PART 1 GENERAL

1.01 DESCRIPTION

1. Applicable Documents:
   a. State of Washington Regulations, including:
      (1) Chapter 296-96 WAC, Safety Rules Governing Elevators, Dumbwaiters, Escalators and other Lifting Devices and Moving Walks.
      (2) Chapter 296-96 part B WAC, Regulations and fees for freight and passenger elevators, man lifts, dumbwaiters, escalators, moving walks, automobile parking elevators, personnel elevators, and other lifting devices.
      (3) Chapter 296-96 C WAC, Rules and Regulations for new and altered elevators, escalators and lifting devices.
      (4) Safety Code for Elevators and Escalators ASME A17.1a-2008/CSA B44a-08A.
      (5) Safety Code for Existing Elevators and Escalators ASME A17.3
      (6) Inspectors Manual for Elevators, Escalators and Moving Walks ASME A17.2.
      (7) National Electrical Code, No. ANSI/NFPA 72-latest version.
      (8) International Building Code, IBC, latest version.
   b. ASTM A167, Steel, Sheet Stainless
   c. ASTM A1008, Steel, Sheet, Carbon, Cold Rolled, Commercial Quality
   d. AWS D1.1, Structural Welding Code - Steel
2. Permits and Codes:
   a. All equipment, replacement, and installation work shall comply with requirements of the ASME A17.1a-2008/CSA B44a-08 Safety Code for Elevators and Escalators, and other applicable codes of the State of Washington.

1.02 MATERIAL AND EQUIPMENT

A. General: Material and equipment shall be new, of the best quality used for the purposes in good commercial practice, the best of their respective kinds, and as specified. Equipment shall be standard products of reputable manufacturers. Furnish equipment complete with all parts necessary for proper operation. Material and equipment shall be cleaned, free of corrosion, and selected to provide quiet operation.

B. Standard Products: Unless otherwise indicated, the equipment to be furnished under these Standards shall be the standard products of manufacturers regularly engaged in the

production of such equipment. Apparatus, equipment and systems furnished must be similar and equal thereto with respect to quality, functional performance, capacity and efficiency. Where the actual equipment furnished requires certain changes in pipe location, controls, electrical equipment and foundations, the Contractor shall incorporate this into their design.

1.03 ELECTRICAL

A. Provide electrical components of the escalator equipment and systems, including motors, motor starters, controller, control instruments, switches, conduit, wire and relays under this Specification as specified herein and as necessary for complete and operable systems. Furnish interconnecting wiring for components of equipment as an integral part of the equipment.

B. Electrical equipment and wiring shall conform to applicable paragraphs of the Electrical Specifications and National Electrical Code (NEC).

C. For equipment with electrical components, provide UL label on each component for which published standards exist.

D. The frames of all motors, controllers, transformers and the metal enclosures for all electrical equipment in or on the escalator shall be grounded in accordance with NEC-Article 250. Provide "daisy chain" electrical grounding for all electrical cabinets.

E. Conductors and Connections: Provide all new wiring for equipment installed. Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Solid conductors are not allowed. Use no splices or similar connections in wiring except at terminal blocks, control cabinets or junction boxes. Provide 10% spare wires in main wiring run from top pit controller location to lower pit area. Separate and mark all spare wires. All spare wire ends shall be turned back or protected against accidental exposure to any live electrical circuit or electrical ground.

F. Conduit, Etc.: Provide painted or galvanized steel conduit. Conduit size, 1/2" minimum. Do not use flexible conduit exceeding 36" in length. Flexible heavy-duty service cord may be used for low voltage wiring where allowed by Code. Plastic wire ties shall not be allowed for conduit fastenings or support except for flexible electrical cords.

G. Escalator Monitoring: Provide interface, software, licenses and wiring to interface with existing Integrated Display Systems (Lift Net) for all escalators.

1.04 PAINTING

A. All exposed metal work furnished in these standards, except as otherwise specified, shall be properly primed and painted with an enamel color as selected by Owner.

1.05 MAINTENANCE

A. Contractor shall furnish complete maintenance service on all escalators for a period of twelve (12) months in accordance with the escalator manufacturer required, Maintenance Control Program (MCP) . The twelve-month Warranty maintenance period of each escalator will start from the beneficial occupancy date. This service shall include regular

systematic examinations of the equipment by competent and trained employees of this Contractor; and shall include all necessary adjustments, lubrication, cleaning, supplies and parts to keep this equipment in operation, except such parts made necessary by misuse, accidents or negligence not caused by the Contractor. Contractor shall furnish written reports of each service call, whether routine or emergency, describing services performed. Basic service work shall be performed during regular working hours of regular working days. Emergency callback service shall be provided on a twenty four (24)-hour, seven (7)-day basis at no additional cost to Owner including travel time and mileage. Response shall be within (1) hour of notification. The Owner's Maintenance Contractor may secure the escalator equipment while Contractor is in route, if required. Any necessary repairs shall commence within 8 hours and be completed within 24 hours unless special circumstances exist.

B. The escalator equipment shall be maintainable by trained mechanics without the need to purchase or lease additional tools or software to diagnose problems and/or change operational parameters of the equipment. All tools and software necessary to diagnose problems and/or change operational parameters of the equipment shall be retained by the Owner and shall function for the life of the installed equipment or a minimum of twenty (20) years whichever comes first. Special tools shall be identified and stored on site in a service parts cabinet. No substitutions of proprietary circuit boards, EPROMS, hardware locks, software passwords or coding shall be allowed. As a condition of the escalator replacement, the original equipment manufacturer shall guarantee to sell and deliver, on a timely basis, replacement parts and software updates to Owner and to a third-party escalator maintenance company at a fair market price.

1.06 WARRANTY

A. Warrant the complete escalator in accordance with Washington State law and regulation, but in no case less than complete coverage of parts and labor for one (1) year after receiving beneficial occupancy from Port of Seattle for each escalator.

1.07 QUALITY ASSURANCE

A. Contractor shall furnish Owner with all special tools, meters, diagnostic tools/devices, troubleshooting special hand-held tools/devices, printed information, adjusting information and all other special tools/devices to perform maintenance, troubleshooting, repairing and adjusting at conclusion of the escalator replacement. For the life of the equipment or a minimum of twenty (20) years from date of escalator beneficial occupancy provided by, Port of Seattle RE, any special tool, meter, diagnostic tools/devices requiring readjusting or re-programming all costs including freight shall be paid by the Contractor. Cost, if any, to Owner for the above stated items shall be included in RFP Bid.

B. Contractor shall provide and install all software improvement up-grades for a period of five (5) years from date beneficial occupancy is provided by Port of Seattle RE and State of Washington Escalator Inspector. The up-grades are defined as improvements to escalator operation. If any escalator safety software up-grades are designed or discovered by the Contractor, the up-grades shall be installed immediately. All costs of the software up-grades shall be paid by Contractor.

C. Contractor shall provide means for Owner to purchase and receive all escalator replacement parts within twenty four (24) hours from date of parts order by Owner. Replacement and spare parts are defined as any and all items required maintaining, service, repairing, adjusting and operating the escalators as designed and installed, in a safe and trouble-free manner. Contractor shall be able to obtain and shall sell any and all spare parts including proprietary parts to Owner during the entire life cycle of the escalator equipment or a minimum of twenty (20) years whichever is longer.

D. Contractor shall provide a list, in writing, of all equipment. The list shall include a guarantee of availability. This guarantee shall specify that all parts, including software shall be available for the life, or a minimum of twenty (20) years, of the escalator equipment and within a twenty four (24) hour period of placing parts order. The list shall include individual item cost and part numbers or coding. Parts ordering information shall be provided.

E. Contractor shall provide written Maintenance Control Program (MCP) specifically designed for the equipment. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required escalator tests.

PART 2 PRODUCTS

2.01 GENERAL

A. The completed escalator shall conform to the ASME A17.1a-2008/CSA B44a-08 Safety Code for Elevators and Escalators except as specifically otherwise indicated or specified. The escalator including equipment, material, workmanship, design, and tests shall be in accordance with the standards, rules and Specifications referenced. All required material and equipment shall be new. Electrical materials shall meet and bear evidence of meeting the requirements of Underwriter's Laboratories. The equipment shall be the product of a manufacturer regularly engaged in the manufacture and modernization of this type of escalator equipment. Working parts shall be accessible for inspection, servicing and repair. Adequate means shall be provided for the lubrication of all wearing parts that require lubrication.

1. Description and Performance: Escalator will be in accordance with the following details and consist of:

   a. Nominal Step Width: As required.

   b. Speed: Ascend and Descend at a nominal speed of 100 feet/minute (0.5M/sec.)

   c. Vertical Rise: As required.

   d. Floors Served: As required.

   e. Power Supply: Typical 460 VAC/3 phase/60 Hertz – Field Verify

   f. Lighting Supply: Typical 120 volts, 1 phase, 60 Hz LED.

B. All escalator materials shall be protected from the weather and kept in as-manufactured condition with no corrosion rust, or damage evident.

2.02 GENERAL MATERIALS

A. Steel:

1. Sheet Steel: Furniture Steel for Exposed Work: Stretcher-leveled, cold-rolled, commercial-quality carbon steel, complying with ASTM A366, matte finish.
2. Sheet Steel: For Unexposed Work: Hot-rolled, commercial-quality carbon steel, pickled and oiled, complying with ASTM A569.
3. Structural Steel Shapes and Plates: ASTM A6, ASTM A36 AND ASTM A108.

B. Fastening Screws:

1. Stainless steel tamper-proof screws shall be used throughout for all exposed fasteners.

C. Keys:

1. For each escalator provide three (3) sets of keys for operation. Each set of keys shall be attached to a three inch (3") round metal disk with a 1" ring. Engrave on the round metal disk in ¼" letters, the function of the key including key number. Key type and cut shall be the same as currently used in the A Concourse at Seattle Tacoma International Airport. Samples can be provided upon request. Key type and cut shall be the same throughout.

D. Signs:

1. Provide all signage required by Code. Specifically as required by ASME A17.1a-2008/CSA B44a-08 section 6.1.6.9

2.03 ESCALATOR MACHINERY

A. Truss: In replacement applications, Contractor can elect to retain the existing truss (but is responsible for verification that the truss is adequate for the use), or replace the existing truss for each escalator.

B. The following work shall be performed where existing trusses are retained:

1. Upper and Lower End:
   a. Removal of track and support brackets.
   b. Removal of access cover support plates.
   c. Removal of selected truss cross members.
   d. Removal of handrail support return brackets.
2. Incline:
   a. Removal of top and return track
   b. Removal of handrail return brackets.
   c. Modification as required to truss cross members.

3. Clean down of the existing truss removing all remnants of oil, grease, lint, dirt and debris from the unit.

4. Clean down of the existing drip pan removing all remnants of oil, grease, lint, dirt and debris from the unit. Seal areas as required to ensure that drip pan is water and oil-tight over the entire length of the truss. Reinforce drip pan as required to be of sufficient strength to withstand weight of workmen, entire width and length of truss.

5. Inspection/analysis of the existing truss welds, rivets and overall structure. Provide a Written Report by a Licensed Professional Engineer that all existing trusses are structurally sound and do comply with the requirements of the Safety Code for Elevators and Escalators ASME A17.1a-2008/CSA B44a-08A concerning existing escalator trusses. No extra costs or change orders will be allowed for any required repair, alteration or replacement of existing trusses after award of project.

6. Isolation Mounting: Existing isolation mounting shall be replaced.

7. Upper, Lower, and Incline Modules: Upper, lower, and incline modules shall be designed and fabricated for installation into the existing truss to accommodate all new escalator components.

    a. The upper end module shall include the drive machine, track sub-assemblies, and truss interface components. The track sub-assemblies shall be welded steel plate construction. The left and right hand plates shall be connected by structural steel tube cross members. The following components shall be directly mounted to the upper end module: Top and return curve track; Step guidance system; Handrail guidance system; Skirts and support brackets; Access cover and comb plate support angles; Safety devices and associated mounting brackets, including skirt switches, missing step detector, step out of level detector, and handrail speed sensors.

    b. The lower end module shall include the reversing station, track sub-assemblies, and truss interface components. The track sub-assemblies shall be welded steel plate construction. The left and right hand plates shall be connected by structural steel tube cross members The following components shall be directly mounted to the lower end module: Top and return curve track; Step guidance system; Handrail guidance system; Skirts and support brackets; Access cover and comb plate support angles; Safety devices and associated mounting brackets, including skirt switches, missing step detector, step out of level detector, and step upthrust device.

    c. Incline Modules: Modular multi-purpose stanchion assemblies shall be installed on the incline of the existing truss. These incline support stanchions shall be fabricated of steel and mounted to the existing truss. They shall be designed to support all incline track sections and handrail guide components as part of the complete step band. These stanchions shall be pre-assembled and fixed to set track spacing, as well as step and handrail guidance components, prior to installation into the existing truss.

C. The following work shall be performed where new trusses are installed:

1. Existing trusses will be completely removed from premises in a safe fashion
2. New trusses will be steel designed to safely carry entire load of escalator, including all components, full capacity load and weight of exterior truss and balustrade covering material not to exceed 10 lbs p.s.f. The deflection of the loaded truss shall not exceed on thousandth (1/1000) of the span under a live load of 320 pounds per 40” step. Provide factor of safety per Code.
3. The trusses shall be permanently identified for the centerline at both ends and in both transition curves.
4. Provide clearly identified exterior cladding support attachment locations on exposed sides and bottom of entire length of truss. Provide low friction material on lower landing bearing surfaces.
5. Provide truss and access cover extensions or reductions at upper and lower landings as required to suit existing conditions.
6. Provide seismic slip-end support plates as required by Code.
7. Truss Isolation pads shall be provided at support locations to isolate truss and prevent transmission of vibration to building structure.
8. Drip pans shall be galvanized, 3 mm steel, water and oiltight over the entire length of the trusses. Pan depth shall be sufficient to collect all drippings and loose debris at the turn around points. Steel pans shall be of sufficient strength to withstand weight of workmen, entire width and length of trusses.

D. Machine and Wellway Equipment:

1. Drive Machine: Worm geared, planetary, or helical spur gear reduction unit coupled directly to AC induction or P.M.S.M drive motor. Handrail drive shall be directly coupled to drive machine or chain driven. Machine shall be located within the truss envelope at the upper end. Main bearings shall be rated for 200,000 hours.
2. The escalators shall be equipped with a motor designed for escalator service. The motor shall be of TEFC design, ball bearing type, integrally and horizontally mounted to the drive machine. The motor shall be flange mounted to the main drive gear case and torsionally connected to the gearbox. Driving motor and motor switchgear shall be designed to provide a smooth start with reduced current starting and reduced continuous automatic voltage and current adjustment in response to escalator work load, which shall prevent undue strain on drive components. The motor shall be of sufficient size to operate the escalator at a minimum of Code-rated load, ascending without exceeding the rated horsepower.
3. Auxiliary Drive; An auxiliary drive shall be installed to allow variation of speed after start-up once directed in the future by owner to activate this operation. The design should conform to the following requirements:
   a. The acceleration and deceleration rates shall not exceed 1.0ft/s2.
   b. The rated speed is not exceeded.

c. The minimum speed shall be not less than 10ft/min.

d. The speed shall not automatically vary during inspection operation.

e. Automatic deceleration shall not occur before a period of time has elapsed, since the last passenger detection that is greater than three times the amount of time necessary to transfer a passenger between landings.

f. Means shall be provided to detect failure of the passenger detection means once external sensors are added in the future, and shall cause the escalator to operate at full speed only.

4. Each escalator shall be provided with a permanent magnet ceramic brake, located on the high speed shaft which, when activated, shall stop the escalator as required by Code, upon activation of a stop button, safety device, or loss of power.

5. Permanent Magnet Ceramic Brake: A load compensating brake system shall be installed. The brake shall be capable of automatically stopping the escalator quickly but gradually at a constant rate not greater than three feet/second squared, and shall hold the escalator stationary under full load whenever the power is interrupted. The brake shall be "fail safe" and electrically released. The system shall continually adjust brake torque to maintain a relatively constant deceleration independent of the load. The brake shall not cause the escalator to come to an abrupt stop. It shall be designed to meet ASME A17.1a-2008/CSA B44a-08 Code deceleration requirements without adjustment.

6. Upper Reversing Station: The Upper Reversing Station and drive shall include a precision-machined step chain sprocket mounted on the machine output shaft and rotating on bearings.

7. Lower Reversing Station: The Lower Reversing Station shall consist of a machined floating track system designed to maintain proper tension on the step chain by use of springs. It shall be designed to maintain uniform chain tension, and shall detect movement of the carriage through the activation of a safety switch.

8. Step Guidance: A step guidance system shall be provided to control the movement of the steps both horizontally and vertically. Each step shall be provided with horizontal guide pads, which shall guide the steps throughout their travel, in combination with a continuous guide profile installed in the area of the escalators open to passengers. ASME A17.1a-2008/CSA B44a-08 Code Step/Skirt Performance Index requirements shall be met without the need for skirt deflector brushes.

9. Step Chain: The step band shall consist of consecutively running steps powered and spaced with a heavy duty chain designed for long life and quiet operation. The step chain shall properly mesh with the main drive sprockets and lower reversing station castings. The chain shall be an engineering class roller chain, manufactured to close tolerances, from high quality material with heat-treated bushings, pins, and link plates.

10. Steps: The steps shall be formed from one-piece die cast aluminum with closely spaced tread and riser cleats. Step rollers shall rotate on sealed ball bearings. The step shall be connected to the chain by a pin and bushing. Vertical curved step risers shall be furnished with vertical cleats arranged to pass between the cleats of the tread on the adjacent step to form an inter-meshing unit with minimum clearances. Steps shall be covered on the underside with sound-deadening material. Step color shall be grey painted aluminum.

    a. The number of level steps at each end of the escalator shall be three in new installations. If a modernization is being done and the existing escalator has two level steps then the replacement can have two level steps.

    b. Step demarcation inserts shall be provided on the sides and rear of each step. The inserts shall be fabricated from reinforced structural plastic, shall be easily replaced and shall be approximately 1.5 inches (38 mm) wide at the sides and approximately 1.5 inches (38 mm) wide at the rear. Inserts shall be attached to the step without the use of visible fasteners. The color of the demarcation inserts shall be yellow per ASME A17.1a-2008/CSA B44a section 6.1.3.5.6.

11. Tracks: New tracks shall be designed and fabricated to support and retain the steps and running gear at the rated load and at the highest speed specified. Tracks shall be assembled and secured together for easy removal and replacement of sections. The system shall be adjustable, with no welding of the track sections at the joints. Tracks shall be properly supported on stanchions to provide correct alignment and smooth transition to return stations. The rolling surface of the incline track shall be a minimum thickness of 3 mm. The transition track shall be a minimum thickness of 10 mm. The guiding surface of the wheels shall be galvanized steel profiles with smooth and even running surfaces. Joints shall be cut diagonally to the running direction. A second, continuous step guiding profile shall be provided above the step chain rollers.

E. Comb Plates and Access Covers

1. Comb Plates: Adjustable comb plates shall be located at the top and bottom landings. The comb plates shall support injection molded, reinforced structural plastic comb segments, which shall be designed to be removable and to mesh with the cleats on the step, treads. The skid resistant comb plates shall be designed to sense both horizontal and vertical movement of the comb segments. Comb segments shall be yellow, anodized if aluminum or solid color if molded; painted segments shall not be allowed.

2. Access Covers: Lightweight aluminum access covers shall be provided. The design of these skid resistant access covers shall allow for ease of maintenance. These covers shall be provided at both upper and lower landings, and match the pattern of the new comb plates. Provide access covers without visible manufacturer’s name or logo.

F. Decks/Balustrades/Frontplates/Skirts/Interior Trim

1. Decks: New decks shall be reinforced 14 gauge metal. All deck section joints shall abut to provide a smooth surface to surface connection.
2. Floor Intersection Guards: Provide clear plexiglass intersection guards at floor penetrations as required per code.
3. Deck Guards: Provide clear plexiglass guards between adjacent units at top and bottom of trusses as required per code.
4. Newel Ends: Both the upper and lower newel end decks shall be continuous metal guides at upper and lower end of the balustrade, matching profile of handrail guides. Newel end shall include a multi-roller bearing system to minimize friction and provide smooth return of handrail.
5. Handrail Base: Replace with a new handrail base. New plastic handrail guide channels shall be installed.
6. Solid Balustrades: New Solid Balustrades shall be provided between the escalator skirts and the handrails. These panels shall provide a finished surface for the escalator interior. Balustrade panels shall be installed without overlapping joints or requiring trim pieces to cover where two panels meet. The balustrade shall be fabricated of reinforced 14 gauge sheet metal with Stainless Steel #4 satin finish.
7. Provide flush-mounted low-voltage LED lighting located on inside balustrades to provide uniform illumination. Lighting should be vandal proof, and have no potential snag points. Lighting shall be located on every panel on both sides as a minimum standard. This lighting shall provide a minimum of 5 foot candles on the step treads per ASME A17.1 paragraph 6.1.7.2.
8. Frontplates: New frontplates shall be provided at upper and lower ends designed to include the handrail inlet device and key actuated direction-starting switch. The handrail inlet device shall be a four-piece door/gate assembly. The frontplate material shall be Stainless Steel #4 satin finish.
    a. Control Station: At both the upper and lower landings, located near the handrail inlet, a station shall be provided which shall include a key actuated direction starting switch. The escalator shall not restart automatically. It must be restarted with the appropriate key after any shut down.
9. Skirts: The new skirts shall be constructed from a heavy gauge material reinforced with steel channels. Skirts shall be fastened to the truss modules with hidden fastenings in the incline and transition areas. Skirt panels shall be installed without overlapping joints or requiring trim pieces to cover where two skirt panels meet. The skirt panels will be finished in Teflon coated 11 gauge Stainless Steel #4 satin finish.
10. Skirt Deflector Devices: Skirt deflector devices meeting the requirements of ASME A 17. 1a-2008/CSA B44a section 6.1.3.3.10 shall be provided for each escalator.
11. Interior Trim: Interior trim pieces shall be aluminum and designed to connect the skirts and inner panels together.

12. Fault Indicator: Provide upper and lower end with fault indicator to display source of fault without removal of equipment access plate. Locate indicator in handrail inlet box or inner deck.

G. Handrails: Escalator handrails, properly constructed and reinforced, shall be provided. Handrails shall be endless with a smoothly vulcanized splice and shall operate with the moving steps. The handrails shall move on specially formed guides and traction sheaves. These sheaves shall be an integral part of the drive machine. Close fitting guards shall be provided at the handrail openings in the newel base. The handrail color shall be black.

H. Controls and Wiring

1. Controller: The controller shall be of the microprocessor type. The controller shall monitor the condition of each safety device, brake, and motor operation, and shall cause the escalator to come to a stop upon activation of any safety device, brake problem, or motor overload. Should a power failure occur, the controller shall automatically remove power from the motor, and brake, and bring the escalator to a controlled stop. The controller shall include phase and overload protection.

2. The contractor shall provide in writing the maximum voltage fluctuation allowed by controller before a fault is registered and the unit is shut down.

3. Wiring: A pre-assembled wiring harness shall be installed, complete with modular assemblies for the upper end, incline section, and lower end of the truss. The upper and lower end assemblies shall be constant and consistent from unit to unit. The incline assembly shall be variable by length only. Both upper and lower harnesses shall have terminal boxes for easy access and troubleshooting capabilities. In conjunction with the low voltage/low power circuitry, S.O. cord shall be installed between terminal boxes and individual safety switches.

4. The contractor shall include any required software to allow variation of speed after start-up once directed in the future by owner to activate this operation. The software will provide operation per the requirements outlined in item 2.03.D.3 of this section.

5. Escalator and moving walk controllers shall be located in a machine room and not in the pit of the escalator or moving walk.

I. Safety Devices:

1. Reversal Stop Device: Each escalator shall be provided with a reversal stop device or function that is controller sensitive to stop the escalator automatically should the escalator attempt to reverse its direction while operating in the ascending direction.

2. Broken Step Chain Device: A broken step chain device, a part of the lower reversing station assembly, shall be provided for each chain. When these devices are activated, the escalator will come to a controlled stop.

3. Step Upthrust Device: A step upthrust device shall be located on each side of the lower curve track on the lower end of each escalator. The escalator will come to a controlled stop should a step be displaced against the up thrust track.

4. Comb-Step Impact Device: A comb-step impact device shall be provided at the upper and lower comb plates. The escalator will come to a controlled stop should an impact occur between the comb segments and steps.

5. Skirt Obstruction Device: Skirt obstruction devices shall be provided, at both upper and lower ends, within the skirt panels. The escalator will come to a controlled stop should an obstruction occur between the step and skirt panel. Switches shall be of the plunger, self-resetting type, adjustable to maintain the required position and clearance from the skirts.

6. Missing Step Device: Missing step devices shall be provided. The missing step devices are designed to detect a missing step or steps at the upper and lower ends of the escalator. When these devices are activated, the escalator will come to a controlled stop.

7. Step Demarcation Lights: LED Step demarcation lights shall be furnished at the top and bottom of each escalator. They shall consist of a light fixture installed just below the track system where the step leaves or enters the comb plate. This fixture shall be furnished with two independent green LED lamps and shall be capable of lighting the entire width of the step. The light, which shall be visible between the steps and the step and comb segment, shall provide a reference point for entering or exiting the escalator.

8. Handrail Entry Device: A handrail entry device shall be provided at the handrail inlet in the newel. The escalator will come to a controlled stop should an object enter the handrail inlet area.

9. Handrail Speed Monitoring Device: A magnetic sensor shall be provided to sound an alarm when the handrail deviates from the step speed by 15% or more. If the deviation lasts for more than 2-6 seconds, the escalator will come to a controlled stop.

10. Emergency Stop Buttons: Emergency stop buttons shall be provided, designed so that the momentary pressure of either button shall cut off the electrical power supply to the motor and bring the escalator to a controlled stop.

    a. One emergency stop button shall be located at each landing. Location shall be in the existing newel upper radius quadrant, 45 degrees above horizontal, in order to provide easy access. The stop button shall be red in color.

    b. The button shall be housed under a clear, high impact resistant plastic cover, which shall be self-closing. Instructions for operating the stop button shall be imprinted on the cover in half-inch high letters. When the cover is lifted, an audible alarm shall sound until the cover is returned to its closed position.

11. Safety Signs: A pictorial sign meeting the requirements of the ASME A17.1a-2008/CSA B44a-08 Code shall be provided at both the upper and lower landings. The safety signs will be provided in English.

12. Stop Switch in Machinery Spaces: Each escalator shall be provided with stop switches in the upper and lower pits. When these switches are activated, the escalator will come to a controlled stop.

13. Step Level Devices: Step level devices shall be provided at the upper and lower ends of the escalator to detect downward displacement of the step prior to it reaching the comb plates. When these devices are activated, the escalator will come to a controlled stop.

14. Step Guards: Escalators in this specification are required to have step guards. Step guards will be provided in the upper and lower pit. The step guard will protect a mechanic from the step band.

2.04 CONNECTION TO EXISTING "LIFT NET" MONITORING SYSTEM

A. Interface requirements

1. Provide interface, software, licenses and wiring to interface with existing Integrated Display Systems (Lift-Net) for all escalators. Escalator controller shall provide to Lift Net all inputs Lift Net can accept from a typical escalator.

2.05 PERFORMANCE

A. Speed: +/- 3% of contract speed under any loading condition or direction of travel.

B. Protection: At time of final completion of escalator work (or portion thereof), remove all protective coverings, barriers, devices, signs or such other methods or procedures used to protect escalator work from damage or deterioration. Contractor is responsible for damage and wear during the replacement period, and shall repair or replace, to Port of Seattle RE's satisfaction, any components worn significantly or damaged before Port of Seattle RE accepts the escalators, except damage to the escalator equipment caused by other than the Contractor.

C. Step Speed: Unit shall be capable of operating at contract speed under any loading condition in either direction of travel.

D. Handrail Speed: Consistent with step speed.

E. Noise and Vibration Control: Provide sound isolation within truss as required to limit noise levels relating to escalator equipment and its operation to no more than 60 dBA, measured 3'-0" above escalator at any point of its length.

End of Section