1. **GENERAL**
   A. Related sections:
      i. 00 00 13 – Designing Learning Environments
      ii. 11 52 13 – Projection Screens
      iii. 12 56 52 – Audio-Visual Equipment
      iv. 72 41 00 – General Audio-Visual Systems Requirements
   B. Bidding of Audio-Visual Equipment and Systems
      i. When soliciting multiple bids for audio-visual equipment and systems, the
         request for proposals and bid documents shall include written communication
         to vendors that the project is considered a ‘Statewide contract release’ and shall
         ensure the State administrative fee associated with use of the statewide
         contract is included in the bids.

2. **PRODUCTS**
   A. Flat Panel Monitors
      i. Flat-Panel monitors shall be provided in small classrooms, 10-20 seats, in lieu of
         ceiling mounted projectors, as well as in SCALE-UP classrooms (one for each
         group of 9).
      ii. Consider providing recessed wall boxes behind the monitors for housing any
          small electronics and accommodating power, AV and data connections. Size all
          displays (both flat-panel monitors and projection systems) such that the farthest
          viewer is within five screen heights from the image.
   B. Projectors
      i. Projectors are typically ceiling mounted but may be shelf mounted at the rear of
         the room with a long-throw lens if the ceiling is not conducive to mounting the
         projector. Long pole mounts should be avoided due to potential for vibration
         concerns.
      ii. Projectors with a low noise level (<42 dBA) are recommended. For the largest
          lecture halls, a conditioned sound enclosure may be required to mitigate sound
          in the room while properly removing heat from the enclosure. Projectors in
          high-ceiling spaces and/or in hard to service areas may require a retractable
          projector lift to lower the projector for routine maintenance (e.g. lamp and filter
          replacement).
      iii. Projectors should be sufficiently bright to provide at least a 10:1 contrast ratio
           (and preferably 15:1) during typical teaching conditions. The contrast ratio
           would be determined by ANSI/INFOCOMM 3M-2011 - Projected Image System
           Contrast Ratio. Those situations that require high resolution or have detailed
           visual information (e.g. Medical imaging or fine art) may require a 50:1 to 80:1
           contrast ratio depending on the physical makeup of the room. The largest
           negative contributor to achieving the preferable contrast ratio is ambient light
           from the room’s lighting system and/or sunlight (direct or reflected) on the
           projection surface. Generally, ambient light will need to be less than five foot-
           candles on the projection surface during normal AV presentation mode while
           maintaining light on the students and instructor. Indirect lighting near the front
of a classroom should be avoided to manage both the ambient light level on the screen and to maintain a clear light path from projector to screen.

iv. Display technology is constantly evolving; therefore, the Design Professional should consult with The Center for Teaching and Learning as to the preferred make and model of projector for each classroom in a given project.

v. Projector lifts are required if:
   1. A projector’s “show” position is to be higher than 14 feet;
   2. A projector is positioned over fixed flat seating;
   3. A projector is positioned over tiered fixed seating;
   4. A projector is positioned over an aisle with rails;
   5. A projector’s access is limited by mechanical or physical infrastructure.