

**THE NEW SURREY HOSPITAL
AND
BC CANCER CENTRE PROJECT**

Schedule 1 – Statement of Requirements

Appendix 1P – Metering Matrix

System	Load Category Grouping (For targeted energy monitoring)	Individual Circuit Metering Required	Electrical Consumption Metering							Thermal (BTU) - Steam or Hydronic Meter(s)	Flow Meter(s)	Notes
			Department-Level Grouping	Electrical Revenue Certified Meter(s)	Electrical Power Quality Meter(s)	Electrical Energy Information Meter(s)	BMS Current Transducer for calculating electrical energy usage	Current Transducer - to provide status only	BACnet meter(s)			
Main Electrical Utility Service Meter(s)	Electrical Power Supply - Utility	X		X	X							
Main Building Water Meter(s)											X	
Cooling												
Chillers (1 per chiller)	Cooling	X				O		X	O			
Cooling Towers (1 per cooling tower)	Cooling					O		X	O			
Cooling Tower DCW Make-Up	Cooling										X	
Chilled Water - Total	Cooling									X		
Building Space Cooling - Sub Meter	Cooling									X		
Building Space Process cooling - Sub Meter	Cooling									X		
MRI, CT Scans, PET Scans, Cyclotron - Sub Meter	Cooling									X		
Pumps	Cooling					O	O	X	O			VFD BACnet must provide power consumption or CT
Energy for Heat Recovery	Heat Recovery					O	O			X		The intent of this line item is to quantify the amount energy of "forced mechanical cooling" to generate heat for the heat recovery plant (i.e. using mechanical cooling for space cooling when free cooling would otherwise be available and/or the cooling energy to recover heat from exhaust heat recovery coils). This should include the amount of thermal cooling energy plus the electrical energy consumed by the pumps and compressor for "forced mechanical cooling." The meters that are required to quantify the total amount of cooling energy (thermal, pumping, and compressor energy) for the chiller plant may be sufficient to also quantify the energy for heat recovery, in which case no additional physical meters would be required and this energy can be a calculated quantity.
Heat Recovery Plant												
Heat Recovery Chillers (1 per chiller)	Heat Recovery	X				O		X	O			
Source Heat	Heat Recovery									X		
Simultaneous	Heat Recovery									X		
Exhaust air heat recovery	Heat Recovery									X		
Condenser Output - Total	Heat Recovery									X		
Heat Recovery Output - Sub-Meter	Heat Recovery									X		Utility Grade Thermal Metering Required
Pumps	Heat Recovery					O	O	X	O			
Hot Water Boilers												
Electrical Metering on each boiler	Space Heating + DHW	X				O		X	O			Acceptable to calculate a break out of the gas usage for space heating vs DHW
BTU Meter on hydronic side (each boiler)	Space Heating + DHW									X		Acceptable to calculate a break out of the hydronic heating energy / usage for space heating vs DHW
Glycol HX (preheat coils, freeze protection loops)	Space Heating									X		
Hot water for DHW Loads	DHW									X		
Boiler blower motor fan energy (1 per boiler)	Space Heating + DHW						O	X	O			Acceptable to calculate a break out of the gas usage for space heating vs DHW
Heating Pumps	Pumps					O	O	X	O			
AHU/MUA/RETURN AND EXHAUST SYSTEMS:												
Supply Fan systems with a combined fan power of 5 HP or less	Ventilation						O		O			It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp.
Supply Fan systems with a combined fan power of more than 5 HP	Ventilation					O		X	O			
Return Fan systems with a combined fan power of 5 HP or less	Ventilation						O		O			It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp.
Return Fan systems with a combined fan power of more than 5 HP	Ventilation					O		X	O			
Exhaust Fan systems with a combined fan power of 5 HP or less	Ventilation						O		O			It is not acceptable to only provide Current Transducers for fan arrays with individual fans less than 5 hp.
Exhaust Fan systems with a combined fan power of more than 5 HP	Ventilation					O		X	O			
Total AHU Energy	Ventilation											
Supply Air Flow Meter on any AHU w/SF > 5 HP	Ventilation										X	Must be constructed in such a way to guarantee this accuracy as per manufacturers recommended install
VAVs Flow Station											X	
Return Air Flow Meter											X	
Exhaust Air Flow Meter											X	
Energy Valves on H/C, C/C, EHRC, PHC for all AHUs w/ SF > 5 HP										X		Energy valves or equivalent are acceptable for metering the thermal load transferred to/from the air stream
Sensors												Industrial grade sensors on larger AHU(s), Return fan(s), Exhaust fan(s) and pumps (50HP and up, per system/equipment) such as following: Duct static pressures (controlling AHU(s), Return fan(s), Exhaust fan(s) system/equipment) Pipe pressure differential pressures (controlling pump(s) and pumping system(s)/equipment)
Heat Recovery (coils, heat Wheels etc.)										X		All heat recovery systems to be metered to record amount of energy recovered
Steam Plant (MDR)												
Electrical metering on each boiler		X										
Utility Grade steam meter on primary Steam Supply										X		
Utility Grade steam meter on each boiler										X		
DCW											X	
Humidification (Adiabatic)		X				O		X	O	X		Electrical meters required if steam is generated from electrical steam generator or for boosting steam production at the zone level
Condensate Recovery Metering Energy Center										X		
MDR												
MDR - Electrical	Process (MDR)		X			X						
MDR - Steam										X		
MDR - DHW										X		
MDR - DCW / RO Water											X	
Condensate Recovery Meter MDR										X		
Kitchen												
Electrical Metering (kettles, hoods, etc)	Process (Kitchen)					X						
DCW											X	
DHW										X		
Process Cooling (walk-in freezers/walk-in coolers) (Chilled Water)										X		
Cyclotron												
Electrical Metering						X						
Chilled Water Energy (process cooling)										X	X	
Radiation Therapy												
Electrical						X						
Chilled Water Energy (process cooling)										X	X	

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			Department-Level Grouping	Electrical Revenue Certified Meter(s)	Electrical Power Quality Meter(s)	Electrical Energy Information Meter(s)	BMS Current Transducer for calculating electrical energy usage	Current Transducer - to provide status only			
Inpatient Unit per Floor											
Electrical Metering						X					
DHW								X			
DCW									X		
Bedpan Disinfectors	Process		X			O	O		O		
Energy Centre											
Electrical Metering						X					
Chilled Water Energy (process cooling/transformers)								X	X		
Laboratory											
Electrical Metering						X					
DHW								X			
DCW									X		
RO/Water									X		
Interior Lighting (including underground parking)	Lighting (Interior)		X			X				Virtual metering from addressable controls system is acceptable where per-zone or per-fixture on/off/dimming level data is provided. Night lights, surgical lights, exit signs and emergency unit lighting do not require metering.	
Exterior Lighting	Lighting (Exterior)					X					
Elevators	Elevators						X			Bi-directional power measurement required (to measure regenerative braking output)	
EV Chargers - General Use	EV Charging					X				Electrical energy data from EVSE is acceptable instead of separate electrical meters	
EV Ambulance Chargers	EV Charging					X				Electrical energy data from EVSE is acceptable instead of separate electrical meters	
IM/IT Equipment	IM/IT					X				All outlets or hard wired equipment located in Comm Rooms (except housekeeping receptacles) can be grouped together as IM/IT loads	
Potable Domestic Water											
DCW - Total Building									X		
DHW - Total Building								X			
Booster Pumps	Pumps					O	O		O		
Recirculation Pumps	Pumps					O	O		O		
Reverse Osmosis (RO) - (DCW)	RO System									X	
Irrigation Top Up (to grey water)										X	
Cooling Tower Top-Up (to grey water system)										X	
DCW / IPU Tower										X	
DHW / IPU Tower										X	
Fire Protection & Smoke Control											
Fire Pumps & Jockey Pumps										Metering not required for these systems	
Dry sprinkler air compressors										Metering not required for these systems	
Smoke control pressurization fans										Metering not required for these systems	
Rainwater Harvesting System Metering											
Cooling Tower - Make-up										X	
UV - Electrical	Process (Grey Water)					O	O		O	X	
Aeration	Process (Grey Water)					O	O		O		
Site										X	
Parking											
Exhaust Fans	Ventilation					O	O		O		
External Ambulance Canopy/Vehicle Bay Exhaust Fans	Ventilation					O	O		O		
Heating (heating coil or unit heater)	Heating					O	O		O	X	
Electrical Outlets (per department/floor)	Plug Loads		X			X				Plug loads may be calculated by subtracting other load types from total panel load, but only on panels where all other load types (i.e. lighting, mechanical, process) are independently metered	
Electrical Panel Feeders - Facility	N/A	X	X			X					
Electrical Panel Feeders - Commercial Opportunity & Retail Tenants	Electrical Power Supply - Tenants	X		X						Project Co to include space and communications wiring provisions to connect future tenant meters to base building metering system, each tenant to be metered for DCW, DHW, electrical, gas	
Electrical CDP Feeders	N/A	X		X							
Electrical MCC Feeders	N/A	X		X							
Electrical Main Transformer Feeders	N/A	X		X							
Electrical each HVATS Feeder	N/A	X		X							
UPS System Output	UPS	X		X						UPS meters may be grouped into one meter point per paralleled bank of UPS units.	
Med Gas / Non Med Gas											
Medical Air	Med Gas					O (per compressor)	O (per compressor)		O (per compressor)	BMS to record run hours of these systems.	
Medical Vacuum	Med Gas					O (per compressor)	O (per compressor)		O (per compressor)	BMS to record run hours of these systems.	
Nitrogen	Med Gas					O (per compressor)	O (per compressor)		O (per compressor)	BMS to record run hours of these systems.	
Laboratory Air	Non Med Gas					O (per compressor)	O (per compressor)		O (per compressor)		
Anesthetic Gas Scavenging System (AGSS) / HDR	Med Gas					O (per compressor)	O (per compressor)		O (per compressor)		
Compressed Air	Non Med Gas					O (per compressor)	O (per compressor)		O (per compressor)		
Sump Pumps (Sanitary / Storm)	Pumps					O	O		O		
Emergency Generators											
Electrical (per generator)	Electrical Power Supply - Diesel Generators	X				X					
Distributed Resources (local renewable thermal / electrical generation & energy storage)	Distributed / Renewable Resources	X		X	X				X	If other local power generation (e.g. solar PV) or grid-connected electricity storage is installed, a separate revenue grade power quality meter is required for each point of common coupling.	

Legend:
X = Required metering method / feature
O = Select one of these metering methods as applicable for the system/equipment.