

## ***APPENDIX B: ENERGY AUDITS AND AUDIT PROCEDURES***

- A. The American Society of Heating Air Conditioning and Refrigeration Engineers (ASHRAE) *Procedures for Commercial Building Energy Audits, 2004*, has developed standard energy audit levels. There are four levels of commercial energy audits recognized by the AEO and three of them conform to ASHRAE's standards. The ASHRAE procedures should be reviewed for additional information and requirements for Levels 1-3 audits. Below is a brief description of these audits:
1. **Overview or Walk-Thru Audit** - Overview audits are the least expensive type of commercial energy audit. They involve walking through a facility, identifying energy conservation opportunities, interviewing facility personnel, and quickly reviewing the facility's utility bills. The overview audit is fine for smaller organizations and those on a budget that want some quick tips on how they can reduce their energy usage and costs. It basically gives a road map of what to do.
  2. **ASHRAE Level 1 – Walk Through Analysis** - ASHRAE Level 1 audits are more intensive than Overview Audits and are used for clients who are seeking Leadership in Energy and Environmental Design-Existing Building status. The ASHRAE Level 1 audit focuses on low-cost/no-cost energy conservation measures, and provides a list of higher cost energy conservation measures. In addition to tasks performed in the Overview Audit, in the ASHRAE Level 1 audit, energy and energy cost savings are reported for each energy conservation opportunity. An energy balance is performed, which breaks out energy usage into different end uses.
  3. **ASHRAE Level 2 – Energy Survey and Analysis** - ASHRAE Level 2 audits include a more detailed building survey, financial projections, and energy analysis than ASHRAE Level 1 audits. Basically, ASHRAE Level 2 audits will identify all appropriate energy conservation measures for a facility, and a financial analysis will be performed based on implementation costs, operating costs, and attainable savings. You will know for each energy conservation measure, the amount to be saved, the amount the measure will cost, and the amount of time it will take for the measure to pay for itself. In addition, ASHRAE Level 2 audits will discuss any changes to operations and maintenance procedures. ASHRAE Level 2 audits are used by clients who are seeking LEED-EB status and are normally less expensive than Retro-Commissioning. With ASHRAE Level 2 audits, realistic savings reports with regard to baseline

operating costs should be provided. These reports will stress the expected return on investment, and projected savings will be presented.

**4. ASHRAE Level 3 – Detailed Analysis of Capital Intensive Modifications**

This level of engineering analysis focuses on the potential capital-intensive projects identified in the Level 2 analysis and involves more detailed field data gathering as well as a more rigorous engineering analysis. It provides detailed project cost and savings calculations with the high level of confidence required for major capital investment decisions. This audit alternatively is called a comprehensive audit, detailed audit, or technical analysis audit. It expands on the Level 2 audit by providing a dynamic model of energy use characteristics of both the existing facility and all energy conservation measures identified. The building model is calibrated using actual utility data to provide a realistic baseline against which to compute operating savings for proposed measures. Extensive attention is given to understanding not only the operating characteristics of all energy consuming systems, but also the situations that cause load profile variations on both an annual and a daily basis. Existing utility data is supplemented with sub-metering of major energy consuming systems and monitoring of system operating characteristics.