Owner's Project Requirements
High Performance Building Envelope Design Criteria

1. Building Envelope
   A high performance building envelope reduces cooling and heating loads so HVAC can be supplied with a smaller mechanical system. Principal elements affecting heating loads are infiltration through the building and conduction losses through building envelope components. Cooling loads are dominated by solar gains through windows and sky lights; internal gains due to lighting, plug loads and occupant use; and ventilation loads required for indoor air quality. An enhanced building envelope improves occupant comfort by eliminating drafts and cold surfaces and reduces the potential for indoor air quality and maintenance issues.

   A performance approach is a more sophisticated compliance method that offers design flexibility and allows for trade-offs between building features such as envelope insulation levels, window performance, lighting power and mechanical system efficiency.

   High performance envelopes have been designed and specified to minimize entropy, control the elements and isolate sound during the daily, weekly, yearly use cycles. Execution of the installation of the functional barriers is vital to the long-term operational success of the building. These barriers include rain screens, air barriers, vapor barriers, thermal insulations and sound-attenuation assemblies.

   a. Opaque Walls – A high performance envelope relies on the following good design practices:
      i. Tight well-detailed construction to eliminate air infiltration to include a continuous air barrier around the building.
      ii. Continuous insulation integral to any opaque surface of the building envelope and has no thermal bridges other than fasteners and necessary service openings.
      iii. Maintains a continuous, well-insulated thermal barrier connecting roof insulation to wall insulation to foundation insulation around the building.
      iv. A vapor control layer to limit vapor migration through the assembly and lets moisture out if it does penetrate the wall assembly.
      v. A vented "rain screen" system to resist water penetration.

   b. Envelope Performance Targets
      i. Air tightness (Non-Terminal Buildings) $\leq$ 0.25 cfm/ft^2 (1.25 L/(s*m^2)) at 0.3 inches of water gauge (75 Pa)
      ii. Clear Wall Steel Framed Assemblies R-value: $\geq$R-15
      iii. Concrete Masonry Units R-value: $\geq$ R-20
      iv. Cast-in-Place Concrete R-value: $\geq$ R-15
      v. Insulated Metal Panel R-value: $\geq$ R-21
      vi. Curtainwall Spandrel R-value: $\geq$ R-15
      vii. Curtainwall U-value: $\leq$ 0.35
      viii. Curtainwall and storefront systems should be thermally broken.
      ix. Foundation or lowest floor if over parking: $\geq$ R-15
      x. Roof R-value: $\geq$ R-30

c. Glazing System Targets
    i. All insulated glazing units shall include Low-E Glass.
    ii. Solar Heat Gain Coefficient (SHGC): <0.27
    iii. Thermal Performance (U-Value):
        a. NFRC U-Value, Winter Nighttime: $\leq$0.28
        b. NFRC U-value, Summer Daytime: $\leq$0.26
    iv. Visible Light Transmittance (VLT): <50%
        a. Exception <64% VLT for clerestory windows used in conjunction with light shelves or daylight redirecting film.
        b. Light to Solar Gain Ratio (LSG): $\leq$1.70
        Exception <2.15 for clerestory windows used in conjunction with light shelves or daylight redirecting film.