21-026 Appendix A - Town Centre Fire Station Training Centre Above Grade Structure and Appurtenances Specifications

TRAINING STRUCTURE AND EXTERNAL PROPANE GAS TRAINING DEVICES

The City of Coquitlam (the "City") requires a new training structure and propane gas fueled training devices for its Town Centre Fire Station. The training structure shall be designed and constructed to permit a wide range of training activities by the City's Fire and Rescue Department, including but not limited to the following activities: live fire, high angle operations, searches, laddering, fire ground survival evolutions, roof breach operations, combat challenge, fire alarms, standpipe operations, sprinkler systems, theatrical smoke generation & evacuation and elevator operations. The training structure shall be designed and constructed to support and meet all of the training activities required by the City through a collaborative process consisting of design meetings, drawing and specifications review, site inspections of the structure's construction at the owner's facilities and final inspection of the completed work at the City's Town Centre Fire Station.

The training structure will be situated upon a new foundation and supporting infrastructure including, but not limited to: propane fuel systems and training devices, electrical supply, drainage systems and heliport requirements. The proponent will be required design and install the structure and propane gas fueled training devices in coordination with City selected consultants and contractors.

Specifications provided herein are general in nature. It is the responsibility of the proponent to provide detailed plans, specifications, schedules and shop drawings for the review and approval by the City. The following minimum design and construction requirements shall be incorporated into the project:

1. REGULATORY REQUIREMENTS
    a. The design and construction of the structure shall meet all applicable federal, provincial, municipal or any other applicable regulatory agency statutes, regulations and bylaws, including but not limited to:
        i. BC Building Code 2018;
        ii. BC Plumbing Code 2018;
        iii. BC Fire Code 2018;
        iv. NFPA 13-2013 - Installation of Sprinkler Systems;
        v. NFPA 14-2013 – Installation of Standpipe Systems;
        vi. NFPA 1402-2019 – Standard on Facilities for Fire Training and Associated Props;
        vii. BC Electrical Safety Regulation;
        viii. Safety Standards Act;
        ix. Gas Safety Regulation;
        x. Propane Storage and Handling Code - CSA B149.2-15; and
        xi. Canadian Aviation Regulations.

b. All applicable federal, provincial, municipal or any other applicable regulatory agency installation or operating permits shall be obtained.
c. The proponent shall ensure that inspections required by all applicable federal, provincial, municipal or any other applicable regulatory agency be conducted and deficiencies remedied.

2. DRAWING & SPECIFICATIONS
    a. Drawings shall meet the standards specified by:
        i. Architectural Institute of BC
        ii. Engineers and Geoscientists BC
    b. Drawings shall be prepared using AutoCAD R16 or equivalent industry standard.
    c. Drawings shall consist of floor plans, sections, elevations and three dimensional perspectives to describe the structure.
    d. Shop drawings shall be prepared and provided.
    e. All drawings shall be sealed by an engineer registered with the Engineers and Geoscientists of BC.
    f. Specifications shall be prepared to describe detailed requirements on the design, construction and performance for all devices, equipment or systems related to the structure.
    g. The proponent shall supply five sets of structural drawings with original seal and signature from the design engineer. The drawings shall include details of the fall protection and restraint devices.
    h. Final as-built drawings shall be provided.
    i. Original letters of confirmation of commitment by owner and coordinating registered professional and assurance of professional design and commitment for field review for structural and electrical from the project design professionals shall be provided to the City. (British Columbia Building Code schedules.)
3. OWNER's REVIEW & INSPECTIONS
    a. During the design of the structure, the proponent shall meet with City representatives on at least the following stages:
        i. 50% design completion
        ii. 75% design completion
        iii. 100% design completion.
    b. During the construction stage of the structure, the proponent shall meet with City representatives for the following:
        i. Inspect the proponent's manufacturing facility.
        ii. 50% completion of off-site assembly.
        iii. 75% completion of off-site assembly.
        iv. 100% completion of off-site assembly.
        v. 100% completion of on-site assembly.
    c. Original letters of assurance of coordination of professional field review (if applicable) and assurance of professional field review and compliance shall be

provided from the project design professionals to the City. (British Columbia Building Code schedules.)

4. INTEGRATION WITH SITE WORKS & SUPPORTING INFRASTRUCTURE
    a. Provide a schedule of design, off-site assembly and on-site assembly.
    b. The construction and fabrication of the structure shall be completed at the vendor's facility.
    c. The contract shall include design, off-site assembly, on-site assembly, delivery of all materials and components and coordination of the testing, calibration and commissioning of all functional systems with the structure, including those systems relying on integration from other contractors.
    d. Coordination and installation of the structure with other City selected contractors.
5. STRUCTURE CONFIGURATION and DESIGN
    a. The structure shall be configured and designed with the following minimum requirements:
        i. The structural systems and layout shall be designed and constructed to facilitate training as specified by the City.
        ii. Layout and configuration acceptable to the City containing at least the following rooms and spaces:
            1. Two burn rooms with training devices supplied by a propane gas system.
            2. One interior and three exterior stairways.
            3. Slope roof training system complete with attic access, replaceable plywood & wood frame training device, asphalt roof shingles, roof overhang (eave) and gutters. The attic area shall sloped to a drainage system.
            4. Floor access hatches.
            5. Residential type entrance and lobby.
            6. Commercial type entrance and lobby.
            7. Control room for building systems.
            8. One level shall contain various function rooms and a corridor.
            9. Open roof area on highest level for high angle training operations.
            10. Five cantilevered deck projections.
            11. The structure shall contain four floors and five levels.
            12. The second level shall be 9'6" high ("high cube" version.) All other levels shall be 8'-6" high.
            13. Interior wall breach systems.
            14. Roof trenching training system located on the roof above the third level burn room. The trenching system shall be complete with a replaceable plywood & wood frame training device designed and constructed to facilitate the training requirements specified by the City.

15. Modular and moveable interior wall systems complete with overlapping devices to prevent daylighting between panels.
16. Various other multifunction rooms and spaces as determined by the City.

b. Structure foundation:
    i. The foundation will be designed and constructed by others.
    ii. The training structure shall be designed to be supported by the foundation described in drawing number S201, drawings issued for construction, by Wicke Herfst Maver Structural Engineers.
c. The structure shall be generally constructed using new steel shipping containers.
d. The structure shall consist of six forty feet long by eight feet wide containers and six twenty feet long by eight feet wide containers.
e. Shipping containers are to be “new one-trip” in good condition with no significant dents. Prior repairs such as roof or wall patches are not acceptable. Inspection by City representatives may be required prior to structure fabrication.
f. The structure, including all components and materials, shall be designed to withstand the expected live and dead loads and water from fire-fighting hose streams in accordance with the 2018 BC Building Code.
g. The structure shall be secured and connected to the foundation with devices designed in accordance with the 2018 BC Building Code.
h. The structure shall be designed by a professional engineer in good standing with the Engineers and Geoscientists BC.
i. The structure shall be designed with an environmental separation from the weather.
j. The structure shall be provided with a drainage system that prevents water ingress into all spaces and components within the building.
k. All safety requirements for the various components, equipment and systems for the function of the structure shall be designed and constructed in conformance with the 2018 BC Building Code.
l. The structure shall be of non-combustible construction.
m. All systems, components and materials used in the construction of the structure shall be approved by the City.
n. The structure shall be constructed true and level.

6. STRUCTURE LAYOUT AND GENERAL SPECIFICATIONS:
    a. First floor:
        i. Three (3) containers x 40’ long plus 20’ long stair tower.
        ii. One side is “residential entrance” featuring:
            1. Single door (no window in the door, solid panel.)
            2. Window beside door.
            3. Entry area to have removable central partition.

4. One (1) 14-1/2" x 14-1/2" wall breach section between compartments.
5. Entry into central room or 16' x 24' burn room with stove burn prop.
6. 8' x 8' control room is also in this module.

iii. Center module is burn room and middle room.
iv. Other side is "commercial entry" featuring:
1. Double storefront style doors with full lite (window in door.)
2. Entry has fire alarm and elevator panel simulator prop plus elevator door prop.
v. Smoke piping and valves to smoke all areas.
vi. Stair tower has single flight of stairs.
vii. Total of 5 exterior and 5 interior doors (plus elevator door.)
viii. Window count is three (3.)

b. Second floor:
i. Three (3) containers x 40' long plus 20' long stair tower container.
ii. North-west room will have steel checker plate flooring (where high use sprinkler head is located.)
iii. This shall be an apartment style floor, with a corridor.
1. Center module is the hallway and has removable central divider for varied training layouts. Entrance from stair tower.
2. Each side module has three (3) rooms and one balcony.
3. This floor has three (3) sprinkler heads (room with steel floor, in stair tower, in other apartment suite closest to stair tower), each with shutoff valve.
4. One of the rooms will be an "electrical room" mockup with non-working commercial transformer, panels, disconnect, etc.
5. Corner room has roof hatch to access sloped roof attic above.
iv. Floor shall be supplied with smoke piping and valves covering all areas.
1. Soffit of sloped roof prop will be fed with smoke via this floor.
v. Stair tower has single flight of stairs plus 30"x30" hatch in floor to access first floor.
vi. Total of seven (7) interior doors plus open wall span to fit existing forcible entry prop door.
vii. Window count is three (3.)
viii. One (1) 14-1/2" x 14-1/2" wall breach section in one divider wall.
ix. The end container doors of the central hallway module will be functional to permit easy transfer of materials to the second floor.
x. Ceiling below the walking surface above to be reinforced.

c. Third floor:
i. Three (3) 20' long containers.

ii. 16' x 20' burn room:
    1. Access from stair tower, outside deck area or to/from balcony.
    2. Bed burn prop.
    3. One (1) shutter style window, inward swing.
    4. Railing of balcony is built as tie off point.
iii. Stair tower. The stair design style switches to return format (up, landing, up) plus 30"x30" hatch in floor to access second floor.
iv. Remainder of floor is outside deck with railings and sloped roof prop:
    1. Two (2) hinged gate sections of railing.
v. Sloped roof is 18' x 20' with:
    1. Structural steel frame with pressure treated plywood top.
    2. Walking surface is roofing shingles.
    3. Custom formed steel door in the center of west side of prop.
    4. 4' x 4' chop through area with lightweight aluminum fold down frame.
        a. Frame has side wood for extra securement of plywood plus two (2) central sacrificial joists. Joists are 2x4 and plywood is ½" thick.
        b. Frame will have small lip on three (3) sides to capture plywood and simplify setup.
        c. Hinged on lower edge, pinned on top
    5. Soffit to be fed with smoke.
    6. Floor of the "attic" is simply the roof of the container below, although it will be reinforced to add stiffness. This also allows for easy cleaning with a hose.
vi. Exterior single run stair case to roof of 3rd floor (top of 3rd floor burn room)
vii. All exposed deck areas shall be reinforced from underneath.

d. Fourth floor:
    i. Top of stair tower, one container x 20' long.
    ii. Exterior door opening onto deck.
    iii. Railings with three (3) swing gates.
    iv. One - 2' x 12' roof chop-through trench prop.
    v. Tie off anchor added to roof/deck structure. Lines up with one of the swing gates.
    vi. Roof deck walking surfaces covered with 3/16" thick aluminum flattened expanded metal.
    vii. Exterior single run stair case to roof of 4th floor (top roof of stair tower.)
    viii. Ceiling below the walking surface above shall be reinforced.
e. Fifth floor:
    i. Top roof deck of stair tower.
    ii. Balconies both ends to extend deck.

iii. Railings with one (1) side swing gate, gate at each balcony.
iv. Two (2) rappel bars (one for the ends and one for the sides.)
v. 30”x30” roof hatch with formed aluminum removable cover over raised tube steel frame fully welded into container roof.
vi. Roof deck walking surfaces shall be covered with 3/16” thick aluminum flattened expanded metal.

7. MATERIALS
    a. All materials used in the design and construction of the structure, including all systems, components and equipment shall be approved by the City.
8. WINDOW & DOOR SYSTEMS
    a. Window and door systems shall be designed and constructed to provide access to the structure and facilitate training as specified by the City.
    b. Windows and doors shall be provided in locations specified by the City.
    c. Windows and doors shall be in sizes as specified by the City.
    d. A door breach prop shall be included in the structure.
    e. Unless otherwise noted exterior doorframes shall be of heavy duty construction, all steel, 10 gauge or thicker, fully welded in place, with drip rail and formed threshold, and bulb type gasket (note gasket not required at burn room.)
    f. Interior door frames shall be either the heavy duty type as noted above, or regular commercial steel type boxed with steel flat bar perimeter.
    g. Unless otherwise noted, doors slabs be of commercial quality or better, with minimum skin thickness of 20 gauge. Door slabs shall be of "satin coat", or galvanized finish. Doors do not need to be insulated unless noted.
    h. Burn room door slabs shall be 16 gauge TRR-250 degree F temperature rise rated.
    i. Exterior doors shall be locking, keyed alike.
    j. Interior doors shall be passage set only (non-locking.)
    k. Door handles shall be lever type.
    l. Door hinges shall be stainless steel.
    m. All doors shall have a spring type check chain or self-closing device approved by the City.
    n. All interior non-burn room doors shall have an automatic self-closing device.
    o. Unless otherwise noted, windows shall be a heavy duty hinged shutter design as follows:
        i. Frame size shall be 4 feet wide by 3 feet high.
        ii. Frames shall be HSS tube steel, minimum .125" thick, fully welded into the container.
        iii. Shutters shall be formed steel construction, minimum 12 gauge thick, double broke with no sharp edges.
        iv. Shutter hinges shall be heavy duty stainless steel piano type, full height.
        v. Shutters shall be able to be latched in the open or closed position, with latches easily reachable from the inside.

vi. Shutters must withstand ladder forces in either the open or closed position.
vii. All exterior windows shall have a corresponding floor drain, minimum 8" deep and full window width.
viii. Burn room windows to open inward.
ix. Burn room shutters shall be 10 gauge thick steel
x. All windows to have an "inside/outside" latch system for use during training, plus locking security pins for lockup when not in use.

9. STAIRS SYSTEMS
    a. Stair systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. A combat challenge type exterior stairs shall be designed and priced separately.
    c. The interior stair design shall incorporate a mixture of commercial and residential dimensions and landings.
    d. All stairs shall be constructed with steel channel stringers with bar grating treads. Treads shall be hot dipped galvanized smooth bar grating with rounded checker plate steel toe to provide a good balance between grip and suitability for dragging gear over without damage.
10. HANDRAILS / GUARDS / SAFETY SYSTEMS
    a. Handrails, guards and safety systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Handrails, guards and safety systems shall be provided in locations specified by the City.
    c. Handrails, guards and safety systems shall be provided as required by the codes and standards referenced in this document.
11. ELECTRICAL SYSTEM
    a. Electrical systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Electrical devices shall be provided in locations specified by the City.
    c. Electrical devices and components including not limited to the following shall be provided:
        i. Interior and exterior lighting;
        ii. Interior duplex receptacles;
        iii. Lighting controls; and
        iv. Strobe lights.
    d. The electrical system shall consist of base 120V wiring including the panel, lights and duplex outlets.
    e. Lights shall be aluminum housing LED strip design, IP65 rated for protection against hose spray.
    f. The residential entry shall have an entrance light above the door (porch light) as well as a wall mounted strobe (similar to what would be installed in a modern townhome.)

g. All wiring shall be Teck cable with waterproof connectors. Continuous cable runs are used whenever possible to reduce junction boxes or connections where water might get in.
h. A total of eight (8) – 300 watt LED large flood lights on stanchions shall be provided on the structure exterior to light all faces and decks.
i. Provide a deck light (one (1) – 50W rotatable LED) for the top deck. This light shall be able to be positioning and directed by the trainers.
j. One (1) stanchion mounted illuminated wind sock with photocell.
k. The switch layout shall be as follows:
    i. Control room light switch in the control room.
    ii. Residential entry wall strobe switch in the control room.
    iii. Residential porch entry light switch inside the residential entry (this light shall also have a light sensor and be on automatically at night.)
    iv. First floor room lights on a single switch in the stair tower on the first floor.
    v. Exterior flood lights shall be provided and divided up into circuits covering each face of the structure (i.e., north, south, east, and west.) Four switches for these lights shall be in the stair tower on the first floor.
    vi. The second floor room lights shall be on three (3) switches in the stair tower on the second floor (one switch per container module.)
    vii. The third floor room lights shall be on a single switch in the stair tower on the third floor.
    viii. The sloped roof attic space shall have a light and duplex outlet with the switch on the wall beside the attic entrance door.
    ix. Fourth floor room lights shall be on a single switch in the stair tower on the fourth floor. The top deck (fifth level) shall be equipped with a deck light and its switch shall be in the fourth floor of the stair tower.
l. The control room shall be equipped with a small heater.
m. The main distribution panel shall be located in the control room.

12. PAINT

a. Exterior paint colours for walls, doors, windows, handrails & guards and other components shall be specified by the City. General exterior paint colour scheme to be as follows:
    i. Red on first and second levels of the building;
    ii. Black on the third and fourth levels if the building; and
    iii. Red on railings, doors and window shutters.
b. Interior wall colour shall be factory light grey, RAL 7035. Interior paint colour for doors, windows, handrails & guards and other components shall be specified by the City.
c. All new steel must be prepared to SSPC-SP3 Power Tool Cleaning or better prior to painting. The exposed new steel surfaces shall be free from Grease, Oils, Dirt & Dust, Drawing & Cutting Compounds, Mill Scale, Rust, and Paint.

d. All new steel must be primed with a 2 part epoxy coating.
e. Interior and exterior surfaces shall be top-coated with a single part industrial finish, typically referred to as "marine enamel" or "single part acrylic".
f. Paints shall be sourced from a leading industrial producer such as Jotun, Hempel, International/Devoe, PPG or Sherwin Williams.

13. STANDPIPE & SPRINKLER SYSTEM
    a. Standpipe and sprinkler systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Standpipe and sprinkler equipment and devices shall be provided in locations specified by the City.
    c. The standpipe system shall include the following minimum attributes:
        i. Both Storz and Siamese connection shall located on the exterior of the building with ports matching Coquitlam Fire/Rescue hose threads. A manual valve shall be provided to isolate each connection type when the other is not in use.
        ii. Hose valves to be located on at least two landing levels (2nd and 3rd floors) and the top interior landing within the structure; and
        iii. Be provided with drains and pressure gauges.
    d. The sprinkler system shall include the following minimum attributes:
        i. A fully functional dry sprinkler system including but not limited to:
            1. Dry sprinkler control valve;
            2. Drain line;
            3. Tamper switches;
            4. Flow switch; and
            5. Sprinkler heads in multiple locations, including, the stairwell and in each room adjacent to the stairs on the second floor.
            6. Each pipe feeding the individual sprinkler head shall be provided with a manual ball valve.

14. FIRE ALARM SYSTEM
    a. Fire alarm systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Fire alarm equipment and devices shall be provided in locations specified by the City.
    c. The fire alarm system shall include the following minimum attributes:
        i. Multi-function control panel to simulate activation of manual pull station, smoke detector, sprinkler system flow and trouble conditions;
        ii. Audible device; and
        iii. Voice communication system.
    d. Fire alarm panel shall be name brand quality and presentation (i.e. Simplex, Mircom, or equivalent.)
    e. Fire alarm panel shall be similar to Simplex 4100ES in features and must have:

i. Led text display;
ii. Alarm lights and labeling for each typical alarm signal;
iii. Phone handset; and
iv. PTT hand held microphone.

f. The fire alarm panel simulator shall allow the trainer to preselect different alarm scenarios for each training evolution. Reset and alarm/display selection shall be user friendly and housed in a waterproof cabinet. A touch screen shall be provided as the trainer's interface.
g. Structure shall have a phone cabinet (phones connected to lobby fire alarm panel phone) and speakers (connected to the PTT microphone) on each floor.
h. Lobby shall have a fire alarm bell near the fire alarm panel.
i. The overall packaging and presentation of the fire alarm panel and other components shall be clean, professional and as waterproof as is reasonably possible. All junction or switch boxes must be outdoor rated (unless supplied by the fire alarm panel manufacturers as part of their systems) and watertight connectors shall be used.

15. SMOKE PRODUCTION & EVACUATION SYSTEM
    a. Smoke production and evacuation systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Smoke production and evacuation equipment and devices shall be provided in locations specified by the City.
    c. The smoke control and evacuation system shall include the following minimum attributes:
        i. Two smoke generators located in the control room and controlled through a central touch screen system;
        ii. Piping shall be 4" diameter PVC and is routed away from burn room doors to minimize exposure to heat. A flapper or manual valve shall be located at each burn room entry to prevent hot air entering the smoke system.
        iii.
        iv. Smoke piping to all rooms and spaces within the structure, including the roof trenching training system and the slope roof attic and eaves; and
        v. Smoke control dampers (manual gate valves) at each floor level and into each room and space within the structure.
16. ELEVATOR DOOR PROP AND CONTROL
    a. Elevator control training systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Elevator control training equipment and devices shall be provided in locations specified by the City.
    c. The elevator control training equipment system shall include the following minimum attributes:
        i. Controls and equipment including, but not limited to:

1. Control panels;
2. Phone;
3. Recall buttons; and
4. Elevator door training device.

d. Elevator door prop shall be augmented by a powered lobby type elevator panel (i.e., floor call.) Inside the "elevator" there shall be another panel representing what is typically found inside a modern elevator including a phone cabinet mounted close to the fire alarm panel. Specifically these are:
   i. Three (3) stop car station;
   ii. Terminal surface mount hall station with fire recall and communication failure indicator and fire emergency operation indicator; and
   iii. Rescue station with fire recall switch (equivalent to Emerson brand.)

e. Elevator panels shall be:
   i. Commercial quality and presentation (i.e. sourced from known elevator company);
   ii. Preferably stainless steel face;
   iii. Buttons must be lit and show typical colors; and
   iv. Both panels must have connected fire fighter key ability.

f. The elevator simulator shall allow the trainer to preselect alarm or status scenarios typically found in modern commercial or residential high rise buildings, and to reset the panel easily.

g. The overall packaging and presentation of the panels and other components shall be clean, professional and as waterproof as is reasonably possible. All junction or switch boxes must be outdoor rated (unless supplied by the elevator panel manufacturers as part of their systems) and watertight connectors must be used.

17. PROPANE GAS SYSTEM, DEVICES AND BURN ROOMS

a. The fuel used in the burn system shall be propane.

b. Propane gas systems shall be designed and constructed to facilitate the training requirements specified by the City.

c. Two rooms shall be provided that have fully functional and controllable propane gas fueled training devices complete with safety features.

d. The propane gas system shall include both central and portable devices to control flame devices.

e. The first floor shall include a burn room containing a kitchen setup as follows:
   i. Stove device with side cabinets.
   ii. The devices shall be stainless steel construction. (Burn tubes may be copper.)
   iii. Stove top to be stainless steel bar grating.
   iv. Burn pan/ flame areas to be 900 square inches minimum.
   v. Burn pan shall have a water drain valve, overflow drain and water level sensor fitting.

vi. Device to offer low and high flame heights with a single burn tube loop. Flame height low shall be 12" – 36" above the burner platform and flame height high shall be 60" – 84" above the burner platform.
vii. Devices shall include a separate rollover flame or curved flame deflector shield.
viii. Upper stove cabinets are not required.

f. The third floor shall include a burn room containing a bedroom setup as follows:
   i. Bed prop with obvious front and back.
   ii. All stainless steel construction (Burn tubes may be copper.)
   iii. Burn pan top to be stainless steel bar grating or mesh.
   iv. Burn pan/flame area to be 1400 square inches minimum (i.e. 2'x5'.)
   v. Burn pan shall have water drain valve, overflow drain and water level sensor fitting.
   vi. Device to offer low and high flame heights with a single burn tube loop. Flame height low shall be 12" – 36" above the burner platform and flame height high shall be 60" – 84" above the burner platform.
   vii. If accepted by local safety authorities, prop shall be relocatable along 2 walls via flexible fuel and vent lines (pilot assembly is expected to be permanently mounted to the bed frame.)
g. Burn rooms shall be designed to mitigate the heat effects on the structure and related components.
h. The third level shall be equipped with three exterior connections for propane devices.
i. An outside balcony on the second level of the structure shall be provided with a propane gas connection for use with an outdoor gas prop.
j. All piping, valves and gas work must be in accordance with the Safety Standards Act, and the Gas Safety Regulation.
k. Burn room lining: as a minimum, burn rooms shall be design and constructed as follows:
   i. A structural steel frame with high temp rigid insulation and floating steel panels.
   ii. The ceiling shall get a secondary "sacrificial" layer where there is flame contact or excessive heat.
   iii. Minimum fastener size shall be ½" with Stover type locking nuts.
   iv. The design must have been tested to 1200 degrees Fahrenheit with no adverse effects.
   v. Design specification is 500 degrees Fahrenheit room temperature and shall not exceed 750 degrees Fahrenheit at the ceiling.
   vi. The design must withstand repeated rapid heating/cooling cycles.
   vii. There shall be no combustibles in the burn rooms:

1. All wood flooring shall be removed and replaced with steel plate (minimum thickness 3/16".) The finished steel floor surface shall be at the same height as the original floor.
2. The lining shall not be painted.

viii. Drainage must be provided and be able to accommodate firefighting hose water volumes. Standing water is not permitted.

ix. Combustion and pilot combustion air intakes shall be provided.

l. The burn control system shall be provided with the following minimum attributes:

i. System shall be controlled by a Programmable Logic Controller (PLC.) Systems controls shall allow the user to control the ignition, rate of fire growth, flame height and extinguishment. The PLC designed system shall be reliable and require minimal maintenance. A wired hand held controller at each burn room shall be included.

ii. The PLC cabinets and operator touch screen shall be located in the building control room.

iii. The control system must be reviewed and accepted by the Technical Safety BC Gas Safety Branch.

iv. Safety features shall include the following minimum requirements:

1. A propane gas monitoring and detection system with alarms set at 10% Lower Explosive Limit (LEL) and emergency shutdown at 20% LEL (or as required by Technical Safety BC.)
2. Air samples shall be drawn close to the burn devices, or between the burn device and room entrance and not in a remote corner of the room.
3. High temperature shutdown shall be provided in each burn room. When the burn room reaches the maximum preset operating temperature, the system shall activate an alarm. If a higher preset shutdown temperature limit is reached, the system shall automatically shut down.
4. Constant pilot flames shall be interlocked with fuel delivery valves to prevent fuel from flowing without a confirmed pilot flame being present. Pilot flames shall be continuously monitored at the point at which they ignite the main burner element. Upon loss of pilot flame, all gas supply valves shall automatically close. All burners in the training compartment should be ignited directly from a confirmed and monitored flame that is designated as the primary ignition source.
5. In the event of an emergency situation, the system shall be provided with a device so that the user can release a dead-man button and shutdown all fires and gas flow.

6. Each main and pilot fuel gas burner system shall be separately equipped with at least two safety fuel gas shutoff valves arranged in series that automatically shut off the fuel to the burner system in any of the following events: interruption of electrical power, activation of any interlocking safety devices, activation of the combustion safeguard, user input from the operating controls and activation of manual shutdown stations.
7. Emergency stop buttons shall be placed adjacent to each burn room exit to provide immediate shutdown in the event of an accident. The buttons shall be mounted in a waterproof/water resistant box and be surrounded with a suitable guard to prevent accidental activation. The buttons shall be red.
8. Red strobe lights to indicate when the burn system is turned on shall be located adjacent to each main entrance (i.e., both the residential and commercial entrances.) The alarm devices shall be located beside the strobe lights.
9. Be designed so that once the system is on (and gas and temperature levels are safe) the user can initiate fire, select the burn loop, select low or high flame, or stop the flame. Smoke on/off and exhaust fan on/off controls shall be able to located at the control panel.

v. Control panel shall be a color touch screen of industrial quality, minimum 10" wide by 10” long in size. The touch panel shall contain all of the controls and indicators required for safe and easy operation of flame ignition, flame growth, flame height, secondary flame loop initiation, and safety monitoring of the training scenario.
vi. The exhaust fans shall be interlocked to start up if high gas level or high temperature limits are reached.
vii. The burner pilot tube shall be of stainless construction with adequate holes/slots/baffles/shields such that direct, aggressive hose spray will not extinguish the pilot flame (either from directly extinguishing the pilot flame or by causing errors in flame detection.)
viii. The pilot and gas valve train shall be adequately protected from heat and hose spray. The pilot circuit shall be housed in an enclosure next to the burner, and the main gas valve train shall be enclosed in a separate Nema 4 (or equivalent) cabinet for protection against heat and hose spray.
ix. All control wires shall be labelled.
x. All controls related wires or cabling shall be neatly run or mechanically protected to prevent undue wear or damage during training use.
xi. All PLC's, relays and associated equipment shall be in an appropriate cabinet, or otherwise protected.

m. Exhaust fans shall be provided with the following minimum requirements:

i. Each burn room shall be equipped with an exhaust system capable of removing heat, smoke and unburned gas at a minimum rate of one air change per minute in the training space.

n. Vendor shall supply and install a fuel regulation and control assembly to the gas supply from a stub-out point at ground level at a predetermined location, approximately half way along the bottom 40' container on the burn room side, approximately 6" perpendicular to the wall. The fuel regulation and control assembly shall consist of a second stage regulator, a blocking valve and pressure gauge, and outlets to individual devices with manual valves and screens.

o. Coordinate the location of the fuel regulator & controller, shut-off valves and propane supply piping for the new training center and outdoor props locations with other site contractors.

p. Three outdoor propane gas fueled burn props (devices) shall be priced separately and the basic requirements are as follows:
   i. A car and garbage dumpster type prop to be located on space adjacent to the training building.
   ii. A barbecue prop that can be located on a second floor balcony of the structure.
   iii. A small burn pan that can be located on the structure.
   iv. Outside gas prop design, construction and installation to be meet the standards for interior devices described above.
   v. The car prop shall include the following requirements:
      1. Be of stainless steel construction.
      2. Have internal water curtain/spray loop to keep the car itself cooler and minimize warping.
      3. Be designed to replicate a mid-size vehicle and include the following features:
         a. Operating hood;
         b. Operating passenger and driver doors (1 each side);
         c. Operating trunk;
         d. Driver and passenger front seat mockups;
         e. Steering wheel mockup; and
         f. Four (4) heavy duty steel casters.
      4. Include its own water burn pan with four (4) burn loops (engine, high engine, front cabin, rear cabin.) The different burn loops shall be able to be on separately or all at the same time. The pan shall have a water overflow and a lower drain with valve. The pan shall be able to be used as a standalone burn pan, that is, it shall not be fastened to the car but can be placed under it.
      5. Include a separate "tire fire" burn loop (not part of the water pan) and integrated with the engine burn loop.

6. The car prop hood shall include a hood-pry prop. This shall consist of a slot that will accept replacement thin gauge metal consumable sheet that can be pried to simulate rolling the hood.

vi. The dumpster prop shall include the following requirements:
1. Be of painted steel construction.
2. Have water overflow drain plus a separate drain valve.
3. Have four (4) heavy duty casters.
4. Be designed to look and feel like a commercial garbage dumpster.
5. Have two (2) hinges for the lids.
6. Have two (2) burn loops.
7. One burn loop shall be located in the bottom submerged by water.
8. One burn loop shall be located around the top rim and burns in the air.
9. Each burn loop shall be fed with two (2) lines, offering low and high fire for each loop (as the gas control system shall have four (4) output lines.)

vii. The barbecue prop shall include the following requirements:
1. Be of stainless steel construction.
2. Have water overflow for each water pan and a lower drain valve.
3. Have four (4) heavy duty casters.
4. Be designed to look and feel like a large residential BBQ. It shall have a hinged lid and side shelves but no cooking grate.
5. Have three (3) burner locations:
    a. Lower water pan with two (2) burn loops;
    b. Upper water pan with a small loop (but fed with two (2) lines to provide two (2) flame heights); and
    c. A single flame orifice at the "regulator" on the tank. The tank shall be a regular 20 lb. propane type tank with the bottom cut out.
6. The building and components adjacent to the placement of the barbecue prop shall be protected from heat damage.

viii. The small burn pan shall include the following requirements:
1. Shall be approximately two feet (2') wide by five feet (5') long constructed of stainless steel and include a side drain valve.
2. Have a single burn loop.
3. Be designed for small/medium flame heights that can run for extended durations.

ix. All outdoor props shall work from the same control pedestal and pilot box as the interior building props.

x. The pedestal shall have the following controls:
1. System on;

2. Pilot flame (shall internally confirm flame or shut off gas flow);
3. Choices to utilize gas separate gas supply lines, including on and off for each; and
4. A system emergency stop.

xi. The main regulator shall be in the pedestal.
xii. The pilot box shall contain the pilot flame circuit/burner and the valves that control the gas flow for each burn loop.
xiii. The pilot flame tube sticks into each of the outdoor props from the back. For props with casters, the prop shall be equipped with a shelf to support the pilot box at the correct height.

18. CONTROL ROOM
    a. The control room and associated systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. The control room shall include systems to centrally control and coordinate all training devices incorporated into the structure.
19. EXTERIOR COMBAT STAIRS
    a. Supply and install a steel combat challenge training staircase to sit adjacent to (and affix to) the training structure.
    b. Include the following:
        i. Landings are spaced 80" apart;
        ii. Stairs shall be thirty-six (36") wide with railings both sides;
        iii. Include a total of 6 landings;
        iv. Stair tread material shall be hot dipped galvanized smooth bar grating with rounded checker plate steel toe to provide a good balance between grip and suitability for dragging gear over without damage;
        v. Structure to be galvanized; and
        vi. Landings shall closely match the structure floor level on the third (3rd) floor, and include an entry door to the structure at that height.
20. FALL PROTECTION
    a. Fall protection systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Fall protection devices shall be provided in locations specified by the City.
    c. Engineer sealed drawings of the fall protection and restraint devices shall be posted in the structure within a waterproof and wear restraint plaque in accordance with WorkSafe BC regulations.
21. HELIPORT SYSTEMS
    a. Systems and devices for the safe operational of the site heliport shall be designed and incorporated into the structure as specified by the City.
    b. A windsock shall be mounted on the highest portion of the structure.
    c. Obstacle marking in accordance with Transport Canada regulations may be required to be incorporated into the design and construction of the structure.

22. SIGNAGE
    a. Signage systems shall be designed and constructed to facilitate the training requirements specified by the City.
    b. Signage shall be provided in locations specified by the City.
    c. The signage system shall include the following minimum attributes:
        i. A magnetic address sign, which allows changing numbers and letters shall be provided.
        ii. A full building schematic to facilitate training shall be provided.
        iii. Safety signage shall be posted as required for the safe use of the structure.
        iv. Any other signage deemed necessary by the City.
23. TRAINING
    a. Proponent shall provide a minimum three site training sessions on the operation of the entire structure, including all systems located within, and any external props.
    b. Each site training session shall be a minimum of four hours and longer if required by the City.
    c. An operational manual for the facility shall be provided.
24. COMMISSIONING & WARRANTY
    a. Proponent shall provide one year warranty on all devices/equipment/control parts, components and labour.
    b. Proponent shall provide three annual calibration and overall system checks (three annual visits from date of install.)
    c. Proponent shall participate in repeated testing and commissioning exercises to ensure the systems are working properly and providing a high standard of reliability. Any modifications or changes required for the system to function reliably (i.e. not shut down due to normal hose spray, or otherwise fail to reliably start or continue with fire) shall be remedied promptly at no charge.
25. DOCUMMENTATION
    a. Original copies of all operating manuals, approvals, inspection reports, as-built drawings, installation permits, operating permits and any other correspondence related to the project from all consultants, contractors and authorities having jurisdiction shall be supplied to the City for review, approval and retention.