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BLATCHFORD RENEWABLE ENERGY

District Energy Sharing System Service
Requirements for Fee-Simple Townhouses

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Abbreviations:

- FSTH: Fee-Simple Townhouse
- DESS: District Energy Sharing System
- DHW: Domestic Hot Water
- DPS: Distribution Piping System
- ETS: Energy Transfer Station
- HDPE: High Density Polyethylene
- RPVC: Rigid Polyvinyl Chloride

1. Installation by the City

A. Service Connections

- The City will provide each lot with a single DESS service connection, installed into the property line.
- The City will provide DESS supply and return pipes, and a metering network conduit service connection at the property line of each FSTH.

B. Thermal Energy Meter

- The City will supply, install, own and maintain a thermal energy meter for each FSTH. The meter will be installed by the City after the owner completes the installation of the townhouse heat pump systems.
- DESS (source) piping inside the building must be flushed and pressure tested prior to installation of the thermal energy meter by the City.

2. Installation by the Owners

A. Building Mechanical System - HVAC

The following HVAC system types are acceptable given they meet the following minimum performance criteria:

- Ducted water-to-air heat pump system:
 - The heat pump shall 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 heat pump operation should be designed for a source water flow of 0.62 L/s per kW (2.8 gpm per ton) nominal capacity.
- Heat pump based hydronic heating-only system:
 - The heating system must be designed to meet the peak heating load with a hot water temperature no greater than 49°C (120°F).
 - Example hydronic heating systems include in-floor radiant heat, low-temperature radiators, low-temperature convectors or fan coils.

- 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.
- The buffer tank shall 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.
- The heat pump operation should be designed for a source water flow of 0.67 L/s per kW (3.0 gpm per ton) nominal capacity.

B. Building Mechanical System - Design Report

The owner must submit a final (98%) building design package for review by the City prior to submitting a Building Permit application. All review comments must be addressed before the owner proceeds with their building permit application. The final design drawing must include:

1. Complete building mechanical system design, including schematics, floor plans, equipment schedules, piping details and controls details.
2. Complete site plans showing all DESS service connection pipes and communications conduits from the property line to each unit.
3. Complete electrical designs.
4. Drawings must include plan view, pipe elevations, trenching and backfill details, and building entry details.
5. Building Mechanical System Report.

The following forms must be submitted along with the Development Permit (Preliminary Design) submission and Building Permit (Final Design) submission packages from the District Energy Sharing System Design Guide:

1. Part A: DESS Design Guide Requirements Checklist
2. Part B: Development Loads Design Report

These forms must be signed by the registered professional of record who is a member in good standing of the Association of Professional Engineers and Geoscientists of Alberta.

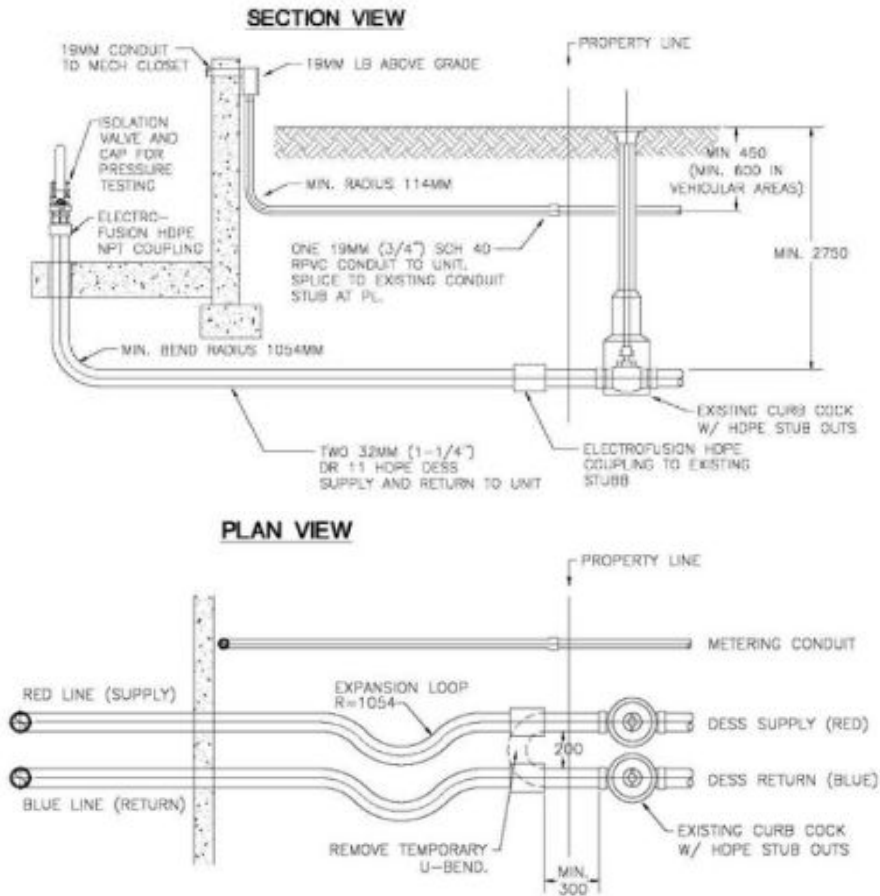
C. Building Mechanical System - Domestic Hot Water

- Domestic hot water (DHW) heating shall be provided by a heat pump based system connected to the DESS.

- Lane suites 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 or gas-fuelled system.
- DHW Heat Pump Requirements:
 - 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.
 - 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.
 - The DHW heat pump shall 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 228L (60 gal) is recommended.
 - The DHW storage tank must have one or more electric element(s) for backup heating. The backup elements shall be enabled through a relay on an alarm signal from the DHW heat pump which shall energize the electric element thermostat(s). Backup electric element thermostats shall be set at no more than 60°C (140°F) and shall only be energized on alarm signal from the DHW heat pump and shall not be designed for supplemental heating.
 - A thermostatic mixing valve shall be provided as part of the building plumbing design to prevent scalding in accordance with local codes.

D. Service Connections

- The owner is responsible for extending the DESS supply and return piping connections and a meter communications conduit into the building at the location of the future mechanical closet.
- The owner must install the DESS service connections as per the following requirements:



DESS Services Pipes

- 32 mm (1-1/4") DR11 HDPE DESS supply and return service connections are provided at the property line of each FSTH 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.
- 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.
- Provide a trench from the property line to the service location below the slab of the building. The trench must be free of debris.
- The invert of the service pipe must be a minimum of 2.75m below finished grade at all points.
- Place and compact 75mm (minimum depth) of fine granular bedding material under the pipe (maximum depth 400mm) and around the pipe to 300mm above the top-of-pipe. Compact to 95% of Standard Proctor Density.
- Fine granular bedding material must be in accordance with the City of Edmonton Design and Construction Standards - Volume 4 Water, Section 02515 - Pipe Bedding.

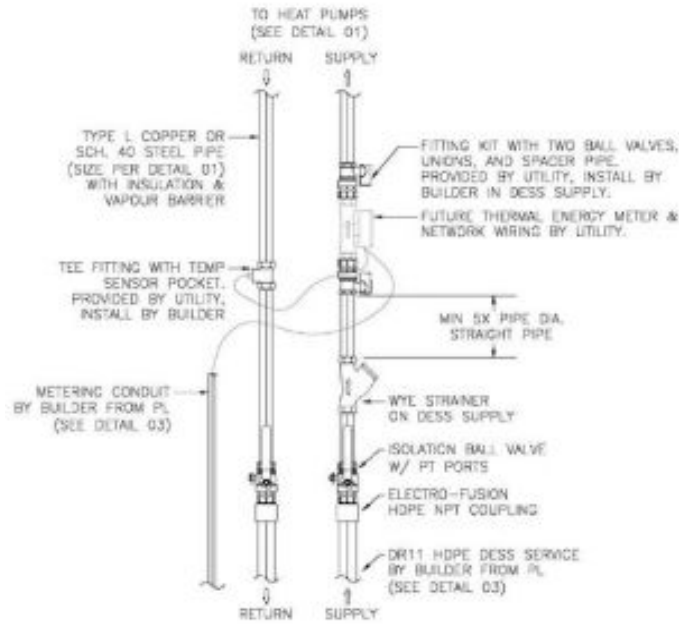
- Extend the HDPE service connections from the property line to inside the house at a location as close as practical to the heat pump mechanical closet.
 - Service lines must be red and blue co-extruded DR11 32mm (1-1/4") PE4710 HDPE.
 - Note: A larger diameter service pipe may be required where the length of the service pipe, the potential demand or the supply pressure warrant a mandated increase.
 - 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 property curb stop valve.
 - Use an electrofusion coupling or butt fusion machine to fuse new HDPE service extensions to existing service stubs.
 - Use a single continuous length of pipe to extend the service from the property line to the entry location.
 - Take precautions to prevent debris from entering the service pipe. Provide temporary caps at all open ends.
- Flush the HDPE pipes by blowing off water from the DESS mains to drain. Open the property line valve to flush the DESS supply line to drain for 60 seconds. Close the valve and repeat for the DESS return line, flushing to drain.
- Cap and terminate the HDPE lines after flushing to allow for pressure testing.
- Arrange for pressure testing and the City final inspection of DESS underground services prior to backfilling. Pressure testing of HDPE must be completed as follows:
 - Provide notice to the City a minimum of 72 hours in advance of pressure testing to arrange for inspection. The City must inspect underground services prior to backfilling and witness pressure test prior to acceptance.
 - 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).
 - Vent and bleed off trapped air.
 - Initial Expansion: Maintain 724 kPa (105 psi) for four hours and add water as needed. Do not measure this volume. Hydrostatic pressure expands pipe.
 - Begin Test: Reduce pressure to 655 kPa (95 psi) with the City representative on site to witness testing.
 - The pipe installation is acceptable if there is no pressure drop over one hour.
- Provide means to prevent water from freezing and damaging DESS service lines.
- Piping must be backfilled with fine granular bedding following acceptance by the City.

Meter Network Communications Conduit

- The goal of the metering network conduit is to provide a continuous pathway from the RS-485 cabinet at the street to the thermal energy meter in the mechanical closet inside the building.
- Provide a trench from the property line to the service location at the side of the building.
- The trench must be free of all construction materials at a depth of 1m.
- Where other services may occupy the same trench, Canadian Electrical Code Rule 60-602 must be followed.
- Supply and install a 19mm (3/4") Schedule 40 RPVC conduit from the property line connection to the building service location. Splice the new conduit to the existing conduit provided at the property line.
- Supply and install a 19mm (3/4") LB-type conduit box above grade on the building wall and extend the pull string from the property line connection.
- Provide the following separations between services on the outside of the house:
 - From electrical service, Telus service, cable TV service: 250mm (10") minimum separation.
- Extend 19mm (3/4") non-metallic conduit with pull string from the LB to the mechanical closet inside the building. This conduit must have a maximum of four sweeping 90° bends.
- Meter network conduit must be inspected by the City prior to backfilling; contact the City a minimum of 72 hours in advance to arrange for inspection prior to backfilling.

E. Thermal Energy Meter

- The owner must install a fittings kit with pipe spacer, unions and ball valves provided by the City, for future installation of the thermal energy meter.
- The owner must contact the City with at least five business days' advance notice to arrange for system final inspection and thermal meter installation.
- The owner must provide the following for installation of the thermal energy meter by the City:



- Install the utility-supplied fitting kit and spacer 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.
 - The location must be as close as practical to the point where the DESS supply pipe enters the mechanical space.
 - Fitting kit includes two ball valves with unions that must be installed for future servicing of the meter.
 - Maintain five pipe diameters straight pipe upstream of the meter installation location.
 - Metering network conduit must be extended to the meter installation location by the owner.
 - The thermal energy meter will be owned and maintained by the City. Maintain 60cm of clear working area in front of the 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.
 - Pipes may be vertically or horizontally oriented at meter installation location.
- Fitting kit includes a brass tee with pocket temperature sensor that must be installed in the DESS return pipe, within 30cm of the energy meter location, for installation of the return temperature sensor.

3. Maintenance by Customers

Customers must maintain and repair building mechanical systems for their premises including but not limited to the following:

- Taking necessary measures to prevent loss of fluid from the building mechanical system,
- Prevent contamination of the fluid within the building mechanical system, and
- Undertaking maintenance of the building mechanical system as per the equipment manufacturer's guidelines.

Customers are also responsible for all expenses, risk and liability for any loss or damage caused by or resulting from the failure of a customer to maintain its building mechanical system in accordance with the equipment manufacturer's guidelines.