

September
2022

TECHNICAL BULLETIN NO. 2-2022

SUBJECT:

Revisions to BC Housing Design Guidelines and Construction Standards 2019

REFERENCE:

Sections 1, 4 and 5 of the Design Guidelines and Construction Standards 2019

PURPOSE:

Updates, revisions and corrections to the Guidelines to enhance the efficiency, functionality, durability, health and safety, and livability aspects of housing units, and to optimize maintenance and operating aspects.

DESCRIPTION

The changes to the BC Housing Design Guidelines and Construction Standards 2019 are within the following Sections:

Section 1 General Design Guidelines

Section 4 Construction Standards

Section 5 Drawing and Document Requirements

LEGEND:

ADD followed by **Green font text**: Added provision to Design Guidelines and Construction Standards 2019 through the Technical Bulletin No. 2-2022

DELETE followed by **Stroked text**: Deleted provision from the Design Guidelines and Construction Standards 2019 through the Technical Bulletin No. 2-2022

RENUMBER "X" to "Y": indicates the numerical notation and relative location within the Design Guidelines for this item has been changed from X to Y; there is no change to the item content itself

SECTION 1 GENERAL DESIGN GUIDELINES

Sub Section 4 Building Common Areas

4.2 Indoor Amenity, Program and Office Spaces

.3 Supportive Housing & Assisted Living Projects

- .9 Common laundry room for use of residents and a separate staff laundry room. Refer to Article 4.2.6 for the number of pairs of washers /dryers required. For staff laundry, provide one pair commercial grade washer/dryer at a minimum. **ADD** All common dryers to have secondary lint trap installed in exhaust duct in laundry room easily accessible for regular maintenance. Refer to 4.2.6 Common Laundry.

.5 Common Washrooms

- .2 Provide slip-resistant resilient vinyl flooring with integral **DELETE** flash-cove **ADD** base and floor drain with trap primer.

.6 Common Laundry

- .6 The laundry room should be well ventilated to avoid moisture issues. Locate laundry rooms close to the exterior of the building to minimize the length of dryer duct runs and to avoid lint and moisture build-up within the ducts. **ADD** All dryers to have secondary lint trap installed in the exhaust duct easily accessible for regular maintenance in the laundry room. Refer to Division 11 30 00 Equipment.

- .7 Laundry rooms shall be finished in non-slip resilient flooring with integral **DELETE** flash-coved base and floor drain complete with trap primer.

4.4.Circulation and Access

.1 Entrance Lobby

ADD

- .8 The entrance and waiting area should be designed to create a warm and welcoming environment that is consistent with the residential nature of the building and in keeping with the building character.
- .9 Create this appealing ambience using appropriate materials, colour palettes, or other options such as feature walls, artwork or maximised glazing where interesting look outs can be experienced.
- .10 Provide lighting to complement the interior residential aesthetics while providing adequate lighting levels for safety, minimizing glare and visual discomfort.

Sub Section 5 Dwelling Unit Design

ADD

5.6 In-Suite Laundry

- .1 In-suite laundry can be considered in townhouses that lack dedicated common laundry areas and in some family apartment units where specific functional necessities make them essential, and in accessible units.
- .2 Supply and install stackable washer/dryer appliances except in accessible units where appliances are to be side by side.
- .3 All in-suite laundries to have a floor drain adjacent with trap primer, resilient sheet flooring with integral base, and an in-duct lint trap for the dryer.
- .4 As a cost saving measure, for accessible units consider integrating the laundry with the bathroom to allow the floor drain and trap primer to be shared.

Sub Section 6 Kitchens and Bathrooms

6.2 Bathrooms

.1 General

DELETE

- ~~.4 Provide non-slip, resilient sheet flooring with flash cove base. The provision of floor drains in the bathroom should be considered, based on the anticipated need of the users. Floor drains shall be provided in bathrooms in wheelchair accessible units, and in homeless at-risk projects.~~

ADD

- .4 Provide non-slip, resilient sheet flooring for all bathrooms. Integral base and floor drains with trap primers shall be provided in all supportive housing, homeless at-risk and shelter projects, and accessible bathrooms. For all other projects and unit types, floor drains and integral base shall be considered by the project team during the design process.

.2 Fixtures and accessories

DELETE

- ~~.5 Provide 38 mm x 286 mm (2" x 12") horizontal blocking installed at 915 mm (3'-0") from the top of finish floor around the shower, bathtub and beside the water closet for future installation of grab bars. Review additional municipal requirements.~~

ADD

- .5 Provide solid wood blocking or a minimum of 19mm plywood backing around the shower, bathtub and adjacent to the toilet for future installation of grab-bars. Review additional municipal requirements.

.6 Seniors Units

.2 The use of roll-in showers should be considered where necessary to meet the needs of target users. **ADD** Refer to Section 8.2.7.3 for roll-in shower requirements.

DELETE

~~.3 Provide ADA compliant low flush water closets with the seat at 430 mm to 480 mm (1'-5" to 1'-8") from the floor, with bolted lids. Refer to plumbing section.~~

ADD

.3 Provide BC Building Code compliant low flush water closets with the seat at 430 mm to 480 mm (1'-5" to 1'-7") from the floor, with bolted flush tank lids. Refer to plumbing section and latest version of Building Accessibility Handbook.

ADD

.9 Include electric heating in seniors unit bathrooms. Type of heating and specific location to be determined by project team during design.

Sub Section 7 Finishes and Materials

7.2 Interior Finishes

.4 Floor Finishes

.3 Common Laundry, Assisted Bathing Rooms, Commercial Kitchens & Common Washrooms

Provide non-slip safety flooring sloped to a clampable floor drain complete with **DELETE** flash-cove-wall **ADD** integral base.

.5 Baseboards

For common laundry, assisted bathing rooms, commercial kitchen, janitorial closets: 140mm (5 1/2")

DELETE flash-coved base **ADD** integral base.

7.5 Exterior Finishes

.2 Roofing

ADD

.6 Low slope vented roof systems are not permitted.

.3 Exterior Wall Cladding

.1 All exterior wall cladding should be designed with a rainscreen or a drained cavity system.

DELETE except in geographical locations, exposure conditions and building form where this may not be necessary. Review with building envelope consultant and refer to the BC Housing Building Enclosure Design Guide, Wood-frame Multi-unit Residential Buildings for best practice guidelines.

Sub Section 8 Wheelchair Accessible and Adaptable Dwelling Units

8.2 Wheelchair Accessible Units

.6 Kitchen

.3 Appliances

- .4 Range hood: two speed range hood with light and fan controls mounted on the front of the counter, **DELETE** ENERGY STAR®-rated. Obtain on-site CSA approval if required.

.7 Bathroom

- .4 **DELETE** Bath and Shower control positioning **DELETE** all controls are offset from centre, roughly 1/2 way between center location and the outside edge of the shower or tub enclosure. **ADD** to comply with latest version of Building Accessibility Handbook.

.11 Electrical Items

DELETE

- .3 Light fixtures must contain two or more bulbs.

RENUMBER items 8.2.11.4 - 8.2.11.6 to next sequential number.

Sub Section 9 Building Systems

9.1 Building Envelope

.4 Window Location, Quality and Quantity

DELETE [Fourth bullet point]

Fenestration products shall be labeled to show an overall product U-value of $U \leq 1.4 \text{ W/m}^2\cdot\text{°K}$ ($0.25 \text{ Btu/h}\cdot\text{ft}^2\cdot\text{°F}$) as required by the BC Energy Efficiency Standards Regulation and depending on BC Housing energy target for that climate zone. U-value labels shall bear the mark of a recognized certification agency.

ADD [Fourth bullet point]

Fenestration products shall be labeled to show an overall product U-value as required by the BC Energy Efficiency Standards Regulation and depending on BC Housing energy target for that climate zone. U-values shall comply with Table 10.2.2.7 (Maximum Thermal Transmittance of Exterior Closures and Fenestration) of the latest edition of the Vancouver Building Bylaw (VBBL). U-value labels shall bear the mark of a recognized certification agency.

SECTION 4 CONSTRUCTION STANDARDS

Sub-Section 8 Review by BC Housing

ADD [After first paragraph]

Any change to milestone drawings, specifications or other documents resubmitted to BC Housing for further reviews shall be clearly indicated by revision cloud and revision number (within delta symbol) along with corresponding notations and dates to communicate the changes. If changes are made to the documents without the above-mentioned requirements these changes will be deemed as not reviewed and approved by BC Housing.

01 91 00 Building Commissioning

1 General

DELETE .1

~~.1 Commissioning is an integrated set of activities intended to ensure that a project meets both the Owner's project requirements (OPR) and the operational needs. The Owner's goals and objectives should drive the project team and be documented in OPR at an early phase of development. The value of commissioning lies in its power to verify and document that all building systems and assemblies are planned, designed, installed, tested, operated and maintained to meet those goals and objectives.~~

RENUMBER .2 to .1

.1 All BC Housing funded and financed projects including both new development and renovation/ capital projects shall require **ADD full building** commissioning. **ADD The Consultant & General Contractor/ Design-Builder/Construction Manager** shall refer to BC Housing Building Commissioning Guidelines for details.

RENUMBER .3 to .2

.2 The level and depth of commissioning required for the project will be determined by the size and complexity of the project itself and by the needs defined in the **ADD Owner's Project Requirements (OPR) and BC Housing Building Commissioning Guidelines.**

RENUMBER .5 to .3

- .3 The **ADD Architect/Consultant** team shall be responsible for ensuring that the contract documents are in accordance with the OPR, basis of design, meet BC Housing Design Guidelines, Building Code, By-law requirements and Authorities Having Jurisdiction, and outlining the commissioning requirements and process for all building systems and integration of systems.
- .4 The General Contractor **ADD/Design-Builder/Construction Manager** is ultimately responsible for ensuring that all building systems and integration of the systems are operating and functioning as intended in the Contract Documents, regardless of whether a 3rd party independent Commissioning Provider (CxP) is initiated by the Owner or BC Housing.

DELETE .6, .7 and .8

- ~~.6 The consultant team shall consult the re-zoning and building commissioning by-law requirements and BC Housing/Owner before establishing the commissioning activities for the project. Regardless, a third-party commissioning provider is hired by the Owner or BC Housing the consultant team shall oversee the commissioning activities confirming that all building systems and integration of systems are functioning, and all testing and contractor's commissioning documentations are submitted at substantial completion and close-out phase.~~
- ~~.7 There are four options (Article 2.2) of implementing the 3rd party independent commissioning process initiated by the Owner/BC Housing. The Owner/BC Housing is responsible for choosing~~

one of the four options based upon the local re-zoning by-laws, project classification and size/complexity of the building to complete the commissioning process at a minimum.

.8 Refer to Refer to BC Housing Building Commissioning Guidelines for details.

2 Project Commissioning Activities ~~DELETE~~ and Responsibilities

DELETE all of Section 2 except for 2.2.3

ADD

- .1 Regardless, a 3rd party Commissioning Provider (CxP) is hired by the Owner or BC Housing, the Consultant team shall oversee the commissioning activities confirming that all building systems (e.g. architectural, electrical, mechanical, building envelope, elevator) and integration of systems are functioning, and all testing and General Contractor/Design-Builder/Construction Manager's commissioning documentations are submitted at Substantial Performance and close-out phase.
- .2 Under each building system, there are a list of minimum testing requirements in BC Housing Building Commissioning Guidelines. The Consultant and General Contractor/Design-Builder/Construction Manager shall refer to Section of 5.1.1 Consultant and Contractor Commissioning Responsibilities of the Commissioning Guidelines for the list of minimum testing and consultant/contractor responsibilities. The Architect/Consultants shall ensure that at a minimum these minimum testing requirements are clearly outlined in project specifications for the General Contractor/Design-Builder/Construction Manager to complete and submit.
- .3 For mechanical and electrical systems, depending on project classification, size/complexity, BC Housing requires an independent 3rd party CxP in the project. There are four options of implementing the 3rd party commissioning process in BC Housing projects and requirement of retaining a CxP.

RENUMBER 2.2.3 to 2.4

- .4 The project team is responsible to choose one of the four options based upon the project complexity. The options are as follows:
 - .1 Option 1 - Independent Enhanced Commissioning, if required by re-zoning or funding partners (hired by Owner)
 - .2 Option 2 - Independent Commissioning, 7-storey or higher or high complexity project (hired by Owner)
 - .3 Option 3 - Independent Mechanical Commissioning, 3-6 storey or medium complexity project (hired by Owner)
 - .4 Option 4 - Independent Mechanical Commissioning, 1-2 storey or low complexity project (hired by Mechanical Contractor)

ADD

- .5 In option 1, 2 and 3, the General Contractor/Design-Builder/Construction Manager will complete pre-functional checklists, start-up, TAB (contractor hired-3rd party agency), and controls end-to-end checkouts and submit associated documentation to the owner hired- CxP. The CxP will complete, at a minimum, the 25% sampling methodology of on-site checks of Contractor's pre-functional/ equipment start-up and perform 100% functional tests when these sample pre-functional checks are complete. The construction Contract Documents shall clearly state who will perform these tests.
- .6 In Option 4, the mechanical consultant will decide if an independent Commissioning Agent (CxAg) is deemed necessary for the project. At a minimum, the General Contractor/Design-Builder/ Construction Manager shall retain an independent TAB agency and submit all test reports, static, start-up, and functional test documentation for the project. The Consultant and General Contractor/Design-Builder/Construction Manager shall refer to Section 5: Commissioning Requirements to BC Housing/ Owner.
- .7 The 3rd party commissioning option for building renewal and retrofit projects will depend on scope of the retrofit, building size/complexity and how the new and retrofitted systems are integrating. For mechanical retrofit it is also important to understand whether the scope includes entire system, partial or major equipment replacement only. Given the vast array of possible renewal project scopes for mechanical systems, some general recommendations are provided on either option 3 or 4 may be most applicable in BC Housing retrofit projects. The Consultant and General Contractor/ Design-Builder/Construction Manager shall refer to BC Housing Building Commissioning Guidelines.
- .8 The commissioning of retrofit project for other building systems follows the minimum testing requirements as outlined in Section 5: Commissioning Requirements and elsewhere in the commissioning guidelines, as applicable.
- .9 In the Commissioning Guidelines under each option as indicated in clause 2.4. depending on building type, it is outlined required commissioning activities in different phases, systems to be commissioned, and commissioning management for the recommended number and frequency of meetings based on the options. The Consultant shall ensure there is no gap between General Contractor/Design-Builder/Construction Manager and 3rd party CxP's roles and responsibilities.
- .10 While commissioning activities are ongoing, the CxP shall keep a formal and documented record of issues or concerns that have been raised during the course of the commissioning process and their resolution. The CxP shall ensure the team responds to and rectifies all issues in this Issues Log as soon as possible and that no major issues are left behind at the time of project completion.
- .11 Any outstanding issues from Issues Log (if any) should be addressed as deficiency and included as part of building deficiency list with associated amount of holdback. The Architect/Consultant team shall ensure these issues are listed in the compiled deficiency list and that the Contractor agrees on a target Completion Date for these items.

- .12 As part of the handover process, the Architect/Consultants will ensure that the operation and maintenance requirements of all equipment and systems are demonstrated and explained in detail to the Owner's operating personnel and Owner's sign-off is retained. The project team including Architect/Consultant, General Contractor/Design-Builder/Construction Manager, CxP and Owner/operator shall complete seasonal testing and one-year Warranty milestone for any operational issues.
- .13 Consultant team and General Contractor/Design-Builder/Construction Manager shall refer to BC Housing Building Commissioning Guidelines for any sample checklists and templates.

03 30 00 Cast in Place Concrete

2. Products

.1 Concrete Topping

DELETE

~~.3 Reinforcement: use of Polypropylene fibres or micro fibres to reduce cracking. Use fibre additive only with approval of BC Housing. It is generally recommended to reduce shrinkage and hold thin set concrete together as it will crack at a microscopic level if not used.~~

ADD

.3 Reinforcement: The Consultant shall consider the use of additives such as polypropylene or micro fibres to minimize the risk of cracking due to shrinkage.

07 50 00 Membrane Roofing

1. General

ADD

.2 Low slope vented roof systems are not permitted.

RENUMBER items 1.2 - 1.6 to next sequential number

08 14 00 Wood Doors and Frames

2. Products

- .1 Exterior **ADD** Entrance Doors (Solid Core)
- .2 Door Faces: Flush face with tempered glazed panel (if required), medium density overlay, primed & finish paint as Division 09 91 00 - Painting **ADD** or prefinished fibreglass or metal clad panel doors.

08 50 00 Windows, Side Hinged and Sliding Glass Doors**1. General****.2 Design and Performance Requirements****DELETE**

~~.5 Fenestration products shall be labeled to show an overall product U-value of $U \leq 1.4 \text{ W/m}^2 \cdot \text{°K}$ ($0.25 \text{ Btu/h} \cdot \text{ft}^2 \cdot \text{°F}$) as required by the BC Energy Efficiency Standards Regulation and depending on BC Housing energy target for that climate zone. U-value labels shall bear the mark of a recognized certification agency.~~

ADD

.5 Fenestration products shall be labeled to show an overall product U-value as required by the BC Energy Efficiency Standards Regulation and depending on BC Housing energy target for that climate zone. U-values shall comply with Table 10.2.2.7 (Maximum Thermal Transmittance of Exterior Closures and Fenestration) of the latest edition of the Vancouver Building Bylaw (VBBL). U-value labels shall bear the mark of a recognized certification agency.

DELETE

~~.12 To specify the solar heat gain coefficient (SHGC) for the fenestration products depends on building orientation, shading from surrounding buildings and structures and amount of overhang. All windows are to have a maximum SHGC of 0.3. Windows with high exposure to summer sun can be considered for a lower coefficient. The consultant shall specify the SHGC in the construction documents for different exposures and elevation of the building.~~

ADD

.12 Specifying solar heat gain coefficient (SHGC) for fenestration products depends on building orientation, shading from surrounding buildings and structures and amount of overhang. All windows shall be within a SHGC range of 0.27 to 0.33 and have a minimum visible transmittance (VT) of 0.5. The consultant shall specify the SHGC in the construction documents for different exposures and elevations of the building. For example, windows with high exposure to summer sun can be considered for SHGC values on the lower end of the SHGC range.

08 70 00 Finish Hardware**2. Products****.4 Ball Bearing Hinges****ADD**

.4 Ives 5BB1 652 (Ferrous Steel); Ives 5BB1 630 (Non-Ferrous)

.5 Or equivalent

09 24 23 Stucco

1.3 Stucco should be designed using the drained cavity wall approach. **DELETE** Face-sealed stucco is only acceptable in certain geographical locations in the province as noted in the building code. The form of the building must be considered when deciding on the face-seal approach.

09 65 00 Resilient Flooring

1. General

.5 Provide resilient flooring in the following general areas:

.1 Tenant Suites

.1 Bathrooms **DELETE** /Wheel in bathroom/shower – Slip resistant sheet vinyl for bathrooms with painted 89mm x 17mm (3.5" x 0.67") wood base. **DELETE** For homeless at-risk and shelter projects, provide slip resistant sheet vinyl with integral or flash-cove base. **ADD** For supportive housing, homeless at-risk and shelter projects, and accessible unit bathrooms provide slip resistant sheet vinyl with integral base and floor drain with trap primer.

.2 Tenant Common Areas

.5 Laundry – Homogeneous sheet vinyl flooring with integral **DELETE** or flash-cove base.

.7 Common Washrooms - Slip-resistant sheet vinyl with integral **DELETE** flash-cove base.

2. Products

.4 Heterogeneous Sheet Vinyl

.7 Acceptable products: For tenant suites Wood Collection by Altro, Eternal by Forbo, or equivalent alternatives, and for common or support areas Ruby **DELETE** or Footnotes by Tarkett, **DELETE** Timberline **ADD** Nidra by Armstrong or **DELETE** approved equal **ADD** equivalent alternate.

.5 Homogeneous Sheet Vinyl

.8 Acceptable products: iQ Granit or Optima by Tarkett or Classic Mystique PUR by Polyflor, **DELETE** or approved equal **ADD** Accolade Plus by Armstrong or equivalent alternate.

.6 Linoleum Sheet Flooring

.7 Acceptable Products: Forbo Marmoleum; **DELETE** Armstrong-Marmorette, Tarkett Harmonium Veneto or **DELETE** alternate equal **ADD** equivalent alternate.

.8 Slip-Resistant Sheet Vinyl For Bathrooms

.5 Acceptable products for bathing areas for barefoot: products shall be appropriate for barefoot use: Aquarius by Altro, Multisafe or Safe-T by Tarkett, **DELETE** Safeguard Spa by Armstrong or approved equal. **ADD** Safety Zone Sheet by Armstrong or equivalent alternate.

09 91 00 Painting

1. General

.4 Guarantee

Provide and pay for **DELETE** either the local MPI Accredited Quality Assurance Association's two (2) year guarantee or, alternatively, a 100% two (2) year Maintenance Bond **DELETE** –both

.5 Submittals/Mock-up

- .1 Submit consent of surety with Bid Submission as proof of ability to supply a 100% two (2) year Maintenance Bond **DELETE** if an MPI Accredited Quality Assurance Association's guarantee option is not used.

3. Execution

.4 Interior and exterior Finish/Coating Systems

Exterior [Table]

[After row "Dimension Lumber - Stained - EXT 6.2B WB Latex colour stain WB"]

ADD

[Row for] Dimension Lumber - Transparent - EXT 6.2H (Modified) - Polyurethane, Clear, 2 component (over stain)

ADD

[Row for] Glue Laminated Beams - Transparent - EXT 6.1E Polyurethane Clear, 2 component (over stain)

10 00 00 Specialities

2. Products

.1 Washroom Accessories (Common Areas and residential) [Table]

Mirrors

For residential units: frameless plate glass mirrors mounted with "L" shaped steel clips, with full width of the vanity, no more than 102 mm (4") above washbasin. Do not use adhesive.

DELETE For public washrooms: 457 mm x 610 mm (18" x 24") aluminum frame mirror, centered over lavatory, tilt design where used in accessible washroom.

ADD For public washrooms, residential accessible and adaptable bathrooms lower edge of mirrors to be mounted maximum 1000mm above floor level

10 28 19 Plastic Laminate Tub Enclosure

3. Execution

.2 Installation

DELETE Install backer board and solid wood blocking for future installation of grab bars. Provide 50 mm x 305 mm (2" x 12") horizontal blocking installed at 900 mm (3'-0") from the top of finish floor around the shower or bathtub.

ADD Install backer board and solid wood blocking or minimum 19mm plywood for future installation of grab bars. Provide horizontal blocking around the shower or bathtub. Refer to Section 06 10 00 – Rough Carpentry and Section 09 28 00 – Gypsum Wallboard for coordination.

11 30 00 Equipment

1. General

ADD

.7 All common laundry dryers are to have secondary in-line lint collectors in addition to appliance screen. Collectors are to be installed in easily accessible locations. It is recommended they be installed in exhaust ducts for in-suite residential dryers as well.

2. Products

.1 Residential Appliances Table

Range Hood

DELETE Max Sones 7.5

ADD Max. Sones 5.0

DELETE Installation type: 3-1/4 x 10" rectangular, 7" round

ADD Installation type: 3-1/4" x 10" rectangular, 6" round

Laundry [Row, under description column]

Front loading, commercial grade washer/dryer, for common laundry. Residential type washer/dryers are not accepted. **ADD** Condensation dryers are not accepted.

ADD [Row, to bottom of table]

ITEM	DESCRIPTION	STANDARD UNITS	WHEELCHAIR ACCESSIBLE/ ADAPTABLE UNITS
In-Suite Laundry	Residential grade washer and dryer for in-suite laundry with exterior vent for dryer. Condensation dryers are not accepted.	Stacking, front loading washer and dryer.	Side by side washer and dryer, front loading w/ accessible controls and operation (e.g. pedestals)

12 20 00 Window Treatment

1. General

.1 Window Treatment Style

- 1 Provide horizontal or vertical louvered blinds to all exterior windows and doors **ADD with wand/rod control**, if required, **DELETE** consider wand/rod control, in lieu of cords, to operate or tilt the blinds. Provide manufacturers written standard ten (10) year guarantee for blinds from the date of substantial performance.

2. Products

.5 Roller Blinds

DELETE

- ~~.3 Operating system: chain drive pulley operating, consisting of metal clutch housing and locking plug containing minimum 6 ribs and inserted at minimum of 57.2 mm (2-1/4") into roller tube. Provide smooth and trouble free operation, stainless steel ball chain, compliant with WCMA safety standard A 110.1~~

ADD

- .3 Cordless operation required.

21 00 00 Fire Protection

1. General

.3 Quality Assurance

- .3 In order to provide a better quality assurance of the mechanical design, BC Housing **DELETE** may **ADD shall** retain an independent consultant to provide a mandatory design review **DELETE** at the end of the design development stage, **ADD usually at the 50% design stage.** **DELETE** The mechanical Engineer of Record **ADD The Engineer responsible for the fire protection design** will be asked to provide all relevant information for the independent review and will be requested to address any potential design issues and comments brought up by the reviewer before moving to next design stage.

.5 Warranty

- 1 Provide full **DELETE 2-years** **ADD one year** warranty for all labour and materials along with full **DELETE 2-years** **ADD one year** of service contracts for projects under Part 3 buildings for new construction and as appropriate for renovation projects for overall mechanical systems including control systems. For Part 9 projects, provide **ADD standard** one year warranty with full one year of service contracts.

.6 Mandatory Mechanical System Commissioning

DELETE

All BC Housing projects shall require mechanical, HVAC, and plumbing systems commissioning by an independent commissioning provider. Refer to Section 4, Division 01-91-00 – Building Commissioning to establish the commissioning requirements and activities for the mechanical contractor.

ADD

All Part 3 buildings, 3-storey and higher, shall require Fire Protection, HVAC and plumbing systems commissioning by an independent Commissioning Provider. Part 3 buildings less than 3-storey high and Part 9 buildings require commissioning by an independent Commissioning Agent hired by the Mechanical Contractor.

ADD

.7 Design Requirements

- .1 There are three (3) acceptable ways of providing the detailed fire protection design for the BC Housing projects:
 1. Detailed fire protection design provided by the Mechanical Consultant as a part of the Mechanical Consultant's scope of work for the project.
 2. Detailed fire protection design provided by the independent Fire Protection Engineer retained as a part of the design team for the project.
 3. Detailed fire protection design provided by the design-build Sprinkler Contractor hired by the Contractor at the beginning of construction.
- .2 If the design is being provided by either the Mechanical Consultant or independent Fire Protection Engineer, the entire fire protection design package must be included as a part of the Building Permit (BP) submission and, subsequently, as a part of the Issued for Tender (IFT) package. The design team must verify with the Authority Having Jurisdiction if the detailed fire protection design is required as a part of the BP submission.
- .3 If the fire protection design is provided by the design-build Sprinkler Contractor hired after the tender completion, the Mechanical Consultant shall be responsible for issuing Letters of Assurance (Schedules B and C-B) for the "*Fire Suppression Systems*" at the BP stage and must review and accept the shop drawings submitted by the design-build Sprinkler Contractor. There are minimum fire protection design requirements that must be included in the design provided by the Mechanical Consultant. This includes:
 1. Fire Protection System Schematic indicating all devices required to be monitored by the fire alarm panel.
 2. Location of the fire department Siamese connection and confirmation that it is located within 45m (150ft) from the closest fire hydrant.
 3. Information about the available static and residual water pressures.
 4. Locations of standpipe and combination standpipe-sprinkler risers in stairwells, coordinated with the architectural design.
 5. Reference to the sprinklers NFPA standard applicable to the project (NFPA-13, 13R, 13D).

2. Products

.2 Dry Pipe Valves ULC listed dry pipe valve to be **DELETE** iron body, bronze/galvanized trim, complete with quick opening device if needed, and all accessories, interconnecting piping and subassembly valves and trims in accordance with NFPA Standard **ADD** cast iron construction with a bronze seat and ductile iron clapper assembly with a single hinge pin. Clapper gasket shall be a one-piece rubber design and galvanized trim complete with quick opening device. All accessories, interconnecting piping, and sub-assembly valves and trim shall be in accordance with NFPA-13 Standard.

.4 Pressure Gauges Provide pressure gauges at the following locations and additional gauges as required by NFPA, Authority Having Jurisdiction and system configuration;

- .1 Water entry valve station both upstream and downstream of backflow preventer.
- .2 Upstream and downstream of pumps.
- .3 At top of fire standpipe and sprinkler risers.

ADD

- .4 At floor sprinkler zone flow station.

3. Execution

.1 Installation

- .3 Supply and install cabinet containing spare sprinkler heads corresponding to the types and temperature ratings as installed in the building. The cabinet shall be located **DELETE** as indicated on site **ADD in the water entry or dedicated sprinkler room** and shall include sprinkler wrench suitable for each head type. Provide a **DELETE** minimum of six spare heads for each type of head installed **ADD number of spare heads for each type used on the project as required by NFPA-13 Standard**.
- .4 Ensure that the sprinkler system is protected from freezing in accordance with the requirements of the Authority Having Jurisdiction **ADD and Good Engineering Practice**. **DELETE** The dry-sprinkler system shall be installed in unheated attic and parkade areas (Note: for buildings designed to the requirements of NFPA-13D or NFPA-13R, sprinklers in the attic spaces are not required). **ADD** The dry sprinkler system shall be installed, where required, in unheated attic and parkade areas, and where side-wall dry sprinkler heads, connected to a wet sprinkler system, cannot provide proper sprinkler coverage. Stand pipe distribution piping located in unheated areas shall be insulated and provided with electric heat tracing monitored by the fire alarm panel.

.3 Performance

- .1 The construction documents shall indicate the location of sprinkler heads in finished areas, main piping distribution and location of all supervised valves and flow alarm switches. **DELETE** The Sprinkler Contractor **ADD** If the design of the fire protection system is provided by the design-build Sprinkler Contractor, he/she shall be responsible for the final layout of the sprinkler system and submission of shop drawings complete with hydronic calculations for review by the Consultant and approval by the Authority Having Jurisdiction. **DELETE** Sprinkler shop drawings shall be stamped/ signed by Supporting Professional Registered in BC and issue Schedule S-B and S-C upon complete.

DELETE

~~.2 The Sprinkler Contractor shall provide the hydraulic design for the system in accordance with NFPA Standard and, where applicable, code equivalency requirements.~~

ADD

.2 The design-build Sprinkler Contractor shall design fire suppression systems complete with hydraulic calculations and in accordance with applicable NFPA Standards, BCBC, VBBL, equivalent solutions provided by the Code Consultant, and requirements of the Authority Having Jurisdiction. Fire suppression shop drawings shall be stamped and signed by the Supporting Professional Registered in BC who must issue Schedules S-B and S-C for the "Fire Suppression Systems".

DELETE

~~.3 Hydraulic calculations are to include for 20% more in volume than the total sprinkler demand and 10% more pressure at the base of the riser is required by Authority Having Jurisdiction and NFPA Standard.~~

ADD

- .3 Sprinkler hydraulic calculations must include the following safety margins:
1. 20% more in volume than the total sprinkler demand.
 2. 10% more pressure at the base of the riser.
 3. As requested by the Authority Having Jurisdiction.

22 00 00 Plumbing**1. General****.4 Quality Assurance**

.2 In order to provide better quality assurance of the mechanical design, BC Housing **DELETE** may **ADD** shall retain an independent consultant to provide a **ADD** mandatory design review **DELETE** at the end of the design development stage **ADD** usually at the 50% design stage (no later than before BP submission). The mechanical Engineer of Record will be asked to provide all relevant information for the independent review and will be requested to address any potential design issues and comments brought up by the reviewer before moving to next design stage.

.5 Warranty**DELETE**

Provide full **DELETE** 2-years **ADD** one year warranty for all labour and materials along with full **DELETE** 2-years **ADD** one year of service contracts for projects under Part 3 buildings for new construction and as appropriate for renovation projects for overall mechanical systems including control systems. For Part 9 projects, provide **ADD** standard one year warranty with full one year of service contracts.

.6 Mandatory Mechanical System Commissioning

DELETE

- ~~.1 All BC Housing projects shall require mechanical, HVAC, and plumbing systems commissioning by an independent commissioning provider. Refer to Section 4, Division 01 91 00 – Building Commissioning to establish the commissioning requirements and activities for the mechanical contractor.~~

ADD

- .1 All Part 3 buildings, 3-storey and higher, shall require Fire Protection, HVAC and plumbing systems commissioning by an independent Commissioning Provider. Part 3 buildings less than 3-storey high and Part 9 buildings require commissioning by an independent Commissioning Agent hired by the Mechanical Contractor.

.7 Potable Water System

DELETE

- ~~.2 Install a pressure reducer if the street pressure is greater than 551 kPa (80 psi).~~

ADD

- .2 Install pressure reducing valves (PRVs) in domestic cold water connection if the street pressure is greater than 450 KPa (65psi). Provide separate full flow and low flow PRVs and a valved bypass.

DELETE

- ~~.3 Provide an approved double check valve backflow preventer as per CSA and code requirements.~~

ADD

- .3 Provide an approved double check valve backflow assembly (DCVA) in water main as per the CSA-B64 and Authority Having Jurisdiction requirements.

DELETE

- ~~.4 Provide Reduce Pressure Backflow Preventer for water main for site.~~

ADD

- .4 Avoid domestic water distribution inside a concrete slab or in concrete topping for more than one residential suite. In-slab distribution within a residential suite is acceptable.

DELETE

- ~~.5 Where a permanent irrigation system is approved for the project by BC Housing, provide Reduce Pressure Backflow preventer for irrigation system.~~

ADD

- .5 Provide a reduced pressure backflow assembly (RPBA) for any makeup water connection to a closed-loop hydronic system. Separate DCVA for the irrigation water line is acceptable, provided there is no chemicals used for the irrigated landscape.
- .8 Provide a shut off for each riser in apartment buildings. Valves 57 mm (2") and less in diameter must be ball valves. Shutoffs to be easily accessible **ADD** from a common corridor.

.8 Domestic Hot Water Systems

- .2 Provide hot water distribution to common kitchen areas and for janitor sinks at 60°C (140°F) **ADD** if it does not require a separate DHW distribution system. If the building is provided with a central thermostatic mixing valve for tempering DHW temperature, confirm with the Building Operator if providing 49°C (120°F) DHW to common kitchen areas and janitor rooms is acceptable and avoid a separated DHW distribution system if accepted.
- .4 **DELETE** All residential showers shall be provided with pressure independent valves (pressure balance valves) with temperature limit stops. **ADD** If decentralized tempering of DHW temperature is utilized, all residential showers shall be provided with pressure independent valves (pressure balance valves) with temperature limit stops. All residential bathroom and kitchen faucets shall be provided with temperature limit stops. The shower valves and faucets shall be set to maximum hot water temperature of 49°C (120°F). **ADD** The same applies to plumbing fixtures using DHW in the common areas. Additional commissioning requirement of adjusting temperature limit stops and providing a written report confirming that this work was done, shall be added to the scope of work by the Mechanical Contractor.
- .5 **DELETE** Pressure balance valves with temperature limit stops for residential showers, and temperature limit stops only for faucets is acceptable, as a minimum requirement, for low anti-scalding risk tenants such as Family Housing. For higher anti-scalding risk tenants including shelters, wheelchair accessible units, assisted living, group homes and residential care homes, the domestic hot water system shall be provided with either a central thermostatic mixing valve or individual in-suite thermostatic mixing valves installed at the distribution manifolds **ADD** or in-suite DHW tanks, to reduce a scalding risk. Individual under-deck thermostatic mixing valves are not acceptable due to higher installation costs and increased maintenance requirements.

.9 Drainage Systems

- .2 Provide floor drains with trap primer in **DELETE** common laundry

ADD

- .1 Public and staff washrooms

- .2 Common laundry rooms

- .3 Janitor rooms

- .4 In-suite laundry closets

- .5 Garbage rooms

- .6 Accessible, supportive housing, homeless at-risk, and shelter bathrooms (Note: The Building Operator might request providing floor drains in all residential bathrooms. Cost/benefit analysis should be considered.)

- .7 Mechanical rooms.

ADD

- .8 Provide a settlement sump at the connection from perimeter foundation drainage to storm drainage.

ADD

.9 Plumbing risers shall not be shared between adjacent residential suites. Avoid, where possible, running plumbing risers in fire rated corridor or demising walls. Bathroom plumbing risers should be located in either internal walls or plumbing furr-outs. Locating kitchen drainage risers inside fire-rated demising walls is acceptable if it cannot be avoided. The Acoustical Consultant shall review the plumbing design and installation to ensure that STC55 is achieved in party walls.

.10 Common Laundry Contractor to provide plumbing rough-in for tenant laundry equipment, including a utility sink. **ADD** Provide a floor drain with trap primer in each common laundry room.

2. Products**.1 Potable Water Piping**

.4 Non-metallic pipe and fitting systems, i.e. cross linked polyethylene (PEX), chlorinated polyvinyl chloride (CPVC) **DELETE**, polypropylene (PP-R) shall be accepted as alternates for potable hot and cold water mains and risers applications as per the BC plumbing code 2012 Division B - Appendix A.

DELETE

~~.7 The Contractor shall provide a 25-year manufacturer's warranty on all piping, in-line fittings and domestic water distribution manifolds which includes coverage for consequential damage.~~

ADD

.7 Stainless steel pipes are now approved by the Plumbing Code for use for potable water and can be used for potable water mains and risers, when provide competitive pricing.

.8 Cross linked polyethylene (PEX) may be used for potable water piping for in-suite run outs from fixtures to manifold **ADD** and be the preferred piping system for distribution inside suites subject to the following conditions:

.1 **DELETE** Approved PEX piping systems are acceptable **ADD** PEX domestic water piping systems can be used in lieu of copper for in-suite run-outs to fixtures provided the potable water piping distribution is contained within an individual residential suite. The PEX piping and fitting system shall conform to CSA B137.5 and shall be approved for potable water use. **ADD** The PEX piping shall be covered by the manufacturer's 25-year warranty.

.2 Distribution manifolds shall be manufactured of brass or **DELETE** copper **ADD** Polyphenylsulfone (PPSU), approved for use in the system by the piping manufacturer and covered by the manufacturer's 25 year warranty.

.3 In-line **ADD** press, or expansion type fittings shall be approved for use in the system by the piping manufacturer and **DELETE** covered by **ADD** be included in the manufacturer's 25 year warranty. **ADD** Crimp fittings are not acceptable.

DELETE

~~.4 It is not recommended to have the potable water pipes to be installed in the concrete slab due to future maintenance. Where PEX potable water piping is installed in structural slabs, a larger diameter polyethylene sleeve is required. Polyethylene bags are not acceptable.~~

ADD

- .4 It is acceptable to distribute PEX piping inside concrete slabs and concrete toppings in a wood-frame construction, provided PEX pipes are protected by high-density polyethylene (HDPE) corrugated sleeves.
- .5 PEX potable water piping shall not be installed in slabs used for radiant heating/cooling, due to potential problems with heat gain in the DCW and conflict with the heating pipe layout. PEX piping shall not be exposed to UV prior to or during installation and must be warranted for a minimum of 30 days exposure.
- .6 Protect piping and manifolds from entry of contaminating material by installing suitable plugs in all open ends until installation. Where possible connect pipes to assembled manifolds to eliminate possibility of contaminants.

DELETE

~~.7 Provide lockable metal access covers for all manifold locations.~~

ADD

.7 Provide metal access covers with tamper-proof screws for all manifold locations.

RENUMBER 2.1.8.8 to 2.1.9

.9 The Contractor shall submit the following for review and acceptance by the Consultant prior to installation: specifications for all components of the system, confirmation of compliance with referenced standards, confirmation of municipal approval, confirmation in writing from the manufacturer that the installer is trained and approved to install the system and a copy of the manufacturer's warranty.

RENUMBER 2.1.8.9 to 2.1.10

.10 All piping shall be installed so that it will in no way be strained or distorted by thermal expansion. Anchors and expansion loops shall be provided where necessary to protect equipment / piping and regulate expansion. This shall be the responsibility of the Mechanical Consultant and Contractor

.3 Water Closets

.2 Water closets shall be closed front with cover seat **ADD in residential suites and open front seat in common areas.** **DELETE** that **ADD Seats** shall be rugged, high impacted solid plastic that is highly stain and chemical resistant with stainless steel hardware package and factory-installed top tite hinges.

ADD

.4 Water closets in all accessible and adaptable suites shall have seats at 430mm to 480mm (1'-5" to 1'-7") from the floor and bolted flush tank lids. Installation and a grab bar shall be as per requirements of Section 1 - General Design Guidelines, Building Accessibility Handbook, and CSA B651.

.4 Kitchen Sinks

DELETE

~~.4 Provide temperature limit stops set not to exceed 49°C (120°F) hot water temperature.
For project where increased level of anti-scalding protection is required, consider utilizing
thermostatic mixing valves.~~

RENUMBER 2.4.5 to 2.4.4

.4 Sink Dimensions.

.5 Amenity Area

.2 Faucet shall be **DELETE** deck mounted, and have a solid cast brass lead-free body, washerless, ceramic drip-free disc valve cartridge, 240 mm (9-1/2") long cast swing spout with vandal-resistant, 5.7 LPM (1.5 GPM) flow pressure compensating aerator outlet. The faucet shall also come with a removable brass escutcheon plate, single control metal lever handle, flexible copper and omit the hand spray (cap is to be provided for non-spray application). **ADD** the same type as for kitchen sinks in residential suites.

DELETE

~~.3 Provide temperature limit stops set not to exceed 49°C (120°F) hot water temperature.
For project where increased level of anti-scalding protection is required, consider utilizing
thermostatic mixing valves.~~

RENUMBER 2.2.5.4 to 2.2.5.3

.3 The sink shall be wheelchair accessible.

.6 Laundry

.2 Faucet shall be **DELETE** deck mounted, and have a solid cast brass, lead-free body, washerless, ceramic drip-free disc valve cartridge, 240 mm (9-1/2") long cast swing spout with vandal-resistant, 5.7 LPM (1.5 GPM) flow pressure compensating aerator outlet. The faucet shall also come with a removable brass escutcheon plate, single control metal lever handle, flexible copper supplies and omit the hand spray (cap is to be provided for non-spray application). **ADD** the same type as for kitchen sinks in residential suites.

.7 Janitor Rooms

ADD

.4 Provide a floor drain in every janitor room.

.8 Bathtubs (Family Projects) Bathtubs must be non-slip, stain resistant, porcelain enameled steel with plug and chain drain, sound deadening, overflow, over-rim spout and cast brasstrap. Fiberglass bathtubs are not acceptable. **ADD** Acrylic bathtubs are acceptable. Provide tub spout with diverter and single lever **ADD** and pressure independent valve (pressure balance valve). **DELETE** with-temperature limit stops set not to exceed 49°C (120°F) hot water temperature.

.9 Pre-fabricated Shower Unit - For Adaptable and Senior Tenant's Suites

- .1 One piece, non-slip gelcoat shower to minimum 914 mm x 1521 mm (3' x 5'). **DELETE** Includes three grab bars, wall hook and low curb at floor. In lieu of acrylic grab bar install 32 mm diameter, 914 mm long stainless steel grab bar (1-1/4" x 3'). **ADD** Grab bars, wall hooks, and low curb at floor shall be provided as per requirements of Section 1 - General Design Guidelines. For Renovation project, two or three piece shower unit can be considered, if one-piece cannot be installed due to existing bathroom configuration. Make sure the potential leak sources are sealed properly to prevent water damage.

.10 Pre-fabricated Shower Unit - For Wheelchair Accessible Suites

- .1 One piece barrier-free, fibreglass or custom non-slip showers for wheelchair accessible suites, to minimum 974 mm x 1586 mm (3' 2-3/8" x 5' 2-1/2"). **DELETE** Includes three grab bars, folding seat, and rollover threshold to maximum 13 mm (1/2"). Conform to recommendations of CSA B651 **ADD** Grab bars, folding seat, and rollover thresholds shall be provided as per requirements of Section 1 - General Design Guidelines, Building Accessibility Handbook, and CSA B651. Provide single lever, and pressure independent valve (pressure balance valve) **DELETE** with temperature limit stops set not to exceed 49°C (120°F) hot water temperature. **ADD** Utilizing temperature limit stops for tempering DHW temperature is not acceptable for the accessible suites. For Renovation projects, two-piece shower unit can be considered, if one-piece cannot be installed due to existing bathroom configuration. Make sure the potential leak sources are sealed properly to prevent water damage.

3. Execution

.4 Piping

- .8 Drain connection for a water closet shall be minimum 100 mm (4") diameter. **ADD** This includes the sanitary connection for any bathroom group or any sanitary riser, which includes water closets. This is a requirement specific to the BC Housing projects and must be complied with.

SECTION 5 DRAWING AND DOCUMENT REQUIREMENTS

1 Phase 1: Schematic Design Phase (new construction and conversion projects only)

1.1 Drawing Requirements

ADD

- .6 Exterior Elevation Drawings (scale 1/8" = 1'-0" or 1:100)
Elevations – show all elevations of all buildings noting proposed finish materials

ERRATA AND CLARIFICATIONS

#	LOCATION	REVISIONS
1	Section 1 8.2.2.1	.1 Provide a clear 1500 mm (5'-0") turning radius turning area of not less than 1500 mm (5'-0") in diameter: <ul style="list-style-type: none"> • inside and outside of suite entrance doors • inside the bedroom, and a clear floor area of at least 750 x 1200 mm (29.5" x 4'-0") to at least two sides of the bed • inside the bathroom, (radius diameter to be clear of all cabinets and fixtures) • inside the kitchen (radius diameter to be clear of all cabinets and fixtures)
2	Section 1 8.2.4.1	.1 Doors and doorways shall have accessible maneuvering space on either side of the door swing. Door latch swing towards the person shall have a minimum clear level floor space of 600 mm x 1500 mm (2'-0" x 4'-0" 5'-0") beside the latching door frame.
3	Section 1 8.2.6.2.2	.2 Provide a knee clearance centered on the sink at least 760 mm wide x 250 mm deep x 685 mm high (2'-6" wide x 10" deep x 2'-3" high) with an additional toe space at least 760 mm wide x 250 mm deep x 685 mm 250 mm high (2'-6" wide x 10" deep x 2'-3" 10" high).
4	Section 1 8.2.7.3	.3 Provide a 915 mm x 1500 mm (3'-0" x 3'-5" 5'-0") prefabricated non-slip gelcoat roll-in shower...
5	Section 1 8.2.7.12	.12 Toilet seat height shall be between 430 mm and 485 mm (1'-6" 480 mm (1'-5" and 1'-7")) from the floor. Tank lid shall have bolted lids...
6	Section 4 Division 21 00 00 Fire Protection General clarifications through this section	"Sprinkler system" terminology replaced with "Fire suppression system" Conformance to "Vancouver Building By-Law (VBBL)" added to list of requirements Minor grammatical revisions and clarifications.
7	Section 4 Division 21 00 00 Fire Protection 1.6.2	BC Housing or Owner will conduct an independent commissioning option as outlined in Division 01 91 00 – Building Commissioning and detailed in the Building Commissioning Guidelines based upon the local re-zoning by-laws, project classification and size/complexity of the building. This should not replace the consultant, contractor, their sub-contractors or their own 3rd party agency's responsibilities in the contract documents.
8	Section 4 Division 21 00 00 Fire Protection 1.6.4	Refer to Section 4, Division 01 91 00 - Building Commissioning for details outlines and the Building Commissioning Guidelines for details.
9	Section 4 Division 21 00 00 Fire Protection 2.1.2	Compressors to be sized in accordance with the requirement of NFPA Standard, for capacity as determined by hydraulic calculation design of dry sprinkler systems and pipe size capacity as determined by hydraulic calculations for the dry sprinkler systems.
10	Section 4 Division 21 00 00 Fire Protection 2.3 Piping	Piping to be Schedule 40, Schedule 10, Schedule 7 or lightwall threadable pipe. Use threadable fittings for Schedule 40 or lightwall threadable pipes only. Use Victaulic grooved fittings for Schedule 40, Schedule 10 and lightwall Schedule 7 pipes or MegaPress fittings for Schedule 10 to Schedule 40 pipes. Blazemaster PVC CPVC pipe may be used if installed in accordance with the ULC listing, NFPA Standard and Authority Having Jurisdiction.

#	LOCATION	REVISIONS
11	Section 4 Division 21 00 00 Fire Protection 2.7.3	Provide standard brass upright or pendant heads on 25 mm (1") connection for unfinished areas. Provide mechanical protection (sprinkler head guard) in areas susceptible to damage (mechanical rooms, low headroom, etc.).
12	Section 4 Division 21 00 00 Fire Protection 2.7.5	Provide dry heads on wet sprinkler system , standard brass upright or pendant, for areas subject to freezing.
13	Section 4 Division 21 00 00 Fire Protection 2.7.7	Provide spare sprinkler heads, complete with a head wrench , in a steel cabinet as required by NFPA-13 Standard.
14	Section 4 Division 21 00 00 Fire Protection 2.8 Sprinkler System Zoning	Provide zoning in accordance with NFPA Standard, BCBC, VBBL , and in accordance with the requirements of Authority Having Jurisdiction. As a minimum, provide separate zones for each floor and the attic. ULC listed zone valve assemblies to be in accordance with NFPA Standard, shall be accessible and provided with a monitored shut off valve and flow alarm switch flow switch connected to the fire alarm panel.
15	Section 4 Division 21 00 00 Fire Protection 2.11 Backflow Preventer	Main fire line shall be separated from the potable water source by a ULC listed double check valve backflow preventer or double check valve detector backflow preventer, subject to the Authority Having Jurisdiction.
16	Section 4 Division 22 00 00 Plumbing 1.1	Provide complete sanitary and storm drainage systems, including clean-outs, manholes, catchbasins, piping, pumps, sumps, fixtures and all other equipment connected to local drainage. Avoid sump pumps for storm and sanitary wherever possible drainage by gravity is possible . If pumps are needed, route only that drainage through the pump that cannot be drained by gravity. Design, construct and install storm and sanitary drainage systems to conform to applicable codes and good engineering principles. The plumbing system shall be designed to comply with the requirements of the BC Plumbing Code and the Local Authority Having Jurisdiction.
17	Section 4 Division 22 00 00 Plumbing 1.2	Insulate all plumbing system components including, but not limited to, hot water mains, recirculation and run outs to comply with the current version of ASHRAE 90.1-2010 standard and National Energy Code for Buildings (NECB). Provide a continuous vapour barrier for all cold water and chilled water piping to prevent condensation.
18	Section 4 Division 22 00 00 Plumbing 1.6.2	BC Housing or Owner will conduct an independent commissioning provider (CxP) as outlined in Division 01 91 00 - Building Commissioning and detailed in the Building Commissioning Guidelines based upon the local re-zoning by-laws, project classification and size/complexity of the building. This should not replace the consultant, contractor, their sub-contractors or their own 3rd party agency's responsibilities in the contract documents. The contractor must submit the mandatory mechanical testing reports for prefunctional and equipment start-up before the CxP performs the system functional testing and all other commissioning activities.
19	Section 4 Division 22 00 00 Plumbing 1.6.3	Refer to Section 4, Division 01 91 00 - Building Commissioning for outlines and the BC Housing Building Commissioning Guidelines for details.
20	Section 4 Division 22 00 00 Plumbing 1.7.9	Provide a shut-off valve for each unit. Provide a prefabricated, keyed metal access panel. Shut offs to be easily accessible. Tamper-proof screws for access panels to in-suite manifolds are acceptable.

#	LOCATION	REVISIONS
21	Section 4 Division 22 00 00 Plumbing 1.7.12.1	garbage enclosures room
22	Section 4 Division 22 00 00 Plumbing 1.7.14	Provide a total building water meter. Where applicable, provide separate water sub-meters to areas with separate lease agreements or commercial units. Confirm requirements for water sub-metering with BC Housing and Operator.
23	Section 4 Division 22 00 00 Plumbing 2.1.1	Use Type L copper pipe for all main hot and cold water supply piping.
24	Section 4 Division 22 00 00 Plumbing 2.1.4 [Third Paragraph]	The Consultant shall coordinate specifications and detailing for the installation of the system and confirm that all components meet the local authority's Authority Having Jurisdiction's requirements including referenced standards, fire stopping and STC rating.
25	Section 4 Division 22 00 00 Plumbing 2.1.5	The Consultant shall submit written confirmation of approval for the specified system from the authority having jurisdiction and, where applicable, a copy of the approved equivalency, to BC Housing prior to approval of the construction documents when non-metallic pipe and fitting systems are selected.
26	Section 4 Division 22 00 00 Plumbing 2.2.3	Provide aerated low flow fixtures for the bathroom: 2 LPM/0.5 GPM faucet, and 5.7 LPM/1.5 GPM showerhead. Fixtures shall display CSA approval. Refer to Section 2 - Energy and Environmental Design.
27	Section 4 Division 22 00 00 Plumbing 2.3.1	Low Flush Water Closets: Vitreous China, ADA compliant, free standing elongated rim, washdown bowl, china bolt caps, single flush 4.8 LPF (1.3 GPF), min. 54 mm (2-1/8") fully glazed trapway, and comply with the latest edition Maximum Performance (MaP) testing rated at 1000 gram of waste per flush. Refer to Section 2 - Energy and Environmental Design.
28	Section 4 Division 22 00 00 Plumbing 3.1	Damaged or repaired bathtubs fixtures will not be accepted.
29	Section 4 Division 26 00 00 Electrical 2.3 Table: Electrical Device Mounting Heights [Third row, First column]	Thermostats and control devices - to center align vertically horizontally with light switch.

- End -