1. **GENERAL**
   1. **Requirements Include**
      1. Fall protection systems for maintenance personnel (particularly when parapets are less in height than required for guards), and for window washing equipment and personnel.
   2. **References**
      1. Province of British Columbia Industrial Health and Safety Regulations pursuant to WorkSafe BC.
      2. CAN/CSA-Z91-M90 Safety Code for Window Cleaning Operations.
   3. **Coordination Requirements**
      1. Early in the design process, review design intent and additional requirements with:
         1. Coordinate requirements with Facilities Services.
         2. Coordinate requirements with BCIT Occupational Health & Safety (OH&S).
   4. **Design Requirements**
      1. A Guidelines for Rooftop “Fall Protection System” Design.
         1. Overview:
            1. All new buildings, major renovations, and roof replacement projects to be reviewed with OH&S and Facilities Services to determine if it’s required to incorporate the design of a permanent engineered fall protection system.
            2. The system shall incorporate the use of rust resistant (e.g. galvanized metal), railing anchors, horizontal life lines, signage, etc.
            3. The “Fall Protection System” design is more than a rooftop anchor installation design. The lead design consultant is responsible for the functional requirements of the system design.
         2. Buildings or Rooftop Surfaces less than 3m above Grade:
            1. Fall protection design is not typically required unless the hazard of falling is greater than the hazard of impacting a flat surface. Consideration must be given to what periodic maintenance is required to be performed while on these surfaces to ensure that safe access is achievable using ladders.
         3. Buildings or Surfaces greater than 3m but less than 7.62M above Grade:
            1. A fall protection system design is required for use by employees for the purpose of fall restraint and fall arrest. Design for window cleaning is only required on buildings where access is not practical from the ground via extension poles or a mobile lift.
         4. Buildings or Surfaces greater than 7.62m above Grade:
            1. Fall protection system design is required for use by employees for the purpose of fall restraint, fall arrest, and window cleaning via a bosun’s chair. Attachment mechanisms for swing stage or other roof supported maintenance equipment should only be designed if specifically required for the project; like a high-rise building. A wall stabilization anchoring system is to be provided to prevent the working platform from dangerously swaying in the wind while suspended, where required by code or deemed necessary due to the combination of building accessibility, building height and wind speeds.
         5. Fall Protection System:
            1. Window cleaning anchor design must allow for separate anchors for the person (safety line) and the suspension equipment (bosun’s chairs, swing stages etc.) (suspension line).
         6. Rooftop mounted equipment, ducting, skylights, piping, vent stacks, etc. are accounted for and do not impact the operation of the system.
         7. With atria - allow for the use of person lifts to access all interior surfaces and fixtures for maintenance. Ensure floor/slabs are capable of supporting all equipment and access entrances are large enough.
         8. Avoid adhesive and expansion shield anchors due to load testing inspection requirements.
      2. Instructions on any protection requirements for the building parapet walls and / or flashings to ensure that the ropes do not damage the building components, and so that the building components do not damage the ropes.
      3. Imposed loads on the parapet walls and for the lead designer to ensure that parapets are designed accordingly.
2. **ADMINISTRATIVE AND SUBMITTAL REQUIREMENTS**
   1. **BCIT Submittals and Notifications**
      1. Shop Drawings:
         1. The Design Engineer's seal, signature and a statement assuring code compliance must appear on each shop drawing.
         2. Anchor design and load ratings for each type of anchor in the system.
         3. Anchor manufacturer’s shop drawings, installation instructions, and inspection / testing requirements.
         4. Comprehensive and detailed anchor inspection descriptions so that anchors and fastening mechanisms can be inspected by third party personnel.
         5. Every anchor on the roof shall be uniquely identified, and the checklist will correspond to these identifiers for annual inspections.
      2. Closeout Submittals:
         1. O&M Manual:
            1. At completion, submit as-built drawings and 2 copies of a reduced plastic laminated as-built shop drawing, that shows anchor locations and detailed fall protection plan clearly, depicting the intent and usage of each component and overall system. Indicate ground areas requiring pedestrian protection while suspension equipment (bosun’s chairs, swing stages etc.) is being used for maintenance; for example, over doorways, etc.
            2. One (1) hard copy of all components of the anchor system design shall be provided in a three ring binder complete with a stamped and sealed cover letter from the Professional Engineer describing the system. The binder shall include all drawings, shop drawings, anchor detail drawings, fastener detail drawings and specifications, inspection checklists, instructions on the proper use and limitations of the system, instructions for inspections, testing requirements and frequency, letter of initial system certification stamped and sealed by a Professional Engineer.
            3. Provide one (1) copy of the same contents in navigable pdf via a USB or download.
   2. **Commissioning**
      1. Roof anchor designer/manufacturer to provide a comprehensive seminar to BCIT's maintenance staff and Contractor personnel, on the purpose and nature of the tie-back and lifeline anchoring system.
   3. **Quality Assurance**
      1. Engineer to design a complete fall protection system to prevent a worker from falling according to WorkSafe BC requirements.
      2. All components to be designed, reviewed, and certified by a professional engineer registered in the Province of British Columbia.
      3. Installation work of the fall protection system to be carried out by a company specializing in the type of safety equipment required.
      4. Roofing penetrations to conform to roofing membrane – see Section 07 50 00.
      5. Manufacturer’s and roofing inspector’s recommendations to be followed.
      6. All proposed systems must be reviewed and signed off by Facilities Services and OH&S prior to any tendering.
3. **MATERIALS**
   1. **Prescriptive Requirements**
      1. Location and types of anchorages required to provide a complete system.
      2. Special consideration shall be applied to equipment installation locations in atria and other hard to reach interior locations. It is preferred that all building systems and equipment that require periodic maintenance are located in areas that do not require fall protection.
      3. All miscellaneous metal work shall have the minimum standards described in Section 05 50 00.
      4. All roofing work and roof repair work shall be in accordance with Section 07 50 00 - Membrane Roofing.
      5. Components:
         1. Cast-in-place material: stainless steel type 304.
         2. Exposed anchor surfaces and exposed structural components: stainless steel type 304.
         3. Rotating heads are not allowed on campus, as they make safety inspections more difficult.
         4. Anchors must be certified that they meet the performance requirements of CSA Z91M.
         5. No adhesive or expansion shield anchoring of anchors.

\*\*\* END OF **FACILITY FALL PROTECTION** SECTION \*\*\*