Building Connection Guideline

Disclaimer: *The following information is provided for general use and the user assumes all responsibility. The information contained within is general in nature and does not substitute for the execution of detailed engineering relative to specific projects or problems. The City nor any of their contractors or employees give any warranty expressed or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, product application, or process disclosed within this document. Nor are they liable for consequential damage whatever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other losses) arising from the use of inability to use this document.*

This document provides information to assist developers in taking advantage of the benefits offered by the Neighbourhood Energy Utility (NEU) and to assist designers in their work to properly integrate with the NEU thermal distribution system.

Part One: Guide to Connecting to the Neighbourhood Energy Utility

Part Two: NEU Building Compatibility Design Guidelines

Guide to Connecting to the Neighbourhood Energy Utility

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Background Information

Neighbourhood energy systems distribute heat generated in a centralized location (such as the False Creek Energy Centre) to residential and commercial buildings to meet their hot water and space heating requirements. They are most suitable in dense urban areas. These systems work on a utility business model (a utility is an organization that supplies services like electricity, gas, water or sewerage). They are capable of serving both new developments and existing buildings that are gas-heated.

Neighbourhood energy systems go beyond the fossil fuels traditionally used for heat production. They are adaptable to a wide variety of alternative energy sources including geo-exchange, solar, biomass and waste heat recovery. Due to their networked economies of scale, they are able to use renewable energy resources in a way that is often not available or affordable to implement in individual buildings.

Neighbourhood energy systems eliminate the need for a boiler in each individual building and can provide higher efficiencies and better pollution control than localized equipment.

Worldwide, neighbourhood energy systems are undergoing a renaissance in urban development as a result of growing concerns about climate protection, energy security and economic resiliency.

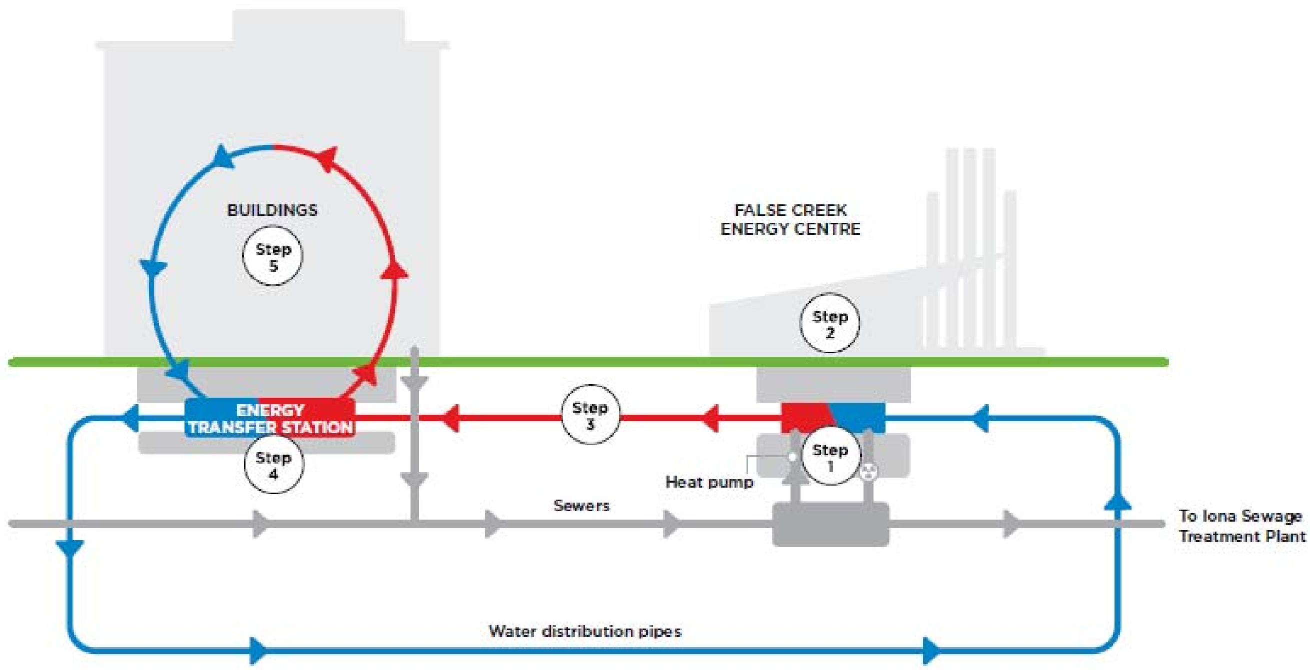
Guide to Connecting to the Neighbourhood Energy Utility

NEU Description

The South East False Creek Neighbourhood Energy Utility (NEU) was completed in 2010 to provide environmentally friendly heat and hot water to the Olympic Village and surrounding area. The False Creek Energy Centre enables the NEU to recycle waste heat from sewage.

While neighbourhood energy systems like the NEU are common place in Northern European countries, only three other systems in the world recover waste heat from untreated sewage: two in Oslo, Norway and one in Tokyo, Japan.

The NEU eliminates the global warming pollution, space requirements, and maintenance associated with boilers in individual buildings, and provides cost effective and stable rates to area residents and businesses.



Thermal energy (heat) is captured at the ***False Creek Energy Centre*** using a heat exchange process integrated with a City of Vancouver sewage pump station. This supplies 70% of the utility's energy production. The remaining 30% of the heat is supplied by high-efficiency natural gas boilers that provide supplemental heat on the coldest days of the year.

A ***Distribution Pipe System*** sends thermal energy – in the form of heated water – from the False Creek Energy Centre to the buildings that it services.

Each building has an ***Energy Transfer Station*** that transfers the thermal energy (heat) to the building's mechanical system. The building's mechanical system then distributes heat and hot water to building occupants.

NEU RATES AND BILLING

The South East False Creek Neighbourhood Energy Utility is a self-funded utility. It provides a return on investment to City taxpayers while providing cost-competitive rates to its customers.

The use of a local energy source reduces exposure to fluctuations in electricity and natural gas prices.

Additionally, a third party panel of experts provides independent advice to staff and Vancouver City Council. This ensures fair and stable rates for customers.

Owned by: City of Vancouver

Governed by: Vancouver City Council, with oversight from third-party expert Rate Review Panel

Operated by: City of Vancouver, Engineering Services

NEU RATE STRUCTURE

Customers are billed according to a tariff established for different customer classes (e.g., residential and commercial customers), similar to the practice of other utilities in B.C. Tariffs will typically consist of three line items, or charges:

1. *Energy Charge*

A variable fee based on the amount of metered heat energy used in a designated building each month. The *Energy Charge* will generally cover variable costs, which are mainly fuel costs for the NEU and come variable operating costs.

2. *Fixed Capacity Levy*

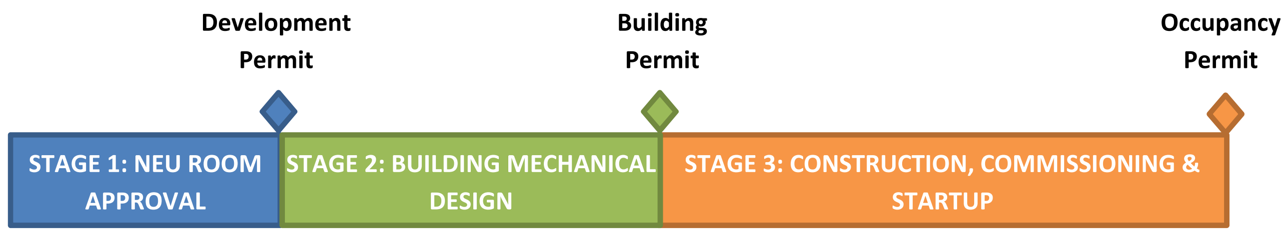
A fixed monthly fee related to the designated building's capacity requirements. The *Fixed Capacity Levy* will cover NEU fixed costs (non-commodity operation, maintenance and capital recovery costs).

There are two forms of the levy:

> ***Floor Area Levy*** – This rate is used by primarily residential buildings in SEFC, which are generally of the same building form.
>
> ***Capacity Levy*** – This rate is used by all other buildings connected to the NEU. The building subscribes to a specified capacity, and pays a monthly levy based on the subscribed capacity.

Note: current rates can be found in the most recent NEU rate report published on the NEU website

BUILDING COMPATIBILITY PROCESS



In the NEU Service Area issuance of Development Permits, Buildings Permits, and Occupancy Permits requires the Developer to satisfy NEU Design Requirements.

This section outlines the requirements which must be met at each stage.

Stage 1: NEU ROOM APPROVAL: Prior to issuance of Development Permit, the NEU Room must be approved by the NEU.

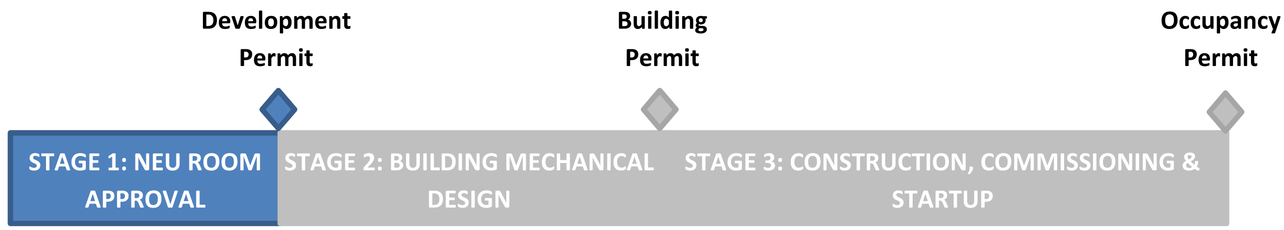
Stage 2: BUILDING MECHANICAL DESIGN: Prior to issuance of Building Permit, the building mechanical system (Heating, Ventilation and Air Conditioning) must be approved by the NEU.

Stage 3: CONSTRUCTION, COMMISSIONING AND STARTUP: Prior to startup of the NEU service to the building, the base building mechanical systems must be commissioned to the satisfaction of the NEU.

Note: Consistent with APEGBC practice note 16: **"Professional Design and Field Review by Supporting Registered Professionals"**, the NEU's Engineer will provide the Registered Professional (likely the mechanical Engineer of Record)with the following completed documents as required:

- **Schedule S-B: Assurance of Professional Design and Commitment for Field Review** by Supporting Professional, and
- **Schedule S-C: Assurance of Professional Field Review and Compliance** by Supporting Professional.

GUIDE TO CONNECTING TO THE NEIGHBOURHOOD ENERGY UTILITY



Stage 1: NEU ROOM APPROVAL

NEU ROOM REQUIREMENTS:

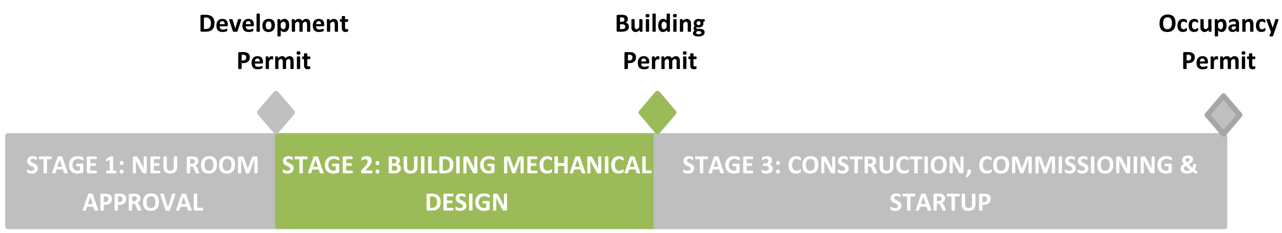
1. ***Location:*** The NEU room should be located on the building parkade level, adjacent to the building perimeter, in a location convenient for NEU distribution pipes to enter the building.
2. ***Dimensions***: The NEU room should be rectangular and sized according to the following table

Building Floor Area	Minimum NEU Room Dimensions
<150,000ft^2	6m x 3m 20ft x 10ft
>150,000ft^2	6m x 4m 20ft x 13ft

3. ***Access Door***: The NEU room requires a minimum 6' (1.83m) wide standard height access door with zero clearance (no step) entry.
4. ***Height:*** The Energy Transfer Station requires typical headroom for a mechanical room.
5. ***Electrical:*** A single dedicated 120V, 15A circuit with lockable breaker

DELIVERABLE:

Provide a sealed architectural drawing via PDF to the City of Vancouver, indicating the NEU Room meets the above requirements as coordinated with NEU staff.



Stage 2: BUILDING MECHANICAL DESIGN

BUILDING MECHANICAL REQUIREMENTS:

1. A building must integrate the building mechanical system and NEU system in a manner that enables the building mechanical system to make efficient use of the energy utility system.

2. The building must be heated using a hydronic heating system compatible with a hot water energy utility system. The heating and domestic hot water systems shall be designed to operate within a flow and temperature regime compatible with the energy utility system.

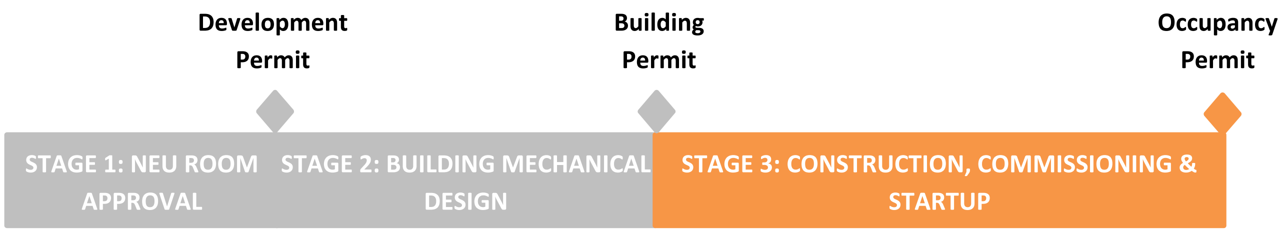
3. Heating and domestic hot water systems must have equipment centralized in a common mechanical room adjacent to the NEU room. For developments comprising more than one building within one site, heating equipment shall be centralized within one mechanical room serving all buildings.

4. The building mechanical system designer must collaborate with NEU staff to complete a Mechanical System Peer Review and satisfy all NEU mechanical design requirements. **Note: this process can take 2-3 months to complete.** The NEU will provide the developer with a **Peer Review Design Memo** at the conclusion of this process.

DELIVERABLES:

1. *Provide a signed and sealed **Application for Thermal Energy Service** completed in full.*
2. *Provide written confirmation of acceptance of the **Peer Review Design Memo**.*
3. *Provide a letter from electrical consultant confirming electrical requirements have been met.*

Detailed Mechanical Requirements can be found in Part 2 of this document: **NEU Building Compatibility Design Guidelines**



Stage 3: CONSTRUCTION, COMMISSIONING & STARTUP.

STARTUP OF HEATING SERVICE REQUIREMENTS:

1. Provide written proof of flushing (flushing certificate and water quality test report) directly to NEU Staff. Please note that flushing through the heat exchangers is never permitted, the ETS must be bypassed with spool pieces.

2. Permanent electrical feed must be installed and activated to the ETS panel.
3. Electrical provisions for accommodating a rooftop antenna must be installed

Note: Consistent with APEGBC practice note 16: **"Professional Design and Field Review by Supporting Registered Professionals"**, the NEU's Engineer will provide the Registered Professional (likely the mechanical Engineer of Record)with the following completed documents as required:

- **Schedule S-B: Assurance of Professional Design and Commitment for Field Review** by Supporting Professional, and
- **Schedule S-C: Assurance of Professional Field Review and Compliance** by Supporting Professional.

DELIVERABLES:

1. *Provide a **Flushing Certificate** in full.*
2. *Provide latest **HVAC Schematics** indicating heating and DHW systems*
3. *Provide letter from electrical consultant confirming electrical requirements have been met.*

<u>NEU BUILDING COMPATIBILITY GUIDELINES</u>

TABLE OF CONTENTS

NEU BUILDING COMPATIBILITY GUIDELINES

INTRODUCTION

These guidelines are intended to aid developers and designers to connect to the SEFC NEU. Developers are required to make provisions in building design to take full advantage of the benefits of the NEU.

The goal is to optimize the connection, improve building efficiency, and provide seamless integration with the NEU.

GENERAL TECHNICAL REQUIREMENTS

A building mechanical system must utilize the energy transfer station for all of its space heating and domestic hot water requirements.

PROHIBITED EQUIPMENT

The building mechanical system must not incorporate any additional heat production equipment including, but not limited to:

- Boilers,
- Water source heat pumps,
- Air source heat pumps,
- Variable Refrigerant Flow (VRF) systems,
- Furnaces,
- Hot water heaters,
- Geo-exchange systems,
- Electric baseboards,
- Sewer heat recovery systems,

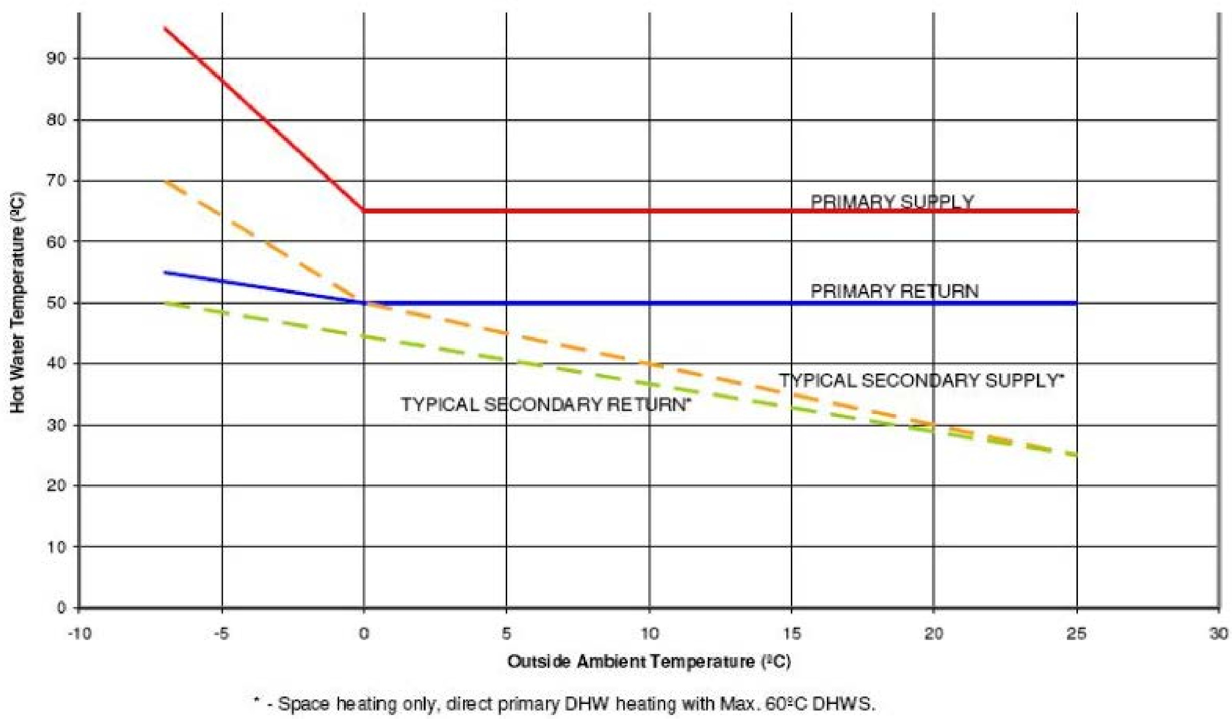
except that in certain cases the City Engineer may approve the use of prohibited equipment to heat remote spaces that would be difficult to heat hydronically, provided the developer can demonstrate that all exceptions will not exceed 1% of the total thermal energy needs of the project.

NEU BUILDING COMPATIBILITY GUIDELINES

GENERAL HVAC DESIGN REQUIREMENTS

The following sub-sections outline technical requirements and identify the respective responsibilities of the developer and the NEU to ensure that all the new buildings in SEFC are designed and constructed in a way that maximizes the NEU's operational efficiency.

	NEU Primary Loop Temperatures		**Building Secondary Side Temperatures**	
	Winter Design Condition	Summer Design Condition	Winter Design Condition	Summer Design Condition
Supply	95° C	65° C	70° C	60° C
Return	55° C	50° C	50° C	45° C
Difference (ΔT)	40° C	15° C	20° C	15° C



Note: As shown on the graph above, the primary supply temperature does not increase from 65°C until the outside air temperature goes below 0°C. The building must be designed to be adequately heated at O°C based on this primary supply temperature.

NEU BUILDING COMPATIBILITY GUIDELINES

INTRODUCTION

This section provides technical information for hydronic space heating and domestic hot water systems for construction of new developments in SEFC. The design information provided in this specification should be regarded as a general guideline only, and the Developer's Mechanical Engineer shall be responsible for the final (building specific) design. If the building requires lower temperatures than as specified in the guidelines below, alternative design approaches can be used to obtain the minimum ΔT requirement for efficient NEU service.

The NEU will provide a peer review of each building HVAC design at the 50% and 90% completion stages, but will not be responsible for the design, which will be executed by the builder. The NEU will make suggestions as deemed necessary for achieving the required temperature profiles. Since a NEU can be only as good as the building HVAC systems allow, the HVAC design must ultimately integrate well with the Utility. Prior to requesting a peer design review, the developer must submit the following:

- Completed energy service application
- Designed annual and peak loads. Note that these calculations are to include future tenant improvement loads.
- Mechanical schematic for the buildings heating and domestic hot water showing design temperatures, flowrates, acceptable delta T's, domestic storage tank capacity
- Mechanical room layout including NEU pipe penetration location and routing to NEU room
- Equipment schedule for all mechanical equipment
- Confirmation that the base building mechanical system has been extended to provide heat and hot water to all future tenant improvements
- Confirmation from Electrical Consultant the all NEU requirements for power to panel and rooftop antenna have been included in the design

NEU Building Compatibility Guidelines

HVAC Systems – Developer Prime Responsibility

The building developers will be responsible for designing and installing their HVAC systems. There will be some differences and similarities with conventional systems, as explained below.

The building will require hydronic thermal distribution systems, including:

1. Internal distribution pumps
2. Internal distribution piping
3. Heating elements, e.g. fan-coil units, air handling unit coils, and/or perimeter or radiant heating

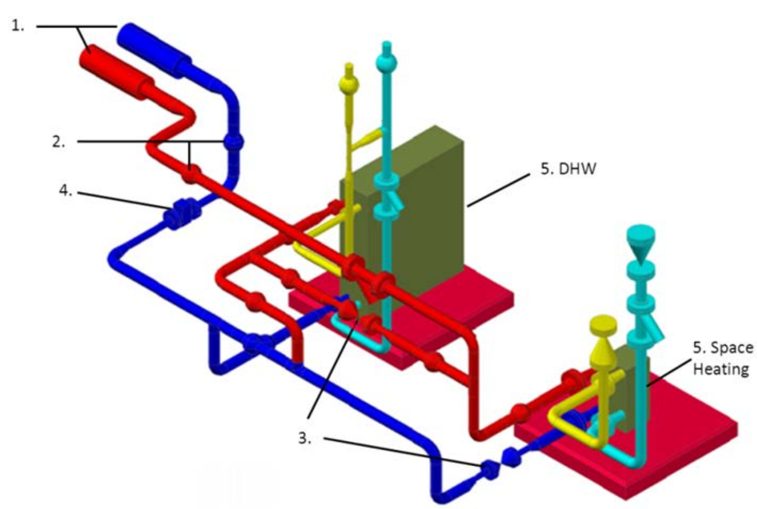
Provision for the following design conditions specific to Neighbourhood energy is required

1. The building will host ETS and branch lines from the NEU distribution pipelines.
2. Buildings connected to the NEU are always hydronic.
3. The NEU will operate most effectively with the use of low temperatures in the building heating systems. The listed temperatures are considered to be the maximum allowable at design with appropriate outdoor air reset.

ETS Connection – NEU Prime Responsibility

The NEU will design, install, operate and maintain the ETS at a location to be determined by the NEU, subject to reasonable accommodation with the building design, after consulting with the developer/building owner(s). Due to hydraulic considerations, the preferred location is in the basement at the P1 Level.

Space required for ETS varies with circumstances. Refer to the table in part one as a general guideline.



NEU BUILDING COMPATIBILITY GUIDELINES

The building contractor will connect the building HVAC system to the load side of the ETS at demarcation points that distinguish the builders' responsibility from the NEU responsibility. The demarcation points will be generally at the first flange on the building side of heat exchangers.

NEU BRANCH CONNECTIONS – NEU PRIME RESPONSIBILITY

The NEU will install, own and maintain the primary distribution pipes inside the building up to the ETS. Branch connections will be laid in internal roads or alleys or courtyards or directly from the main trunk lines into a building.

FOUNDATION PENETRATION- DEVELOPER PRIME RESPONSIBILITY

The developer must work closely with the NEU to determine the exact size and location of foundation penetration for the supply and return connections. The preferred method for new buildings is to core holes for the supply and return pipes at the time of service connection. The Developer is responsible for coring and sealing the building envelope. A recommended detail is provided in Appendix 3, however the Developer's envelope consultant should be consulted.

HVAC DESIGN REQUIREMENTS

PUMPING AND CONTROL STRATEGY

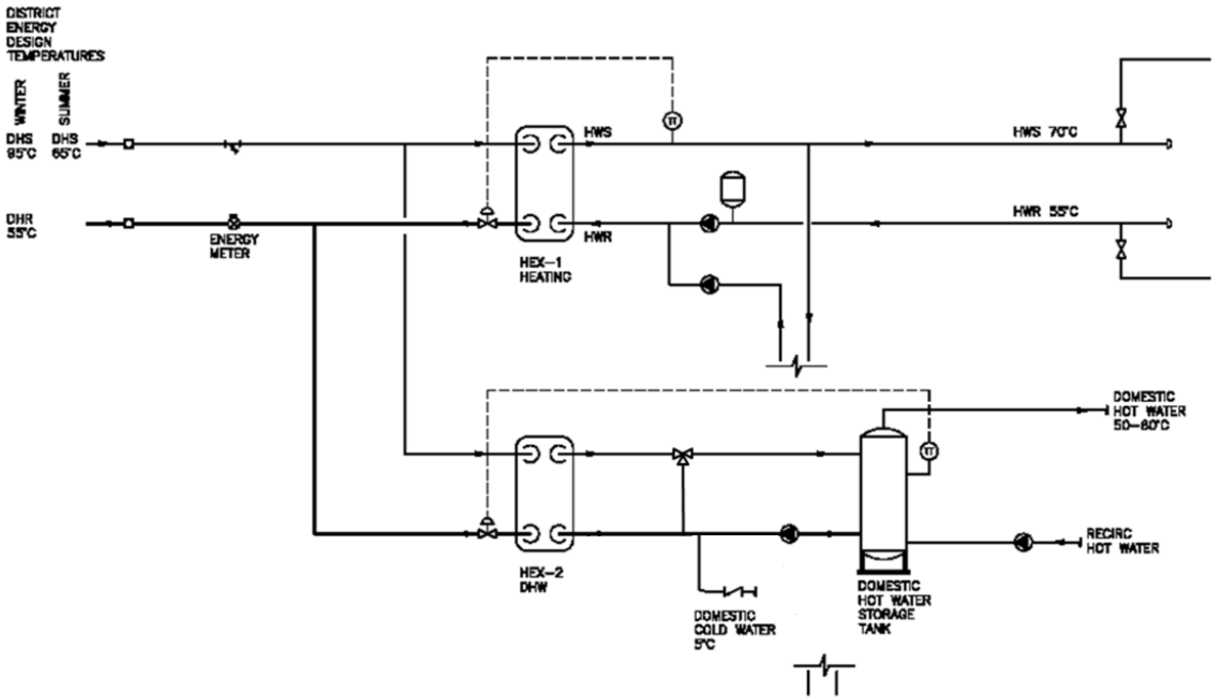
The building heating system shall be designed for variable volume flow operation (preferably with variable speed pumps to minimize the pumping power requirements).

All control valves (terminal units and zone valves) to be of 2-way modulating (or on/off for Fan Coil Units) type. Three–way valves that allow flow to by-pass the heating elements are not permitted as they result in lower ΔT, hence lower system capacity.

The secondary supply temperature (from the ETS) shall be reset based on outside air temperature.

HYDRONIC HEATING AND DOMESTIC HOT WATER SYSTEMS (MINIMUM) REQUIREMENTS

The primary flow though the ETS is controlled to achieve the design supply temperature to the building on the secondary side, i.e. on the building internal hydronic system, as shown in Figure below.



DISTRICT ENERGY DESIGN TEMPERATURES
WINTER
SUMMER
DHS 85°C
DHS 65°C
DHR 55°C
ENERGY METER
HWS
HWR
HEX–1 HEATING
TT
HWS 70°C
HWR 55°C
HEX–2 DHW
DOMESTIC COLD WATER 5°C
DOMESTIC HOT WATER STORAGE TANK
TT
DOMESTIC HOT WATER 50–60°C
RECIRC HOT WATER

HYDRONIC (SPACE) HEATING

The hot water hydronic heating system shall be designed to provide the space heating and ventilation air heating requirements for the individual suites, hallways/stairwells and other common areas in the building, supplied from a central Energy Transfer Station (ETS) location within the building.

Hot water generated by the ETS shall be distributed, via a 2-pipe (direct return) piping system, to the various heating elements throughout the building. The building heating system shall be designed according to the design temperatures specified below.

The specified differential temperature (ΔT) shall be regarded as a minimum requirement, and a larger ΔT is desirable to further reduce the pipe sizes and associated valves, fittings, etc., and pumping requirements in the secondary system. The building return temperatures must be kept to a minimum to allow the NEU central energy plant to operate efficiently.

In **Appendix 2** there are sample system flow schematics of three typical heating configurations:

- Option 1 – Radiant Heating with Make-up Air units
- Option 2 – Perimeter Heating with Make-up Air Units
- Option 3 – Fan Coil Unit Heating with Make-up air Units

HEATING EQUIPMENT SELECTION

HYDRONIC RADIANT FLOOR HEATING

Radiant floor heating shall be provided by PEX tubing installed within the floor structure just below the surface. The floor heating shall be designed for the following maximum temperatures: (HWS = hot water supply, HWR = hot water return):

Secondary System:	HWS:	45°C
	HWR:	35°C

FIN TYPE BASEBOARD CONVECTORS / PERIMETER RADIATORS

The radiant (transmission) heating requirements shall be provided by 2-pass commercial fin type radiators or perimeter style radiant panels (European style) mounted on the perimeter of the (outside) walls. The baseboard convectors and perimeter wall mounted radiant panels shall be designed for the following maximum temperatures:

Convectors Secondary System:	HWS:	70°C
	HWR:	50°C
Radiators Secondary System:	HWS:	60°C
	HWR:	45°C

NEU BUILDING COMPATIBILITY GUIDELINES

FAN COILS

Packaged fan coil units designed with hot water coils mounted on the inside walls can be used to provide individual unit heating. The fan coil units shall be designed the following maximum temperatures:

Secondary System:	HWS:	70°C
	HWR:	50°C

HYBRID HEAT PUMPS

Hybrid heat pump units designed with hot water coils can be used if cooling is required. The major benefit of these units is that the compressor only runs when cooling is required and shuts down when in heating mode. This results in lower operating costs, reduced maintenance, reduced noise, extended unit life, and a more efficient system due to heat recovery options

Secondary System:	HWS:	52°C
	HWR:	32°C

VENTILATION MAKE-UP AIR UNITS

The ventilation (make-up air) requirements shall be provided by air handling units designed with hot water/glycol heating coils. The coils shall be provided with freeze protection circuits. The heating coils shall be designed for the following maximum temperatures:

Secondary System:	HWS:	65°C
	HWR:	45°C

NEU BUILDING COMPATIBILITY GUIDELINES

DOMESTIC HOT WATER

The Domestic Hot Water (DHW) system shall be designed to provide all DHW requirements for the building, supplied from the ETS. The preferred DHW system is designed for semi-instantaneous heating with a minimum of storage tanks in accordance with ASHRAE design guidelines and local plumbing code. Storage tanks must be in close proximity to the NEU ETS.

The owner is responsible for including a 3-way control valve to ensure water leaving the DHW storage tanks does not exceed the design temperature set point.

LETTERS OF ASSURANCE

Note: Consistent with APEGBC practice note 16: **"Professional Design and Field Review by Supporting Registered Professionals"**, the NEU's Engineer will provide the Registered Professional (likely the mechanical Engineer of Record)with the following completed documents as required:

- **Schedule S-B: Assurance of Professional Design and Commitment for Field Review** by Supporting Professional, and

Schedule S-C: Assurance of Professional Field Review and Compliance by Supporting Professional

COOLING/AIR CONDITIONING

The NEU does not provide neighbourhood scale cooling service. If mechanical cooling is desired by the developer, the design of the cooling system should be reviewed with NEU staff to ensure compatibility with the NEU system.

There are many mechanical cooling terminal unit options which are compatible with Neighbourhood Energy, including, but not limited to:

- Radiant baseboards
- Radiant Panels
- 2-pipe fan coils
- 4-pipe fancoils
- Hybrid heat pumps
- Capillary mats

There are several terminal units which are not compatible with the NEU, including, but not limited to:

- Variable Refrigerant Flow (VRF) systems
- Water-to-water heat pumps
- Electric Baseboards

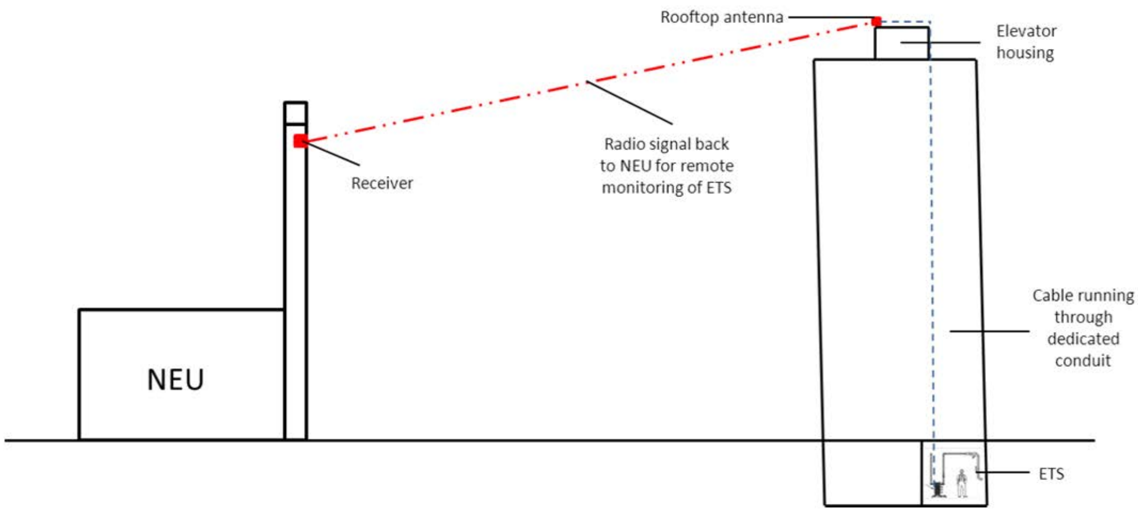
NEU BUILDING COMPATIBILITY GUIDELINES

REMOTE MONITORING

Every ETS is remotely monitored to ensure proper operation and allow alarms to be transmitted to NEU staff on a 24-hour basis. In most cases this will be achieved by installation of a wireless SCADA Antenna on the exterior of the upper levels of the building.

ROOFTOP NEU SCADA ANTENNA

To facilitate remote monitoring of buildings ETS, a wireless system has been developed to transmit data from each building back to the NEU. Data is transferred through a hardwire cable from the buildings ETS to an antenna mounted on the rooftop of the building. A wireless signal is then directed back to a receiving unit mounted on the stack of the NEU Energy Centre.



<u>The developer is responsible for providing the following to facilitate antenna installation:</u>

- 1" dedicated conduit (with string) from the rooftop to the buildings ETS room
- Dedicated 15A 110V circuit at rooftop
- #6 gauge grounding wire at rooftop
- Access to building prior to commissioning to facilitate the City installation of the antenna

NEU Building Compatibility Guidelines

Energy Performance Modelling Criteria:

Energy performance modeling of an immediate DES connection system is to follow a procedure meant to level the field between immediate and future connectivity projects. To demonstrate compliance with ASHRAE 90.1, energy performance modeling is to treat the building as if it were a conventional boiler based system. The model is to follow the conventional methodology as outlined in ASHRAE 90.1, where the proposed building shall use a boiler system with 90% seasonal efficiency, then be compared against the Reference building using the appropriate boiler efficiency from ASHRAE 90.1's Table 6.8.1F. Compliance with ASHRAE 90.1 under the Energy Cost Budget Method (ECB) is demonstrated when the energy cost of the Proposed Building is equal to or less than the energy cost of the Reference building, as shown by the modeling output.

LEED Energy Credits

LEED certification, and the requirement to obtain a specified number of LEED energy credits, is the realm of the City of Vancouver Rezoning Conditions, which are separate from Vancouver's requirement to comply with the Building By-Law and of ASHRAE 90.1 energy performance criteria. The satisfactory achievement of obtaining the required LEED energy credits can only be achieved through building energy performance modelling. Unlike the compliance process developed by the City for immediate connection scenarios outlined in Section 5 above, the defining criteria are developed by the CaGBC (Canadian Green Building Council). Until recently, the CaGBC made available a document outlining their specific methodology on how to deal with DESs when modeling for LEED energy credits and certification. This methodology appeared to make the ability to obtain the require energy credits more difficult than a conventional boiler based building.

LEED Energy Credit Calculations – DES Input Ratios

On April 1st, 2012, the CaGBC released their "*LEED Canada 2009 Interpretation Guide for District Energy Systems*", which incorporates a slightly revised methodology (Method 1) from the previous version, as well as a new addition, "Method 2", requiring specific information about the energy efficiencies of the DESs in question. The following are the input ratios, required by "Method 2", for the existing district energy systems within the City of Vancouver (to be updated as required) ;

South East False Creek (SEFC)

Input Ratio (Nat. Gas): 0.214 GJ_{in}/GJ_{out}

Input Ratio (Electricity): 0.072 MWh_{in}/GJ_{out} (0.259 GJ_{in}/GJ_{out})

APPENDIX 1 – SYSTEM DRAWING (JAN 2016)

APPENDIX 3 – GENERIC FOUNDATION DETAIL

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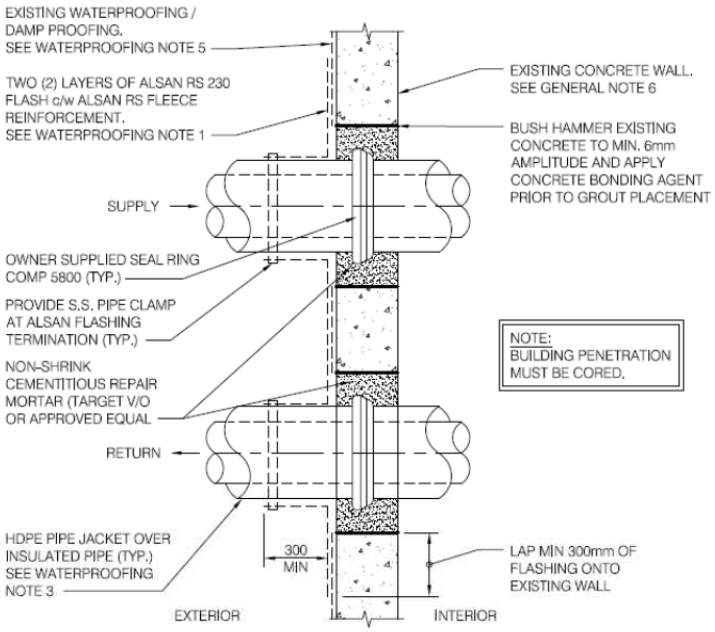

SCALE: N.T.S.

GENERAL NOTES:
1. THE CONTRACT DOCUMENTS ARE BASED ON ASSUMED RECORD DIMENSIONS FOR THE EXISTING BUILDING STRUCTURE AND ASSUMPTIONS IN ACCORDANCE WITH DETAILING AND PLACING PRACTICE. THESE ASSUMPTIONS MAY VARY FROM THE ACTUAL ONSITE CONDITIONS. THE CONTRACTOR SHALL IMMEDIATELY INFORM THE ENGINEER OF ANY VARIATIONS FROM THE ASSUMED CONDITIONS.
2. MINOR MODIFICATIONS WILL BE REQUIRED TO THE WORK INDICATED ON THESE DRAWINGS TO REFLECT ACTUAL SITE CONDITIONS. THE CONTRACTOR WILL COOPERATE WITH THE ENGINEER IN THIS REGARD. MINOR MODIFICATIONS WILL BECOME THE RESPONSIBILITY OF THE CONTRACTOR AND WILL NOT RESULT IN A CHANGE IN CONTRACT PRICE.
3. ENSURE THAT ALL NECESSARY JOB DIMENSIONS ARE TAKEN AND ALL TRADES ARE COORDINATED FOR THE PROPER EXECUTION OF THE WORK. THE CONTRACTOR SHALL ASSUME COMPLETE RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS OF SUCH DIMENSIONS AND FOR COORDINATION.
4. PRIOR TO FABRICATION OF ANY STRUCTURAL MEMBERS, THE CONTRACTOR SHALL COMPLETE THIS SITE REVIEW OF CRITICAL "TIE-IN" DIMENSIONS AND CONFIRM ALL DIMENSIONS TO ENSURE PROPER FIT OF NEW WORK TO EXISTING. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO STARTING ANY WORK.
5. COMMENCEMENT OF CONSTRUCTION OR ANY PART THEREOF CONSTITUTES ACCEPTANCE OF EXISTING CONDITIONS AND MEANS DIMENSIONS AND ELEVATIONS HAVE BEEN CONSIDERED, VERIFIED AND ARE ACCEPTABLE.
6. THE CORING OR CUTTING OF OPENINGS AND HOLES SHOWN ON THE DRAWINGS THROUGH THE EXISTING STRUCTURE SHALL NOT CUT ANY REINFORCING BARS. THE CONTRACTOR SHALL LOCATE THE POSITION OF EXISTING REINFORCING BARS IN THE VICINITY OF THE HOLES AND SLEEVES TO BE CUT OR CORED, AND THE HOLES AND SLEEVES SHALL BE LOCATED TO AVOID CUTTING OF REINFORCING BARS. WHERE THIS IS NOT POSSIBLE, IT SHALL BE REPORTED TO THE ENGINEER FOR REVIEW.

WATERPROOFING NOTES:
1. WATERPROOFING SHALL BE SOPREMA ALSAN RS 230 FLASH, 2 LAYERS COMPLETE WITH ALSAN RS FLEECE FLASHING REINFORCEMENT. INSTALL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
2. WEATHER CONDITION REQUIREMENTS (TO BE CONFIRMED WITH MANUFACTURER):
   2.1. ALSAN RS 230 FLASH MUST BE INSTALLED ON A DRY SUPPORT, AT A TEMPERATURE BETWEEN 5 AND 35 DEGREES CELSIUS.
   2.2. ALSAN RS 230 FLASH MUST NOT BE INSTALLED WHEN RAIN IS FORECASTED WITHIN 12 HOURS OF INSTALLATION OR WHEN THERE IS A RISK OF EXPOSURE TO ANY TYPE OF WATER WITHIN 12 HOURS OF INSTALLATION.
3. SUBMIT APPROVED APPLICATOR CARD TO ENGINEER FOR REVIEW PRIOR TO INSTALLATION.
4. PIPE SURFACE PREPARATION: CONTRACTOR SHALL PERFORM AN ABRASION TEST ON THE PIPE JACKET AND SELECT A PRIMER BASED ON THE RESULTS OF THE TEST AND AS RECOMMENDED BY THE MANUFACTURER. NOTIFY ENGINEER OF THE PRIMER SELECTED PRIOR TO APPLICATION.
5. CONCRETE SURFACE PREPARATION: SURFACE MUST BE DUST-FREE AND HAVE NO OTHER SUBSTANCES THAT CAN INTERFERE WITH THE ADHERENCE, ANY RESIDUE MUST BE REMOVED BY CLEANING, SANDING OR HIGH PRESSURE WASHING.
6. CONTRACTOR TO CONFIRM EXISTING FOUNDATION WALL WATERPROOFING / DAMP-PROOFING SYSTEM AFTER EXCAVATION AND PRIOR TO NEW PIPE PENETRATION WATERPROOFING. CONTRACTOR SHALL NOTIFY THE ENGINEER TO CONFIRM THE COMPATIBILITY OF THE PROPOSED WATERPROOFING SYSTEM.

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consulting engineers

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City of Vancouver
District Energy System
Watertight Concrete Penetration Detail (Plan View)