1. **Design Criteria**:
    a. The specification of entrance and storefront systems shall include requirements for the following system components.
        i. Extruded aluminum components
        ii. Hardware requirements and specifications
        iii. Frame Types, components, and options
        iv. Performance expectations and requirements
        v. Finish choices
    b. The work of entrances and storefronts is related to many other building envelope systems such as wall and soffit systems, sheet metal flashing and trim, door hardware, operators, and glazing. The design consultant shall coordinate the work of these systems and indicate related requirements in the design documents so the contractor has a high chance of success installing the related work successfully.
        i. Door hardware for aluminum entrances and storefronts is not described in here. Refer to the division 8 door hardware section.
    c. Thermally broken systems are preferred over non-thermally broken ones, depending on the project budget. Review options with the UVM project manager to determine what is most appropriate for the project on a case-by-case basis.
    d. Standard finish coating systems are preferred over custom mix colors that are more difficult to obtain for future maintenance.
    e. Door Thickness and Rail Size:
        i. Standard Duty: 1 3/4" thick doors with 5" min. stiles are acceptable for standard-duty locations with an expected 0 - 1000 cycles per day.
        ii. Heavy Duty: 2" thick doors with 5" min. stiles are acceptable for heavy-duty locations with an expected 1000-1500 cycles per day.
        iii. Review expected cycles per day with the UVM project manager.
        iv. Bottom rails shall be 10 inches minimum. Top rails shall be sized to accommodate the mounting of door closers.
        v. Horizontal center mullions are required where exit devices are required.
    f. Where entrance and storefront systems need to be engineered by contractor, the design consultant shall indicate in the specifications that the contractor is responsible for engineering and what requirements the contractor must satisfy with their design.
        i. ie: design loads, deflection limits, air and water leakage.

g. Movement and Deflection
    i. The design consultant shall indicate the limits of expected movement/deflection of the structural system for use by the contractor's engineer, ie: initial deflection of beams/metal deck/concrete slab, deflection due to superimposed dead/live loads, column shortening, and floor to floor lateral building deflection due to seismic movement.
h. Entrance and storefront systems shall be detailed to tie into water and air barriers as part of the exterior envelope.
i. Review sustainability requirements of the project with the UVM project manager to determine the environmental requirements for entrance and storefront systems.

2. References

a. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
b. Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
c. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
d. ASTM E2068 - Standard Test Method for Determination of Operating Force of Sliding Windows and Doors
e. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
f. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
g. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
h. AAMA 507-15 – Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems in Commercial Buildings
i. AAMA 1503-09 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
j. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts.

k. AAMA 2605-13 – Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performing Organic Coatingson Aluminum Extrusions and Panels
l. AAMA 611-14 – Voluntary Specification for Anodized Architectural Aluminum
m. National Fenestration Rating Council (NFRC) 102-2010 – Procedure for Measuring the Steady-state Thermal Transmittance of Fenestration Systems.
n. Refer to the LEED Standard being applied if this is a LEED Project, and factor the U values into the building energy modeling.

3. **Required Submittals**:
    a. Product Data: Manufacturer's data including instructions, recommendations, and restrictions.
    b. Shop Drawings: Provide detailed shop drawings for fabrication, installation, and erection.
        i. Elevations and Sections: 3/4 inch scale including sections of heads, jambs, sills, intermediate members, mullions, and all other conditions.
        ii. Details: 1.5 inch scale details of connections, flashings, trims, panning, and accessories.
        iii. Glazing Details: 3 inch scale details including size and location of all weeps.
        iv. Sealant Details: 3 inch scale details including size and location of all joint sealants.
        v. Include details of provisions for assembly expansion and contraction.
        vi. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
            1. Joinery, including concealed welds.
            2. Anchorage.
            3. Reinforcing: Show all special framing and reinforcing.
        vii. Water Management: Show how water in the system is controlled and wept to exterior.
        viii. Air Barrier System Interface: Show how air barrier system interfaces with work of this Section.
    c. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

d. Verification Samples: ≥ 12 inches long of fully finished aluminum.

4. **Products, Materials & Equipment**:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      i. Kawneer North America.
      ii. EFCO Corporation.
      iii. Oldcastle Building Envelope.
      iv. Tubelite.
      v. Trulite Glass & Aluminum Solutions, LLC.
      vi. CRL Manufacturing; United States Aluminum.
      vii. YKK AP America Inc.
   b. Entrance Adapters: Provide all adapters and framing to accommodate entrance doors located within curtain wall.
      i. Maintain sight lines. Do not "double up" framing at entrances.
   c. Door Closers and Automatic Door Operators: Provide framing to conceal view of closers/operators through glass.
   d. Entrances and storefronts shall utilize high performance sill pans with waterproof end dams. Thermally broken sill pans are preferred but not required.
   e. Sealants shall have a VOC content less than 25 g/l.
   f. Coordinate stile and rail dimensions with the necessary hardware so adequate mounting space is provided.
   g. Doors with mid-rails are preferred over full glass doors so panic hardware has adequate mounting space.
   h. Provide nonremovable glazing stops on outside of door.

5. **Installation, Fabrication, and Construction**:
   a. Dissimilar metals shall be isolated from contact by use of tapes or coatings or protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
   b. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
   c. The work of air and water barrier systems needs to be coordinated with the installation of entrance and storefront systems.

d. Coordinate all related work including, without limitation, air barrier system, roof edges, hardware, electric power, and security systems.
    i. Seal all penetrations through air barrier system, roofing, and waterproof systems.
e. Provide flush, uniform, tight visible metal-to-metal seams.
    i. Do not expose unfinished metal to view in the completed assembly.
f. Cap ends of all visible hollow sections.
g. Review field testing requirements with the UVM project manager to determine what testing will be required as part of the project. Provide recommendations for consideration by the UVM PM - ie: water-spray testing.
h. Specify post-installation adjustment requirements for door operation. The contractor shall need to adjust operating hardware to function properly for smooth operation without binding, and for weathertight closure.
i. Specify requirements for touching up aluminum entrance and door framing as part of the punch-list process- ie: finish repairs, sealant corrections, cleaning.

6. **Warranties**:
    a. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
        i. Failures include, but are not limited to, the following:
            1. Structural failures including, but not limited to, excessive deflection.
            2. Noise or vibration created by wind and thermal and structural movements.
            3. Water penetration through fixed glazing and framing areas.
            4. Failure of operating components.
        ii. Warranty Period: Two years from date of Substantial Completion.
    b. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
        i. Deterioration includes, but is not limited to, the following:
            1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
            2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

ii. Warranty Period: 20 years from date of Substantial Completion.