of the information that a builder is required to submit as part of the final design can be found in Appendix A.

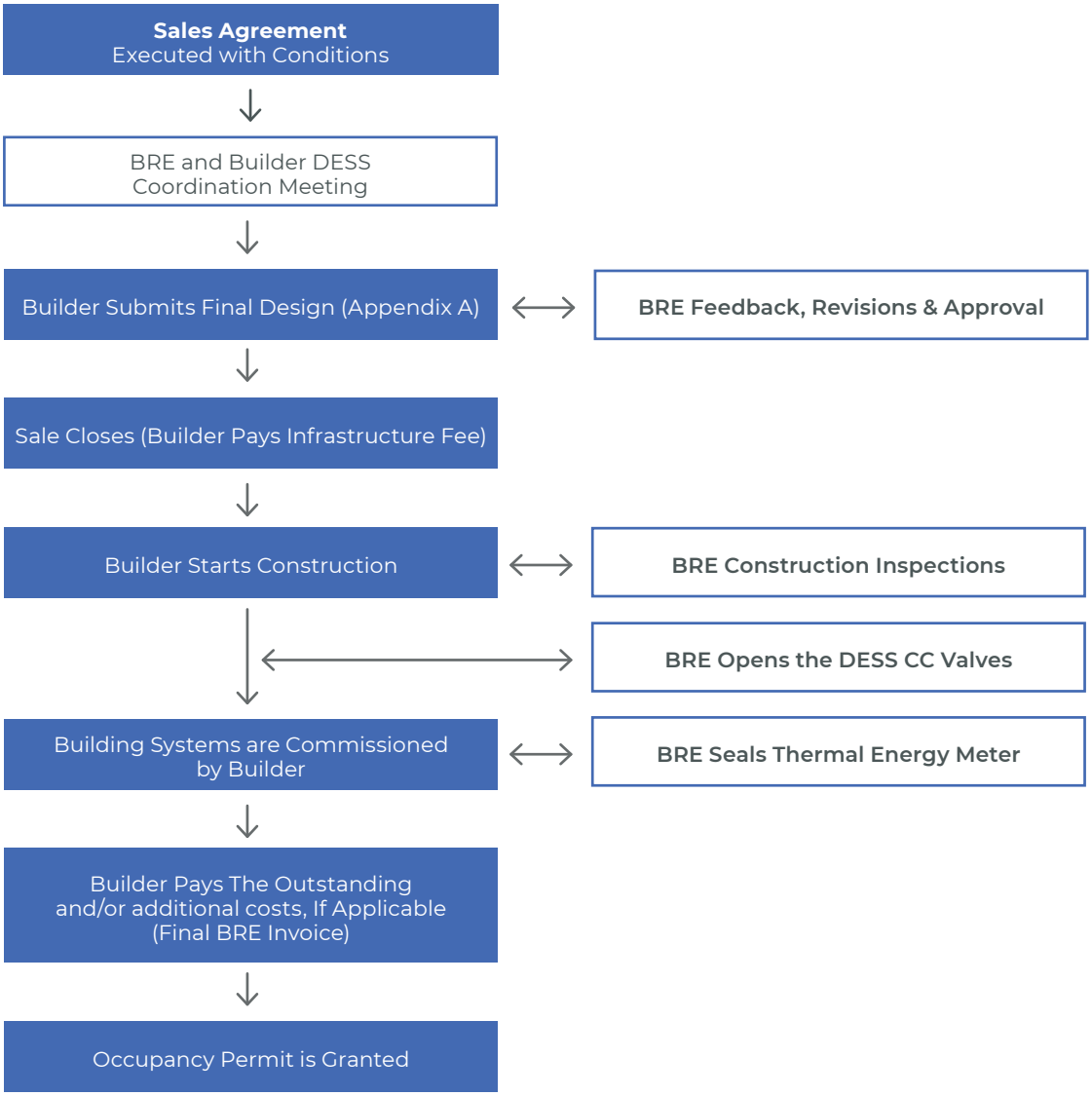
Construction Inspections

During construction, Blatchford Renewable Energy will complete inspections to ensure compliance with the final design and the construction-based requirements.

The inspection process is detailed in Appendix D.

Figure 1: Blatchford Building Design Review and Approval Process – Townhouse Lots

Figure 1 depicts the steps in the overall design review, coordination and approvals process.



3. Rates and Charges Overview

3.1 Thermal Energy Charges

- Townhouse lots will have a thermal energy meter to measure DESS energy used by the customer's heat pump system.
- BRE will bill customers on a monthly basis. The bill is based on a fixed monthly charge and a variable charge based on the customer's consumption. The current rates can be found under Rates at BlatchfordUtility.ca
- All customer charges will be based upon cost of service and will be at most comparable to what consumers would pay elsewhere in the City of Edmonton in energy utility bills and annual maintenance costs.

3.2 Infrastructure Fee

- BRE will charge the builder a one-time infrastructure fee for each unit. The fee will be charged on the sale closing date.
- Details on the Infrastructure Fee, including the amount, can be found in the Customer Terms & Conditions at BlatchfordUtility.ca

4. DESS Connection Requirements Overview

Buildings in Blatchford must be built with heating, cooling and domestic hot water heating systems that are compatible with, and use, the DESS. Townhouse lots are required to have standalone heat pump systems for HVAC and DHW heating that extract energy from the DESS.

Table 1 provides an overview of the major elements of a DESS compatible mechanical system for townhouse lots. A conceptual building schematic for Townhouse Lots is presented below. This schematic identifies key components of the DESS connection design and the utility ownership demarcation. The numbered items and colour scheme in Table 1 correspond to the schematic.

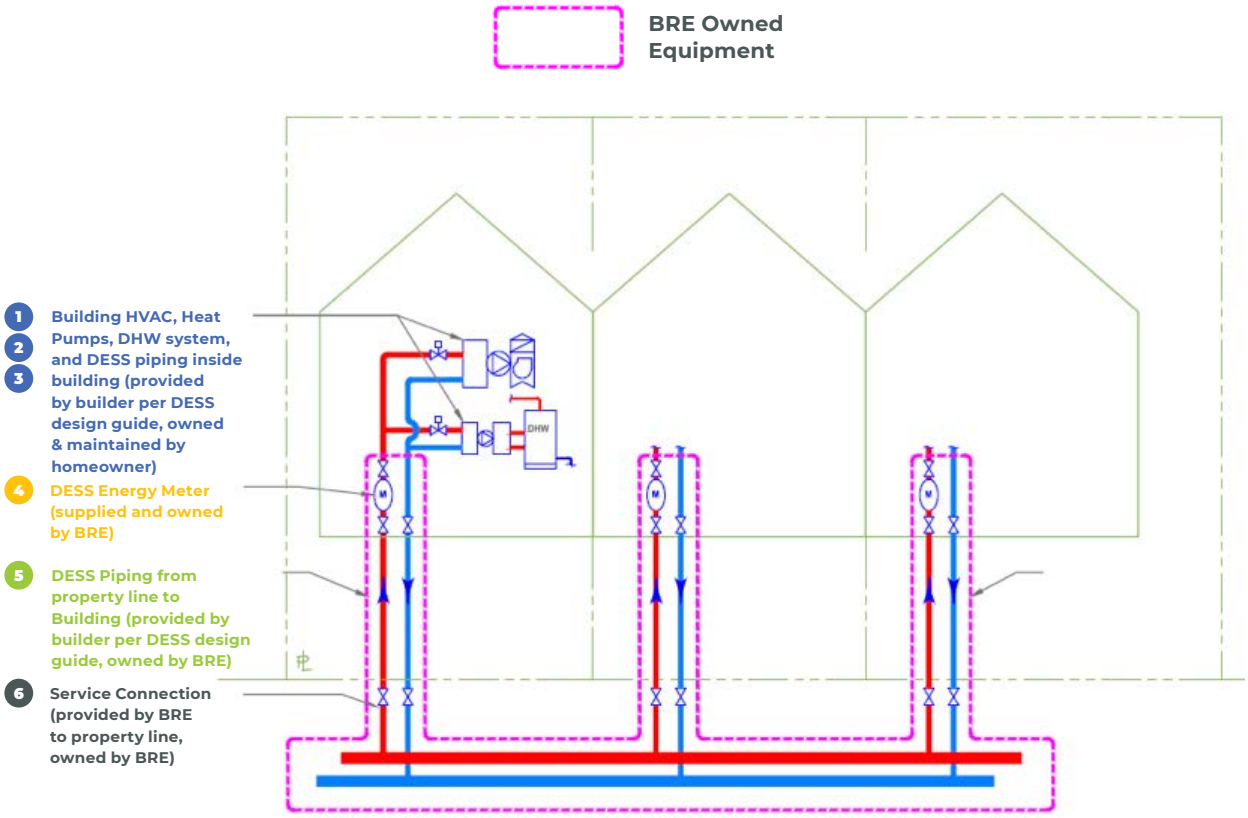
TABLE 1: Overview – Major Elements of a DESS-Compatible Mechanical System for Townhouse Lots.

ITEM #	TOWNHOUSE LOTS	
	DESS Connection Requirement	• All buildings, except those identified as exempted, must connect to the DESS. • All thermal energy for heating, cooling and domestic hot water must come from the DESS. • Other heat loads such as garage heat or snowmelt systems must be served by the DESS.
1	Building HVAC System	• The builder must provide an HVAC system for all conditioned spaces that is compatible with the DESS as described in this guide. • Compatible systems include water-air heat pump, water-source variable refrigerant flow, or water-to-water heat pump for in-floor radiant, hydronic radiators, or fan coils, in-floor radiant, low-temp hydronic radiators or low-temp fan coils. • Customer-owned generation systems such as boilers, gas furnaces or air-source heat pumps are generally not permitted. • Electric resistance heat is only permitted as a backup heat source or in specific circumstances as described in this guide. • The homeowner will own and maintain their HVAC system(s).
2	Building DHW Heating System	• The builder must provide a heat pump-based, DHW heating system in each townhouse as detailed in this guide. • The homeowner will own and maintain their DHW heating system.
3	Building HVAC and DHW Piping	• The builder must provide all DHW piping and hydronic piping (as required) for the townhouse. • The homeowner will own and maintain building piping.
4	Energy Metering	• BRE will supply, own and maintain a thermal energy meter in each townhouse lot. • The meter will be installed by the builder after completing the installation of the townhouse heat pump systems.

5	DESS Piping	• The builder must extend the DESS service piping from the property line to the thermal energy meter in the building as described in this guide. In addition, the builder must extend the wireless metering conduit with pull strings from the metering point inside each building's mechanical space to the exterior of the building above the front door where the wireless meter antenna will be installed, as described in this guide. • The DESS piping from the property line to the townhouse lot energy meter will be subject to acceptance testing along with the wireless metering conduit. Upon acceptance, BRE will take over ownership and maintenance of the DESS service piping. • The builder must provide DESS piping from the thermal energy meter to each customer-owned heat pump as described in this guide.
6	DESS Service Connection	• BRE will provide each legal lot with a single DESS service connection installed to the property line.

Conceptual Building Schematics for Townhouse Lots

Below is a conceptual building schematic for townhouse lots identifying key components of the DESS connection design and utility ownership demarcation.



5. Building Design Requirements

BRE will provide DESS supply and return pipes at the property line of each townhouse lot.

The builder will be responsible for the design and construction of all of the building's HVAC and DHW system(s) and connection to the DESS in accordance with this guide. The builder must provide access and space for the installation of the BRE owned thermal energy meter. The meter will be installed by the builder after the customer building and mechanical systems are constructed.

Disclaimer: All design guidance in this document must be applied (where applicable) to the detailed building mechanical design by the builder's engineering team. The builder will be responsible for ensuring the final building design, including all components described in this guide, is designed and built in compliance with all applicable aspects of the Alberta Building Code, National Energy Code for Buildings, Alberta Plumbing Code, applicable ASHRAE standards and good engineering practice.

5.1 Heating and Cooling System Requirements

All heating and cooling (where provided) for conditioned spaces must be provided by a heat pump-based mechanical system connected to the DESS and as described in this section.

Those units with lane and/or basement suites are required to use a heat pump-based mechanical system for heating and cooling the lane and/or basement suites from the DESS.

All heat pumps must be capable of continuous operation with a source water temperature of 10°C in winter heating mode and up to 30°C in summer cooling mode.

The following HVAC system types are acceptable, given they meet the following minimum performance criteria. A partial list of heat pump manufacturers and models that meet these requirements is provided in Appendix B.

1. **Ducted Water-to-Air Heat Pump System** (Refer to Water-Air Heat Pump Detail A1 in Appendix C)

    1.1 The heat pump must operate with a minimum coefficient of performance (COP) of 4.0 in heating mode when rated at groundwater heat pump conditions (10°C entering water temperature and 20°C entering air temperature) in accordance with Air Conditioning, Heating and Refrigeration Institute/ISO 13256-1. (For a complete listing of manufacturers and model efficiencies, please see www.ahridirectory.org.)

    1.2 The heat pump must operate with a minimum energy efficiency ratio of 17.0 in cooling mode when rated at ground loop heat pump conditions (25°C entering water temperature and 27°C/19°C dry bulb temperature/wet bulb temperature entering air temperature) in accordance with Air Conditioning, Heating and Refrigeration Institute/ISO 13256-1.

1.3 For two-stage or variable speed heat pumps, the average of full load and part load performance must meet the performance criteria stated in 1.1 and 1.2 above.

1.4 The heat pump must be equipped with a backup electric resistance heater, internally or externally mounted, and controlled by the heat pump controller to provide backup heat only in the event of a heat pump fault and not as supplemental heating. The size of the backup heat is left to the builder. Note that 100% redundancy is not outlined as a requirement. The objective is to provide a minimum level of comfort and freeze protection in the event of a service emergency.

1.5 The heat pump operation must be designed for a source water flow of 0.62 L/s per kW (2.8 gpm per ton) nominal capacity.

2. **Heat Pump-Based Hydronic Heating-Only System** (Refer to Water-to-Water Heat Pump Detail A2 in Appendix C)

2.1 The heating system must be designed to meet the peak heating load with a hot water temperature no greater than 49°C (120°F).

2.2 The heating system must include an outdoor air reset control to reduce the hot water temperature during part load conditions.

2.3 Example hydronic heating systems include in-floor radiant heat, low-temperature radiators, low-temperature convectors or fan coils.

2.4 The hydronic heating system must be heated entirely by a water-to-water heat pump. The system must include a buffer tank to prevent short cycling of the compressor, sized as recommended by the manufacturer.

2.4.1 The buffer tank must include a backup electric element controlled by the heat pump controller to provide backup heat only in the event of a heat pump fault and not as supplemental heating.

2.5 The water-to-water heat pump must operate with a minimum heating COP of 3.5 when rated at groundwater heat pump conditions (10°C entering source temperature, 40°C entering load temperature) in accordance with Air Conditioning, Heating and Refrigeration Institute/ISO 13256-2.

2.6 The heat pump operation must be designed for a source water flow of 0.67 L/s per kW (3.0 gpm per ton) nominal capacity.

5.2 Domestic Hot Water Systems Requirements

Domestic hot water heating must be provided by a heat pump-based system that uses the DESS as described in this section.

Backyard houses that are not connected to the main building are not required to use a heat pump-based DHW heating system and may use an electric system.

WATER-TO-WATER DHW HEAT PUMP REQUIREMENTS

(Refer to DHW Heat Pump Detail A3 in Appendix C):

Builders proposing to use a water-to-water heat pump must meet the following requirements:

1. The heat pump must be a high-temperature water-to-water heat pump designed for operating with a DHW tank temperature setpoint of 55°C (130°F) or greater.
2. The heat pump must operate with at least a COP of 3.0 when operating at 10°C entering source temperature and 40°C entering load temperature.
3. The heat pump must include a vented, double-wall heat exchanger on the load side for direct potable water heating; or the designer must provide an intermediary double-wall heat exchanger for indirect potable water heating. Refer to Standata Plumbing Information Safety Bulletin P-08-01-NPC15 and the Alberta Building Code for details.
4. The DHW heat pump must heat potable water in a DHW storage tank sized appropriately for the DHW load and heat pump heating capacity to avoid short cycling. A minimum storage tank size of 227 L (60 gal) is required.
5. The DHW storage tank must have one or more electric element(s) for backup heating. The backup elements must be enabled through a relay on an alarm signal from the DHW heat pump, which will energize the electric element thermostat(s). Backup electric element thermostats must be set at no more than 60°C (140°F), must only be energized on alarm signal from the DHW heat pump and must not be designed for supplemental heating.
6. A thermostatic mixing valve must be provided as part of the building plumbing design to prevent scalding in accordance with local codes.

HYBRID ELECTRIC / AIR-SOURCE HEAT PUMP HOT WATER HEATER REQUIREMENTS

Builders may, at their option, propose the use of a hybrid electric heat pump hot water heater ("hybrid water heater") for domestic hot water heating in townhouse lots.

Builders proposing to use a hybrid water heater must meet the following additional requirements:

1. The hybrid water heater must be ENERGY STAR® certified.
2. The hybrid water heater must be installed within a heated space. Garage installations are not permitted.
3. The hybrid water heater must have a minimum storage capacity of 60 gallons.
4. The hybrid water heater installation must comply with the manufacturer's installation recommendations and applicable Alberta code requirements.
5. The hybrid water heater must be provided with a factory-approved ductwork adapter. The hybrid water heater must be ducted so as to recirculate all cooled discharge air to the main floor living space. Use rigid ductwork for hybrid water heater ducting.
6. The thermostat for the space conditioning heat pump must be located so as to be able to sense cool space temperature due to the operation of the hybrid water heater.
7. The room where the hybrid water heater is installed must be provided with a means to transfer supply air from the main living space. The room must be provided with an opening to the living

space of 116 cm^2 (18 in^2) free area or larger (a larger opening may be required by the manufacturer). This may be provided as an air transfer grille or ductwork system. Ducted supply and return air points inside the main dwelling space should be separated by enough distance to prevent recirculation of cool air back to the hybrid water heater.

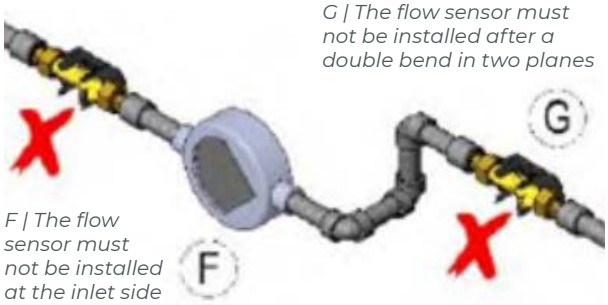
8. Please see 05A, and 05R in Appendix C for more information regarding ducting requirements for hybrid water heaters. Note there are differing requirements whether or not a basement suite is built. All hybrid water heater ducting must be rigid. Any flexible ducting will not be accepted. All equipment ducting is inspected by and approved by the City's HVAC inspection team.

Final design packages for townhouse lots which include a hybrid water heater must clearly indicate how all of these conditions are met.

5.3 Source (DESS) Piping Systems Requirements

Piping must be provided by the builder to connect the DESS service connections to the source water connections on the heat pumps. This piping will be directly connected to the DESS and, during operation, will carry district energy water to the heat pump(s). Kit#1 & Kit#2 will be provided by BRE to the builder, refer to detail M-1 & M-2 in Appendix C.

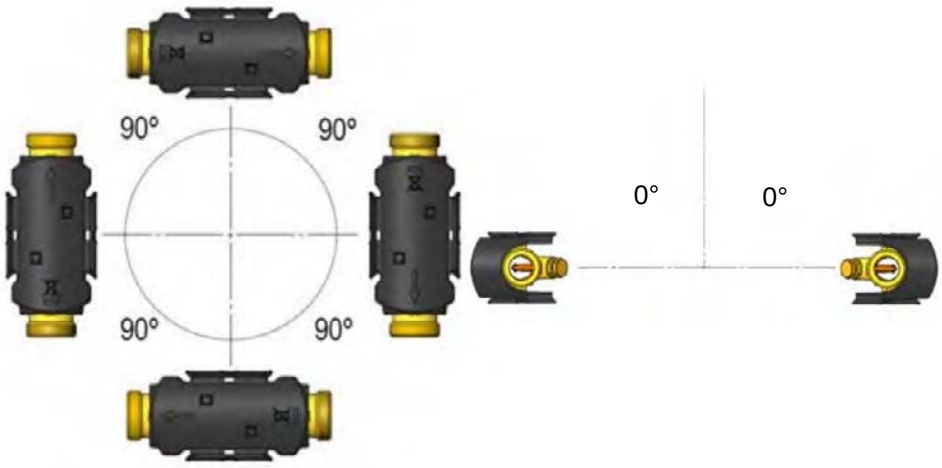
Builders must install the Return DESS piping manifold above the Supply DESS piping, see image above (for demonstration only).



G | The flow sensor must not be installed after a double bend in two planes

F | The flow sensor must not be installed at the inlet side of a pump

Builders to also take a note of positions F and G below as it relates to the piping manifold installation, see image above (for demonstration only).



Acceptable flow sensor mounting and orientation. Note that the preference is for the meter to be installed with the plastic housing at 0° (pointing towards the wall)

The source piping inside the customer building must be designed to meet the following requirements as well as the DESS HP Source Piping & Detail 01A in Appendix C. All elements shown on Detail 01 & 01A and listed in this section are mandatory and must be included in the final mechanical design.

SOURCE (DESS) PIPING MANDATORY REQUIREMENTS:

1. The entry point for the source (DESS) service piping must be coordinated to enter the building as close as possible to the mechanical closet housing the heat pump(s). Source piping running within building walls must be minimized.
2. Where the DESS service enters the building, provide line-sized, full port ball valves for isolating the building piping. Provide an access panel if required (refer to DESS Service Connection Detail 03 in Appendix C).
3. Source (DESS) piping inside the customer building must be one of the following:
    - 3.1 Type L or K hard drawn copper tube with soldered (sweated) wrought copper or cast brass fittings. Type M copper tubing is not permitted.
    - 3.2 Schedule 40 black steel with 150 lb malleable iron threaded fittings.
    - 3.3 Schedule 40 type 304 or 316 stainless steel pipe with 150 lb stainless steel threaded fittings.
4. Source piping must be sized based on a maximum head loss of 24 kPa/100m (2.5 ft/100') of pipe.
    - 4.1 25mm (1") pipe must be used where design flows are less than 0.37 L/s (6 gpm).
    - 4.2 32mm (1-1/4") pipe must be used where design flows are between 0.37 to 0.63 L/s (6 to 10 gpm).
    - 4.3 38mm (1-1/2") pipe must be used where design flows are between 0.63 to 1.0 L/s (10 to 16 gpm).
    - 4.4 50mm (2") for flows in excess of 16 gpm up to 32 gpm.
5. The total head loss of the source piping from the property line, including the pressure drop through the heat pump and all fittings, must not exceed 104 kPa (15 PSI) at design flow.
6. Source piping must be insulated where installed above ground and provided with a vapour barrier to avoid condensation. Source water return temperatures may range from a low of 5°C (winter) to a high of 29.5°C (summer).
7. Where source piping is run through unconditioned spaces and may be exposed to freezing temperatures, heat tracing is required for freeze protection.
8. Source (DESS) piping must be installed to include all fittings and components as per the mandatory DESS HP Source Piping Detail 01 & 01A in Appendix C.
9. Air vents must be provided at high points inside the mechanical closet where necessary.
10. Source piping components must be rated for an operating pressure of 689 kPa (100 psi) and a working fluid of water with corrosion inhibitor.

11. The builder must install an energy meter fitting kit (Kit #1), provided by BRE, which includes two unions, two ball valves and a spacer pipe for future installation of the thermal energy meter (refer to DESS Energy Meter Detail 04 in Appendix C).

12. The DESS (source) flow to each heat pump must be controlled with all of the following flow control components (refer to DESS HP Source Piping Detail 01 & 01A in Appendix C).

    12.1 A strainer on the DESS supply piping.

        12.1.1 Main strainer must be installed immediately after the first valve entering the mechanical room and with sufficient access for cleaning.

        12.1.2 Optional additional strainers may be added immediately before each heat pump.

    12.2 A motorized flow control valve for each heat pump as follows:

        12.2.1 Full port line-sized ball valve with minimum 345 kPa (50 psi) working differential pressure.

        12.2.2 On/off actuator controlled by the heat pump or building management system.

        12.2.3 Taco Zone-Sentry, Taco 5101-G3, or Belimo B2 series.

    12.3 An automatic flow control valve for each heat pump as follows:

        12.3.1 Line-sized auto flow control valve, with two 1/4" pressure/temperature ports, minimum 2760 kPa (400 psi) pressure rating, brass body and threaded or sweat connections.

        12.3.2 Internal, interchangeable flow control cartridge selected for the design flow rate of the heat pump and with a 14–221 kPa (2–32 psid) or 14–552 kPa (2–80 psid) control range. Round up the heat pump design flow to next available cartridge size, if required.

        12.3.3 Make and model: FDI YR Series; Hays Measurflo 2510 or 2520; or Griswold K-valve.

    12.4 Locate strainer, automatic flow control valve and motorized control valve in an accessible location for servicing.

13. Optional flexible hoses to equipment, if provided, must be EPDM rubber with braided stainless steel cover, factory-crimped stainless ferrules, and brass or stainless NPT end connections. Make and model: New Line A9450, or equivalent.

PIPE FLUSHING PROCEDURE:

1. DESS (source) piping inside the building must be flushed prior to installation of the thermal energy meter by the builder. Flushing must be performed only with the spacer pipe installed and not with the meter body (refer to drawings M-1 & M-2). Builder is fully liable for all damages if energy meter is used for flushing.

2. After the builder installs the DESS manifold as per Detail 01 & 01A, the builder requests BRE to open CC valves to facilitate flushing. See Figure 2A: Builder Meter Installation Process (Main Dwelling).

3. With the heat pump(s) disconnected, flush all piping by opening all valves on the DESS supply line and flushing DESS water to drain inside the mechanical closet for 60 seconds or until there is no debris and air left in the lines. Flush at each heat pump including basement suites and garage suites (if applicable).

4. Close DESS supply valves and repeat flushing on DESS return line.

5. Clean all strainers in the DESS piping system.

6. Isolate piping from heat pump during flushing to prevent sending debris into the heat pump. In the event of freezing, anytime components are replaced, or at the sole discretion of the utility, BRE may request for multiple flushing and pressure tests to be completed to BRE's satisfaction. This is to ensure that there are no leaks and/or debris present in the DESS manifold. These costs will be the sole responsibility of the builder.

PRESSURE TESTING PROCEDURE:

Upon successful flushing of both DESS supply & return lines with the spacer pipe, the builder then installs the energy meter and conducts the pressure test for BRE to witness.

1. A pressure test of all DESS piping from the CC up to the heat pump(s) is required at Inspection #2. Notify BRE 5 business days in advance to arrange for inspection #2 and witness of pressure test.

2. Pressure testing for DESS piping will be with water.

    2.1 In accordance with Bylaw 17698, Section 5.4 of the Terms and Conditions of Water Service, cross-connections between non-potable and potable water systems are not permitted. Water for filling of the district energy system within the individual units is to be supplied from a water tank. A tank and pump system must be used for the hydrostatic testing of the system. No direct connection to the water system is permitted.

3. Pressure testing of high density polyethylene must be completed as follows:

    3.1 Provide notice to BRE a minimum of 5 business days in advance of pressure testing to arrange for inspection. BRE must inspect underground services prior to DESS pipe backfilling and witness pressure test prior to acceptance.

    3.2 With the curb cocks closed, pressurize services with water to 724 kPa (105 psi), which is equivalent to 1.5 times max operating pressure of 482 kPa (70 psi).

    3.3 Vent and bleed off trapped air.

    3.4 Initial Expansion: Maintain 724 kPa (105 psi) for four hours and add water as needed. Do not measure this volume. Hydrostatic pressure expands pipe.

    3.5 Begin Test: Reduce pressure to 655 kPa (95 psi).

    3.6 The pipe installation is acceptable if there is no pressure drop over one hour.

5.4 Thermal Energy Meter Requirements

The Thermal energy meter installations, inspections, kit details, etc. for the main dwelling and garage suite are outlined in Figures 2A & 2B in appendix D. Builders must provide BRE with at least five business days' notice to arrange for any DESS related inspections.

The builder is to follow detail 04 from Appendix C for the installation of the thermal energy meter).

1. Install the utility-supplied fitting kit and spacer (Kit #1) on the DESS supply pipe where the DESS services enter the mechanical space. All DESS source water must be routed through the thermal energy meter location.

    1.1 The location must be as close as practical to the point where the DESS supply pipe enters the mechanical space.

1.2 Kit #1 includes two ball valves with unions that must be installed for future servicing of the meter.

1.3 Maintain a length of straight pipe equal to or greater than five times the pipe diameter upstream of the meter installation location.

1.4 Wireless metering conduit with pull string must be extended from the meter installation location to the approved exterior location by the builder.

1.5 The thermal energy meter will be owned and maintained by BRE. Maintain 60cm of clear working area in front of meter and do not obstruct access with placement of other equipment or structures. Where meters must be installed in finished spaces, provide a minimum 45cm x 45cm access panel.

1.6 Preference is for meter spacer to be installed horizontally, vertical (upflow only) installation may be approved by BRE.

2. Kit #1 includes a brass tee that must be installed in the DESS return pipe, within 30cm of the energy meter location, for installation of the return temperature sensor.

3. The builder is to provide a dedicated transformer to feed the thermal meter. Locate the transformer as close to the meter as possible (at the most within 1m of the energy meter). The transformer must be fully visible, accessible and not hindered by any piping/equipment.

3.1 A typical doorbell transformer 16-24 Vac and 10 VA is sufficient (the meter is 24 vac +/- 50%, 1 watt).

3.2 The dedicated 15A circuit breaker (must be labeled) to be wired to the junction box with the transformer using 2c#14+gnd BX cable.

3.3 Provide a FD junction box, within 2m of the meter, the transformer threaded to the junction box.

3.4 Wiring between meter transformer and electrical panel to be BX Cabling.

3.5 Ensure all openings are provided with couplings and anti-cut glands.

3.6 Installation to meet CEC.

5.5 Building Services Requirements

BRE will provide DESS supply and return piping connections to the property line of each townhouse lot. The builder is responsible for extending these two DESS service lines into the building at the location of the future mechanical closet. Upon completion, the services will be subject to final inspection and witness of pressure testing by a representative of BRE, and then ownership of the services will be transferred to BRE. The extent of BRE ownership is indicated on DESS HP Source Piping Detail 01 in Appendix C.

Separate DESS services are provided to each separately titled land parcel. A backyard houses may be serviced from the main building after the energy meter. The builder must install the DESS service connections as per the following requirements (refer to DESS Service Connection Detail 03 in Appendix C).

1. DESS Services Pipes

1.1 40mm (1-1/2") DR11 high density polyethylene DESS supply and return service connections are provided at the property line of each townhouse lot and are isolated with curb cock shutoff valves located on the City side of the property line and with an invert depth of approximately 2.75m below finished grade. Details of specific lot services are available on the lot servicing report.

1.2 Service connections are coloured red for DESS supply and blue for DESS return. Supply is on the right when looking at the property from the street and must be maintained on the right as it is routed into the mechanical closet.

1.3 Provide a trench from the property line to the service location below the slab of the building. The trench must be free of debris.

1.4 The invert of the service pipe for main dwellings and backyard houses must be a minimum of 2.75m below finished grade at all points. If 2.75m is not maintained then Detail 06 must be followed to provide adequate frost cover.

1.5 Place and compact 75mm (minimum depth) of fine granular bedding material under the pipe (maximum depth 400mm). After passing BRE's Inspection #1, the builder is to place and compact fine granular bedding material around the pipe to 300mm above the top-of-pipe. Builder to compact to 95% of Standard Proctor Density. Do not backfill over the pipes until Inspection #1 is accepted by BRE.

1.6 Fine granular bedding material must be in accordance with the City of Edmonton Design and Construction Standards – Volume 4 Water, Section 02515 – Pipe Bedding.

1.7 Extend the high density polyethylene service connections from the property line to the inside of the townhouse at a location as close as practical to the heat pump mechanical closet.

1.7.1 Service lines must be marked with spiral wrapped red or blue tape (blue for return and red for supply). DR11 PE4710 high density polyethylene or DR11 PE3608 or DR13.5 4710 piping must be utilized.

1.7.2 Note: Typical service extension size is 1-1/2". For buildings with multiple secondary dwellings or larger thermal loads, a larger service connection from the DESS CCs may be required. BRE will advise on any size increases during the design review process.

1.7.3 Confirm curb stop valves are closed. Cut and remove the temporary U-bend from existing service connections. Do not cut pipe within 300mm of the curb stop valve.

1.7.4 Use an electrofusion coupling or butt fusion machine to fuse new high density polyethylene service extensions to existing service stubs.

1.7.5 Use a single continuous length of pipe to extend the service from the property line to the entry location.

1.7.6 Take precautions to prevent debris from entering the service pipe. Provide temporary caps at all open ends.

1.8 Cap and terminate the high density polyethylene lines after flushing to allow for pressure testing.

1.9 DESS service connections require hydrostatic (water) pressure testing from the CC into the building. The builder is encouraged to conduct an preliminary pressure test to verify their own workmanship and ensure no leaks are present prior to DESS pipe backfilling. BRE will not witness this preliminary test. Final pressure testing of the complete system must be demonstrated at District Energy Inspection #2 and any leaks must be repaired by the Builder. For pressure testing procedure, refer to Section 5.3. Piping must be backfilled with fine granular bedding following acceptance by BRE.

WARNING – Death or serious injury. Failure during a pneumatic (compressed air) leak test can be explosive and result in death or serious bodily injury. Refer to Plastic Pipe Institute's Handbook of Polyethylene Pipe Chapter 2 for testing precautions.

1.10 Provide means to prevent water from freezing and damaging DESS service lines.

1.11 Cold Weather Testing Protocol: DESS services must be protected from freezing during construction and testing. During freezing weather, water must be drained or blown out from the services after preliminary hydrostatic testing. Alternately, during cold weather ONLY, a low-pressure pneumatic (compressed air) test (<5PSI) may be completed.

1.12 Piping must be backfilled with fine granular bedding following acceptance by BRE.

1.13 Flushing for DESS service extension must be completed. After DESS manifold is installed, BRE will open the CC valves to allow for flushing. See Section 5.3.

1.14 Builder is responsible to install a 5 inch diameter CC valve sleeve/casing for both supply and return CC valves. This must be leveled off to the finished grade by the Builder.

2. **Wireless Meter Antenna Conduit**

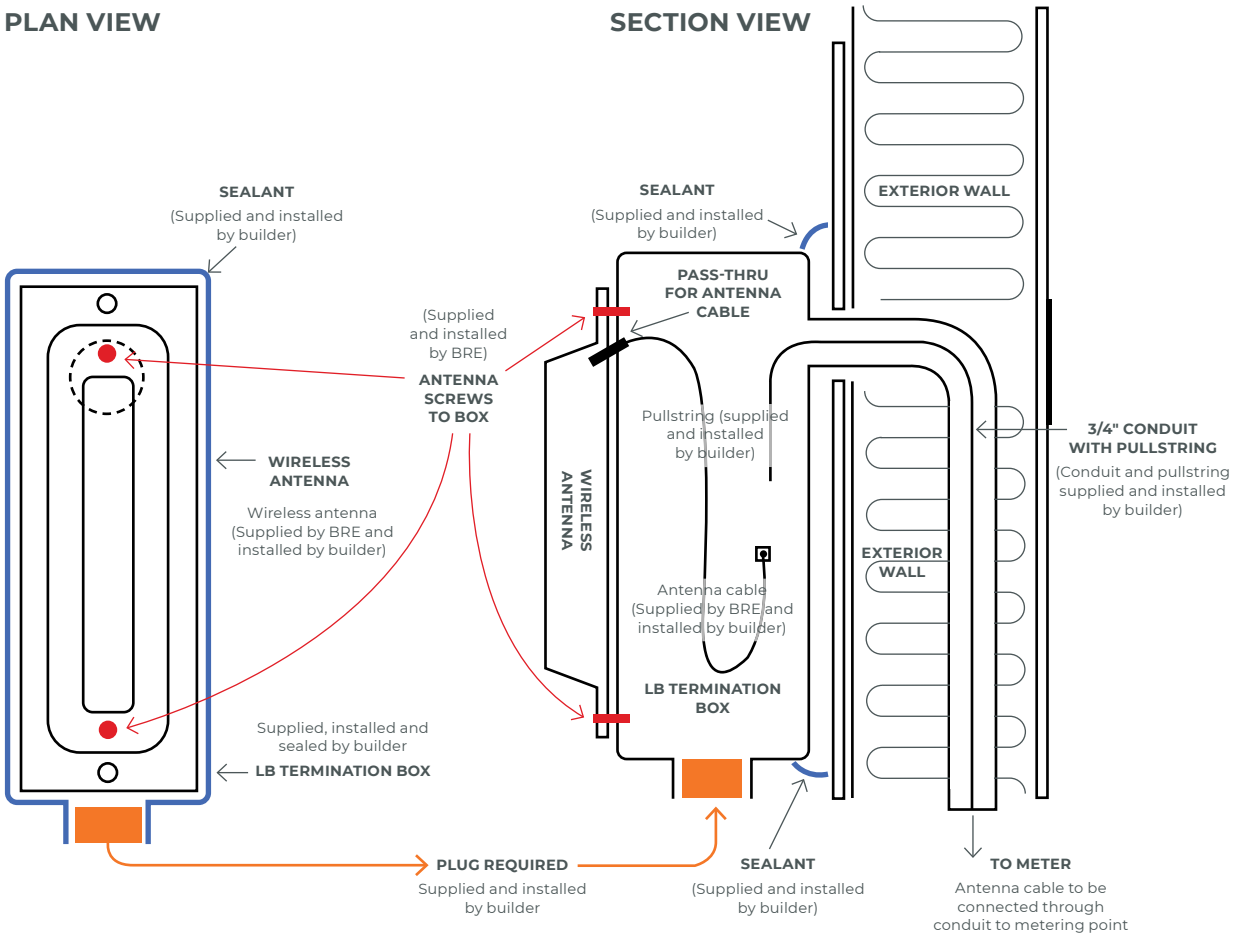
2.1 Extend a dedicated 20 mm (3/4") non-metallic conduit with an end-to-end pull-string from the metering point inside each building's mechanical space to the exterior of the building. This exterior location must face the main street/boulevard and must be located approximately 1m above the front door away from regular access to prevent damage.

2.2 Run the conduit to an exterior location where there are no pipes, drains or boxes within 0.5 meters. In addition, the antenna should not be close to another emitter, i.e., hydro antenna, city water antenna or any other signal that may cause an interference.

2.3 Builder to install a 1-1/4 size PVC LB conduit fitting with waterproof cover on the townhouse exterior wall facing the street. Builder to install a 3/4" rigid PVC conduit with pull string from the LB to the location of the energy meter in the unit's mechanical closet. Do not use metallic conduits. The builder is to mechanically fasten the conduit and LB to the building. The builder is also to seal all building penetrations using weatherproof sealant to ensure proper sealing against water entry. Complete sealing, weatherproofing and waterproofing of the conduit, LB termination box, and all of its associated connection points is the sole responsibility of the builder. LB must have a minimum flat cover size of 6.75" x 2.5". Builder to mount the wireless antenna. An example LB fitting is shown below:

When using the LB style fitting, the builder is to provide and install a suitable cap to seal the bottom conduit hole. (See image below: CARLON 1-1/4 LB Box Model# LBBODY-125).

See the schematic below for reference only. Actual installation may vary.



Please note:

- Complete sealing, weatherproofing and waterproofing of the conduit, LB termination box, and all of it's associated connection points is the sole responsibility of the builder.
- The builder is to supply and install the following: LB Termination box, 3/4" conduit with pullstring LB Termination box plug (if required).
- BRE is to supply the following for builder installation: Wireless antenna, antenna screws, antenna cable.
- **Please Note:** Builder must securely mount the meter antenna LB box to the building frame and not the soffit/flashing to ensure a sturdy connection.

2.4 The conduit routing and the proposed antenna install location must be clearly indicated on the design drawings submitted by the builder prior to installation for BRE's review and approval.

2.5 The 20 mm (3/4") non-metallic rigid conduit installed inside the building must not have more than four (4) 90° bends. Use only long swept bends. From the metering point to the exterior antenna location, the length of the conduit must not be more than 20 meters.

5.6 DESS Piping Insulation Requirements

This section provides townhouse lot builders with guidance regarding insulation on the District Energy Sharing System piping. The piping inside the building needs to be fully insulated and have a continuous vapour barrier as per the requirements of this design guide.

- No holes should be visible on the insulation which can cause sweating, dripping water, and potentially encourage mold growth or other water damage;
- All fittings need to be insulated with insulation segments or insulation tape (Armaflex or equivalent);
- The insulation elbows and joints are to be wrapped covering all holes and gaps with Armaflex insulation tape, polyethylene tape, or equivalent;
- It is encouraged to leave a neat and tidy appearance.

Please find Image 1 corresponding to an acceptable insulation job. Images 2, 3 and 4 correspond to an unacceptable insulation job and point out common errors that should be avoided.

Image 1: Desired Insulation Job

Image 2: Example of unacceptable insulation work

Wrap 2-3 layers over the elbows with a poly tape covering (Armaflex insulation tape or poly (electrical) tape) to provide continuous air vapour barrier and prevent sweating and dripping.

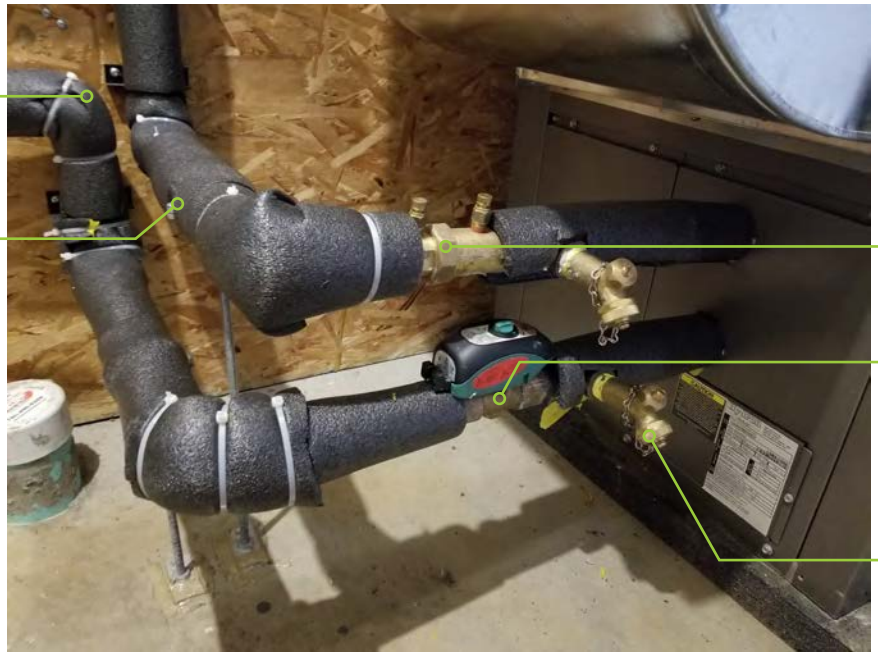
Provide insulation over the valve body and HDPE pipe to the floor. Wrap over the insulation to keep airtight. Keep the valve handle accessible.

Keep the P/T plugs accessible. Don't insulate over them.

Insulate the strainer body and wrap the gaps in the insulation to prevent dripping. Either wrap the strainer with 2 layers of Armaflex insulation tape or provide a piece of insulation on the strainer. The strainer should be cleaned after flushing and before insulation.

Insulate the valves for the meter spacer kit but don't insulate between them.

Image 3: Notes on insulating the DESS piping inside the building



Various cuts and holes in the insulation need to be wrapped to prevent sweating and drips.

Insulation should cover the pipe support and be wrapped to seal any holes and prevent sweating. Alternatively, pipe supports maybe installed outside the insulation with continuous insulation running through the support.

Insulate and wrap the auto flow valve. Keep the P/T plugs accessible.

Use Armaflex insulation tape to wrap the valve body (not the actuator) and make a continuous seal to the insulation on either side.

Insulate and wrap the base of the drain valve but keep the operator and end cap accessible.

Image 4: Missing insulation

Insulate and wrap the tee. Keep the top plug accessible for meter installation.

Appendix A – Final Design Checklist

As part of the design review and approval process, builders must submit the following information to BRE by the dates noted in the sales agreement. Prior to submitting the final design package,, please ensure all the requested information is included in the submission.

BRE will review the final design package and provide feedback. The cost of the first two design reviews will be covered by the BRE. If additional design reviews are required, BRE will charge the builder at cost for each additional review.

DESS Design Review	
First and second review (final design)	No cost to builder
Any additional design review	Actual Costs

FINAL DESIGN

The builder must submit a final building design package for review by BRE incorporating all feedback from the initial design review. BRE will review the final designs for compliance with this guide. All review comments must be addressed before the sale condition will be removed.

The final design drawings must include:

1. Description of the proposed HVAC and DHW heating systems and equipment selections.
2. Complete building mechanical system design, including final schematics, equipment schedules and controls details.
3. Floor plans showing:
    a. Locations of DESS-connected mechanical systems within the building.
    b. DESS service connection entry location and pipe routing within the building.
    c. Energy meter location and meter network conduits.
4. Complete site plans showing:
    a. DESS service connection routings from the curb stop to each townhouse lot.
    b. DESS service connection routings to any outbuildings, garages, or backyard house with DESS connected equipment.
5. Complete electrical designs.
6. Final Building Mechanical System Design Report.
7. Final Grading Plan

Blatchford Building Mechanical System Design Report (Townhouse Lots)

☐ Final Rev. Date: _____

Notes:

i. This form must be submitted along with the Final Design submission package.

Project: _____
(Name of project)

_____
(Address of project)

_____
(Legal description of project)

Part A: DESS Design Guide Requirements Checklist

The undersigned hereby gives assurance that the building design for the above listed project has been designed in accordance with the Blatchford DESS Design Guide and meets the specific requirements as listed below.

(Initial next to each item to confirm compliance.)

Space Heating, Cooling & Hydronics

_____ 1.0 All heating and cooling for conditioned spaces and semi-heated spaces is provided by an HVAC system that receives all thermal energy from the DESS.

_____ 1.1 The HVAC system is one of the approved types listed in the DESS Design Guide.

_____ 1.2 The source-side piping for each heat pump is designed as per the schematic in Appendix C Detail 01 DESS HP Source Piping.

_____ 1.3 The space heat pump is provided with a backup electric resistance heater and controlled to provide backup heat only in the event of a heat pump fault and not as supplemental heating.

DHW

_____ 2.0 All domestic hot water (DHW) is provided by a high-temperature water-to-water heat pump or hybrid electric heat pump as per the requirements outlined in section 5.2 of this guide.

Building Services

_____ 3.0 DESS service piping connections are included and will be extended from the property line stubs into the mechanical space inside the customer building(s) as per Detail 02, Detail 03 in Appendix C and the DESS Design Guide.

_____ 3.1 Procedures for flushing and pressure testing the DESS service piping by the builder's contractor are in place and are as per the DESS Design Guide.

_____ 3.2 The metering network conduit from the property line to the location of the future energy meter is provided as per Detail 03 in Appendix C.

_____ 3.3 A fitting kit and spacer will be installed for the future installation of the thermal energy meter in each unit as per Detail 04 in Appendix C.

Part B: Townhouse Lot Equipment Schedule

The builder must submit a completed copy of the Equipment Schedule below for each heat pump installed. Attach additional pages as required.

Blatchford Townhouse Lot: Space HP Equipment Schedule

To be completed by the builder and submitted with the design package for BRE review

Tag ID	Qty.	Type	Location [1]	Make	Model	DESS Flow (gpm) [2]	Airflow (cfm) [3]	Heating Design Entering DESS Water Temp	Heating Capacity [4]	Heating COP [4]	Cooling Design Entering DESS Water Temp	Cooling Capacity [5]	Cooling EER [5]	HP Electrical	Emerg. Heat Make	Emerg. Heat Model	Emerg. Heat Size (kW)	Emerg. Heat Electrical	Emerg. Heat Internal or External	Controls [6]	Max Specified HP Operating Pressure (psi)
Example	*4*	*Water-to-Air HP*	*Units 1, 2, 3, 4 Main Units*	*Water furnace*	*NS030*	*7*	*1000*	*10°C*	*26,000 Btu/h*	*4.8*	*30°C*	*27,000 Btu/h*	*18.9*	*208/60/1*	*Water-furnace*	*EAMS*	*3.6 kW*	*208/60/1*	*Internal*	Aurora controls with a 3H/2C thermostat. Electric heat set for emergency operation on compressor lockout only.	*120 psi*

Notes:

1. List unit number(s) where equipment will be used. Specify if main unit, laneway suite, or basement suite.
2. List the DESS (source) water flow rate for the HP. Use 2.8 gpm/ton. Flow rate to be used for selection of proper auto flow valve cartridge (see Detail 01 in Appendix C).
3. List the full load design airflow (for water-to-air heat pumps only).
4. Full load Heating capacity & COP at AHRI/ISO 13256-1 rated condition for ground water heat pumps (GWHP) (10°C entering source water temperature).
5. Full load Cooling capacity & EER at AHRI/ISO 13256-1 rated condition for ground loop heat pumps (GLHP) (25°C entering source water temperature).
6. Provide details of how the emergency heat will be controlled to operate only on a compressor failure.

Part B: Townhouse Lot Equipment Schedule continued

Blatchford Townhouse Lot: Domestic Hot Water HP Equipment Schedule

To be completed by the builder and submitted with the design package for BRE review

Tag ID	Qty.	Type	Location [1]	Make	Model	DESS Flow (gpm) [2]	Heating Capacity [3]	Heating COP [4]	Electrical	Tank Backup Elec. Heat Size (kW)	Tank Volume	Max Specified HP Operating Pressure (psi)
Example	*4*	*Domestic Water HP*	*Units 1, 2, 3, 4 Main Units*	*Maritime Geo*	*WH-016*	*4*	*12,000 Btu/h*	*2.8 COP*	*208/60/1*	*4.5 kW*	*60 gal*	*120 psi*
Example(2)	*1*	*Hybrid HP Water Heater*	*Unit 1, Garage Suite*	*Rheem*	*PROPH65*	*n/a*	*4200 Btu/h*	*3.85 UEF*	*208/60/1*	*4.5 kW*	*65 gal*	*115 psi*

Notes:

1. List unit numbers where equipment is installed. Specify if main unit, backyard house, or basement suite.
2. List the design DESS (source) water flow rate for the HP. Flow rate to be used for selection of auto flow valve cartridge. For air-source water heaters write 'n/a'.
3. Heat pump or hot water heater heating capacity. For water source HP, heating design is 10°C entering source water temperature.
4. Full load heating COP at design point with 10°C entering source water temperature. For air-source water heaters provide the UEF.

Certification

I certify that the above mentioned project is designed in compliance with the requirements and details provided in the DESS Design Guide and that the design basis information provided in Part B represents the peak loads expected for this development.

Name

Date of Signature

Signature

Appendix B – Approved Equipment List

The following is a partial list of heat pump makes and models that comply with the performance requirements stated in this guide. Other makes and models that meet the performance requirements may be available.

Table 1: Residential Water-Air Heat Pumps

MANUFACTURER (BRAND)	MODEL
ClimateMaster	Tranquility TS Series
Enertech (Geocomfort / Hydron / Tetco)	VS, VT, YT, CT Series
FHP (FHP / Bosch)	BP, SM Series
Maritime Geothermal	Nordic R-series
Waterfurnace	Synergy3D, 7 Series, 5 Series
Partial list of residential water-air heat pumps meeting the minimum performance requirements of COP 4.0 at ground water heat pump conditions and Energy Efficiency Ratio 17.0 at ground loop heat pump conditions when rated in accordance with Air Conditioning, Heating and Refrigeration Institute /ASHRAE/ISO 13256-1. For complete listing, refer to www.ahridirectory.com.	

Table 2: Water-to-Water Heat Pump

MANUFACTURER (BRAND)	MODEL
FHP (FHP / Bosch)	WT Series
Climate Master	Tranquility TCW, TMW
Enertech (Geocomfort / Hydron / Tetco)	Revolution2 HP Series
Maritime Geothermal	Nordic
Waterfurnace	5 Series, Synergy3D
Partial list of residential water-to-water heat pumps meeting the minimum performance requirements of COP 3.5 at ground water heat pump conditions when rated in accordance with Air conditioning, Heating and Refrigeration Institute/ASHRAE/ISO 13256-1. For complete listing, refer to www.ahridirectory.com.	

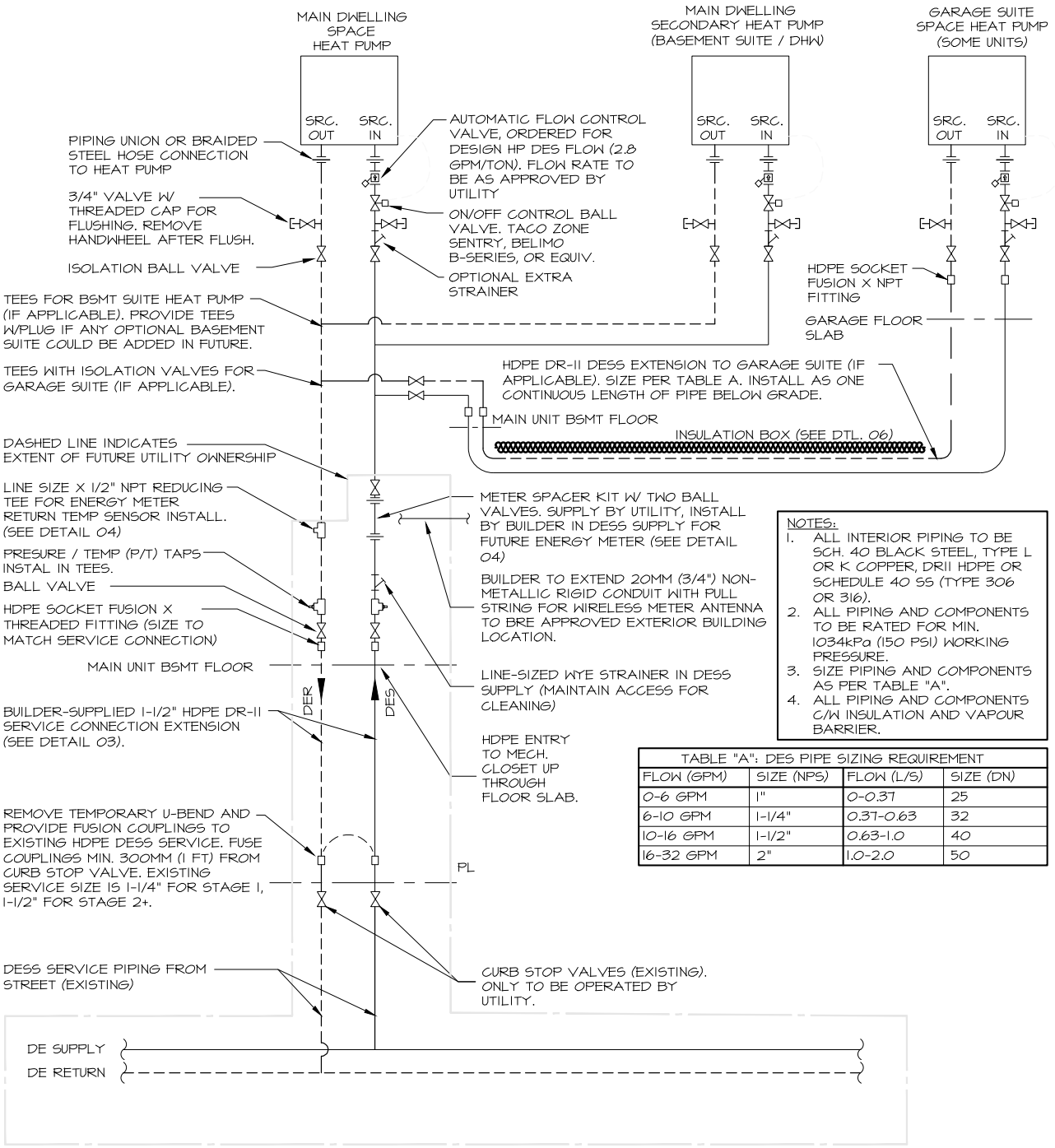
Table 3: Water-to-Water Heat Pump

MANUFACTURER (BRAND)	MODEL
Maritime Geothermal	WH-16
Enertech	HP024
Approved list of high-temperature water-to-water heat pump designed for operating with a DHW tank temperature setpoint of 55°C (130°F) or greater.	

Appendix C – Design Details

Detail Drawing Index

DRAWING NUMBER	DESCRIPTION
	Mandatory Design Details
01	Townhouse Lot Mandatory Design – DESS HP Source Piping
01A	Townhouse Lot Mandatory Design – DESS HP Source Piping
02	Townhouse Lot DESS Servicing Requirements
03	Townhouse Lot DESS Service Connection Detail
04	Townhouse Lot DESS Energy Meter Detail
05A	Air-source Hot Water Heater Ducting Detail (Typical AO Smith Install)
05R	Air-source Hot Water Heater Ducting Detail (Typical RHEEM Install)
06	Insulation Requirements for District Energy Sharing System Services
M-1	Kit #1 - Energy Meter Spacer Kit
M-2	Kit #2 - Kamstrup Energy Meter
	Recommended Heat Pump Designs
A1	Townhouse Lot Recommended Designs – Water-Air Heat Pump
A2	Townhouse Lot Recommended Designs – Water-to-Water Heat Pump
A3	Townhouse Lot Recommended Designs – Water-to-Water DHW Heat Pump



NOTES:
1. ALL INTERIOR PIPING TO BE SCH. 40 BLACK STEEL, TYPE L OR K COPPER, DR11 HDPE OR SCHEDULE 40 SS (TYPE 306 OR 316).
2. ALL PIPING AND COMPONENTS TO BE RATED FOR MIN. 1034kPa (150 PSI) WORKING PRESSURE.
3. SIZE PIPING AND COMPONENTS AS PER TABLE "A".
4. ALL PIPING AND COMPONENTS C/W INSULATION AND VAPOUR BARRIER.

TABLE "A": DES PIPE SIZING REQUIREMENT

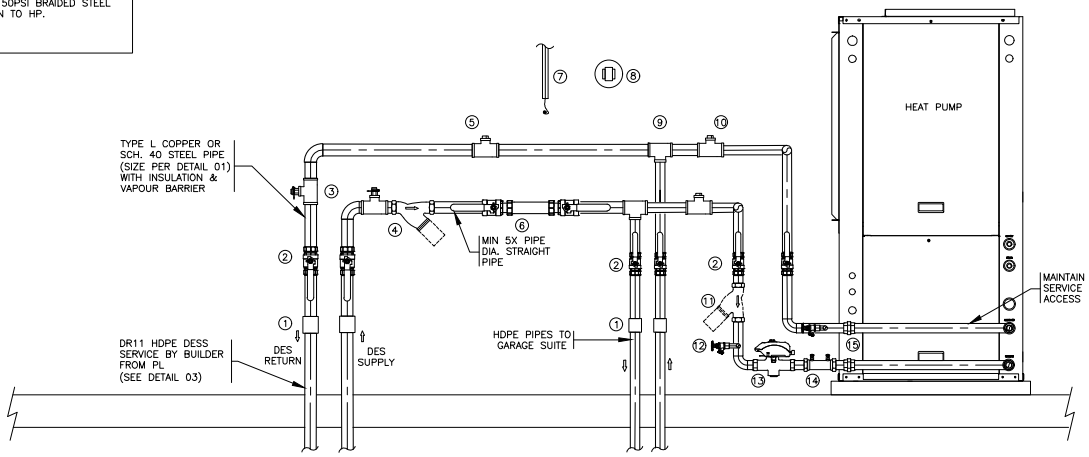
FLOW (GPM)	SIZE (NPS)	FLOW (L/S)	SIZE (DN)
0-6 GPM	1"	0-0.37	25
6-10 GPM	1-1/4"	0.37-0.63	32
10-16 GPM	1-1/2"	0.63-1.0	40
16-32 GPM	2"	1.0-2.0	50

PROFESSIONAL ENGINEER ALBERTA
ANDREW BYRNES
2023-Nov-16
ID 256735
PINCHIN LTD. APEGA PERMIT # P007802

PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: SS
	CHECKED: AB
DRAWING TITLE: FEE SIMPLE TOWNHOUSE MANDATORY DESIGN DESS HP SOURCE PIPING	DATE: NOV 16, 2023
	DRAWING NUMBER: DETAIL 01

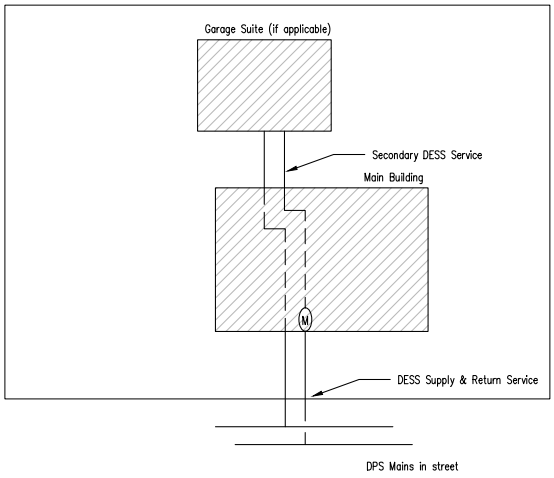
NOTES:

1. ELECTRO–FUSION HDPE NPT COUPLING.
2. FULL PORT BALL VALVE.
3. P/T TAPS ON SUPPLY & RETURN.
4. WYE STRAINER ON DESS SUPPLY.
5. 1–1/4" REDUCING TEE W/PLUG ON RETURN FOR TEMP SENSOR. PROVIDED BY UTILITY, INSTALL BY BUILDER.
6. METER SPACER KIT WITH TWO BALL VALVES, UNIONS, AND SPACER PIPE. PROVIDED BY UTILITY, INSTALL BY BUILDER IN DESS SUPPLY.
7. WIRELESS METER ANTENNA/NETWORK CONDUIT WITH PULL STRING.
8. 24V TRANSFORMER FOR ENERGY METER POWER.
9. GARAGE SUITE EXTENSIONS (IF APPLICABLE)
10. CAPPED TEES FOR FUTURE BASEMENT SUITE (IF APPLICABLE).
11. WYE STRAINER (OPTIONAL).
12. FLUSHING VALVES.
13. CONTROL VALVE.
14. AUTO FLOW VALVE – SET TO REQ GPM FOR HEAT PUMP.
15. PIPE UNION OR 150PSI BRAIDED STEEL HOSE CONNECTION TO HP.



PROFESSIONAL ENGINEER ALBERTA
ANDREW BYRNES
2023-Nov-16
ID 256735
PINCHIN LTD. APEGA PERMIT# P007802

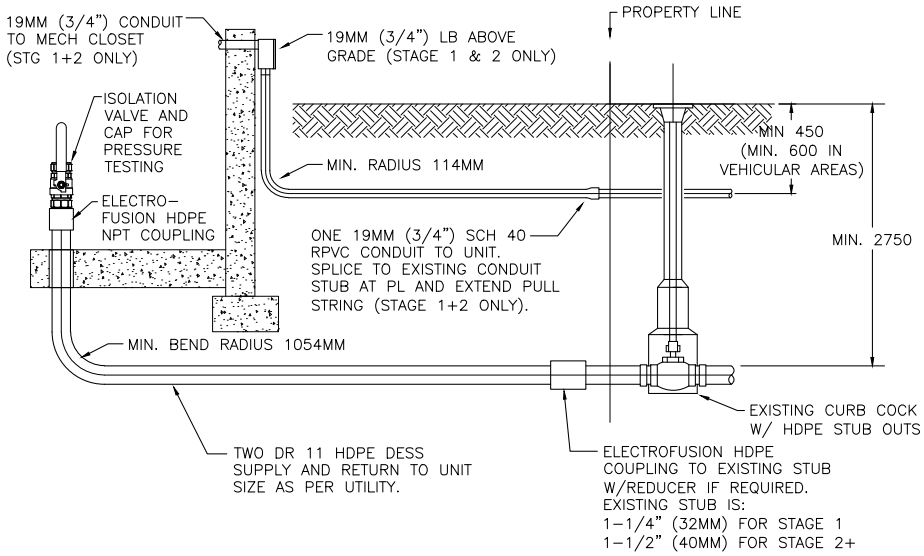
PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: SS
	CHECKED: AB
DRAWING TITLE: FEE SIMPLE TOWNHOUSE MANDATORY DESIGN DESS HP SOURCE PIPING	DATE: NOV 16, 2022
	DRAWING NUMBER: DETAIL 01A



1 Service
1 Meter (located in primary building)
Secondary service to other building after the meter

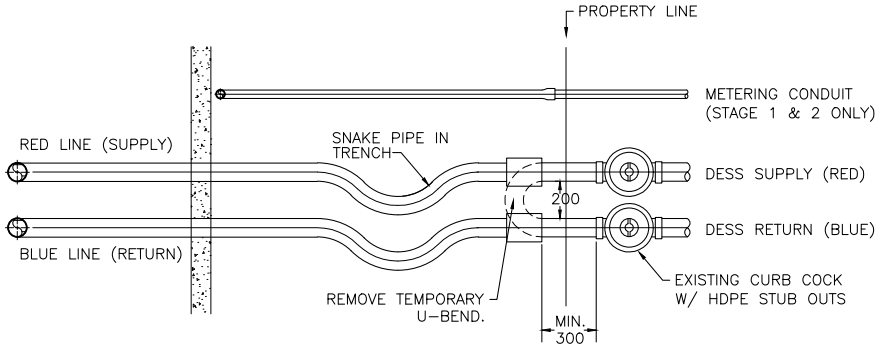
PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: AB
	CHECKED: RM
DRAWING TITLE: FEE SIMPLE TOWNHOUSE DESS SERVICING REQUIREMENTS	DATE: DEC 06, 2022
	DRAWING NUMBER: DETAIL 02

PROFILE VIEW

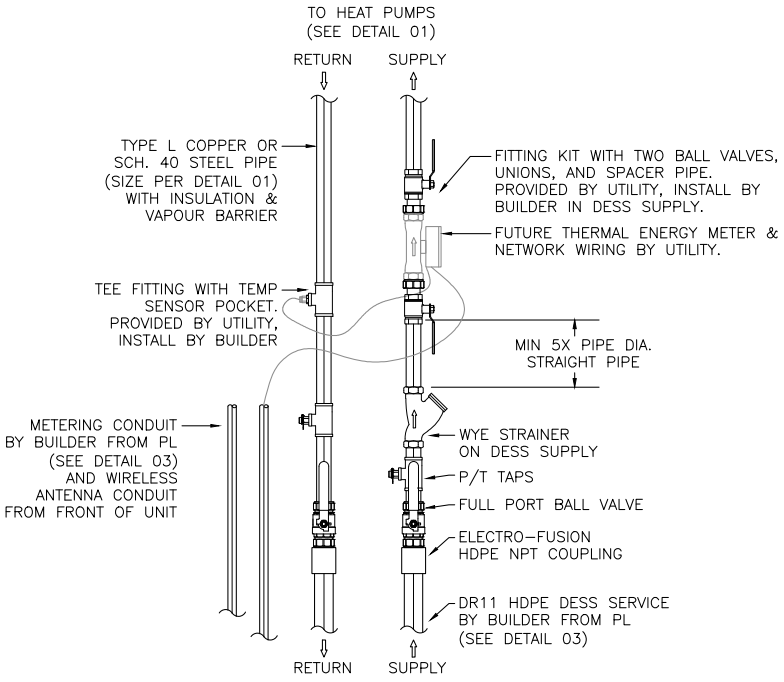


NOTES:
1. PIPE INVERT TO BE MIN. 2750MM BELOW FINISHED GRADE.
2. TRENCH BEDDING AND BACKFILL AS PER EDMONTON DESIGN AND CONSTRUCTION STANDARDS VOL. 2 AND VOL. 4
3. CONTACT UTILITY TO ARRANGE FOR INSPECTION & FLUSHING OF SERVICES PRIOR TO BURIAL.

PLAN VIEW

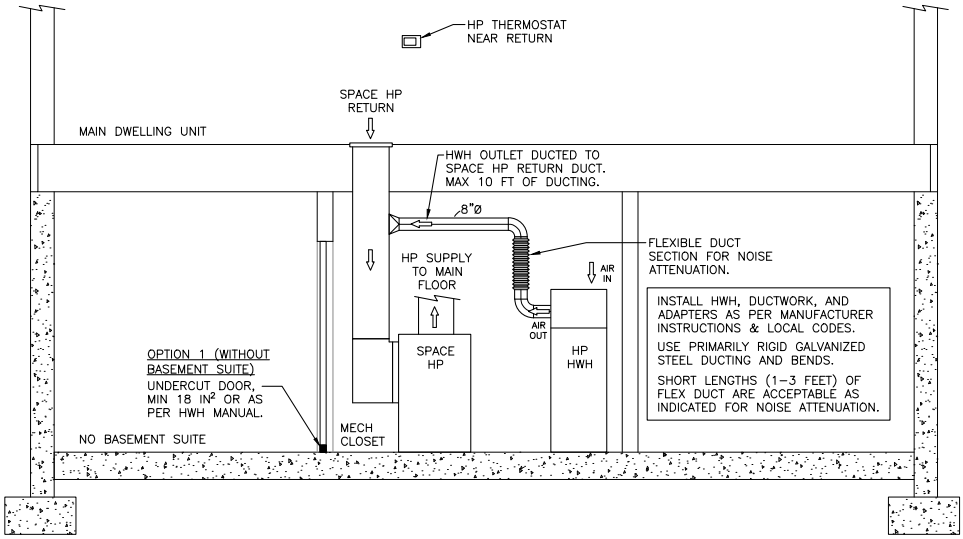


PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: AB
	CHECKED: AB
DRAWING TITLE: FEE SIMPLE TOWNHOUSE DESS SERVICE CONNECTION DETAIL	DATE: MAY 25, 2022
	DRAWING NUMBER: DETAIL 03

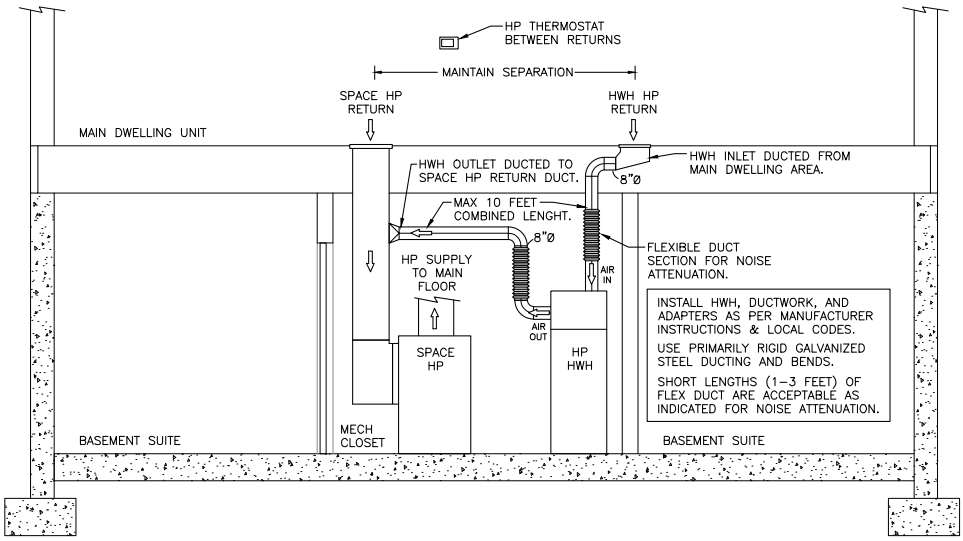


PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: AB
	CHECKED: RM
DRAWING TITLE: FEE SIMPLE TOWNHOUSE DESS ENERGY METER DETAIL	DATE: DEC 06, 2022
	DRAWING NUMBER: DETAIL 04

WATER HEATER DUCTING WITHOUT BASEMENT SUITE
(AO SMITH MODELS)



WATER HEATER DUCTING WITH BASEMENT SUITE *(OR POSSIBLE FUTURE BASEMENT SUITE)*
(AO SMITH MODELS)

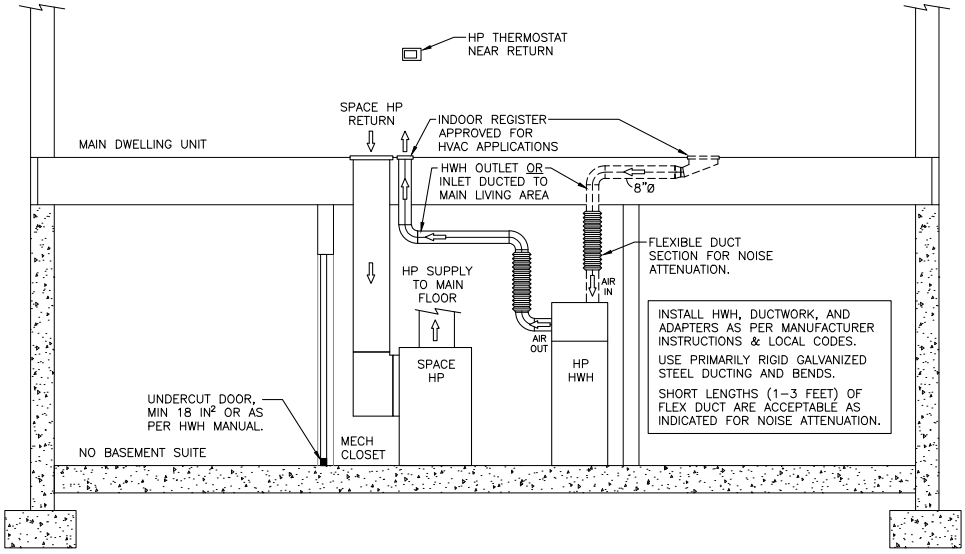


PROFESSIONAL ENGINEER ALBERTA
ANDREW BYRNES
2024-Sep-13
ID 256735

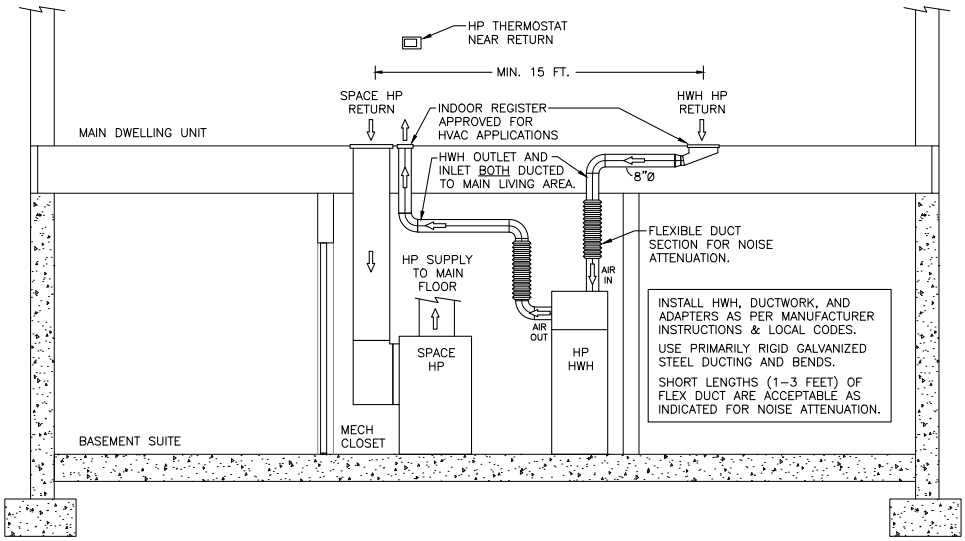
PINCHIN LTD. A.

PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: SS
	CHECKED: AB
DRAWING TITLE: AIR–SOURCE HOT WATER HEATER DUCTING DETAIL (TYPICAL AO SMITH INSTALL)	DATE: SEP 13, 2024
	DRAWING NUMBER: DETAIL 05A

WATER HEATER DUCTING WITHOUT BASEMENT SUITE (RHEEM MODELS)



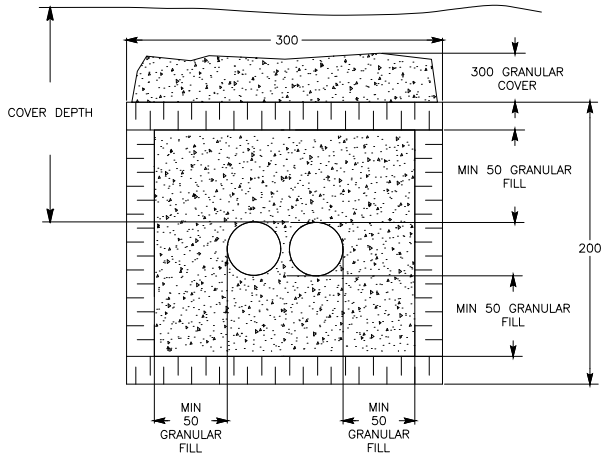
WATER HEATER DUCTING WITH BASEMENT SUITE *(OR POSSIBLE FUTURE BASEMENT SUITE)* (RHEEM MODELS)



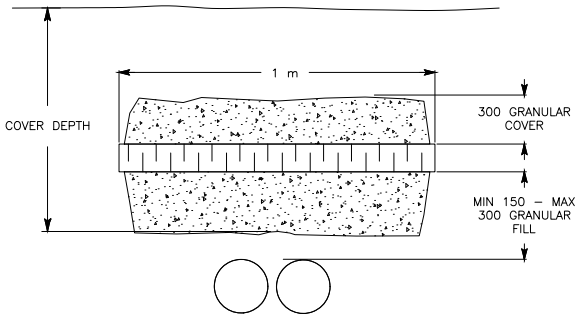
PROFESSIONAL ENGINEER ALBERTA
ANDREW BYRNES
2024-Sep-13
ID 256735

PINCHIN LTD. A...

PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: SS
	CHECKED: AB
DRAWING TITLE: AIR–SOURCE HOT WATER HEATER DUCTING DETAIL (TYPICAL RHEEM INSTALL)	DATE: SEP 13, 2024
	DRAWING NUMBER: DETAIL 05R



BOX



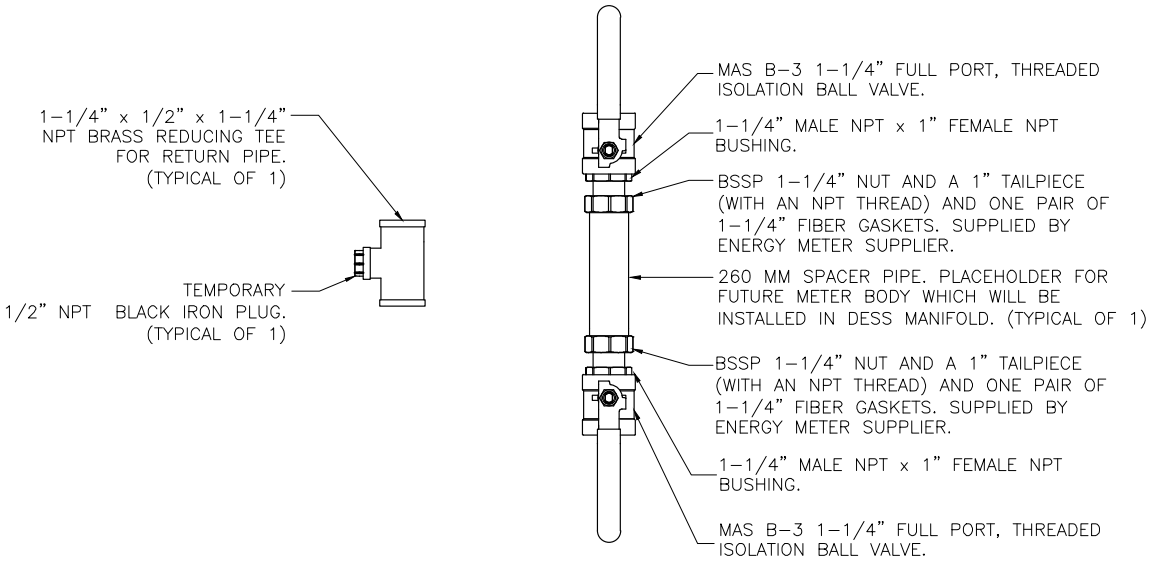
HORIZONTAL

COVER DEPTH m	THICKNESS mm (IN)	TYPE
1.4 – 1.7	75 (3.0)	BOX
1.7 – 2.0	75 (3.0)	BOX
2.0 – 2.3	50 (2.0)	BOX
2.3 – 2.8	40 (1.5)	BOX OR HORIZONTAL
BELOW 2.8	NO INSULATION REQUIRED	

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. DETAIL APPLIES TO 50 MM (2") DIAMETER PIPES OR LESS.
3. APPLICABLE WHEN USING FILLCRETE, GRANULAR OR CLAY BACKFILL FOR DISTRICT ENERGY WITH A DEPTH OF COVER LESS THAN THE MINIMUM, AS DESCRIBED IN THE DESIGN STANDARDS.
4. USE DOW HI–40 STYROFOAM BOARD, OR APPROVED EQUAL.
5. A BOX MUST BE USED IF SERVICES CROSS A STORM SEWER OR CULVERT.
6. SERVICES INSTALLED WITH LESS THAN 1.4 METERS COVER DEPTH ARE NOT PERMITTED.

PROFESSIONAL ENGINEER ALBERTA ANDREW BYRNES
2023-Jul-13
ID 256735
PINCHIN LTD. APEGA PERMIT# P007802

PROJECT NAME: BLATCHFORD DESS	SCALE:	NTS
	DRAWN:	BJ
	CHECKED:	AB
DRAWING TITLE: INSULATION REQUIREMENTS FOR DISTRICT ENERGY SHARING SYSTEM SERVICES	DATE:	JUL 10, 2023
	DRAWING NUMBER:	DETAIL 06

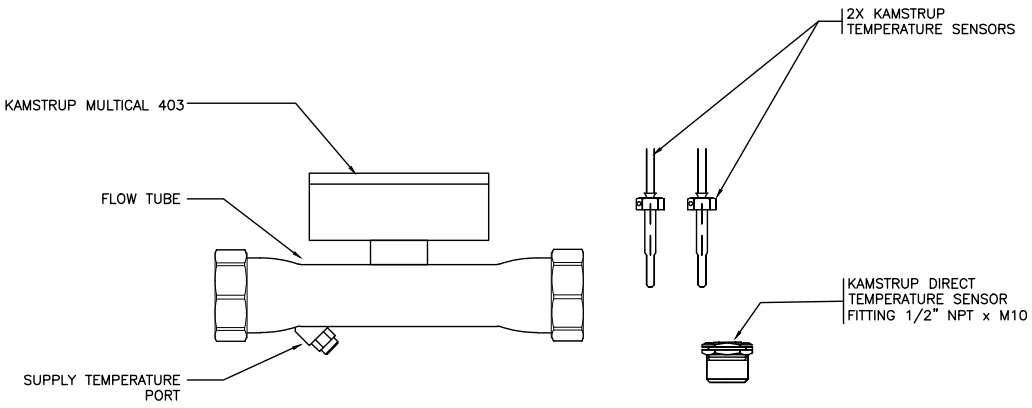


NOTES: 1. PRIOR TO FABRICATION OF STEEL SPACER NIPPLES, MOCK UP THIS ASSEMBLY, SECURE BOTH ENDS IN A VICE, AND CONFIRM THE SPACER IS THE LENGTH REQUIRED TO MATCH EXACTLY THE ENERGY METER BODY AND ALLOW FOR A LEAK–FREE METER INSTALLATION.
2. BUILDER TO FLUSH THE SYSTEM WITH THE SPACER INSTALLED – DO NOT FLUSH WITH THE METER INSTALLED.

KIT #1 – METER SPACER KIT AND RETURN TEE

N.T.S.

PINCHIN LTD MECHANICAL ENGINEERING DIVISION 13775 COMMERCE PARKWAY, SUITE 200 RICHMOND, BC V6V 2V4 604.244.8101 | WWW.PINCHIN.COM	PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S. DESIGN: SS CHECKED: GT DATE: MAR 24, 2025
	DRAWING TITLE: KIT #1 – ENERGY METER SPACER KIT	JOB NUMBER: 0247672.000 SHEET NUMBER: M–1



NOTES: 1. KAMSTRUP MULTICAL 403 THERMAL ENERGY METER BODY. (TYPICAL OF 1) – INCLUDES FLOW TUBE, CALCULATOR, 1 PAIR OF TEMPERATURE SENSORS (WITH ONE SENSOR FITTING 1/2" NPT x M10). ALSO INCLUDES NEW PAIR OF GASKETS WHICH MUST REPLACE OLD SPACER (KIT #1) GASKETS.

KIT #2 – KAMSTRUP ENERGY METER

N.T.S.

TYPICAL METER ASSEMBLY INSTRUCTIONS

NOTE: PRIOR TO INSTALLATION OF THE METER, BUILDER TO ENSURE FLUSHING OF THE DESS SERVICE LINES HAS BEEN COMPLETED, WTTH NO DEBRIS PRESENT.

1. USING THE PREVIOUSLY ASSEMBLED METER SPACER IN THE DESS MANIFOLD, THE BUILDER IS TO UNSCREW THE METER SPACER BY LOOSENING THE UNION ADAPTER ON BOTH SIDES OF THE SPACER.

2. BUILDER IS TO HAVE A BUCKET OR DRAINAGE SYSTEM READY AS ONCE THE SPACER IS UNSCREWED FROM THE MANIFOLD SMALL AMOUNTS OF WATER WILL BE RELEASED.

3. THE KAMSTRUP ENERGY METER SHOULD BE SCREWED INTO BOTH SIDES OF THE UNION ADAPTER WITH A NEW SET OF GASKETS. THE SUPPLY TEMPERATURE SENSOR SHOULD BE INSTALLED IN THE METER BODY PORT. BUILDER TO COMPLETE.

4. BUILDER TO INSTALL THE RETURN TEMPERATURE SENSOR INTO THE ½" THREADED TEE ON THE RETURN PIPE USING THE SENSOR FITTING. BUILDER TO ALSO REMOVE THE BLACK IRON PLUG FROM THE TEE.

5. BUILDER TO CONNECT POWER LOCALLY TO EACH METER FROM THE 24V TRANSFORMER WHICH IS PROVIDED BY THE BUILDER. BRE TO COMMISSION THE METER (IF APPLICABLE).

6. PRESSURE TEST EACH METER INSTALLATION AND ASSOCIATED PIPING AFTER INSTALLATION IS COMPLETE AS PER THE DESS FSTH DESIGN GUIDE.

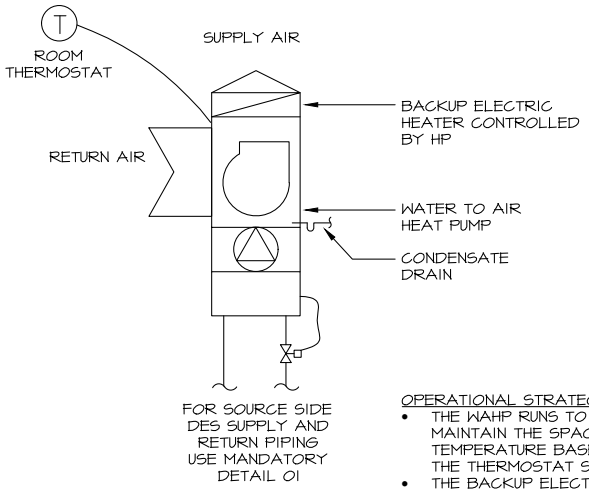
PINCHIN
PINCHIN LTD
MECHANICAL ENGINEERING DIVISION
13775 COMMERCE PARKWAY, SUITE 200
RICHMOND, BC V6V 2V4
604.244.8101 | WWW.PINCHIN.COM

PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: SS
	CHECKED: AB
	DATE: NOV 03, 2023
DRAWING TITLE: KIT #2 – KAMSTRUP ENERGY METER	JOB NUMBER: 0247672.000
	SHEET NUMBER: M–2

RECOMMENDED HEAT PUMP SYSTEMS FOR FSTH

1. A RECOMMENDED HEATING SYSTEM DESIGN IS PRESENTED BELOW, HOWEVER THE BUILDER MAY CHOOSE AN ALTERNATIVE DESIGN AS LONG AS THE PERFORMANCE AND OPERATIONAL REQUIREMENTS ARE MET AS DOCUMENTED IN THE DESS DESIGN GUIDE.
2. SOURCE (DESS) PIPING FOR ALL HEAT PUMPS MUST BE AS PER THE ARRANGEMENT AND SPECIFICATION SHOWN IN MANDATORY DETAIL 01.
3. THE BUILDER MAINTAINS ALL RESPONSIBILITY FOR ENSURING THE INSTALLED SYSTEM MEETS ALL APPLICABLE NATIONAL AND PROVINCIAL CODES.

WATER-AIR HP



OPERATIONAL STRATEGY

- THE WAHP RUNS TO MAINTAIN THE SPACE TEMPERATURE BASED ON THE THERMOSTAT SETTING
- THE BACKUP ELECTRIC HEAT IS ENABLED BY THE HEAT PUMP CONTROLLER ON HEAT PUMP FAULT.
- RECOMMENDED MINIMUM 30 MINUTE DELAY BEFORE ENABLE ELECTRIC ELEMENT.
- ON A CALL FOR HEATING OR COOLING, THE HEAT PUMP OPENS THE DESS CONTROL VALVE AND AFTER A DELAY THE COMPRESSOR STARTS.

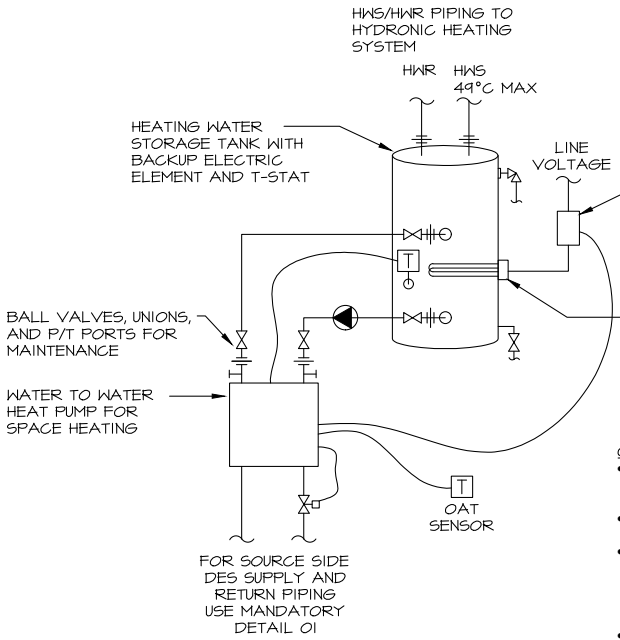
PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: AB
	CHECKED: AB
DRAWING TITLE: FEE SIMPLE TOWNHOUSE RECOMMENDED DESIGNS WATER–AIR HEAT PUMP	DATE: AUG 28, 2017
	DRAWING NUMBER: DETAIL A1

PINCHIN LTD. APEGA PERMIT# P007802

RECOMMENDED HEAT PUMP SYSTEMS FOR FSTH

1. A RECOMMENDED HEATING SYSTEM DESIGN IS PRESENTED BELOW, HOWEVER THE BUILDER MAY CHOOSE AN ALTERNATIVE DESIGN AS LONG AS THE PERFORMANCE AND OPERATIONAL REQUIREMENTS ARE MET AS DOCUMENTED IN THE DESS DESIGN GUIDE.
2. SOURCE (DESS) PIPING FOR ALL HEAT PUMPS MUST BE AS PER THE ARRANGEMENT AND SPECIFICATION SHOWN IN MANDATORY DETAIL 01.
3. THE BUILDER MAINTAINS ALL RESPONSIBILITY FOR ENSURING THE INSTALLED SYSTEM MEETS ALL APPLICABLE NATIONAL AND PROVINCIAL CODES.

WATER-WATER SPACE HP



OPERATIONAL STRATEGY

- THE WAHP RUNS TO MAINTAIN THE HEATING WATER TANK TEMPERATURE AT SETPOINT.
- TANK SETPOINT IS RESET BASED ON OUTDOOR AIR TEMP.
- THE DEADBAND ON THE TANK TEMPERATURE SENSOR SHOULD BE LARGER THAN THE HEAT PUMP DELTA-T TO PREVENT SHORT CYCLING.
- ON A CALL FOR HEATING, THE HEAT PUMP OPENS THE DESS CONTROL VALVE AND AFTER A DELAY STARTS THE COMPRESSOR.
- THE BACKUP ELECTRIC ELEMENT THERMOSTAT IS SET FOR THE MAXIMUM HWS TEMPERATURE (49°C).
- THE BACKUP ELECTRIC ELEMENT IS ENABLED BY A RELAY ONLY ON HEAT PUMP ALARM SIGNAL.

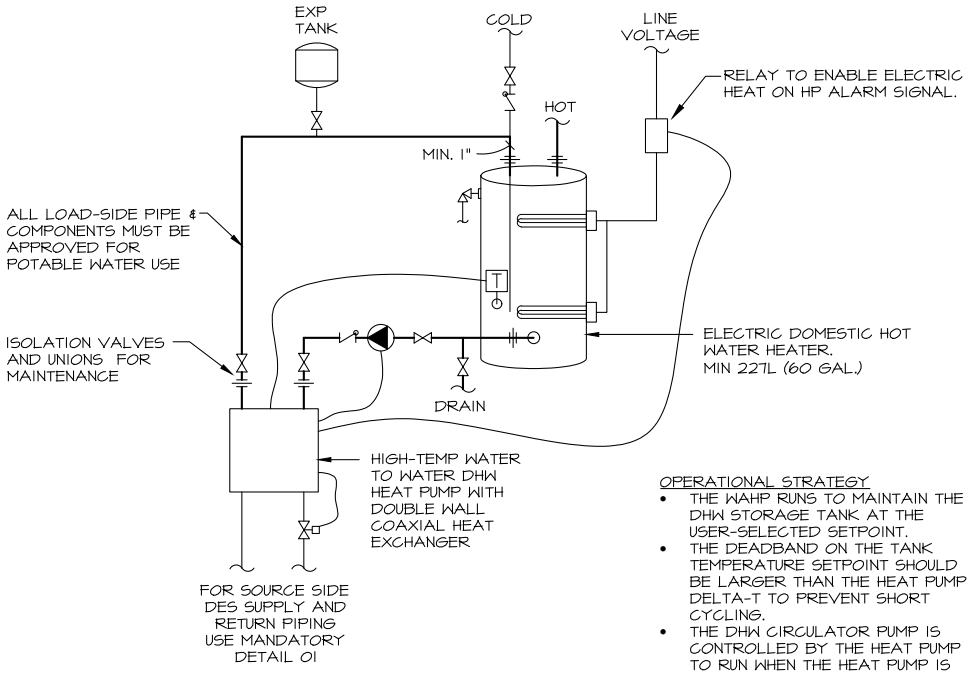
PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.	
	DRAWN: AB	
	CHECKED: AB	
DRAWING TITLE: FEE SIMPLE TOWNHOUSE RECOMMENDED DESIGNS WATER–WATER HEAT PUMP	DATE: AUG 28, 2017	
	DRAWING NUMBER: DETAIL A2	

PINCHIN LTD. APEGA PERMIT# P007802

RECOMMENDED HEAT PUMP SYSTEMS FOR FSTH

1. A RECOMMENDED HEATING SYSTEM DESIGN IS PRESENTED BELOW, HOWEVER THE BUILDER MAY CHOOSE AN ALTERNATIVE DESIGN AS LONG AS THE PERFORMANCE AND OPERATIONAL REQUIREMENTS ARE MET AS DOCUMENTED IN THE DESS DESIGN GUIDE.
2. SOURCE (DESS) PIPING FOR ALL HEAT PUMPS MUST BE AS PER THE ARRANGEMENT AND SPECIFICATION SHOWN IN MANDATORY DETAIL 01.
3. THE BUILDER MAINTAINS ALL RESPONSIBILITY FOR ENSURING THE INSTALLED SYSTEM MEETS ALL APPLICABLE NATIONAL AND PROVINCIAL CODES.

HIGH TEMP DHW HEAT PUMP



OPERATIONAL STRATEGY

- THE WAHP RUNS TO MAINTAIN THE DHW STORAGE TANK AT THE USER-SELECTED SETPOINT.
- THE DEADBAND ON THE TANK TEMPERATURE SETPOINT SHOULD BE LARGER THAN THE HEAT PUMP DELTA-T TO PREVENT SHORT CYCLING.
- THE DHW CIRCULATOR PUMP IS CONTROLLED BY THE HEAT PUMP TO RUN WHEN THE HEAT PUMP IS RUNNING.
- ON A CALL FOR HEATING, THE HEAT PUMP OPENS THE DESS CONTROL VALVE AND AFTER A DELAY STARTS THE COMPRESSOR.
- THE BACKUP ELECTRIC ELEMENT IS ENABLED BY A RELAY ONLY ON HEAT PUMP ALARM SIGNAL.
- THE BACKUP ELEMENT THERMOSTAT IS SET FOR 60°C.

PROJECT NAME: BLATCHFORD DESS	SCALE: N.T.S.
	DRAWN: AB
	CHECKED: AB
DRAWING TITLE: FEE SIMPLE TOWNHOUSE RECOMMENDED DESIGNS DHW HEAT PUMP	DATE: AUG 28, 2017
	DRAWING NUMBER: DETAIL A3

PINCHIN LTD. APEGA PERMIT# P007802

Appendix D – Service Installations and Construction Inspections

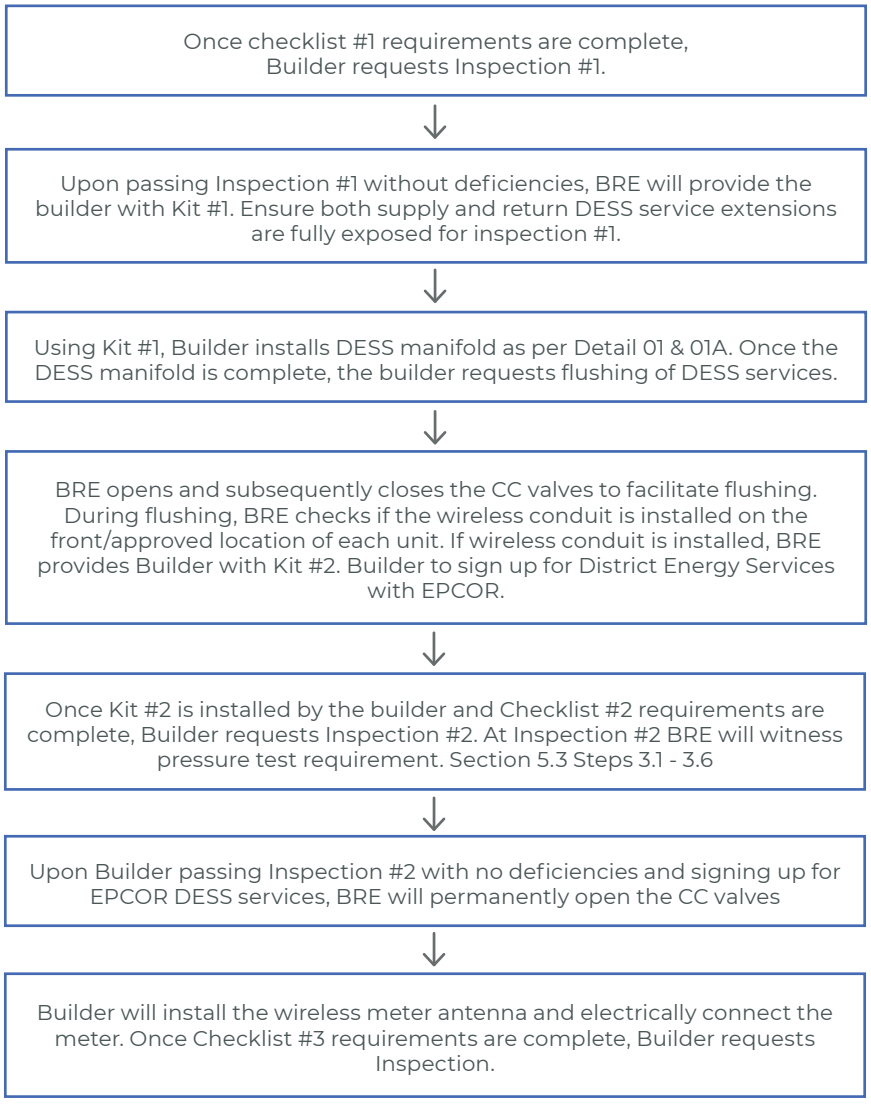
Main Dwellings

To properly connect the building's services and to ensure compliance with the final design, Blatchford Renewable Energy will need to visit the site at the following construction milestones:

1. DESS service pipe Inspection #1 (prior to backfill of DESS piping - refer to Builder Checklist #1 below before contacting BRE).
2. DESS energy meter wireless conduit installed at approved location and DESS pipe flushing inside the building.
3. Conduct Inspection #2 (Refer to Builder Checklist #2).
4. Opening CC supply and return valves.
5. Conduct Inspection #3 (refer to Builder Checklist #3).

Townhouse Lot (Main Dwelling) Inspection Timelines

Figure 2A: Builder Meter Installation Process (Main Dwelling)



Key notes:

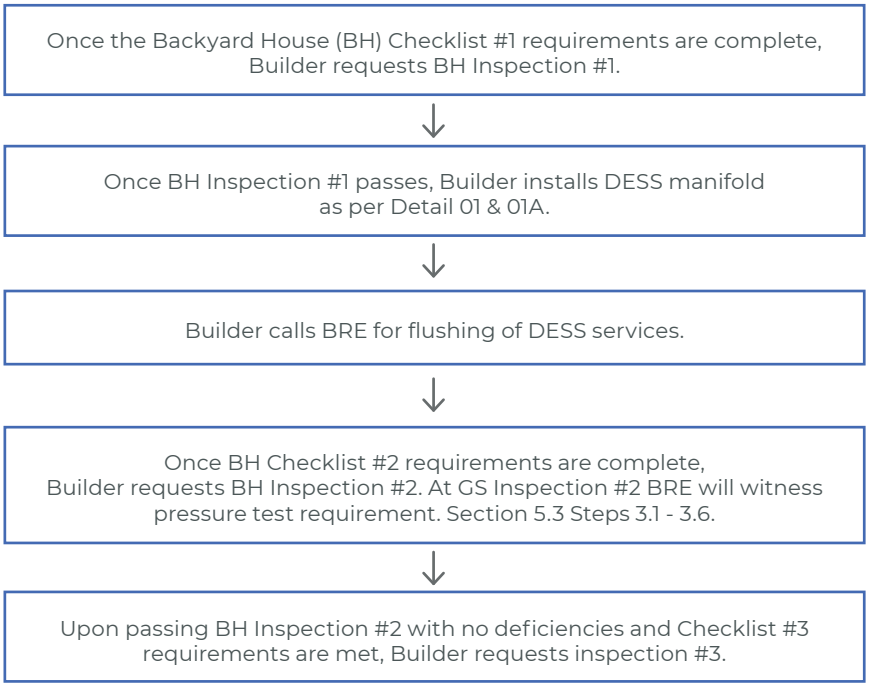
1. Each stage above represents a required site inspection that the builder must successfully pass before moving to the next stage.
2. Builders must provide BRE with 5 business days notice to schedule any inspection.
3. The first inspection for each stage is provided free of charge. Additional fees will be charged to the builder for any additional inspections required at each stage.
4. Inspections should take place 'per building' as per approved site plan (i.e., all townhouse units in one building will be inspected at once).

Backyard Houses

To properly connect the building's services and to ensure compliance with the final design, Blatchford Renewable Energy will need to visit the backyard houses at the following construction stages:

1. DESS service pipe Inspection #1 (prior to backfill of DESS piping - refer to Builder Checklist #1 - Backyard House Inspection below before contacting BRE).
2. DESS pipe flushing inside the building.
3. Conduct Inspection #2 (Refer to Builder Checklist #2 - Backyard House Inspection).
4. Conduct Inspection #3 (refer to Builder Checklist #3 - Backyard House Inspection).

Figure 2B: Builder DESS Installation Process (Backyard House)



Key notes:

1. Each stage above represents a required site inspection that the builder must successfully pass before moving to the next stage.
2. Builders must provide BRE with 5 business days notice to schedule any inspection.
3. The first inspection for each stage is provided free of charge. Additional fees will be charged to the builder for any additional inspections required at each stage.
4. Inspections should take place 'per building' as per approved site plan (i.e., all townhouse units in one building will be inspected at once).

Builder Checklists

Builders must contact BRE at each of these stages to arrange an inspection. Please provide a minimum of 5 business days notice.

Builder Checklist #1

For Blatchford Renewable Energy use only
Service Installation Address and Unit Number:
Inspection Date: *(mm/dd/yyyy)*

MAIN DWELLING INSPECTION

DESS Services Pipe Inspection (Property Line connections)

Completion date: *(mm/dd/yyyy)*

Prior to backfill of DESS piping:

1. DESS service piping installed as per the approved design, and approved line sizing and as follows:
   1.1 Detail 03 and Section 5.5 of the DESS Design Guide
   ○ Pass ○ No, reasoning:
2. Service connections have been marked red for DESS supply and blue for DESS return.
   The supply line is on the right when looking at the property from the street.
   ○ Pass ○ No, reasoning:
3. DESS service pipe size and material is installed as per the Approved Final Design Package
   ○ Pass ○ No, reasoning:
4. DESS fusion weld made to the existing service connection has been installed as per Detail 01 & Detail 03.
   ○ Pass ○ No, reasoning:
5. DESS service lines is at a minimum of 2.75m invert depth. If the minimum depth is not met then Detail 06 regarding frost cover must be followed stringently.
   ○ Pass ○ No, reasoning:
6. Prior to backfill of DESS piping, DESS service piping has undergone and passed pressure testing as per the Pressure Testing Procedure outlined in Section 5.5 (Steps 1.10.2-1.10.6) of the DESS Design Guide.
   ○ Pass ○ Defer ○ No, reasoning:
7. If builder deferred the pressure test in the bullet above to Inspection #2, pressure test to Inspection #2, if the pressure test is not passed in Inspection #2 it is the sole responsibility of the Builder to rectify any DESS service line deficiencies.

   Builder Rep. Initials: Date:

DESS Service CC Valves

Completion date: *(mm/dd/yyyy)*

8. DESS CC Valves are free of all obstructions and are accessible.
   ○ Pass ○ No, reasoning:
9. DESS CCs are covered with 1½" plastic caps; Blue Cap for Return Valve and Red Cap for Supply Valve or with brass caps supplied by Utility
   ○ Pass ○ No, reasoning:

Inspection Outcome	
Inspection passed?	
○ YES	○ NO

BACKYARD HOUSE INSPECTION

DESS Services Pipe Inspection (Backyard House connections)

Completion date: *(mm/dd/yyyy)*

Prior to backfill of DESS piping:

1. DESS service piping installed as per the approved design, and approved line sizing and as follows:
   - 1.1 Detail 03 and Section 5.5 of the DESS Design Guide
     ○ Pass ○ No, reasoning:
2. Service connections have been marked red for DESS supply and blue for DESS return. The supply line is on the right when looking at the property from the street.
   ○ Pass ○ No, reasoning:
3. Backyard house DESS service lines is at a minimum of 2.75m invert depth. If the minimum depth is not met then Detail 06 regarding frost cover must be followed stringently.
   ○ Pass ○ No, reasoning:
4. Prior to backfill of DESS piping, DESS service piping piping has undergone and passed pressure testing as per the Pressure Testing Procedure outlined in Section 5.5 (Steps 1.10.2-1.10.6) of the DESS Design Guide.
   ○ Pass ○ Defer ○ No, reasoning:
5. Builder defers pressure test to Inspection #2, if the pressure test is not passed in Inspection #2 it is the sole responsibility of the Builder to rectify any DESS service line deficiencies.

Builder Rep. Initials: Date:

Backyard House Inspection Outcome	
Inspection passed?	
○ YES	○ NO

BRE notes to builder:

1. The checklist above represents a required site inspection that the builder must successfully pass before moving to the next inspection.
2. Builders must provide BRE with 5 business days notice to schedule any inspection.
3. The first inspection for each stage is provided free of charge. Additional fees will be charged to the builder for any additional inspections required at each stage.
4. Inspections should take place 'per building' as per approved site plan (i.e., all townhouse units in one building will be inspected at once).
5. Backyard house DESS service lines must undergo an inspection to determine if adequate insulation, depth, and cover has been provided, in addition to Checklist #1 Backyard House items.

Builder Checklist #2

For Blatchford Renewable Energy use only
Service Installation Address and Unit Number:
Inspection Date *(mm/dd/yyyy):*

Prior to Inspection #2 (for Blatchford Renewable Energy use only)
Completion date *(mm/dd/yyyy):*
○ With Kit#1 and DESS manifold installed in each unit as per Detail 01, the builder is to contact BRE to schedule flushing for each unit.

MAIN DWELLING INSPECTION

Completion date: *(mm/dd/yyyy)*

1. DESS piping and all components inside the building have been installed as per:
   - 1.1 Detail 01 & 01A of the District Energy Sharing System (DESS) Design Guide;
     ○ Pass ○ No, reasoning:
   - 1.2 Blatchford Renewable Energy (BRE) approved builder design; including tees for the future basement and/or backyard houses, if applicable.
     ○ Pass ○ No, reasoning:
   - 1.3 Approved size auto flow valve with correct flow direction
     ○ Pass ○ No, reasoning:
   - 1.4 The flow sensor mounting and orientation is acceptable.
     ○ Pass ○ No, reasoning:
   - 1.5 Approved heat pump and associated equipment.
     ○ Pass ○ No, reasoning:
   - 1.6 Builder has installed the DESS Return Piping manifold above the DESS Supply manifold. Additionally:
     ○ Pass ○ No, reasoning:
   - 1.7 The flow sensor is not installed at the inlet side of the pump.
     ○ Pass ○ No, reasoning:
   - 1.8 The flow sensor is not installed after a double bend in two planes.
     ○ Pass ○ No, reasoning:
2. With kit #2 installed, DESS service piping has undergone pressure testing as per the Pressure Testing Procedure outlined in Section 5.5 (Steps 1.10.2-1.10.6) of the DESS Design Guide
   ○ Pass ○ No, reasoning:
   - 2.1 Builder to ensure to remove air pockets in the DESS pipes and manifold prior to the Pressure Test.
     ○ Pass ○ No, reasoning:
3. A dedicated doorbell transformer has been installed.
   ○ Pass ○ Fail
4. Builder has signed up District Energy services with EPCOR.
   ○ Pass ○ Fail

Wireless Meter Requirements (if applicable to be determined by BRE)
5. For wireless metering network conduit: A conduit has been installed as per Section 5.5 (steps 2.1 -2.5) of this Design Guide. ○ Pass ○ No, reasoning: 6. For wireless metering network conduit: The mounting location is installed as per the Approved Final Design Package. ○ Pass ○ No, reasoning: 7. For the wireless metering network conduit: Builder / Builder Representative confirms to BRE by initialing below that the Checklist items 5 & 6 have been correctly installed. Builder Rep. Initials: Date: 8. Builder / Builder Representative confirms to BRE by initialing below that the conduit, the LB termination box, and all associated connection points have been completely waterproofed, weatherproofed, and sealed by the builder. Builder Rep. Initials: Date:

Inspection Outcome	
Inspection passed?	
○ YES	○ NO

BRE Notes to Builder:

1. Refer to BRE Inspections Timeline for next steps.
2. Only for the lots with this successful inspection, Blatchford Renewable Energy (BRE) will coordinate with the builder and open the DESS CC valves to the properties.
3. Inspections should take place 'per building' as per approved site plan (i.e., all townhouse units in one building will be inspected at once).

BACKYARD HOUSE INSPECTION

Completion date *(mm/dd/yyyy)*:
1. DESS piping and all components inside the building have been installed as per: 1.1 Detail 01 & 01A of the District Energy Sharing System (DESS) Design Guide; ○ Pass ○ No, reasoning: 1.2 Blatchford Renewable Energy (BRE) approved builder design; ○ Pass ○ No, reasoning: 1.3 Approved size auto flow valve with correct flow direction ○ Pass ○ No, reasoning: 1.4 Approved heat pump and associated equipment. ○ Pass ○ No, reasoning: 2. Builder has installed the DESS Return Piping manifold above the DESS Supply manifold. ○ Pass ○ No, reasoning: 3. DESS service piping has undergone pressure testing as per the Pressure Testing Procedure outlined in Section 5.5 (Steps 1.10.2-1.10.6) of the DESS Design Guide. ○ Pass ○ No, reasoning: 3.1 1 Builder to ensure to removal of air pockets in the DESS pipes and manifold prior to the Pressure Test. ○ Pass ○ No, reasoning:

Backyard House Inspection Outcome	
Inspection passed?	
○ YES	○ NO

Builder Checklist #3

For Blatchford Renewable Energy use only
Service Installation Address and Unit Number:
Inspection Date *(mm/dd/yyyy):*

Prior to Inspection #3 (for Blatchford Renewable Energy use only)
○ Builder to contact BRE to book Inspection #3
○ Builder to ensure unit is fully energized with a functioning heat pump, fully powered energy meter, installed antenna and doorbell transformer for meter commissioning.

MAIN DWELLING INSPECTION

Final Inspection & Energy Meter Install (Main Dwelling)
Completion date *(mm/dd/yyyy):*

1. ○ Thermostat is installed.
   ○ Pass ○ No, reasoning:
2. ○ The actuator valve is wired to the heat pump.
   ○ Pass ○ No, reasoning:
3. ○ Electrical panel is labeled to clearly identify the circuit breakers for the heat pumps and the DESS meter.
   ○ Pass ○ No, reasoning:
4. ○ For powering the DESS meter, a BX cable has been installed from the electrical panel to the transformer.
   ○ Pass ○ No, reasoning:
5. ○ Builder to ensure unit is fully energized and has power connection from the main electrical feed to the unit.
   ○ Pass ○ No, reasoning:
6. ○ The antenna assembly is installed correctly. All fittings are connected securely.
   ○ Pass ○ No, reasoning:
7. ○ If the air source heat pump is installed for the DHW requirements, Builder to comply with the respective Detail 05.
   ○ Pass ○ No, reasoning:
8. ○ Heating and cooling is operational as determined by functional testing of both the heating and cooling modes
   ○ Pass ○ No, reasoning:
9. Builder / Builder Representative confirms to BRE by initialing below that the heat pumps will not freeze if there is no flow from the utility.

   Builder Rep. Initials: Date:
10. Builder / Builder Representative confirms to BRE by initialing below that the backup element is to only turn on in the event of a heat pump failure and not to be used as a supplementary source of heating.

    Builder Rep. Initials: Date:
11. BRE's Energy Meter has been successfully installed and commissioned;
    ○ Pass ○ No, reasoning:
12. All of the DESS piping manifold is insulated except for the return temperature probe tee and the body of the flow sensor, builder has sent pictures of the fully completed insulation after the inspection is completed
    ○ Pass ○ No, reasoning:

Main Dwelling Inspection Outcome	
Inspection passed?	
○ YES	○ NO

BRE Notes to Builder:

1. Refer to BRE Inspections Timeline for next steps.
2. Inspections should take place 'per building' as per approved site plan (i.e., all townhouse units in one building will be inspected at once).
3. Measurement Canada to inspect BRE's installed Energy Meter (BRE to coordinate with Measurement Canada, builder to provide access to each of the units only).

BACKYARD HOUSE INSPECTION

Final Inspection (Backyard House)
Completion date *(mm/dd/yyyy):*

1. Thermostat has been installed.
   ○ Pass ○ No, reasoning:
2. The actuator valve is wired to the heat pump.
   ○ Pass ○ No, reasoning:
3. Electrical panel is labeled to clearly identify the circuit breakers for the heat pumps and the DESS meter.
   ○ Pass ○ No, reasoning:
4. If the air source heat pump is installed for the DHW requirements, Builder to comply with the respective Detail 05.
   ○ Pass ○ No, reasoning:
5. Builder / Builder Representative confirms to BRE by initialing below that the heat pumps will not freeze if there is no flow from the utility.

   Builder Rep. Initials: Date:

6. Builder / Builder Representative confirms to BRE by initialing below that the backup element is to only turn on in the event of a heat pump failure and not to be used as a supplementary source of heating.

   Builder Rep. Initials: Date:
7. All of the DESS piping manifold is insulated
   ○ Pass ○ No, reasoning:
   Optional: Clearly labeled supply and return lines.

Backyard House Inspection Outcome	
Inspection passed?	
○ YES	○ NO

BlatchfordUtility.ca