DESIGN DEVELOPMENT PHASE

During the design development phase, the design team can build on the daylighting and HVAC energy-reduction schemes by focusing on the building shell: the roof, walls, windows, and exterior shading devices**.**

A life cycle cost analysis should be done in this phase to help select from the list of potential ECMs that were identified in the schematic design phase. By the end of this phase of the design, all ECMs should be positively identified**.**

As previously mentioned, the major energy end-uses are the HVAC and the electrical lighting equipment and they should be the major focuses in the life cycle cost analysis of the ECM selection process. However, smaller end-uses sometimes have a very short payback and should not be overlooked.

CONSTRUCTION DOCUMENT PHASE

The construction document phase is the final phase of the design process where the efforts of the two earlier phases are further developed and coordinated, to the point of producing a completed set of documents ready for the bidding process.

As this further development takes place, the design team will incorporate the selected energy conservation measures in this process as plans and specifications are finalized.

The design team should continue to be keenly aware of any new technology or equipment developments that will be advantageous and compatible with the selected systems. Any new technology or other significant changes made during this phase should be thoroughly coordinated with the entire design team (and especially the owner).

BUILDING ENVELOPE

Insulation

Insulation in the building envelope is important to the overall quality and energy efficiency of the building. In particular, attention should be given to buildings that have outside walls that are framed with steel studs and provide a parallel path for heat flow between the insulation batts. According to Table A-21 in ASHRAE Standard 90.1-2001, a six-inch metal stud wall with R-19 insulation can have an effective overall R-value of only R-7.1.

In general, insulation has a positive effect on air conditioning and heating loads and results in energy savings up to a certain point, but additional insulation beyond required insulation levels has strongly diminishing returns. The most useful place to apply additional insulation is in the roof assembly, where a larger proportion of heat gain or loss occurs.