Appendix A. NEAT Weatherization Measures

The list of weatherization measures considered by NEAT can be accessed in the Library Measures form under the Main Menu's "Setup Library" button (see Section 14.5, *Library Measures*). NEAT currently examines 30 weatherization measure types:

1. Attic insulation (R-11, 19, 30, 38, 49, Specified level, Fill cavity)
2. Sill box (band joist) insulation
3. White roof coating
4. Foundation wall insulation
5. Floor insulation (R-11, 19, 30, and 38)
6. Wall insulation and knee wall insulation
7. Duct insulation
8. Window sealing
9. Door replacement
10. Storm windows
11. Window replacement (standard and low-e)
12. Window shading (awnings, sun screens, and window films)
13. Vent damper (thermal and electric)
14. IID (Intermittent ignition device) and Electric vent damper/IID combined
15. Flame retention burner
16. Furnace tune-up
17. Replace heating system (furnace/boiler – standard/high efficiency)
18. Smart (set-back) thermostat
19. Tune-up air conditioner
20. Replace air conditioner (window and central)
21. Evaporative cooler
22. Install/Replace heat pump
23. Seal ducts
24. Lighting retrofits
25. Refrigerator replacement
26. Water heater tank insulation
27. Water heater pipe insulation
28. Low-flow showerheads
29. Water heater replacement
30. Infiltration reduction

Appendix A: NEAT Weatherization Measures

The first seven weatherization measure types are designed to reduce heat loss or gain through walls, floors, ceilings, and ducts. Measure types 8 through 12 affect the way windows and doors behave in the house. They can alter the conduction and infiltration heat loss through windows and doors, and solar gain through windows. Window shading reduces solar gain – a major element of total heat gain. Shading the windows may affect the heating load, because shade blocks some solar heat from the house during the heating season. Measure types 13 through 18 improve the heating system efficiency by decreasing heating energy consumed by the house. They do not affect heat loss through the envelope, however. Measure types 19 through 22 improve cooling efficiency during the cooling season. Evaporative coolers and new air conditioners can reduce cooling costs markedly, if properly installed. Measure type 23, Seal Ducts, can increase the efficiency for both heating and cooling, depending on the HVAC equipment in the home. Measure types 24 through 29 reduce the energy consumption not directly related to the climate. Such measures are referred to as "base load" measures. They can have minor effects on the heating and cooling costs. Measure type 30, Infiltration Reduction, evaluates the success of your efforts to reduce the air infiltration in the home, reducing both heating and cooling costs.

For each of the envelope components of a home where insulation may be added (see Sections A.1, A.2, and A.4 through A.6 below), there are one or two insulation types standard to NEAT that may be chosen to be installed. However, NEAT allows the user to define additional insulation types for each of these envelope locations in the Setup Library (see Section 14.7, *NEAT Insulation Types*). For each of these types, the insulation characteristics (R-value per inch or total R-value) are also specified on this form.

A.1 Attic Insulation

For any attic type or attic component (except knee wall[5]), attic insulation can be evaluated in NEAT in three ways:

- **Add Standard Insulation Levels** – If the R-value of added insulation or the maximum depth of total insulation (see Section 9.4, *Shell – Unfinished Attics*) is not specified, NEAT will evaluate the cost-effectiveness of adding all standard

[5] For knee wall insulation, see Appendix A.6, *Wall Insulation*.

levels of attic insulation (R-11, R-19, R-30, R-38 and R-49) as separate measures and recommend the most cost-effective insulation level.

- **Add Specified Insulation Level** – If the user has specified an R-value of added attic insulation, NEAT will evaluate its addition as a mandatory measure and display it in the recommended measures list, even if it is not cost-effective. If the specified level proves not to be cost-effective, it might be wise to run NEAT again, allowing the program to choose a cost-effective level, if one exists.

- **Fill Ceiling Cavity (given depth restriction)** – If the user has specified a depth restriction for attic insulation (depth of any existing insulation plus the space for any additional insulation), NEAT will evaluate adding all standard levels of insulation that fit into the available space as well as the level of insulation that exactly fills the available space, and recommend the most cost-effective insulation level.

For determining the level of insulation that exactly fills the available space, NEAT uses R-values per inch entered on the NEAT Insulation Types form under the Setup Library (see Section 14.7, *NEAT Insulation Types*).

For determining the installation cost of added insulation levels other than the standard insulation levels, NEAT interpolates using the costs of installing the standard levels entered on the Library Measures form under the Main Menu's "Setup Library" button (see Section 14.5, *Library Measures*).

A.2 Sill Box (Band joist) Insulation

For houses with an enclosed foundation space or an exposed floor, the sill portion of the foundation wall or floor may be uninsulated. Insulating the sill is often cost-effective. No air leakage reduction through the sill is assumed to occur due to implementing this measure. NEAT will compute the change in the overall conductance of the foundation space that results from installing sill insulation. NEAT evaluates installing fiberglass batts or any other sill insulation materials, at their indicated R-values, as specified by the user in the NEAT Insulation Types form under the Setup Library. The insulation is added to the uninsulated perimeter of sill exposed to the outdoors, as indicated by the user.

Sill Box and Floor Insulation measures are considered mutually exclusive; that is, NEAT will not recommend both measures, because the program assumes that if floor insulation is installed, it extends to the sill, thus insulating the sill as well.

A.3 White Roof Coating

An elastomeric, low-emissivity roof-coating retrofit measure is applied only to homes with a Roof Color of "Normal or Weathered" (see Section 9.4, *Shell – Unfinished Attics*) and an existing cooling system. The benefit comes from decreasing the solar load on the roof, which in turn decreases the home cooling load. This retrofit measure is commonly installed only in cooling climates.

A.4 Foundation Wall Insulation

For houses with an enclosed foundation space, the Foundation Wall Insulation measure assumes a uniform addition of insulation to both above- and below-grade foundation space walls. NEAT evaluates installing rigid foam board or any other foundation wall insulation materials, at their indicated R-values, as specified by the user in the NEAT Insulation Types form under the Setup Library. No insulation will be added to foundation walls of a subspace having average height less than two feet.

See Section A.4, *Floor Insulation*, below for information regarding selecting between the foundation wall insulation and floor insulation measures.

A.5 Floor Insulation

For houses with an enclosed foundation space or an exposed floor, adding insulation to the floor between the living space and the foundation space can be evaluated. NEAT will evaluate the cost-effectiveness of adding standard levels of insulation (R-11, R-19, R-30, and R-38) as separate measures and recommend the most cost-effective insulation level. The levels evaluated are restricted to those that fit within the joists, as determined by the entry for the Floor Joist Size on the Foundations form of the audit (see Section 9.6, *Shell – Foundations*) and the R-values per inch entered on the NEAT Insulation Types form under the Setup Library for the floor insulation material chosen to be installed.

The Foundation Wall Insulation and Floor Insulation measures are mutually exclusive; that is, NEAT will not recommend both. You may choose to have NEAT evaluate either or both measures, depending on your choice of Added Insulation Type in the Floor and Foundation Wall data blocks on the Foundations form. A choice of "None" in either or both of these fields prevents NEAT from evaluating installing insulation in the location. If both measures are specified, NEAT will evaluate insulating the foundation walls and all standard levels of floor insulation as separate measures and recommend the most cost-effective measure, if the SIR is greater than the minimum allowable SIR.

A.6 Wall Insulation and Knee Wall Insulation

NEAT will evaluate installing insulation either into the cavity of a frame wall or board insulation over the entire surface of a wall, depending on the Wall Type and Added Insulation Type chosen on the Walls form of an audit (see Section 9.1, *Shell – Walls*). NEAT will not attempt to add loose fill insulation to a wall that is not frame, a frame wall already having loose fill insulation present, or where the existing insulation depth is seen as providing less than 1.5 inches of available space. In determining the available space, the program takes into account the stud size, the R-value of existing insulation, and the insulation's thermal characteristics (R-value per inch). NEAT considers a wall insulation material to be loose fill if the "Units" for the material on the NEAT Insulation Types form have been chosen as "R/in."

NEAT's Wall Insulation measure not only affects the conduction through a wall, but also reduces the free solar heat transmission through the wall. If a wall is located next to a sheltered but unheated area, NEAT reduces the effective temperature difference seen across the wall by one-third.

For houses with a finished attic, NEAT will evaluate the savings from insulating a knee wall (a wall next to an unconditioned attic space) using a measure dedicated to this purpose. NEAT evaluates installing fiberglass batts or any other insulation material, at the indicated R-value, as specified by the user in the NEAT Insulation Types form under the Setup Library.

A.7 Duct Insulation

The Duct Insulation measure can be evaluated for a house where the primary heating system is a furnace or heat pump and uninsulated supply ducts are located in an unconditioned attic or foundation space. NEAT uses information you supply under the Uninsulated Supply Ducts sub-form under the Heating form of the audit (see Section 9.7, *Heating – General Description Data*).

NEAT evaluates this measure by adding a specified R-value (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*) to existing R-1.5 supply ducts and calculating the heat lost from the supply duct during winter as well as heat gained by the duct during summer (if central air-conditioning is present). These heat exchanges are assumed to occur between the duct and the space where the duct is located, either a foundation space or the attic, depending on your input.

A.8 Window Sealing

NEAT estimates the savings that can be obtained from weatherizing an existing window to reduce its leakiness. Both heating and cooling (latent and sensible) energy is considered in this estimate. The amount of energy saved depends on your declaration of each window's pre-retrofit leakiness, as indicated on the Windows input form (see Section 9.2, *Shell – Windows*) as well as the overall house leakiness described on the Ducts/Infiltration form (see Section 11.2, *Ducts/ Infiltration*).

NEAT translates your leakiness designation into an estimate of air leakage through the window that results primarily from a pressure differential created by wind. It then uses empirically-based relations to reduce this air leakage through the window to reflect caulking, weather-stripping, and general repairs to the window. The energy saved from this reduction is computed in much the same way savings from whole house infiltration reduction is determined.

Note that if pre-retrofit whole house infiltration data has been entered, NEAT subtracts from it that leakage determined for the windows. Thus, if window treatments are performed, the savings from general air sealing will likely be reduced, so as to avoid accounting for the window sealing twice.

The Window Sealing measure is one of four mutually exclusive window measures, along with Storm Windows and Window Replacement (both standard and low-e). Only the measure found most cost-effective from a set of mutually exclusive measures will be recommended. Thus, NEAT would never recommend both sealing and replacing the same window. The only exception to the cost-effectiveness criteria is when a specific measure has been declared mandatory, as might be the case for the Window Replacement measure for a window whose frame is so rotted that weatherization or use of a storm window is not practical. Check your program's policy regarding mandating measures. How the measure is viewed depends on the selection you make for Retrofit Status on the Windows form during data input.

A.9 Door Replacement

This retrofit measure is evaluated only if the existing door is not a sliding glass door. The benefit assigned to this measure is to increase the R-value through the door and possibly reduce air leakage through the door. The infiltration savings depends on your indication of the existing door's initial leakiness (see "Leakiness" in Section 9.3, Shell – Doors). This savings is computed in a manner similar to that used for windows (see the discussion of the Window Sealing measure above for more information).

A.10 Storm Windows

NEAT assumes that installation of a storm window introduces an additional air space to the window assembly. The added R-value due to this air space and extra pane of glass is taken from published data for air space R-values with one face having the emittance the user provides in the Key Parameters of the Setup Library (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). This allows for the modeling of installing a low-e storm window. The addition of the storm window will also change the solar transmission through the window, depending on additional data provided in the key parameters. Unless altered by the user, the key parameters are set to model the storm window as a single pane of clear glass in a wood or vinyl frame.

Lastly, the storm window could produce an additional benefit of reducing air leakage. The change in air leakage through the window system with and without a storm window is estimated in NEAT from published and empirical data as well as

your indication of the existing window's initial leakiness (see the discussion of the Window Sealing measure above for more information).

This measure is mutually exclusive with other window retrofit measures. See the discussion of the Window Sealing measure above for the implications of mutual exclusiveness.

A.11 Window Replacement (Standard and Low-E)

NEAT assumes the installation of a quality window with thermal and transmittance properties specified in the Setup Library (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*) and leakage characteristics that meet code standards. The energy savings estimated for the measure considers conduction, solar, and infiltration effects.

The Low-e Window measure replaces the existing window with a low-e window with properties also specified in the Key Parameters. Low-e windows save energy during the winter by reflecting heat rays originating in the house back indoors. During the summer, low-e windows reflect solar heat outdoors. Low-e windows also have a higher R-value than single- or standard double-pane windows.

Both window replacement measures may also produce infiltration savings, depending on your indication of the existing window's initial leakiness (see the discussion of the Window Sealing measure above for more information). Any such savings will be subtracted from the general air sealing savings so as to avoid accounting for this infiltration savings twice.

The window replacement measures are mutually exclusive with other window retrofit measures. See the discussion of the Window Sealing measure above for the implications of mutual exclusiveness.

Unless changed by the user, the standard Window Replacement measure assumes installation of a quality double pane window with a thermally broken metal frame. The Low-e Window measure assumes installation of a double-pane window with a metalized coating on one of the interior glass surfaces.

A.12 Window Shading

NEAT evaluates window shading on all windows not facing north and shaded less than 50% without the measure. Shading measures are most beneficial in cooling climates, since their effect during the heating season is detrimental, blocking sunlight that would otherwise help heat the home. Three types of window shading are evaluated: Awnings, Sun screens, and Window films. The Window Shading measures are mutually exclusive among themselves, as well as with the Storm Windows measure and the Low-E Windows measure.

- **Awning** – Awnings reduce direct solar radiation incident on a window. NEAT's affect is season-dependent since the sun is lower in the sky during the winter than in the summer. Awnings are an effective conservation measure because they stop solar heat before it contacts the house. However, awnings are expensive, they require more planning, and they restrict views through windows more than other conservation measures.

- **Sun Screen (Fabric or Louvered)** – NEAT assumes that fabric sun screens block about 66 percent of solar radiation and that aluminum louvered sun screens block about 89 percent of solar radiation. Fabric sun screens are less expensive and easier to assemble than louvered sun screens. Both affect the view through the window.

- **Window Film** – There is a large variety of window films available having a range of optical and thermal properties. The more reflective films are highly metalized and appear mirror-like from outdoors. All-season films, sometimes called low-e films, also reflect heat energy from inside the house during the heating season. In all but the hottest, sunniest climates, these low-e films are more cost-effective than films that merely reflect solar heat. NEAT assumes that the window films installed have the characteristics specified in the Key Parameters of the Setup Library (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). Unless changed by the user, they represent an average window film, though more effective products do exist.

NEAT assumes that these window treatments, if installed, will cover the entire glazed portion of the window.

A.13 Vent Damper (Thermal and Electric)

A vent damper reduces heat loss from a heating system by closing the chimney when the burner is not operating. The vent damper prevents most of the residual heat from escaping the heat exchanger, allowing the pump or fan to deliver the leftover heat to the house instead of losing it up the chimney.

NEAT evaluates installing electric vent dampers on natural gas, propane, or oil-fueled furnaces or boilers that currently have intermittent ignition devices (IID) or will have an IID installed during retrofit. Electric vent dampers use a solenoid or a small electric motor. A solenoid is a magnetically operated lever that opens the damper when the burner fires and closes it when the burner goes off. Vent dampers for use with oil systems or with gas systems with IIDs may have dampers that close almost completely. NEAT will not evaluate installing an electric vent damper on a heating system having a pilot light.

NEAT evaluates installing thermal vent dampers on natural gas or propane-fueled furnaces, boilers, or vented space heaters, with and without pilot lights. These dampers open a bimetallic damper when they sense heat. Thermal vent dampers close when the burner is off and the chimney cools. Thermal vent dampers may be dangerous in heating systems with marginal draft and may not be permitted by some local codes. Some locations may have regulations barring installation of any vent dampers. Should a damper fail in the closed position, serious health problems may be incurred by the occupants.

NEAT will not consider installing a vent damper of either type on a heating system that is in a conditioned space or has either a power or retention head burner. The savings attributed to the measure ranges from 4% to 9% of monthly heating energy consumption, depending on the system type, fuel, and location.

A.14 IID (Intermittent Ignition Device) and Electric Vent Damper/IID Combined

An intermittent ignition device (IID) saves energy by eliminating the need for a standing pilot light. The IID consists of a special gas valve, an electric igniter, and a pilot light that remains on only while the main burner is lit. NEAT assumes that an electric vent damper will be installed with an IID, or that an IID is present

before an electric vent damper is recommended. NEAT will evaluate this measure only for furnaces or boilers fueled with natural gas or propane.

NEAT uses formulas to estimate savings for two possible conditions: 1 – Pilot light on during the summer; 2 – Pilot off during the summer. Indicate on the heating screen (see Section 9.8, *Required Heating System Details Sub-Form*) which of these conditions exists. Rather than computing savings based on a percentage of annual consumption, NEAT links savings to the location's heating degree days. For most climates, this results in annual savings from 4 to 6 percent of gas consumed by the heater.

A.15 Flame Retention Burner

Flame retention burners provide higher combustion efficiency by mixing the mist of oil and air more vigorously than conventional burners. Furnaces and boilers with flame retention burners have steady-state efficiencies of 80 percent or more. Replacing an existing oil burner with a flame retention burner is usually cost-effective if the existing steady-state efficiency is less than 75 percent. NEAT evaluates installing a flame retention burner only on oil-fueled furnaces or boilers.

When a conventional oil burner is replaced with a flame retention burner, the burner nozzle is usually reduced a size to account for the oversizing of the original burner, the higher efficiency of the new burner, and improvements to the envelope of the house. NEAT does not account for any additional savings that may result from this down-rating of capacity.

The combustion chamber of the existing heating unit may be re-lined with a ceramic liner – installed like a plaster cast – when the burner is replaced. If installation of a flame retention burner in your program includes this procedure, the price of this measure should include its cost.

A.16 Furnace Tune-Up

Heating systems may function far below their potential efficiency or may be unsafe due to the following common problems:

- Dirt, soot, or other materials interfering with the burner flame;
- Dirt, soot, or corrosion on heat exchanger surfaces;

- Electric controls malfunctioning or out of adjustment;
- Air hotter than necessary to heat the house;
- Incomplete combustion;
- Faulty draft;
- Incorrect fuel input;
- Blockages or leaks in heating distribution system; or
- Faulty thermostatic setting, anticipator adjustment, or location.

Heating technicians performing tune-ups should have specific training on increasing the efficiency of heating systems. Technicians should have test equipment to measure efficiency, air temperature, carbon monoxide, draft, and all other parameters relevant to the seasonal efficiency of each heating system.

NEAT will evaluate the Furnace Tune-Up measure only for furnaces or boilers fueled by oil, natural gas, propane, or kerosene. NEAT assumes that if the measure is performed by a qualified technician who addresses the issues listed above, it will save from 0 to 14.5 percent of the fuel used for heating, depending on the Equipment Type and Fuel entered under NEAT's Heating tab and the Condition of the furnace and Steady State Efficiency, as indicated by the user's entries on the Required Heating System Details sub-form of the tab (see Sections 9.7, *Heating – General Description Data*, and 9.8, *Required Heating System Details Sub-Form*). The measure is mutually exclusive with the Replace Heating System measure; that is, only one of the two will ever be recommended, if either.

A.17 Replace Heating System (Furnace/Boiler – Standard/High Efficiency

Replacing the heating system makes economic sense when the steady-state efficiency of the existing system is low and can't be significantly improved. Today's standard efficiency natural gas heating systems have fans that draw in the combustion air and propel the combustion products out of the heater. They also have intermittent ignition devices that eliminate the energy consumed by a standing pilot light. With these improvements, standard efficiency gas heaters achieve seasonal efficiencies of 80 percent or more.

Today's standard efficiency oil heaters use flame retention oil burners. They also eliminate the natural draft chimney and the barometric draft control by using an

induced draft fan and a smaller flue pipe. These improved oil heaters achieve seasonal efficiencies of around 85 percent.

The most efficient gas heaters cause water vapor formed in the combustion process to condense into liquid water. These condensing heaters reclaim the heat in the water vapor and achieve seasonal efficiencies of more than 90 percent.

NEAT provides for two separate furnace/boiler replacement measures: a standard efficiency heating unit (80+ percent) and a high-efficiency unit (90+ percent). The user may have NEAT weigh the two and recommend the most cost-effective, if either; force NEAT to evaluate only one of the two options; or, in the case of a health and safety issue with the existing unit, dictate either option as mandatory (see "Options" in Section *9.8, Required Heating System Details Sub-Form*).

The cost-effectiveness of replacing a heating system heavily depends on the Steady State Efficiency of the existing system, entered on the Required Heating System Details sub-form. If a heating system is to be replaced solely based on the savings of the measure, it is strongly recommended that this entry be obtained from an accepted efficiency measurement, as opposed to data from the name plate of the unit or a data base of heating system efficiencies. The measure is mutually exclusive with the Furnace Tune-Up measure; that is, only one of the two will ever be recommended, if either.

NEAT will also evaluate the cost-effectiveness of replacing any fossil-fueled (including propane and kerosene) furnace or boiler to a system consuming a different fossil fuel. It is left to the user to determine the appropriateness of such a replacement in his/her program.

A.18 Smart (Set-Back) Thermostat

Automatic set-back (smart) thermostats can be cost-effective for people who have regular schedules and who understand how to set the thermostats to follow those schedules. NEAT evaluates savings accomplished by setting back the set-point temperature during the heating season only. Therefore, the measure will not show cost-effectiveness in cooling climates. You may set the number of degrees Fahrenheit of the nightly setback in the Key Parameters of the Setup Library (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). Unless altered, NEAT will assume a five degree Fahrenheit setback.

A.19 Tune-Up Air Conditioner

Significant efficiency increases for an air conditioner may be possible through proper maintenance and periodic tune-ups. The following steps are suggested in performing the tune-up of an existing air conditioner:

- Replace or clean existing air filters and grills,
- Check and clean condensate trough and drain,
- Clean evaporator (indoor) and condenser (outside) coils,
- Straighten bent or flattened coil fins if necessary,
- Ensure unobstructed air flow to the condenser coil,
- Check for proper refrigerant charge,
- Remove dust and dirt from fan blades,
- Examine and oil motor and fan bearings,
- Inspect and/or tighten electrical connections and contacts,
- Check for blockages or leaks in the supply and return ducts.

Properly trained HVAC technicians should perform the tune-up insuring the use of proper equipment, especially in checking the refrigerant charge and the electrical wiring, and straightening the coil fins.

NEAT will evaluate the Tune-Up Air-Conditioner measure for any central or window air-conditioner having an SEER below 10.0. NEAT assumes that a thorough air conditioner tune-up, addressing the issues listed above, will increase the system's SEER from 0 to 36 percent, depending on its existing condition.

A.20 Replace Air Conditioner (Window and Central)

Air conditioners move heat from indoors to outdoors with a cooling coil (the evaporator), a heating coil (the condenser), and a compressor, which moves a heat transfer fluid (the refrigerant) between the two coils. The federal government requires all air conditioners to carry a yellow energy label listing its annual cost of operation and a measure if its efficiency, EER for room air conditioners and SEER for central systems. A room air conditioner with an EER of 12 will use half as much electricity for cooling as one with an EER of 6.

NEAT considers replacing each existing unit individually with an equivalent unit with similar characteristics, but higher efficiency. The program will not evaluate

replacing multiple window units with one central unit. NEAT will not replace an air-conditioner having SEER of nine or above.

The costs of replacing individual air conditioners having each of three capacities for both room and central systems are entered under the "Costs" button for the Replace AC measure on the Library Measures form of the Setup Library (see Section 14.5, *Library Measures*). For room air conditioners, NEAT will interpolate to arrive at a cost of replacing the size of unit specified in the building description. For central systems, the program will use the capacity of the nearest ½-ton increment to the specified size, using interpolation or extrapolation of the costs for the three standard sizes.

Since NEAT accepts only Seasonal Energy Efficiency Ratio (SEER) values, you may need to convert EER to SEER values (see Section 9.9, *Cooling*, for converting EER to SEER). Replacement SEERs may be altered in the Key Parameters of the Setup Library (see "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). Unless changed by the user, the SEERs for the replacement window and central air-conditioners are 11 and 13, respectively.

A.21 Evaporative Cooler

In the warm, dry climates of the western United States, evaporative coolers (also called swamp coolers) are a popular and energy efficient cooling device. The lower the summertime relative humidity, the more the evaporative cooler will drop the indoor temperature. Evaporative coolers use one-quarter to one-sixth of the energy of air conditioners and they cost about one-half as much to install. Unlike central air conditioners, evaporative coolers provide a steady stream of fresh, humid air to the house.

NEAT will evaluate the Evaporative Cooler measure only in climates where the relative humidity is less than 50% during 90% of the months when the average monthly temperate is above 78°F. However, even in some climates where these conditions hold, evaporative coolers may not be available or seen as applicable. They have maintenance requirements that may be difficult for some clients to accomplish. If this measure is not to be considered for your program, the measure should be turned off (see Section 14.5, *Library Measures*) since its high cost-effectiveness will usually place the measure high on the recommended measures

list, preventing other mutually exclusive cooling measures from being recommended and making other cooling measures less cost-effective.

A.22 Install/Replace Heat Pump

Heat pumps operate like air conditioners except that the heating and cooling coils can switch functions to supply heat as well as cooling. The Install/Replace Heat Pump measure will evaluate the cost-effectiveness of (1) installing a heat pump to replace any electric resistance heating system with or without existing cooling and (2) replacing an existing heat pump with one of higher efficiency.

If your existing primary heating system is electric resistance, regardless of the equipment type (see Sections 9.7, *Heating – General Description Data*, and 9.8, *Required Heating System Details Sub-Form*), you may request NEAT evaluate installation of a heat pump. NEAT will evaluate replacing the heating system and all cooling equipment with a single heat pump and recommend this if cost-effective and more so than replacing each individual air conditioner and leaving the heating system unaltered. If no existing cooling equipment has been specified, NEAT will include only heating savings in its estimates of the total savings and SIR for the replacement, as well as for other measures being evaluated.

For NEAT to evaluate replacing an existing heat pump, the primary heating system and at least one of the cooling systems should have been described as heat pumps. Any existing cooling equipment, regardless of its type (see Section 9.9, *Cooling*), will be replaced by the new heat pump.

The heating efficiency (HSPF) of the replacement system is designated in the Replacement System data block on the Required Heating System Details sub-form. The cooling efficiency (SEER) of the replacement heat pump is specified in the Setup Library (see "Equipment" in Section 14.2, *Key Parameters*). The costs for the heat pump installation are determined from the user-supplied costs for three sizes of heat pumps supplied in the Material Cost screens of Setup (see Section 14.5, *Library Measures*).

A.23 Seal Ducts

NEAT's Seal Ducts measure estimates the heating savings from sealing ducts of a forced air furnace or heat pump. Cooling savings will also be determined if the

cooling system is a central air conditioner. The measure has no entry on NEAT's Library Measures form of the Setup Library. It is activated by the user selecting the Evaluate Duct Sealing checkbox on the audit's Ducts/Infiltration form (see Section 11.2, *Ducts/Infiltration – Air and Duct Leakages*). Costs associated with the work are also entered on this form.

NEAT translates your pre- and post-retrofit input data from either of the three duct leakage measurement techniques (whole house blower door, blower door subtraction, or duct blower) into parameters accepted by the ASHRAE 152P "Method of Test for Determining the Design Seasonal Efficiencies of Residential Thermal Distribution Systems." The program applies the resulting pre- and post-retrofit efficiencies to the heating and cooling loads to estimate the savings of the duct sealing efforts.

A.24 Lighting Retrofits

Replacing existing incandescent interior lighting with compact fluorescent lights is a relatively straight forward way to reduce the electric consumption of a home. The development of the compact fluorescent bulb has made this retrofit an extremely simple one to accomplish because most compact fluorescent lights are fitted with screw-in bases identical to the incandescent bulbs, which allow a quick and easy one-for-one replacement.

NEAT computes the savings of using the lower wattage compact fluorescent bulb to replace an existing incandescent bulb. The watt reduction is determined from the user's input of existing and replacement bulb consumption, though default values for replacement wattage give the standard replacement for the existing bulb (see Section 11.6, *Base Loads – Lighting Systems*). NEAT also accounts for the longer life of the fluorescent bulb over that of the incandescent lamp.

You must enter the cost for various wattage compact fluorescent bulbs under the "Costs" button for the Lighting Retrofits measure on the Library Measures form of the Setup Library (see Section 14.5, *Library Measures*). NEAT will use these costs to interpolate or extrapolate to obtain a cost for a wattage not specified in this listing. Therefore, your costs should reflect a reasonable pattern with respect to wattages for the entire range of entries.

A.25 Refrigerator Replacement

On an average, refrigerators use nine percent of a home's total energy consumption. They can consume as much as 2000 kWh/year to as little as 400 kWh/year – a factor of five! Significant energy efficiency improvements have been made in refrigerator construction. Units manufactured prior to 1990 will most often use substantially more energy than today's units. NEAT evaluates the cost-effectiveness of replacing an older unit with a more energy efficient model.

The savings associated with refrigerator replacement is computed from the difference in the annual consumptions of the existing and replacement units. Several methods of data collection can be used to determine this information (see Section 11.5, *Base Loads – Refrigerators*). Depending on the method used, NEAT makes adjustments for the location of the unit, its age, existence of defrost cycles, the condition of the door seals, and door openings (based on occupancy). The characteristics for the replacement refrigerator can either be entered on the Refrigerators form or copied from a listing of replacements in your Supply Library (see "Additional Entries on the Hot Water Equipment and Refrigerator Forms" in Section 15.2, *Materials/Labor Forms*).

A.26 Water Heater Tank Insulation

Older water heaters will likely have less insulation surrounding the hot water tank than is economically justified. NEAT evaluates installing a water heater wrap with R-value specified in the Setup Library (see "Insulation" under "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). Greater dollar savings will occur from this measure when applied to electric units in unconditioned spaces. Common practice is to also insulate the tops of electric units, but not gas or propane due to potential fire hazards associated with the flue or interference with the draft diverter. The measure uses information you provide on the Water Heating form (see Section 11.4, *Base Loads – Water Heating*).

Due to relatively low cost of the measure, it will often be found cost-effective.

A.27 Water Heater Pipe Insulation

NEAT evaluates the savings from insulating the first five feet of both the cold and hot water pipes entering and exiting a water heater. This not only reduces direct

conductive heat loss from the hot water pipe, but also loss from convection of the water in both the hot and cold pipes. The insulation is assumed to be R-1.85, ½ in. elastomer foam rubber. The savings estimates are based on first principle heat transfer calculations.

Due to the measures relatively low cost, it will often be cost-effective.

A.28 Low-Flow Showerheads

Low-flow showerheads are inexpensive, easily installed, energy efficiency measures. NEAT uses your input of the approximate minutes of shower use per day and the gallons per minute discharged from existing showerheads to estimate an energy savings associated with installing low-flow heads. Replacement showerheads are assumed to discharge 2.5 gallons per minute, unless changed by the user in the Setup Library (see "Equipment" under "Site Built (NEAT) Key Parameters" in Section 14.2, *Key Parameters*). The temperature difference of water discharged from the replacement showerheads is assumed to be four degrees Fahrenheit greater than water from the existing showerheads. This is to compensate for the lower output from the replacement heads.

Due to their relative low cost, low-flow showerheads will often be recommended as long as they are not already installed and there is at least average shower use.

A.29 Water Heater Replacement

NEAT will evaluate the cost-effectiveness of replacing an existing water heater with a higher efficiency model. NEAT allows you to evaluate the effectiveness of fuel switching. However, you must be sure that all costs associated with the switch are included in the Water Heater Replacement measure cost and allowed in your program.

NEAT will also evaluate replacing the existing water heater with a heat pump water heater and, if the unit is located in a heated space, model the effect the heat pump water heater has on the heating and cooling consumption in the home. For a heat pump water heater, use a value of EF that represents its efficiency (e.g., 2.2). An RE of 0.98 is normally appropriate.

The derivation of the savings for this measure requires the water heater characteristics of energy factor, recovery efficiency, and input rating, available for many models from the GAMA database referenced by NEAT. Estimates of daily hot water consumption are based on the number of occupants you indicate on the Client Information form (see Section 7.1, *Client Information*).

A.30 Infiltration Reduction

NEAT's Infiltration Reduction measure uses pre- and post-retrofit ("Before Weatherization" and "After Weatherization") blower door readings entered on the Ducts/Infiltration form (see Section 11.2, *Ducts/Infiltration – Air and Duct Leakages*) to estimate the heating and cooling (sensible and latent) energy savings from your air sealing efforts. NEAT translates these leakage rates you enter at the pressure differential specified into infiltration rates under natural conditions, taking into account wind speeds and outdoor temperatures recorded in the weather file for the location of the home as well as the height of the home, as determined from the Conditioned Stories (see Section 8.2, *Audit Information*). If the recommended measures produced by running an audit (see Section 12.2, *Recommended Measures Report*) include window and door measures that would reduce the infiltration through these envelop components, NEAT subtracts this infiltration reduction from the infiltration reduction recorded for this measure so as to not count its effect twice.

The measure has no entry on NEAT's Library Measures form of the Setup Library (see Section 14.5, *Library Measures*). It is activated by the user's input on the Ducts/Infiltration form. If only a post-retrofit blower door reading is entered on the form, no Infiltration Reduction measure will appear on the Recommended Measures report. If only pre- and post-retrofit blower door readings are entered, but no cost, NEAT's recommendations will include an estimate of the energy saved by the measure, but no "Measure Economics" (e.g., savings-to-investment ratio [SIR]). If both blower door readings and a cost for the measure are entered on the form, the Infiltration Reduction measure displayed in the report will have a complete set of results, similar to all other measures recommended.

Appendix B. MHEA Weatherization Measures

The list of weatherization measures considered by MHEA can be accessed in the Library Measures form under the Main Menu's "Setup Library" button (see Section 14.5, *Library Measures*). MHEA currently examines 25 weatherization measure types:

1. Seal ducts
2. General air sealing
3. Wall fiberglass batt insulation
4. Wall cellulose or fiberglass loose-fill insulation
5. Floor cellulose or fiberglass loose-fill insulation
6. Roof cellulose or fiberglass loose-fill insulation
7. Add skirting
8. White coat roof
9. Replace wooden/marked doors (standard and mandatory)
10. Storm doors
11. Window sealing
12. Replace single-paned windows
13. Plastic/glass storm windows
14. Add awnings or shade screens)
15. Setback thermostat
16. Replace heating system
17. Tune heating system
18. Evaporative cooling
19. Tune cooling system
20. Replace DX cooling equipment
21. Lighting retrofits
22. Refrigerator replacement
23. Water heater tank insulation
24. Water heater pipe insulation
25. Low-flow showerheads
26. Water heater replacement

The first eight weatherization measure types are designed to reduce heat loss or gain through walls, floors, ceilings, and ducts. Measure types 9 through 13 affect the way windows and doors behave in the house. They can alter the conduction heat loss through windows and doors, and the solar gain and infiltration through

windows. Window shading reduces solar gain – a major element of total heat gain. Shading the windows may affect the heating load, because shade blocks some solar heat from the house during the heating season. Measures types 14 through 16 improve heating system efficiency by decreasing heating energy consumed by the house. They do not affect heat loss through the envelope, however. Measure types 17 through 19 improve cooling efficiency during the cooling season. Evaporative coolers and new air conditioners can reduce cooling costs markedly, if properly installed. Measure types 20 through 25 reduce the energy consumption not directly related to the climate. Such measures are referred to as "base load" measures. They can have minor effects on the heating and cooling costs.

All of the envelope measure types (3–13) have separate entries in the Library Measures form of the Setup Library for their application to the manufactured home proper versus any addition to the home. They will also be listed separately in any reports involving the measures.

B.1 Seal Ducts

MHEA's Seal Ducts measure estimates the heating savings from sealing ducts of a forced air furnace or heat pump. In addition, the entry in the "Duct Location" drop-down list cannot be "None." Cooling savings will also be determined if the cooling system is a central air conditioner or heat pump. For the measure to be evaluated, it must be indicated as being active in the MHEA's Library Measures form of the Setup Library (see Section 14.5, *Library Measures*) as well as be activated for a specific audit by selecting the Evaluate Duct Sealing checkbox on the audit's Ducts/Infiltration form (see Section 11.2, *Ducts/Infiltration – Air and Duct Leakages*). Costs associated with the work are also entered on this form.

MHEA translates your pre- and post-retrofit input data from either of the four duct leakage measurement techniques (whole house blower door, blower door subtraction, duct blower, or pressure pan) into parameters accepted by the ASHRAE 152P "Method of Test for Determining the Design Seasonal Efficiencies of Residential Thermal Distribution Systems." The program applies the resulting pre- and post-retrofit efficiencies to the heating and cooling loads to estimate the savings of the duct sealing efforts.

B.2 General Air Sealing

MHEA's General Air Sealing measure uses pre- and post-retrofit ("Before Weatherization" and "After Weatherization") blower door readings entered on the Ducts/Infiltration form (see Section 11.2, *Ducts/Infiltration – Air and Duct Leakages*) to estimate the heating and cooling (sensible and latent) energy savings from your air sealing efforts. MHEA translates these leakage rates at the pressure differential specified into infiltration rates under natural conditions, taking into account wind speeds, modified by the choice of Wind Shielding from the MHEA Audit Information form, and the outdoor temperatures recorded in the weather file for the location of the home. If the recommended measures produced by running an audit (see Section 12.2, *Recommended Measures Report*) include window measures that would reduce the infiltration through these envelop components, NEAT subtracts this infiltration reduction from the infiltration reduction recorded for this measure so as to not count its effect twice.

For MHEA to evaluate the Infiltration Reduction measure, the measure must be activated in the Setup Library (see Section 14.5, *Library Measures*) and the post-retrofit blower door reading and the Infiltration Reduction Cost entered on the Ducts/Infiltration form. If the user has not entered a pre-retrofit leakage rate on the form, MHEA will use the leakage rates assigned in the "Home Leakiness" drop-down list on the Audit Information form (see "MHEA Specific Entries" in Section 8.2, *Audit Information*, and "Mobil Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*).

B.3 Wall Fiberglass Batt Insulation

This measure adds 3-1/2 inches of fiberglass batt insulation to the walls. It will be evaluated if the available space in the walls is 1 inch or greater. If the specified Wall Stud Size and depths of Existing Insulation (see Section 10.1, *Shell – Walls*) indicate that compression of the batt will occur, the effect of this compression on the R-value of added insulation is taken into account. If the wall had been declared "Vented" on the Walls form of the audit, this measure will change this characteristic to "Not Vented," increasing the effectiveness of any existing batt insulation. A 15% framing factor is assumed and any wall area indicated as "Uninsulatable" will also be excluded.

B.4 Wall Cellulose or Fiberglass Loose-Fill Insulation

These measures add either cellulose or fiberglass loose-fill insulation to walls. They will be evaluated if the available space in the walls is 1 inch or greater. The quantity of insulation required for the measures accounts for the compression of any existing batt insulation in the cavity, as determined by the density of the added loose-fill insulation, specified in the Key Parameters (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). If the wall had been declared "Vented" on the Walls form of the audit (see Section 10.1, *Shell – Walls*), this measure will change this characteristic to "Not Vented," increasing the effectiveness of any existing batt insulation. A 15% framing factor is assumed and any wall area indicated as "Uninsulatable" will also be excluded.

B.5 Floor Cellulose or Fiberglass Loose-Fill Insulation

These measures fill the available space in the wing sections with cellulose or fiberglass loose-fill insulation and add up to eight inches of cellulose or fiberglass loose-fill insulation to the belly, space permitting. The quantity of insulation required for the measures accounts for the compression of any existing batt insulation in the floor, as determined by the density of the added loose-fill insulation, specified in the Key Parameters (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). The wing and center sections are each assumed to be half the total area of the entire belly. The measures will not be evaluated if the air space in the center section is less than two inches. A 10% framing factor is assumed and the volume of ducts is also excluded, if the user's input indicates their presence in the belly.

B.6 Roof Cellulose or Fiberglass Loose-Fill Insulation

These measures fill the available space in the roof with cellulose or fiberglass loose-fill insulation. The quantity of insulation required for the measures accounts for the compression of any existing batt insulation in flat or bowstring roof types, as determined by the density of the added loose-fill insulation, specified in the Key Parameters (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). The quantity of insulation required for the measures also depends on the roof type and dimensions of the home. A 10% framing factor is assumed and the volume of ducts is also excluded, if the user's input indicates their presence in the ceiling.

B.7 Add Skirting

This measure installs exterior skirting around the home. It is evaluated only if you have not indicated an existing skirt on MHEA's Floor form and the belly insulation measures have been turned off (see Section 14.5, *Library Measures*). The skirt is not assumed to be insulated, but must be capable of blocking the wind. Its effect is to increase the film resistance between the air and the belly to represent still air.

B.8 White Coat Roof

An elastomeric, low-emissivity roof-coating retrofit measure is applied only to homes with either a bowstring or flat roof, whose Roof Color is "Normal or Weathered," and having an existing cooling system. The benefit is to decrease the solar load on the roof, which in turn decreases the home cooling load. This retrofit measure is commonly installed in cooling climates.

B.9 Replace Wooden/Marked Doors (Optional and Mandatory)

- **Standard** – This retrofit measure is evaluated for all door types other than "Steel Insulated." The benefit assigned to this measure is to increase the R-value through the door. The R-values corresponding to the existing door types and the replacement door are specified in the Setup Library (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*).

- **Mandatory** – This measure forces the door replacement for the specified door description to be recommended, whether or not it proves to be cost-effective. If it is not cost-effective, the replacement would normally have to be viewed as a repair item. Alternative approaches are to include the door replacement as part of the infiltration reduction or to list it as a repair item on the Itemized Cost form (see Section 11.8, *Itemized Costs*).

B.10 Storm Doors

This retrofit measure is evaluated for doors not having an existing storm door. The effect of installing a storm door is to add 1 R-value (h-ft^2-F/Btu) to the storm door/ home door combination.

B.11 Window Sealing

MHEA estimates the savings that can be obtained from weatherizing an existing window to reduce its leakiness. Both heating and cooling (latent and sensible) energy is considered in this estimate. The amount of energy saved depends on your declaration of each window's pre-retrofit leakiness, as indicated on the Windows input form (see Section 10.2, *Shell – Windows*) as well as the overall house leakiness described on the Ducts/Infiltration form (see Section 11.2, *Ducts/ Infiltration*).

MHEA translates your leakiness designation into an estimate of air leakage through the window that results primarily from a pressure differential created by wind. It then uses empirically-based relations to reduce this air leakage through the window to reflect caulking, weather-stripping, and general repairs to the window. The energy saved from this reduction is computed in much the same way savings from whole house infiltration reduction is determined.

If MHEA's General Air Sealing measure is being evaluated, the program will subtract from the savings of this measure any savings resulting from the infiltration reduction included as savings for the Window Sealing measure, so as to avoid accounting for the window sealing twice.

The Window Sealing measure is one of four mutually exclusive window measures, along with Plastic/Glass Storm Windows and Replace Single-Paned Windows. Only the measure found most cost-effective from a set of mutually exclusive measures will be recommended. Thus, MHEA would never recommend both sealing and replacing the same window. The only exception to the cost-effectiveness criteria is when a specific measure has been declared mandatory, as might be the case when replacing a window whose frame is so rotted that weatherization or use of a storm window is not practical. Check your program's policy regarding mandating measures. How the measure is viewed depends on the selection you make for Retrofit Option on the Windows form during data input.

B.12 Replace Singe-Paned Windows

MHEA replaces the existing window with one having the U-value and solar heat gain coefficient (SHGC) specified in the Key Parameters of the Setup Library (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). The

measure is not applied to sliding glass doors, door windows, or skylights. An existing double pane window will be replaced only if the user indicates that this measure is mandatory.

The energy savings estimated when replacing a window considers conduction, solar, and infiltration effects. The infiltration savings will depend on your indication of the existing window's initial leakiness (see the discussion of the Window Sealing measure above for more information). Any such savings will be subtracted from the savings for the General Air Sealing measure so as to avoid accounting for this infiltration savings twice.

The Replace Single-Paned Window measure is mutually exclusive with other window retrofit measures. See the discussion of the Window Sealing measure above for the implications of mutual exclusiveness.

B.13 Plastic/Glass Storm Windows

This retrofit measure is evaluated for windows not already having a storm window. No storms will be evaluated for sliding glass doors. The U-value of the storm window/window combination is taken from the values specified in the Key Parameters of the Setup Library (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). MHEA assumes that the plastic or glass storm window is installed on the interior of the window assembly and is used only during the heating-dominated months. The plastic storm may either be purchased or can be fabricated using an acrylic window film/sheet cut to the size of the window and held in place with magnetic strips or Velcro™.

B.14 Add Awnings or Shade Screens

The two window shading measures (Add Awnings and Add Shade Screens) apply exterior awnings or fabric mesh window sun screens to all windows not facing north and to those not having any existing Exterior Shading, as indicated by the user on MHEA's Windows form. The two measures are mutually exclusive; that is, only one of the two will ever be recommended, if either. The measures increase the shade on the windows, which decreases the solar load.

B.15 Setback Thermostat

Automatic set-back thermostats can be cost-effective for people who have regular schedules and who understand how to set the thermostats to follow those schedules. MHEA evaluates savings accomplished by setting back the set-point temperature during the heating season only. Therefore, the measure will not show cost-effectiveness in cooling climates. You may set the number of degrees Fahrenheit of the nightly setback in the Key Parameters of the Setup Library (see "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). Unless altered, MHEA will assume a three degree Fahrenheit setback for eight hours.

B.16 Replace Heating System

The cost-effectiveness of replacing a heating system heavily depends on the Efficiency of the existing system, entered on the Primary sub-form under the Heating tab. If a heating system is to be replaced solely based on the savings of the measure, it is strongly recommended that this entry be obtained from an accepted efficiency measurement, as opposed to data from the name plate of the unit or a data base of heating system efficiencies.

In order for the measure to be evaluated, you must fill in the required data on both the Primary and Replacement sub-forms under MHEA's Heating tab. The replacement will not eliminate any secondary system you may have identified or change the percentage of heat supplied by the primary and secondary systems. MHEA will evaluate the cost-effectiveness of replacing a heating system that uses one fuel with one consuming a different fuel. However, it is left to the user to determine the appropriateness of such a replacement in his/her program. Depending on the characteristics of the two fuels, evaluation of the savings over the life of the replacement system can produce unexpected, yet valid results. The measure is mutually exclusive with the Tune Heating System measure; that is, only one of the two will ever be recommended, if either.

MHEA Versions 8 and earlier treat the heating and cooling sides of a heat pump as separate components requiring descriptions under both the Heating and Cooling tabs. For correct modeling of replacing the existing primary heating and cooling systems with a heat pump, the replacement for both the heating and cooling sides of the existing units must be specified as heat pumps and the total cost of the

replacement split between the Heating Replacement and Cooling Replacement descriptions. To have the replacement seen as cost-effective, this split in cost should be adjusted in order to show an SIR for replacement of both the heating and cooling components as cost-effective.

B.17 Tune Heating System

Heating systems may function far below their potential efficiency or may be unsafe due to the following common problems:

- Dirt, soot, or other materials interfering with the burner flame;
- Dirt, soot, or corrosion on heat exchanger surfaces;
- Electric controls malfunctioning or out of adjustment;
- Air hotter than necessary to heat the house;
- Incomplete combustion;
- Faulty draft;
- Incorrect fuel input;
- Blockages or leaks in heating distribution system; or
- Faulty thermostatic setting, anticipator adjustment, or location.

Heating technicians performing tune-ups should have specific training on increasing the efficiency of heating systems. Technicians should have test equipment to measure efficiency, air temperature, carbon monoxide, draft, and all other parameters relevant to the seasonal efficiency of each heating system.

MHEA will evaluate the Tune Heating System measure only for furnaces that are not electric or fueled by wood or the "Other" fuel type. MHEA assumes that if the measure is performed by a qualified technician who addresses the issues listed above, it will save from 0 to 13 percent of the fuel used for heating, depending on the Equipment Type, Fuel, and Efficiency, as indicated by the user's entries on MHEA's Primary sub-form under the Heating tab. The measure is mutually exclusive with the Heating System Replacement measure; that is, only one of the two will ever be recommended, if either.

B.18 Evaporative Cooling

In the warm, dry climates of the western United States, evaporative coolers (also called swamp coolers) are a popular and energy efficient cooling device. The lower

the summertime relative humidity, the more the evaporative cooler will drop the indoor temperature. Evaporative coolers use one-quarter to one-sixth of the energy of air conditioners and they cost about one-half as much to install. Unlike central air conditioners, evaporative coolers provide a steady stream of fresh, humid air to the house.

MHEA will evaluate replacing any existing DX (direct expansion) cooling system with an evaporative cooler if the existing cooling equipment is a central system or a room air conditioner with a COP of less than 2.5. The measure will replace either or both the primary or secondary systems if they meet the replacement criteria.

B.19 Tune Cooling System

Significant efficiency increases for an air conditioner may be possible through proper maintenance and periodic tune-ups. The following steps are suggested in performing the tune-up of an existing air conditioner:

- Replace or clean existing air filters and grills,
- Check and clean condensate trough and drain,
- Clean evaporator (indoor) and condenser (outside) coils,
- Straighten bent or flattened coil fins if necessary,
- Ensure unobstructed air flow to the condenser coil,
- Check for proper refrigerant charge,
- Remove dust and dirt from fan blades,
- Examine and oil motor and fan bearings,
- Inspect and/or tighten electrical connections and contacts,
- Check for blockages or leaks in the supply and return ducts.

Properly trained HVAC technicians should perform the tune-up insuring the use of proper equipment, especially in checking the refrigerant charge and the electrical wiring, and straightening the coil fins.

MHEA will evaluate the Tune Cooling System measure for any Primary cooling system except an evaporative cooler. Tune-ups of Secondary systems are not considered. MHEA assumes that a thorough air conditioner tune-up, addressing the issues listed above, will increase the system's COP to 3.0. The measure will not be evaluated for systems with existing efficiency above this.

B.20 Replace DX Cooling Equipment

Air conditioners move heat from indoors to outdoors with a cooling coil (the evaporator), a heating coil (the condenser), and a compressor, which moves a heat transfer fluid (the refrigerant) between the two coils. This type of cooling is sometimes referred to as "DX cooling," where the "DX" stands for "direct expansion." It is the expansion of the refrigerant in the evaporator coil that actually produces the cooling. The federal government requires all air conditioners to carry a yellow energy label listing its annual cost of operation and a measure if its efficiency, EER for room air conditioners and SEER for central systems. A room air conditioner with an EER of 12 will use half as much electricity for cooling as one with an EER of 6. See Section "Efficiency and Efficiency Units" in Section 10.8, *Cooling – Primary, Secondary, and Replacement*, for further discussion of the various units of cooling efficiency.

MHEA considers replacing the Primary cooling unit with the unit described under the Replacement tab. If a Secondary cooling unit has been described, the replacement measure does not affect the percent of floor area cooled by the two systems. MHEA will not replace an air-conditioner whose adjusted (for local weather) COP is greater than or equal to 2.5. All equipment types may be designated as being replaced with any other equipment type except the evaporative cooler. If an existing evaporative cooler is mandated to be replaced by a DX unit, it will be recommended but with negative savings and SIR. It is left to the user to determine the appropriateness of the replacements in his/her program.

MHEA Versions 8 and earlier treat the heating and cooling sides of a heat pump as separate components requiring descriptions under both the Heating and Cooling tabs. For correct modeling of replacing the existing primary heating and cooling systems with a heat pump, the replacement for both the heating and cooling sides of the existing units must be specified as heat pumps and the total cost of the replacement split between the Heating Replacement and Cooling Replacement descriptions. To have the replacement seen as cost-effective, this split in cost should be adjusted in order to show an SIR for replacement of both the heating and cooling components as cost-effective.

B.21 Lighting Retrofits

Replacing existing incandescent interior lighting with compact fluorescent lights is a relatively straight forward way to reduce the electric consumption of a home. The development of the compact fluorescent bulb has made this retrofit an extremely simple one to accomplish because most compact fluorescent lights are fitted with screw-in bases identical to the incandescent bulbs, which allow a quick and easy one-for-one replacement.

MHEA computes the savings of using the lower wattage compact fluorescent bulb to replace an existing incandescent bulb. The watt reduction is determined from the user's input of existing and replacement bulb consumption, though default values for replacement wattage give the standard replacement for the existing bulb (see Section 11.6, *Base Loads – Lighting Systems*). MHEA also accounts for the longer life of the fluorescent bulb over that of the incandescent lamp.

You must enter the cost for various wattage compact fluorescent bulbs under the "Costs" button for the Lighting Retrofits measure on the Library Measures form of the Setup Library (see Section 14.5, *Library Measures*). MHEA will use these costs to interpolate or extrapolate to obtain a cost for a wattage not specified in this listing. Therefore, your costs should reflect a reasonable pattern with respect to wattages for the entire range of entries

B.22 Refrigerator Replacement

On an average, refrigerators use nine percent of a home's total energy consumption. They can consume as much as 2000 kWh/year to as little as 400 kWh/year – a factor of five! Significant energy efficiency improvements have been made in refrigerator construction. Units manufactured prior to 1990 will most often use substantially more energy than today's units. MHEA evaluates the cost-effectiveness of replacing an older unit with a more energy efficient model.

The savings associated with refrigerator replacement is computed from the difference in the annual consumptions of the existing and replacement units. Several methods of data collection can be used to determine this information (see Section 11.5, *Base Loads – Refrigerators*). Depending on the method used, MHEA makes adjustments for the location of the unit, its age, existence of defrost cycles, the condition of the door seals, and door openings (based on occupancy). The

characteristics for the replacement refrigerator can either be entered on the Refrigerators form or copied from a listing of replacements in your Supply Library (see "Additional Entries on the Hot Water Equipment and Refrigerator Forms" in Section 15.2, *Materials/Labor Forms*).

B.23 Water Heater Tank Insulation

Older water heaters will likely have less insulation surrounding the hot water tank than is economically justified. MHEA evaluates installing a water heater wrap with R-value specified in the Setup Library (see "Base Loads" under "Mobile Home (MHEA) Key Parameters" in Section 14.2, *Key Parameters*). Greater dollar savings will occur from this measure when applied to electric units in unconditioned spaces. Common practice is to also insulate the tops of electric units, but not gas or propane due to potential fire hazards associated with the flue or interference with the draft diverter. The measure uses information you provide on the Water Heating form (see Section 11.4, *Base Loads – Water Heating*).

Due to relatively low cost of the measure, it will often be found cost-effective.

B.24 Water Heater Pipe Insulation

MHEA evaluates the savings from insulating the first five feet of both the cold and hot water pipes entering and exiting a water heater. This not only reduces direct conductive heat loss from the hot water pipe, but also loss from convection of the water in both the hot and cold pipes. The insulation is assumed to be R-1.85, ½ in. elastomer foam rubber. The savings estimates are based on first principle heat transfer calculations.

Due to the measures relatively low cost, it will often be cost-effective

B.25 Low-Flow Showerheads

Low-flow showerheads are inexpensive, easily installed, energy efficiency measures. MHEA uses your input of the approximate minutes of shower use per day and the gallons per minute discharged from existing showerheads to estimate an energy savings associated with installing low-flow heads. Replacement showerheads are assumed to discharge 2.5 gallons per minute, unless changed by the user in the Setup Library (see "Base Loads" under "Mobile Home (MHEA)

Key Parameters" in Section 14.2, *Key Parameters*). The temperature difference of water discharged from the replacement showerheads is assumed to be four degrees Fahrenheit greater than water from the existing showerheads. This is to compensate for the lower output from the replacement heads.

Due to their relative low cost, low-flow showerheads will often be recommended as long as they are not already installed and there is at least average shower use.

B.26 Water Heater Replacement

MHEA will evaluate the cost-effectiveness of replacing an existing water heater with a higher efficiency model. MHEA allows you to evaluate the effectiveness of fuel switching. However, you must be sure that all costs associated with the switch are included in the Water Heater Replacement measure cost and allowed in your program.

MHEA will also evaluate replacing the existing water heater with a heat pump water heater. However, MHEA does not model the effect the heat pump water heater has on the heating and cooling consumption in the home when it is located in a heated space. For a heat pump water heater, use a value of EF that represents its efficiency (e.g., 2.2). An RE of 0.98 is normally appropriate.

The derivation of the savings for this measure requires the water heater characteristics of energy factor, recovery efficiency, and input rating, available for many models from the GAMA database referenced by MHEA. Estimates of daily hot water consumption are based on the number of occupants you indicate on the Client Information form (see Section 7.1, *Client Information)*.

Appendix C. Reports

This appendix displays samples of reports available in the Weatherization Assistant, Version 8. They are accessed from the Report blocks at the lower right of the General Information tabs for each of the Main Menu windows: Agency, Client, Audit (NEAT and MHEA), and Work Orders. A listing of these reports is given below.

Agency Reports

Client Reports

NEAT Audit Reports

MHEA Audit Reports

Appendix C: Reports

Work Order Reports

Quarterly Program Report

Report Period: Begin 9/1/2011 to End 10/1/2011

Agency Name: Demonstration Agency **Agency State:** US **Grant Number:** 12.034

1. Units By Dwelling Type

Owner-Occupied Single Family Site Built	1
Renter-Occupied Single Family Site Built	0
Multi-Family (5 or more units per building)	0
Owner-Occupied Mobile Home	0
Renter-Occupied Mobile Home	0
Shelter	0
Other	0
UNCATEGORIZED	1

TOTAL DOE Units: 2

2: Units By Primary Heating Fuel Type

Natural Gas	1
Fuel Oil	0
Electricity	0
Propane/LPG	0
Kerosene	0
Wood	0
Other	0
UNCATEGORIZED	1

3: Units By Occupancy

Elderly-Occupied	1
Disabled-Occupied	0
Native American-Occupied	0
Children-Occupied	0
High Energy Use	0
High Energy Cost Burden	0

4. Other Unit Categories

ReWeatherized	
Low Cost / No Cost	

TOTAL Other Units:

5. Total People Assisted with Grant Funds

Elderly	1
Persons with Disabilities	0
Native American	0
Children	0

Scheduled Audits (NEAT)

Report Period: Begin 10/1/2011 to End 11/1/2012

Agency Name: Demonstration Agency
Address: 725 Jefferson St.
Any City, US 11111

Office Phone: (123) 456-7890
Office Email: agencyemail@localisp.net

Audit Name / Auditor / Dwelling Type	Client Name / Client ID / Alt. Client ID	Client Address	Audit Status / Audit Status Date / Comments
11_354SB Site Built	Stokes, Randy 11_354	250 Robertsville Rd. Oak Ridge, TN 37830	Site Visit Scheduled For 10/12/2011
11_355SB Tor, Audrey Site Built	Lassiter, Francis 11_355	317 Louisiana Ave. Oak Ridge, TN 37830	Site Visit Scheduled For 10/14/2011

Open Work Orders

Agency Name: Demonstration Agency

Address: 725 Jefferson St.
Any City, US 11111

Office Phone: (123) 456-7890
Office Email: agencyemail@localisp.net

Work Order Name / Contractor/Company / Work Order Type	Client Name / Client Address / Client ID / Alt. Client ID	Work Order Status / Status Date / Comment	Inspection Status / Status Date / Comment	Payment Status / Status Date / Comment
WO/11_351/JT/1 Contractor, John / Weatherization	MacDonald, Mary 464 New York Ave Oak Ridge, TN 37830 11_351	Work Completed On 10/4/2011	Passed On 10/10/2011	
WO/11_353/JT/1 Contractor, John / Weatherization	Anderson, Grace 210 North Illinois Ave Oak Ridge, TN 37830 11_353	Work Started On 10/6/2011		

Economic Summary

Report Period: Begin 8/1/2011 to End 11/1/2011

Client Record Name	Estimated Cost	Estimated SIR	Actual Cost	Actual SIR
11_348	$726.00	4.74	$726.00	4.66
11_350	$2,125.74	2.64		
11_351	$2,496.24	2.57		
11_353	$3,625.00	6.61		

Client Surveys (Blank)

AGENCY INFORMATION

Agency Name: Demonstration Agency
Address: 725 Jefferson St.
Office Phone: Any City
Office Email: US 11111
(123) 456-7890
agencyemail@localisp.net

CLIENT INFORMATION

Client Name:
Address:
City:
State/Zip:

Survey Name **Client Satisfaction**

	Question	Answer
1	Is the client generally satisfied with the work performed?	
2	Was any instruction given to the client regarding operating new equipment, etc. If so, describe.	
3	Does the client recognize any specific improvements in his living conditions? If so, describe.	

Survey Name **Intake Survey**

	Question	Answer
1	Age of dwelling (year built)	
2	Thermostat setting - Day	
3	Thermostat setting - Night	
4	Existing setback thermostat?	
5	Setback thermostat properly used?	
6	Install setback thermostat?	
7	Client comfort at temperature settings (specify location of drafts, warm rooms, cold rooms)	
8	Suuply/returns in cold rooms? Specify.	
9	Basement used as living space? If yes, describe.	
10	Basement temperature during winter?	
11	Attic use (storage, other)	
12	How will attic use affect attic insulating?	
13	Rooms closed off during winter (locate and explain)?	

Survey Name **Intake Survey**

	Question	Answer
14	Age (years)	
15	Describe repairs in last 3 years	
16	Routine maintenance (Yes or No)?	
17	Describe routine maintenance	
18	Does the dwelling have icicles or ice dams (Yes or No)? Explain if Yes.	
19	Does the dwelling have moisture problems, mold or mildew (Yes or No)? Explain if Yes.	
20	Does the dwelling have freezing pipes (Yes or No)? Explain if Yes.	
21	Does the client have recurrent headaches, itching or burning eyes while at home (Yes or No)? Explain if Yes.	
22	Other (specify)	
23	Do yoyu feel any drafts	

Work Order Totals by Category

The development of the Work Order Totals by Category form was not completed at the time the Weatherization Assistant Version 8.9.0.5 was released. It does not contain identifiable information of use to the user.

Client Completion Report

CLIENT INFORMATION

Client ID: 11_348
Client Name: Tanner, David
Alt. Client ID:
Address: 114 Athens
Anytown
US 01234

AGENCY INFORMATION

Agency Name: Demonstration Agency
Address: 725 Jefferson St.
Any City
US 11111
Office Phone: (123) 456-7890
Office Email: agencyemail@localisp.net

Contact Name	Home Ph	Work Ph	Cell Ph	Contact Type	Primary Applican	Comment
Tanner, David	(111) 764-5687	(111) 764-3789	(111) 764-9902	Applicant/Person of Record	☑	
Tanner, John		(254) 567-8908		Applicant/Person of Record	☐	Son of primary applicant

DWELLING INFORMATION

Dwelling Type: Site Built
Occupancy (own/rent): Owned
Primary heating fuel: Natural Gas
Secondary heating fuel:
☐ **Previously Weatherized**
Year Previously Weatherized
Year Built 1952

ENERGY INDEX

Floor Area (sq ft) 1290
Heating Degree Days (base 65 F) 3400

	Annual Cost	Estim. % for heating
Primary Heating Fuel	$978.00	100
Secondary Heating Fuel		

Total Heating (BTU/HDD/sq ft) 22.3

WORK HISTORY

Client Application

Status	Date	Auditor	Comment
Received On	8/2/2011	admin	
Approved On	8/9/2011	admin	
Active On	8/2/2011	admin	
Work Done, File Closed/Locked On	9/17/2011	admin	

Audit

Audit Name: 11_348SB
Audit Job ID: -1909609271

Status	Date	Auditor	Comment
Audit Complete and Locked On	8/24/2011	admin	

Audit Name: 11_348SB *Audit Job ID:* -1909609271

Status	Date	Auditor	Comment
Recommendations Generated On	8/24/2011	admin	
Site Visit Completed On	8/22/2011	admin	
Site Visit Scheduled For	8/19/2011	admin	

Work Orders

Work Order Name: WO/11_348/JT/1 *Work Order ID:* 12491995

Status	Date	Auditor	Comment
Passed On	9/13/2011	Admin	
Invoice Received On	9/9/2011	Admin	
Invoice Paid On	9/16/2011	Admin	
Work Started On	9/5/2011	Admin	
Work Completed On	9/7/2011	Admin	
Work Order Created from Audit On	8/24/2011	Admin	

Work Order Name: WO/11_348/EASY/1 *Work Order ID:* 1554965122

Status	Date	Auditor	Comment
Passed On	9/13/2011	Admin	
Invoice Received On	9/8/2011	Admin	
Invoice Paid On	9/15/2011	Admin	
Work Started On	9/1/2011	Admin	
Work Completed On	9/6/2011	Admin	
Work Order Created from Audit On	8/24/2011	Admin	

COST SUMMARY BY WORK ORDER / MEASURE

Work Order Name: WO/11_348/EASY/1

Measure Name / Components	Actual Costs Materials	Labor	Total	Funding Source
Install Bathroom Exhaust Fan	$190.00	$80.00	$270.00	Spark Utility Program
Anticipator Adjustment Needed	$20.00	$0.00	$20.00	Spark Utility Program
Low Flow Showerheads	$5.00	$15.00	$20.00	Spark Utility Program
Smart Thermostat	$50.00	$25.00	$75.00	Spark Utility Program
Lighting Retrofits LT1	$26.00	$12.00	$38.00	Spark Utility Program
IID HS1	$150.00	$75.00	$225.00	Spark Utility Program
Work Order Sub Total:	$441.00	$207.00	$648.00	

Work Order Name: WO/11_348/JT/1

Measure Name / Components	Actual Costs Materials	Labor	Total	Funding Source
Infiltration Redctn	$250.00	$0.00	$250.00	Weatherization
Repair Roof	$135.00	$0.00	$135.00	Weatherization
CO Monitor is Needed	$40.00	$30.00	$70.00	Weatherization
Attic Ins. R-30 UA1	$90.00	$180.00	$270.00	Weatherization
DWH Pipe Insulation	$5.00	$10.00	$15.00	Weatherization
DWH Tank Insulation	$15.00	$25.00	$40.00	Weatherization
Wall Insulation WLN-1,WLN-2,WLS-2,WLW-1	$130.00	$375.00	$505.00	Weatherization
Window Replacement WD4	$346.00	$0.00	$346.00	Weatherization
Fill Ceiling Cavity FA3	$73.77	$147.49	$221.26	Weatherization
Attic Ins. R-30 FA4	$16.80	$33.60	$50.40	Weatherization
Kneewall Insulation FA2	$31.20	$60.00	$91.20	Weatherization
Attic Ins. R-30 FA1	$117.60	$235.20	$352.80	Weatherization
Insulate and seal attic access	$11.10	$20.00	$31.10	Weatherization
Work Order Sub Total:	$1,261.47	$1,116.29	$2,377.76	
All Work Orders Grand Total:	$1,702.47	$1,323.29	$3,025.76	

ECONOMICS SUMMARY BY MEASURE TYPE / MEASURE

Measure Type:

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
Infiltration Redctn	3.4	$34	28	$2	0	$0	$36	$250.00	1.2
Repair Roof	0.0	$0	0	$0	0	$0	$0	$135.00	0.0
Measure Type Sub Total:	3.4	$34	28	$2	0	$0	$36	$385.00	

Measure Type: Baseloads

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
Low Flow Showerheads	0.0	$0	0	$0	259	$18	$18	$20.00	10.7
DWH Pipe Insulation	0.0	$0	0	$0	195	$14	$14	$15.00	9.5
DWH Tank Insulation	0.0	$0	0	$0	405	$28	$28	$40.00	7.4
Lighting Retrofits LT1	0.0	$0	0	$0	823	$58	$58	$38.00	3.3
Measure Type Sub Total:	0.0	$0	0	$0	1,683	$118	$118	$113.00	

Measure Type: Building Insulation

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
Wall Insulation WLN-1,WLN-2,WLS-2,WLW-1	5.0	$50	37	$3	0	$0	$52	$505.00	1.6
Attic Ins. R-30 UA1	13.9	$139	190	$13	0	$0	$152	$270.00	8.8
Insulate and seal attic access	0.0	$0	0	$0	0	$0	$0	$31.10	3.5
Fill Ceiling Cavity FA3	8.3	$83	122	$9	0	$0	$91	$221.26	6.4
Attic Ins. R-30 FA4	1.2	$12	15	$1	0	$0	$13	$50.40	4.0
Kneewall Insulation FA2	1.8	$18	3	$0	0	$0	$18	$91.20	3.2
Attic Ins. R-30 FA1	8.6	$86	103	$7	0	$0	$93	$352.80	4.1
Measure Type Sub Total:	38.7	$387	471	$33	0	$0	$420	$1,521.76	

Measure Type: Doors and Windows

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
Window Replacement WD4	1.4	$14	-8	($1)	0	$0	$14	$346.00	0.6
Measure Type Sub Total:	1.4	$14	-8	($1)	0	$0	$14	$346.00	

Measure Type: Health and Safety

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
CO Monitor is Needed	0.0	$0	0	$0	0	$0	$0	$70.00	0.0
Anticipator Adjustment Needed	0.0	$0	0	$0	0	$0	$0	$20.00	0.0
Install Bathroom Exhaust Fan	0.0	$0	0	$0	0	$0	$0	$270.00	0.0
Measure Type Sub Total:	0.0	$0	0	$0	0	$0	$0	$360.00	

Measure Type: HVAC Systems

Measure Name / Components	Energy Savings: Heating MMBtu	Heating $	Cooling kWh	Cooling $	Baseload kWh	Baseload $	Total Annual Savings $	Total Cost $	Actual SIR
Smart Thermostat	6.6	$66	0	$0	0	$0	$66	$75.00	10.7
IID HS1	5.9	$59	0	$0	0	$0	$59	$225.00	2.2
Measure Type Sub Total:	12.4	$124	0	$0	0	$0	$124	$300.00	
All Measure Types Grand Total:	56.0	$560	490	$34	1,683	$118	$712	$3,025.76	

COST SUMMARY BY FUNDING SOURCE

Funding Source	Actual Costs		
	Materials	Labor	Total
Spark Utility Program	$441.00	$207.00	$648.00
Weatherization	$1,261.47	$1,116.29	$2,377.76
Client Total:	$1,702.47	$1,323.29	$3,025.76

Client Information Report

CLIENT INFORMATION

Client ID: 11_348
Alt. Client ID:
Client Name: Tanner, David
Address: 114 Athens
Unit No.:
City: Anytown
State: US
Zip: 01234
County:
Other Geo. Ident.:

Occupants

Number of: Occupants: 2
Elderly: 1
Disabled: 0
Native American: 0
Children: 0
Primary Language: English

Dwelling

Dwelling Type: Site Built
Ownership: Owned
Primary Heat. Fuel: Natural Gas
☐ High Energy Use
Secondary Heat. Fuel:
☐ High Energy Burden
☐ Previously Weatherized
Year Built: 1952
Year:

Comment

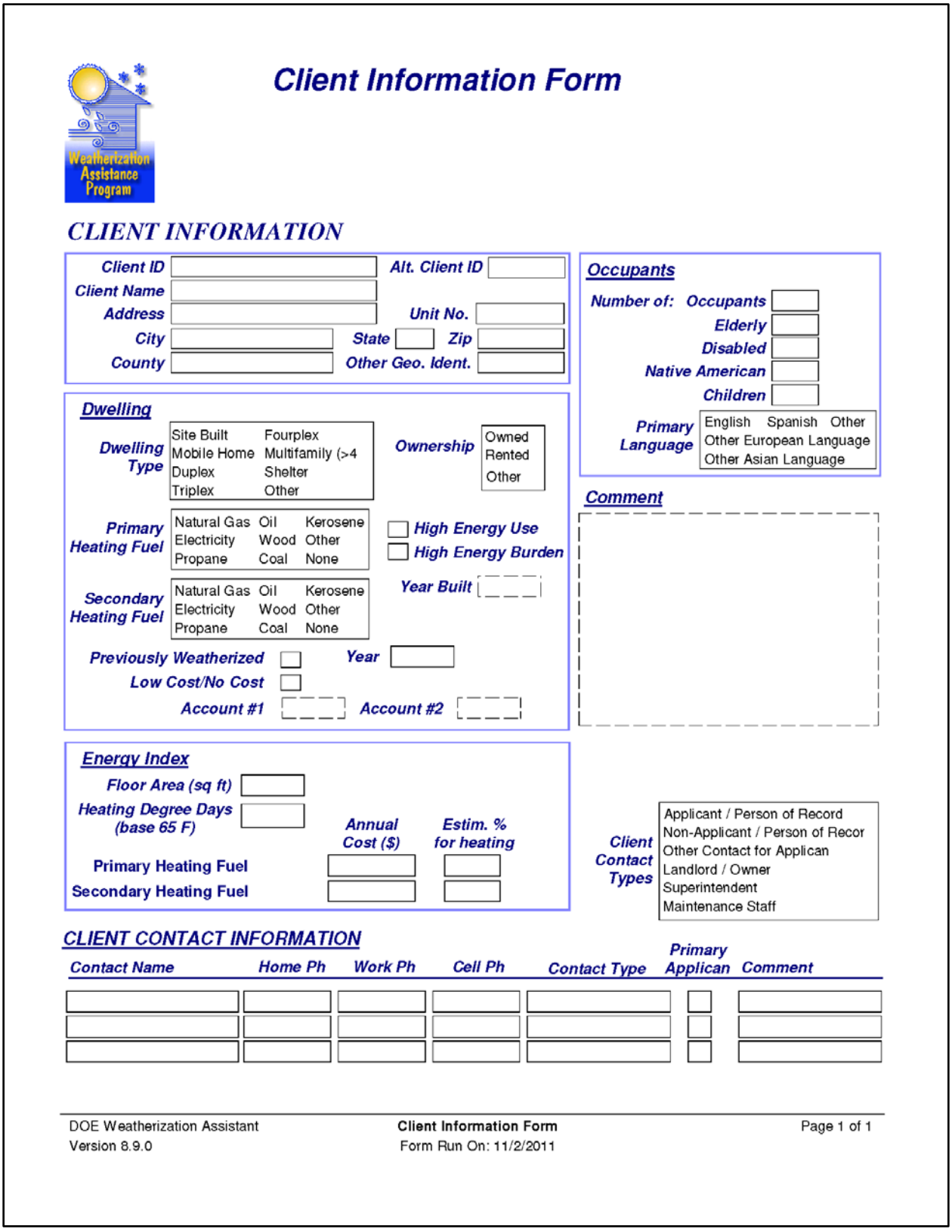
Energy Index

Floor Area (sq ft): 1290
Total Heating (BTU/HDD/sq ft): 22.3
Heating Degree Days (base 65 F): 3400

	Annual Cost	Estim. % for heating
Primary Heating Fuel	$978.00	100
Secondary Heating Fuel		

CLIENT CONTACT INFORMATION

Tanner, David	(111) 764-5687	(111) 764-3789	(111) 764-9902	Applicant/Person of Record	☑
Tanner, John		(254) 567-8908		Applicant/Person of Record	☐ Son of primary applicant



Weatherization Assistance Program

Client Information Form

CLIENT INFORMATION

Client ID | Alt. Client ID
Client Name
Address | Unit No.
City | State | Zip
County | Other Geo. Ident.

Occupants

Number of: Occupants
Elderly
Disabled
Native American
Children

Primary Language: English Spanish Other; Other European Language; Other Asian Language

Dwelling

Dwelling Type: Site Built, Mobile Home, Duplex, Triplex, Fourplex, Multifamily (>4, Shelter, Other

Ownership: Owned, Rented, Other

Primary Heating Fuel: Natural Gas, Electricity, Propane, Oil, Wood, Coal, Kerosene, Other, None

High Energy Use
High Energy Burden

Secondary Heating Fuel: Natural Gas, Electricity, Propane, Oil, Wood, Coal, Kerosene, Other, None

Year Built

Previously Weatherized | Year
Low Cost/No Cost
Account #1 | Account #2

Comment

Energy Index

Floor Area (sq ft)
Heating Degree Days (base 65 F)

	Annual Cost ($)	Estim. % for heating
Primary Heating Fuel		
Secondary Heating Fuel		

Client Contact Types: Applicant / Person of Record, Non-Applicant / Person of Recor, Other Contact for Applican, Landlord / Owner, Superintendent, Maintenance Staff

CLIENT CONTACT INFORMATION

Contact Name	Home Ph	Work Ph	Cell Ph	Contact Type	Primary Applican	Comment

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Client Information Form
Form Run On: 11/2/2011

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NEAT Data Collection Form

Audit Name:

Client Name:

Client ID:

Alternate Client ID:

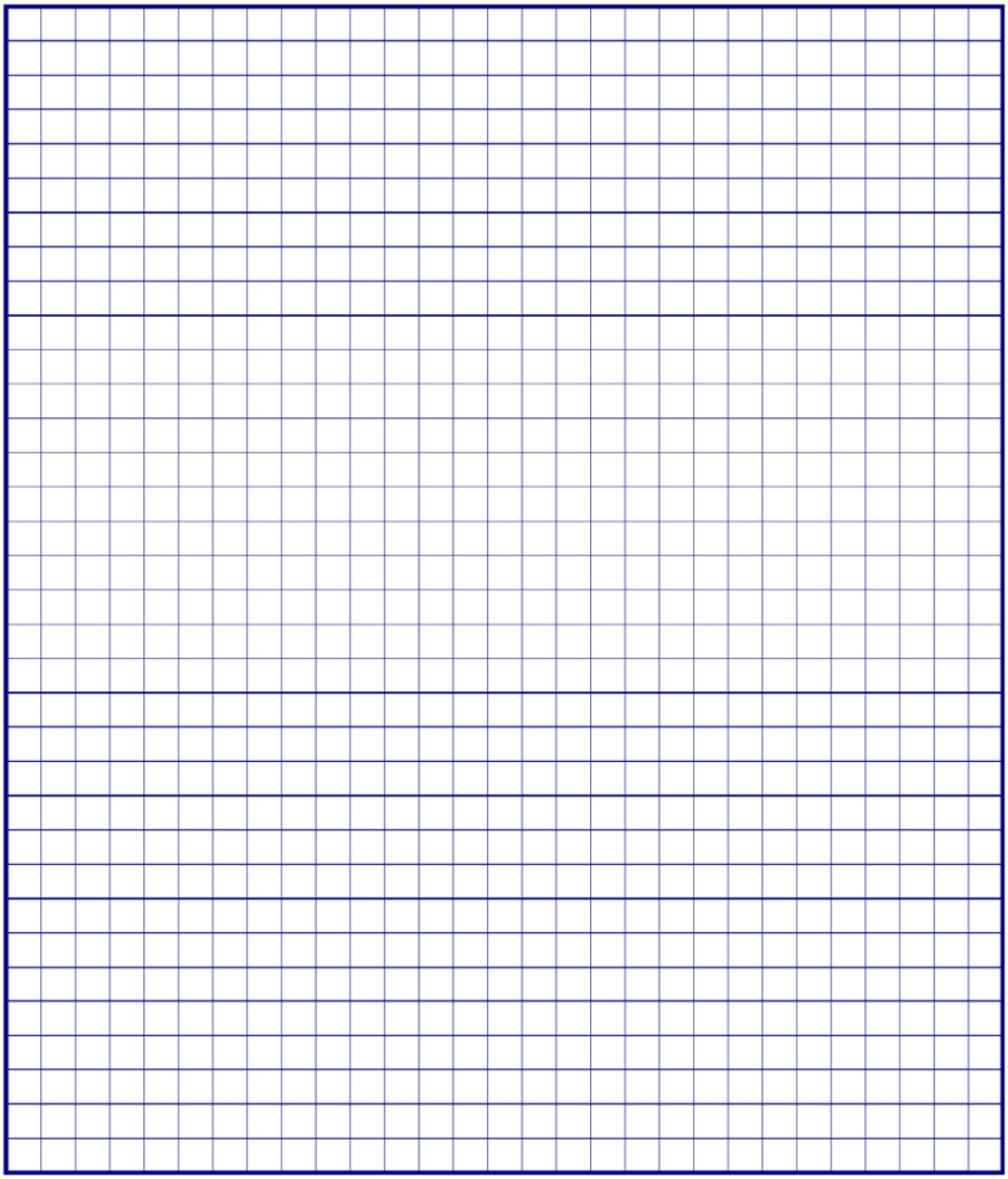
Assigned to (Auditor):

Number of Conditioned Stories:

Floor Area (sq. ft.):

Comment:

Site Diagram



Client Name:
Client ID:
Alt. Client ID:

NEAT Data Collection Form
Form Run On: 11/2/2011

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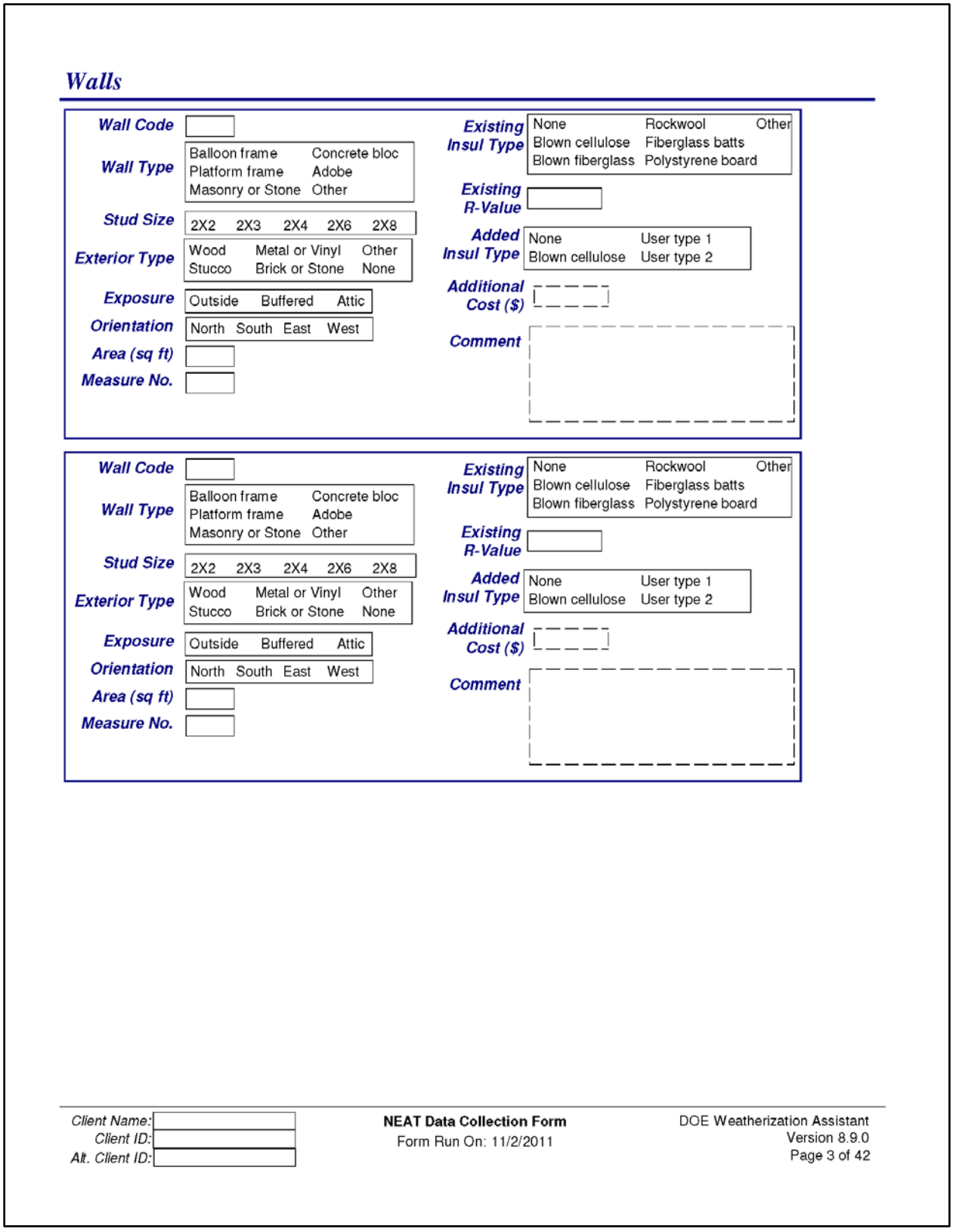

Walls

Wall Code

Wall Type
Balloon frame | Concrete bloc
Platform frame | Adobe
Masonry or Stone | Other

Stud Size
2X2 | 2X3 | 2X4 | 2X6 | 2X8

Exterior Type
Wood | Metal or Vinyl | Other
Stucco | Brick or Stone | None

Exposure
Outside | Buffered | Attic

Orientation
North | South | East | West

Area (sq ft)

Measure No.

Existing Insul Type
None | Rockwool | Other
Blown cellulose | Fiberglass batts
Blown fiberglass | Polystyrene board

Existing R-Value

Added Insul Type
None | User type 1
Blown cellulose | User type 2

Additional Cost ($)

Comment

Wall Code

Wall Type
Balloon frame | Concrete bloc
Platform frame | Adobe
Masonry or Stone | Other

Stud Size
2X2 | 2X3 | 2X4 | 2X6 | 2X8

Exterior Type
Wood | Metal or Vinyl | Other
Stucco | Brick or Stone | None

Exposure
Outside | Buffered | Attic

Orientation
North | South | East | West

Area (sq ft)

Measure No.

Existing Insul Type
None | Rockwool | Other
Blown cellulose | Fiberglass batts
Blown fiberglass | Polystyrene board

Existing R-Value

Added Insul Type
None | User type 1
Blown cellulose | User type 2

Additional Cost ($)

Comment

Client Name:
Client ID:
Alt. Client ID:

NEAT Data Collection Form
Form Run On: 11/2/2011

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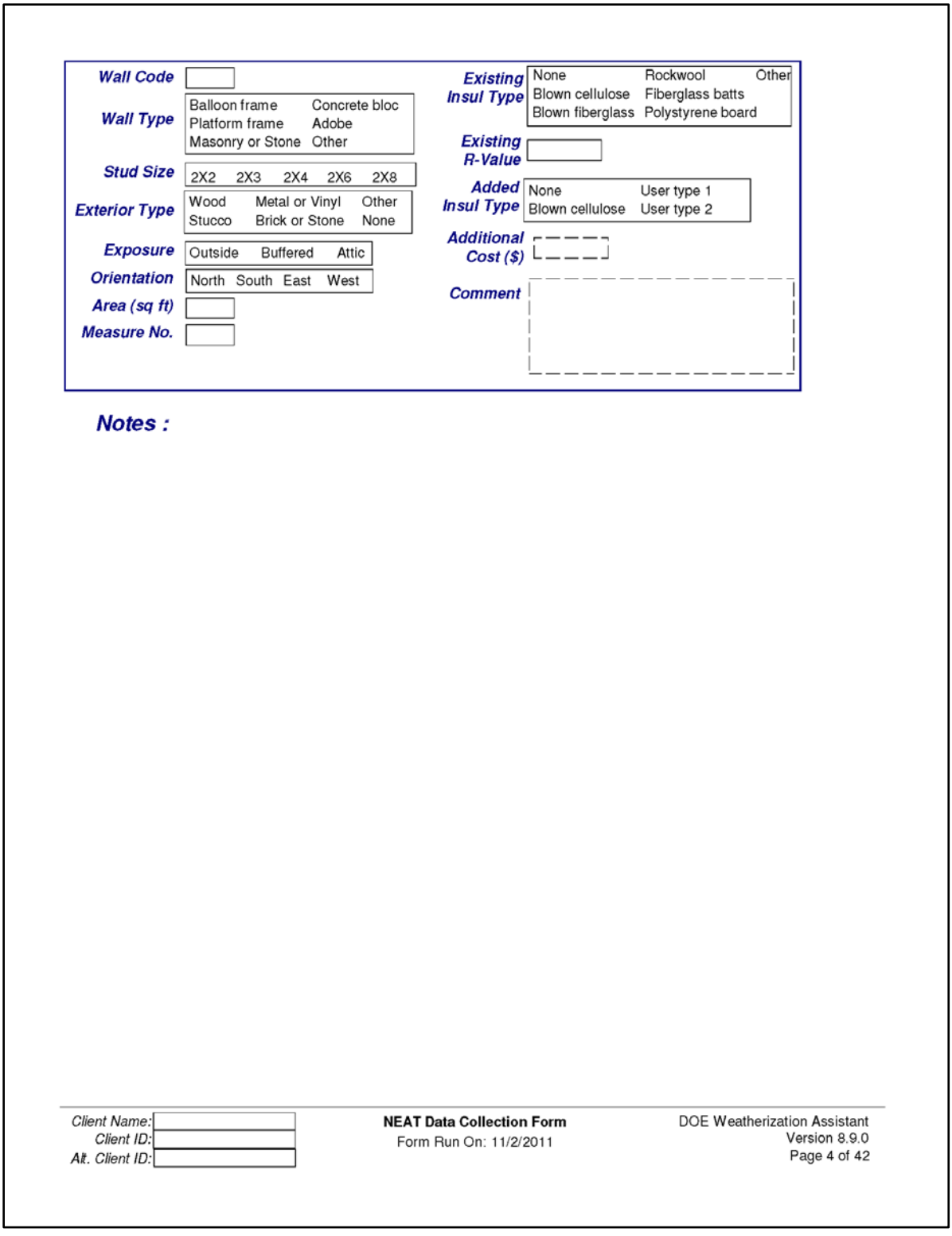

Wall Code

Wall Type: Balloon frame | Concrete bloc | Platform frame | Adobe | Masonry or Stone | Other

Stud Size: 2X2 | 2X3 | 2X4 | 2X6 | 2X8

Exterior Type: Wood | Metal or Vinyl | Other | Stucco | Brick or Stone | None

Exposure: Outside | Buffered | Attic

Orientation: North | South | East | West

Area (sq ft)

Measure No.

Existing Insul Type: None | Rockwool | Other | Blown cellulose | Fiberglass batts | Blown fiberglass | Polystyrene board

Existing R-Value

Added Insul Type: None | User type 1 | Blown cellulose | User type 2

Additional Cost ($)

Comment

Notes :

Client Name:
Client ID:
Alt. Client ID:

NEAT Data Collection Form
Form Run On: 11/2/2011

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Two additional sets of Walls input forms exist in the NEAT Data Collection Forms.

Windows

Window Code

Window Type: Jalousie | Door Window | Awning | Sliding Glass Door | Slider | Skylight | Fixed

Frame Type: Wood or Vinyl | Metal | Improved metal

Glazing Type: Single Pane | Single with Bad storm | Single with Wood storm | Double Pane | Single with Metal stor | Double Pane Low

Interior Shading: Drapes | Drapes w/Blinds or Shade | Blinds or Shade | None

Exterior Shading (%)

Leakiness: Very Tight | Medium | Very Loose | Tight | Loose

Retrofit Options: Evaluate All | Replace w/Low E | Weatherize | Add Storm | Replace | Evaluate None

Additional Costs: Weatherization | Replacement | Low E | Storm

Comment

Width (in)

Height (in)

Wall Code

Number of windows having this description

Window Code

Window Type: Jalousie | Door Window | Awning | Sliding Glass Door | Slider | Skylight | Fixed

Frame Type: Wood or Vinyl | Metal | Improved metal

Glazing Type: Single Pane | Single with Bad storm | Single with Wood storm | Double Pane | Single with Metal stor | Double Pane Low

Interior Shading: Drapes | Drapes w/Blinds or Shade | Blinds or Shade | None

Exterior Shading (%)

Leakiness: Very Tight | Medium | Very Loose | Tight | Loose

Retrofit Options: Evaluate All | Replace w/Low E | Weatherize | Add Storm | Replace | Evaluate None

Additional Costs: Weatherization | Replacement | Low E | Storm

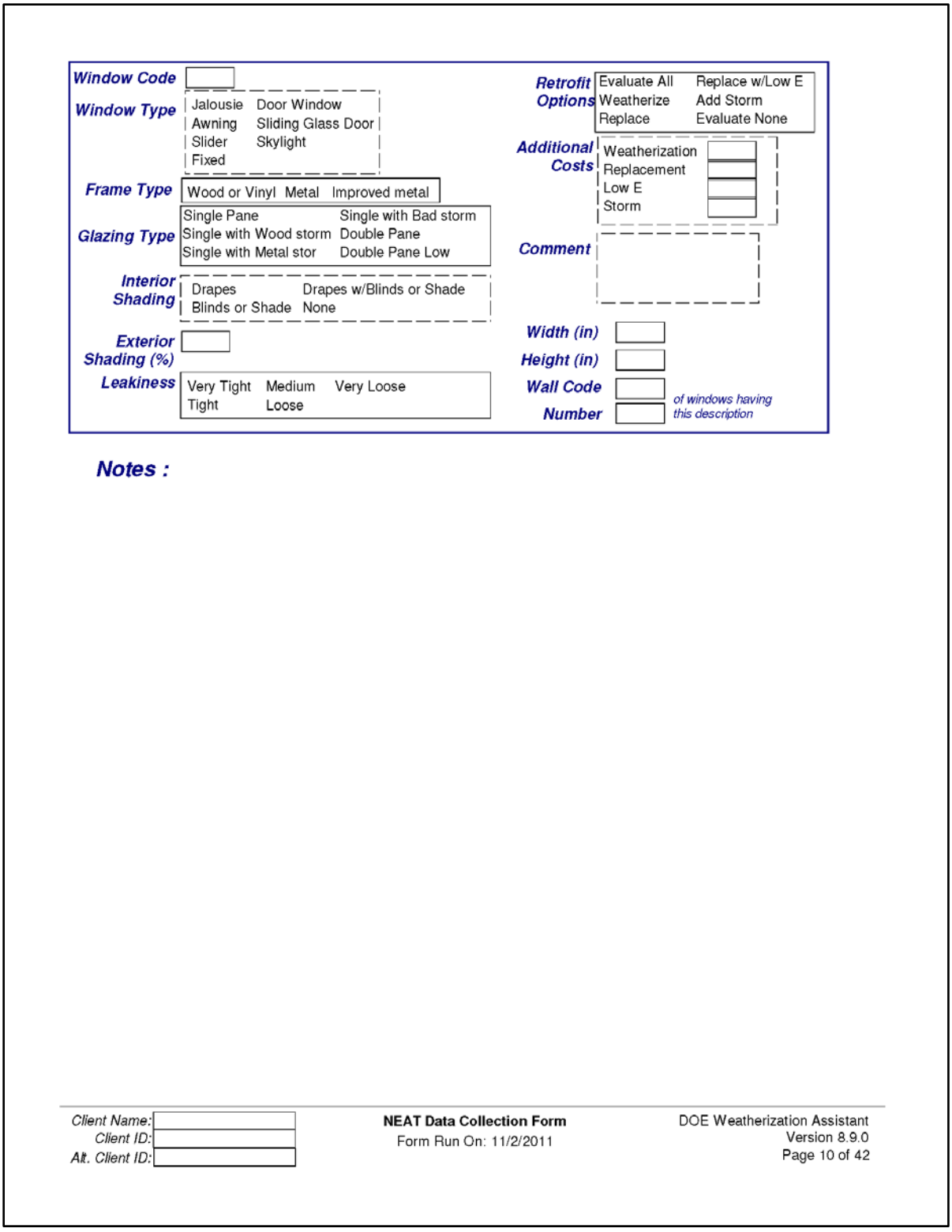
Comment

Width (in)

Height (in)

Wall Code

Number of windows having this description



Two additional sets of Windows input forms exist in the NEAT Data Collection Forms.

Doors

Door Code [ ]
Wall Code [ ] *(from Walls page)*
Door Type Wood Hollow Core / Single Sliding Glass / Wood Solid Core / Double Sliding Glas / Steel Insulated
Number [ ] *of doors having this description*
Area (sq ft) [ ]
Storm Door Condition Adequate / Deteriorated / None
Width (in) [ ] *of storm door (if to be replaced)*
Height (in) [ ] *of storm door (if to be replaced)*
Replacement Door Required ? [ ] **Additional Cost** [ ]
Include In SIR? [ ]
Comment [ ]

Door Code [ ]
Wall Code [ ] *(from Walls page)*
Door Type Wood Hollow Core / Single Sliding Glass / Wood Solid Core / Double Sliding Glas / Steel Insulated
Number [ ] *of doors having this description*
Area (sq ft) [ ]
Storm Door Condition Adequate / Deteriorated / None
Width (in) [ ] *of storm door (if to be replaced)*
Height (in) [ ] *of storm door (if to be replaced)*
Replacement Door Required ? [ ] **Additional Cost** [ ]
Include In SIR? [ ]
Comment [ ]

Door Code [ ]
Wall Code [ ] *(from Walls page)*
Door Type Wood Hollow Core / Single Sliding Glass / Wood Solid Core / Double Sliding Glas / Steel Insulated
Number [ ] *of doors having this description*
Area (sq ft) [ ]
Storm Door Condition Adequate / Deteriorated / None
Width (in) [ ] *of storm door (if to be replaced)*
Height (in) [ ] *of storm door (if to be replaced)*
Replacement Door Required ? [ ] **Additional Cost** [ ]
Include In SIR? [ ]
Comment [ ]

Door Code [ ]
Wall Code [ ] *(from Walls page)*
Door Type Wood Hollow Core / Single Sliding Glass / Wood Solid Core / Double Sliding Glas / Steel Insulated
Number [ ] *of doors having this description*
Area (sq ft) [ ]
Storm Door Condition Adequate / Deteriorated / None
Width (in) [ ] *of storm door (if to be replaced)*
Height (in) [ ] *of storm door (if to be replaced)*
Replacement Door Required ? [ ] **Additional Cost** [ ]
Include In SIR? [ ]
Comment [ ]

Notes :

Client Name: [ ]
Client ID: [ ]
Alt. Client ID: [ ]

NEAT Data Collection Form
Form Run On: 11/2/2011

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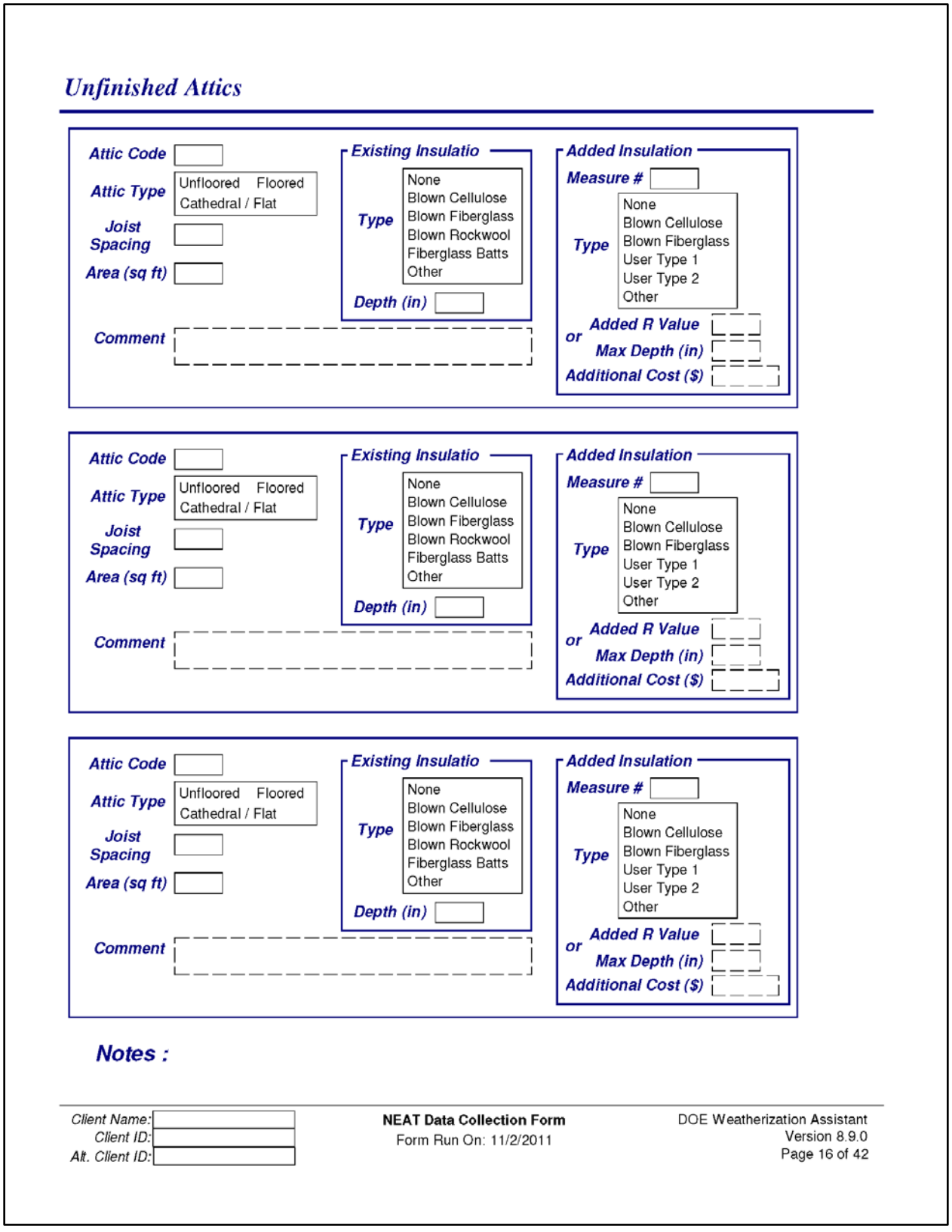

Unfinished Attics

Attic Code
Attic Type: Unfloored Floored / Cathedral / Flat
Joist Spacing
Area (sq ft)
Comment

Existing Insulatio
Type: None / Blown Cellulose / Blown Fiberglass / Blown Rockwool / Fiberglass Batts / Other
Depth (in)

Added Insulation
Measure #
Type: None / Blown Cellulose / Blown Fiberglass / User Type 1 / User Type 2 / Other
or Added R Value
or Max Depth (in)
Additional Cost ($)

Attic Code
Attic Type: Unfloored Floored / Cathedral / Flat
Joist Spacing
Area (sq ft)
Comment

Existing Insulatio
Type: None / Blown Cellulose / Blown Fiberglass / Blown Rockwool / Fiberglass Batts / Other
Depth (in)

Added Insulation
Measure #
Type: None / Blown Cellulose / Blown Fiberglass / User Type 1 / User Type 2 / Other
or Added R Value
or Max Depth (in)
Additional Cost ($)

Attic Code
Attic Type: Unfloored Floored / Cathedral / Flat
Joist Spacing
Area (sq ft)
Comment

Existing Insulatio
Type: None / Blown Cellulose / Blown Fiberglass / Blown Rockwool / Fiberglass Batts / Other
Depth (in)

Added Insulation
Measure #
Type: None / Blown Cellulose / Blown Fiberglass / User Type 1 / User Type 2 / Other
or Added R Value
or Max Depth (in)
Additional Cost ($)

Notes :

Client Name:
Client ID:
Alt. Client ID:

NEAT Data Collection Form
Form Run On: 11/2/2011

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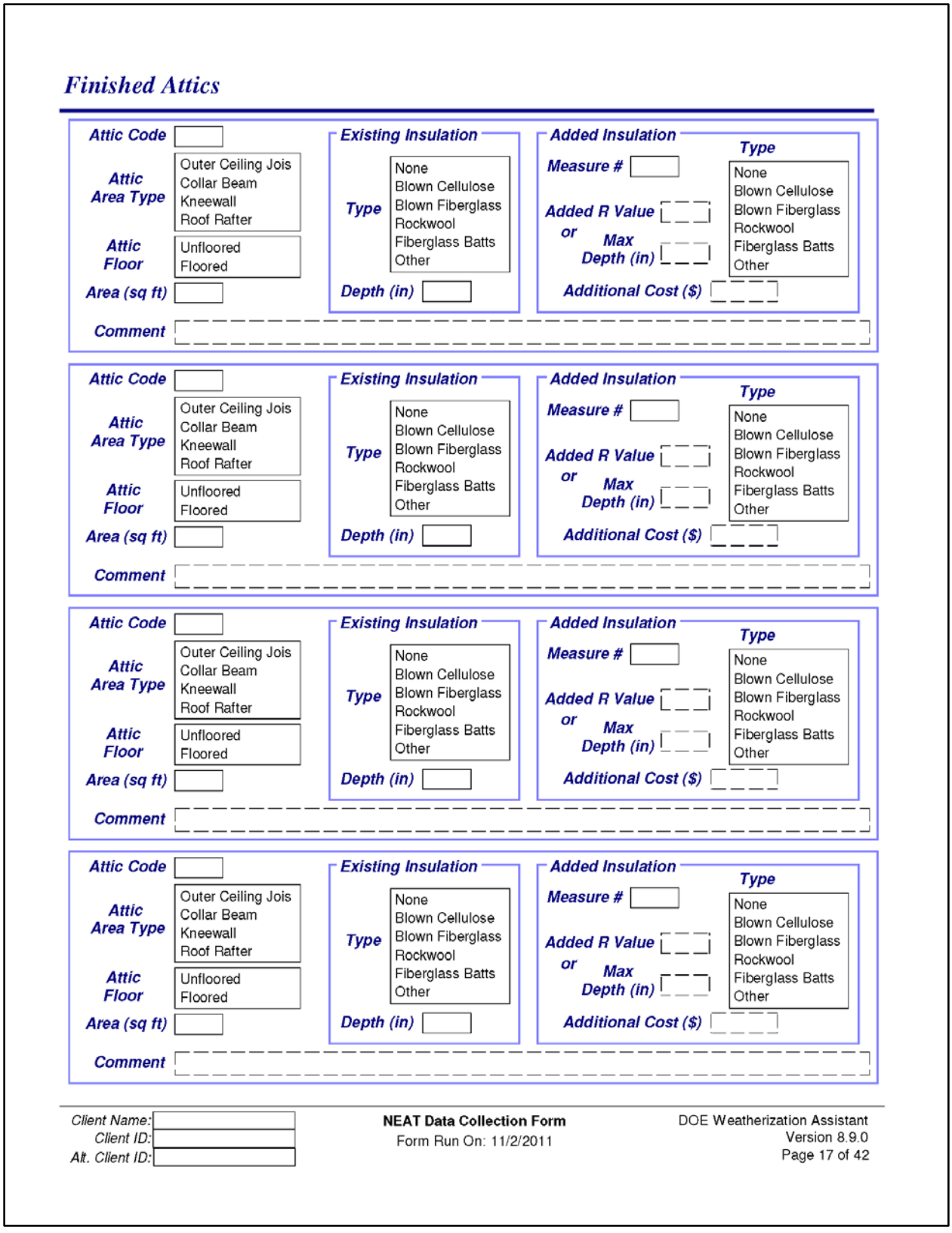

Finished Attics

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation — Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Depth (in)

Added Insulation — Measure #; Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Added R Value or Max Depth (in); Additional Cost ($)

Comment

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation — Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Depth (in)

Added Insulation — Measure #; Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Added R Value or Max Depth (in); Additional Cost ($)

Comment

Attic Code

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Added Insulation — Measure #; Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Added R Value or Max Depth (in); Additional Cost ($)

Comment

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Added Insulation — Measure #; Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other; Added R Value or Max Depth (in); Additional Cost ($)

Comment

Client Name:
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Alt. Client ID:

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Finished Attics

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Depth (in)

Added Insulation

Measure #

Added R Value or **Max Depth (in)**

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Additional Cost ($)

Comment

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Depth (in)

Added Insulation

Measure #

Added R Value or **Max Depth (in)**

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Additional Cost ($)

Comment

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Depth (in)

Added Insulation

Measure #

Added R Value or **Max Depth (in)**

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Additional Cost ($)

Comment

Attic Code

Attic Area Type: Outer Ceiling Jois / Collar Beam / Kneewall / Roof Rafter

Attic Floor: Unfloored / Floored

Area (sq ft)

Existing Insulation

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Depth (in)

Added Insulation

Measure #

Added R Value or **Max Depth (in)**

Type: None / Blown Cellulose / Blown Fiberglass / Rockwool / Fiberglass Batts / Other

Additional Cost ($)

Comment

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Foundations

Foundation Code | Foundation Type | Conditioned / Non-Conditioned / Vented Non-Conditioned / Unintentionally Conditione / Uninsulated Slab / Insulated Slab / Exposed Floor
Measure #

Floor
Area (sq ft) | Added Ins. Type: Fiberglass Batts / None
Existing Ins. R Value | Addl. Cost

Sill
Floor Joist Size | Added Ins. Type: Fiberglass Batts / None
Perimeter to Insulate | Addl. Cost

Foundation Wall
Height (ft) | Existing Ins. R Value
Height Exposed (%) | Added Ins. Type: Rigid Foam Board / None
Perimeter | Addl. Cost

Comment

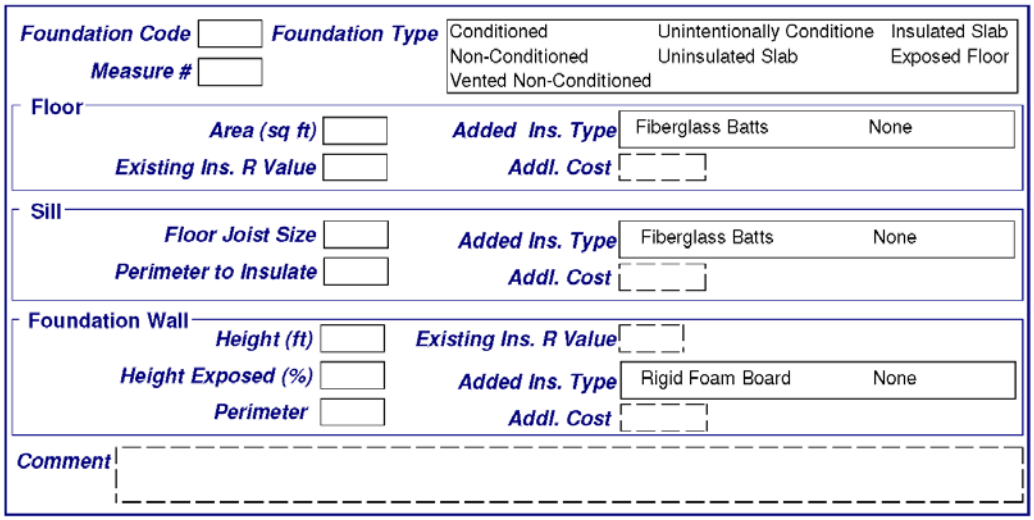
Foundation Code | Foundation Type | Conditioned / Non-Conditioned / Vented Non-Conditioned / Unintentionally Conditione / Uninsulated Slab / Insulated Slab / Exposed Floor
Measure #

Floor
Area (sq ft) | Added Ins. Type: Fiberglass Batts / None
Existing Ins. R Value | Addl. Cost

Sill
Floor Joist Size | Added Ins. Type: Fiberglass Batts / None
Perimeter to Insulate | Addl. Cost

Foundation Wall
Height (ft) | Existing Ins. R Value
Height Exposed (%) | Added Ins. Type: Rigid Foam Board / None
Perimeter | Addl. Cost

Comment



Foundation Code | Foundation Type | Conditioned | Unintentionally Conditione | Insulated Slab
Measure # | Non-Conditioned | Uninsulated Slab | Exposed Floor
Vented Non-Conditioned

Floor
Area (sq ft) | Added Ins. Type: Fiberglass Batts | None
Existing Ins. R Value | Addl. Cost

Sill
Floor Joist Size | Added Ins. Type: Fiberglass Batts | None
Perimeter to Insulate | Addl. Cost

Foundation Wall
Height (ft) | Existing Ins. R Value
Height Exposed (%) | Added Ins. Type: Rigid Foam Board | None
Perimeter | Addl. Cost

Comment

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Heating Systems

System Code

Equipment Type
- Gravity Furnace
- Forced Air Furnace
- Steam Boiler
- Hot Water Boiler
- Fixed Electric Resistance
- Portable Electric Resistance
- Heat Pump
- Vented Space Heater
- Unvented Space Heater
- Other

Fuel
- Natural Gas
- Oil
- Electricity
- Propane
- Wood
- Coal
- Kerosene
- Other

Location
- Heated Space
- Unconditioned Space
- Unintentionally Heated Space

Heat Supplied

Primary System ☐

Manufacturer

Model

Uninsulated Supply Duct

Type: Round / Rectangula

Length (ft)

Width (in)

Height (in)

OR Diameter (in)

Location: Attic / Subspace

Uninsulated Supply Duct

Type: Round / Rectangula

Length (ft)

Width (in)

Height (in)

OR Diameter (in)

Location: Attic / Subspace

Comment

HEATING SYSTEM DETAILS * Equipment Type and Fuel Determine which fields are required

Input Units: No Input / kBTU/hr / Gals/hr / Lbs/hr / CCM

Input Rating

Output Capacity

Steady State System Efficiency (%)

Condition: Good / Fair / Poor (but working)

Programmable Thermostat ☐

Heat Pump HSPF or Year Purchased

Automatic Vent Damper
- Present ? ☐
- Recommended ? ☐
- Flue Diameter (in)

Pilot Light / IID
- IID ? ☐ Pilot Light ? ☐
- On in Summer ? ☐

Power Burner ? ☐

Retention Head
- Present ? ☐
- Recommended ? ☐

System Retrofit

Options
- Evaluate All
- Tuneup Performed
- Tuneup Mandatory
- Standard Efficiency Replacement Mandatory
- High Efficiency Replacement Mandatory
- Don't Replace
- Evaluate None

Fuel
- Natural Gas
- Oil
- Electricity
- Propane
- Wood
- Coal
- Kerosene
- Other

	Standard	High Efficiency
System AFUE		
Labor Cost ($)		
Material Cost ($)		

Notes :

Client Name:
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Alt. Client ID:

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Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Conducted During Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Conducted During Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Heat Rise

	Conducted During Audit	Insp.
Return Temp (F)		
Supply Temp (F)		
Temp Rise (F)		
Listed/Rated Temp Rise (F)		

Comment

VENT TESTS

Venting Informatio

Damper Type: None found / Electric / Thermal / Barometric / None found but one is recommended / Other

Damper Condition: Good / Fair / Poor (but working) / Broken (not working) / Broken (replacement recommended) / None / Not applicable

Chimney Type: Masonry - Lined / Masonry - Unlined / Metal / None / Other

Chimney Condition: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue Type: Metal Single Wall / Metal Double Wall / PVC / Other

Flue Conditio: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue / Damper Diameter (in)

Combustion System Type: Sealed / Unsealed

Combustion Air Intake: Adequate / Present but inadequate / None / Other

Other Venting Related Problems

Normal Operating Conditions Draft Measurement

	Conducted During Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

Notes :

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Fan Limit Controls

- [ ] Control Settings are Adjustable
- [ ] Limit Controls Not Working

Fan On Setting (F) [ ]
Fan Off Setting (F) [ ]
High Limit Setting (F) [ ]

Burner and Pilot

Burner Type: [ ] Ribbon [ ] Power [ ] Upshot [ ] Flame Retention [ ] Other

Pilot Type: [ ] Standing Pilot (on in summer) [ ] Standing Pilot (off in summer) [ ] Hot Surface [ ] IID [ ] Other

Burner Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Pilot Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Blower and Belt

Blower Type: [ ] Direct Drive [ ] Belt Drive

Belt Size [ ] (inches or size code)

Blower Condition: [ ] Clean [ ] Dirty [ ] Plugged

Belt Play (in) [ ]

Motor Current (amps) [ ]

Belt Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Accessories

Humidifier: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Electronic Air Cleaner: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

AC Coil: [ ] Clean [ ] Fair [ ] Dirty [ ] Plugged [ ] None

Air Filter

Filter Size (length x width, in) [ ]

Filter Condition: [ ] Clean [ ] Fair [ ] Dirty [ ] Plugged [ ] None

Comment

Notes :

Client Name: [ ]
Client ID: [ ]
Alt. Client ID: [ ]

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Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

BOILER COMPONENTS

Distribution System

System Type: Gravity / Pump — Pump Location: Supply / Return

☐ Asbestos Present — Asbestos Condition: Good / Fair / Poor

Expansion Tank Condition: Good / Fair / Poor (but working) / Broken (not working)

Drain Valve Condition: Good / Fair / Poor (but working) / Broken (not working) / None

General Condition: Good / Fair / Poor (but working) / Broken (not working)

Controls

☐ Temperature - Pressure Valve Present

Pressure Reading (psi) [ ]

☐ Low Water Cut-Off Present

AquaStat Setting (deg F) [ ]

Convectors

Convector Type: Radiator / Baseboard / Both

☐ Operable Convectors in Each Room

☐ Operable Convectors in Unconditioned Space

☐ Client Knows How to Use a Radiator Key

☐ Zone Valves Present

Zone Valve Type / Model [ ]

Zone Valve Condition: Good / Fair / Poor (but working) / Broken (not working)

Comment [ ]

Notes :

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

INSPECTIONS

Other Items

- ☐ Cracked Heat Exchanger
- ☐ Insufficient Clearance from Combustibles

Electric Service Switch: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

- ☐ Gas Leak Present
- ☐ Fuel Shutoff Valve Not Present
- ☐ Drip Leg Not Present
- ☐ Any Other Heating System Problems

Comment

THERMOSTAT DETAILS

Thermostat Type: Mechanical (bimetallic strip) / Mechanical (mercury bulb) / Electronic (no setback) / Electronic (with setback) / Power Pile / Other

Daytime Thermostat Setting (F) ____

Nighttime Thermostat Setting (F) ____

- ☐ Relocate Thermostat

Anticipator Current (amps) ____

Anticipator Setting (0-1) ____

- ☐ Anticipator Adjustment Needed

Comment

Notes :

Cooling

AC Code		AC Code	
AC Unit Type	Central Window Heat Pump Evaporative	AC Unit Type	Central Window Heat Pump Evaporative
Manufacturer		Manufacturer	
Model		Model	
Area Cooled (sq ft)		Area Cooled (sq ft)	
Size (kBTU/hr)		Size (kBTU/hr)	
SEER	or	SEER	
Year Manufactured		Year Manufactured	
Comment		Comment	

AC Code		AC Code	
AC Unit Type	Central Window Heat Pump Evaporative	AC Unit Type	Central Window Heat Pump Evaporative
Manufacturer		Manufacturer	
Model		Model	
Area Cooled (sq ft)		Area Cooled (sq ft)	
Size (kBTU/hr)		Size (kBTU/hr)	
SEER	or	SEER	
Year Manufactured		Year Manufactured	
Comment		Comment	

Notes :

Ducts / Infiltration

AIR and DUCT LEAKAGES

Evaluate Duct Sealing? ☐

Duct Leakage Method: Whole House Blower Door Measurement / Blower Door Subtraction (sealed and unsealed registeres and grills) / Duct-Blower Measurements

Whole House Blower Door Measurements

	Before Weatherization (Existing)	After Weatherization (Target or Actual)
Air Leakage Rate(cfm)		
at House Pressure Difference (Pa)		
Infiltration Reduction Cost ($)		
Comment		

Whole House Blower Door Measurements

	Before Weatherization	After Duct Sealing	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
Infiltration Reduction Cost ($)			
Duct Sealing Cost ($)			

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

Comment:

Client Name:
Client ID:
Alt. Client ID:

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Ducts / Infiltration (Continued)

AIR and DUCT LEAKAGES (Continued)

BLOWER DOOR SUBTRACTION

	Before Weatherization	After Duct Sealing	After Weatherization (Target or Actual)
With Registers/Grills Open			
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
With Registers/Grills Sealed			
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
Duct/House Pressure Diff. (Pa)			

Infiltration Reduction Cost ($)

Duct Sealing Cost ($)

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

Comment

WHOLE HOUSE BLOWER DOOR MEASUREMENT

	Before Weatherizatio	After Weatherization
Air Leakage Rate (CFM)		
at House Pressure Difference (Pa)		

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

DUCT BLOWER MEASUREMENTS

	Before Duct Sealing		After Duct Sealing	
	Total	Outside *	Total	Outside *
Fan Flow (CFM)				
at Duct Pressure (Pa)				
House Pressure (Pa) wrt outside				

* 'Outside' readings are taken while the house / outdoor pressure differential provided by a blower door is maintained at the same level as the duct / outdoor pressure differential created by the duct-blower. Thus the 'Duct Pressure' and the 'House Pressure wrt outside' should be equal.

Comment

Infiltration Reduction Cost ($)

Duct Sealing Cost ($)

Notes :

Ducts / Infiltration (Continued)

BLOWER DOOR READINGS (Optional)

Audit
Pre-Install
During Install
Post-Install
Inspection
Other

Test Date	Conducted During (pick from list)	Equipment Used	Air Leakage Rate(cfm)	Building Pressure Differential (Pa)	Corrected CFM at 50 Pa	Comments

Notes :

Ducts / Infiltration (Continued)

ZONAL PRESSURES (Optional)

Conducted During options
Audit
Pre-Install
During Install
Post-Install
Inspection
Other

Zone Pressure Location options	
Attic	Exterior Wall
Side Attic	Interior Wall
Kneewall	Basement
Ceiling Joist Space	Crawl Space
Attached Garage	Mobile Home Belly
Unheated Addition	Other

Conducted During (pick from list)	Building Pressure Differential (Pa)	Zone Pressure Location (pick from list or describe)	Zone Pressure (Pa)	Ducts Present	Comments
				☐	
				☐	
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Notes :

Client Name:
Client ID:
Alt. Client ID:

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Ducts / Infiltration (Continued)

PRESSURE BALANCE READINGS (Optional)

Family Room	Bdrm 1
Living Room	Bdrm 2
Dining Room	Bdrm 3
Kitchen	Bdrm 4
Bath1	Basement
Bath2	Addition
Bath3	Other

Location (pick one or describe)	Initial Pressure (Pa)	Final Pressure (Pa)	Comments

Notes :

Ducts / Infiltration (Continued)

PRESSURE PAN READINGS (Optional)

Family Room	Bdrm1
Living Room	Bdrm2
Dining Room	Bdrm3
Kitchen	Bdrm4
Bath1	Basement
Bath2	Foyer
Bath3	Hallway
	Other

Register #	Location (pick one or describe)	Register Type	Initial Pressure (Pa)	Final Pressure (Pa)	Comments
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
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		Supply Return			
		Supply Return			
		Supply Return			

Notes :

Base Load - Water Heater

Existing Equipment

Manufacturer | Model

Fuel: Natural Gas / Electricity / Propane

Rated Input | Input Units: kBTU / kW

Location: Heated Space / Unconditioned Space / Unintentionally Heated Space

Energy Factor | Recovery Efficiency (%)

Gallons

Insulation Type: Fiberglass / Polyurethane

☐ Water Heater Wrap Present

Insulation Thickness (in)

☐ Water Heater Pipe Insulation Present

Label R Value

Replacement Equipment

Manufacturer

Model

Fuel: Natural Gas / Electricity / Propane

Rated Input

Input Units: kBTU / kW

Gallons

Installation Cost ($)

Additional Cost ($)

Energy Factor

Recovery Efficiency (%)

Shower Heads

Number of Showerheads | Average GPM

Minutes of Shower Use Per Day

Comment

Notes :

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAIL

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading In Flue (ppm)		

Comment

VENT TESTS

Venting Information

Damper Type: None found / Electric / Thermal / Barometric / None found but one is recommended / Other

Damper Conditio: Good / Fair / Poor (but working) / Broken (not working) / Broken (replacement recommended) / None / Not applicable

Chimney Type: Masonry - Lined / Masonry - Unlined / Metal / None / Other

Chimney Condition: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue Type: Metal Single Wall / Metal Double Wall / PVC / Other

Flue Conditio: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue / Damper Diameter (in)

Combustion Air Intake: Adequate / Present but inadequate / None / Other

Any Other Venting Related Problems?

Normal Operating Conditions Draft Measurement

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

Notes :

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAILS (Continued)

INSPECTIONS

Fuel Related

- ☐ Insufficient Clearance from Combustibles
- Electric Service Switch: [Good | Fair | Poor (but working) | Broken (not working) | None | Not applicable]
- ☐ Gas Leak Present
- ☐ Fuel Shutoff Valve Not Present
- ☐ Drip Leg Not Present

Water Related

- Hot Water Temp (F) [___]
- ☐ Supply Temperature Adjustment Needed
- ☐ Pressure Relief Piping Needed
- ☐ Water Leak Present

- ☐ Other Water Heating Problem

Comment [ ]

Notes :

Base Load - Refrigerator

Existing Equipment

Manufacturer

Model

Style: Top Freezer / Bottom Freezer / Side by Side / Single Door / Single Door with Freezer / Other

Defrost: Automatic / Manual / Partial Automatic / Other

Size (cu ft)

Location: Heated Space / Unconditioned Space / Unintentionally Heated Space

Height (in) Width (in) Depth (in)

Consumption

Label/Database Annual Consumption

kWh / yr

Age: Less than 5 years / 5 to 10 years / 10 to 15 years / More than 15 years

Door Seal Condition: Good / Fair - Some Wear / Poor - Gaps Visible

OR

Metered Consumption

Metering Minutes

Metering Reading (kWh)

Temperature (F)

Manual Defrost

Includes Defrost Cycle

Adjusted Consumption kWh/yr

Replacement Equipment

Manufacturer

Model

Style: Top Freezer / Bottom Freezer / Side by Side / Single Door / Single Door with Freezer / Other

Defrost: Automatic / Manual / Partial Automatic / Other

kWh / yr

Size (cu ft)

Height (in) Width (in) Depth (in)

Installation Cost ($)

Add'l Cost ($)

Adjusted Consumption kWh/yr

Annual Savings kWh/yr

Comment

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Baseload - Lighting Systems

Existing Incandescent Lighting

Light Code

Room: Kitchen / Dining Room / Other / Family Room / Bedroom / Living Room / Bathroom / Rec Room / Utility

Location: Ceiling / Wall / Floor / Other / Table

Lamp Type: Standard / Flood / Other

Quantity

Use Hours / Day

Watts

Replacement Compact Fluorescent Lighting

CF Watts

Additional Costs ($)

Comment

Existing Incandescent Lighting

Light Code

Room: Kitchen / Dining Room / Other / Family Room / Bedroom / Living Room / Bathroom / Rec Room / Utility

Location: Ceiling / Wall / Floor / Other / Table

Lamp Type: Standard / Flood / Other

Quantity

Use Hours / Day

Watts

Replacement Compact Fluorescent Lighting

CF Watts

Additional Costs ($)

Comment

Existing Incandescent Lighting

Light Code

Room: Kitchen / Dining Room / Other / Family Room / Bedroom / Living Room / Bathroom / Rec Room / Utility

Location: Ceiling / Wall / Floor / Other / Table

Lamp Type: Standard / Flood / Other

Quantity

Use Hours / Day

Watts

Replacement Compact Fluorescent Lighting

CF Watts

Additional Costs ($)

Comment

Client Name:
Client ID:
Alt. Client ID:

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Health & Safety

WHOLE HOUSE

- ☐ Smoke Detector is Needed
- ☐ CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment

BUILDING SHELL

Attic

- ☐ Recessed Lights Present
- ☐ Chimney / Flue Shielding Incorrec
- ☐ Wiring Problems
- ☐ Ventilation Inadequate
- ☐ Water Leaks Present
- ☐ Moisture Problems Evident
- ☐ Vermiculite Present
- ☐ Other Problems

Walls

- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Moisture Problems Evident
- ☐ Lead Based Paint is Likely
- ☐ Asbestos in Siding is Likely
- ☐ Other Problems

Basement / Crawlspace

- ☐ Vapor Barrier Needed
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Plumbing Leaks Present
- ☐ Moisture Problems Evident
- ☐ Other Problems

Comment

Notes :

Health & Safety (Continued)

EQUIPMENT

Worst Case Condition Draft Measurements - Space Heating System(s)

Date	Conducted During	On Which Heating System	Outdoor Temp (F)	Draft (Pa or in H20)	Spillage Time (sec)	Comments
	Audit / Pre-Install / During Install / Post-Install / Inspection / Other					
	Audit / Pre-Install / During Install / Post-Install / Inspection / Other					
	Audit / Pre-Install / During Install / Post-Install / Inspection / Other					

Worst Case Condition Draft Measurements - Water Heatin

Date	Conducted During	Outdoor Temp (F)	Draft (Pa or in H20)	Spillage Time (sec)	Comments
	Audit / Pre-Install / During Install / Post-Install / Inspection / Other				
	Audit / Pre-Install / During Install / Post-Install / Inspection / Other				

Wood Stove / Fireplace

- [ ] Wood Stove / Fireplace is Present
- [ ] Improper Venting
- [ ] Combustion Air is Inadequate

Clothes Dryer

- [ ] Improper Venting

Cook Stove

- CO Measurement Oven (ppm)
- CO Measurement Burner 1 (ppm)
- CO Measurement Burner 2 (ppm)
- CO Measurement Burner 3 (ppm)
- CO Measurement Burner 4 (ppm)
- [ ] Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen	Air-to-Air Heat Exchanger
[ ] Missing	[ ] Missing	[ ] Exists
[ ] Not Operational	[ ] Not Operational	[ ] Not Operational
[ ] Improper Venting	[ ] Improper Venting	

Comment

Itemized Costs

Measure Name | **Comment**
Cost ($) | **Include in SIR?** ☐
Material
Annual Energy Savings | **Units**: kWh, MMBtu, Therms | **Fuel Saved**: Primary Heating Fu, Water Heating Fuel, Natural Gas, Oil, Electric, Propane, Wood, Coal, Kerosene, Other
Life (years)

Measure Name | **Comment**
Cost ($) | **Include in SIR?** ☐
Material
Annual Energy Savings | **Units**: kWh, MMBtu, Therms | **Fuel Saved**: Primary Heating Fu, Water Heating Fuel, Natural Gas, Oil, Electric, Propane, Wood, Coal, Kerosene, Other
Life (years)

Measure Name | **Comment**
Cost ($) | **Include in SIR?** ☐
Material
Annual Energy Savings | **Units**: kWh, MMBtu, Therms | **Fuel Saved**: Primary Heating Fu, Water Heating Fuel, Natural Gas, Oil, Electric, Propane, Wood, Coal, Kerosene, Other
Life (years)

Measure Name | **Comment**
Cost ($) | **Include in SIR?** ☐
Material
Annual Energy Savings | **Units**: kWh, MMBtu, Therms | **Fuel Saved**: Primary Heating Fu, Water Heating Fuel, Natural Gas, Oil, Electric, Propane, Wood, Coal, Kerosene, Other
Life (years)

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Itemized Costs (Continued)

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings

Life (years)

Units kWh / MMBtu / Therms

Comment

Fuel Saved Primary Heating Fu / Water Heating Fuel / Natural Gas / Oil / Electric / Propane / Wood / Coal / Kerosene / Other

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings

Life (years)

Units kWh / MMBtu / Therms

Comment

Fuel Saved Primary Heating Fu / Water Heating Fuel / Natural Gas / Oil / Electric / Propane / Wood / Coal / Kerosene / Other

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings

Life (years)

Units kWh / MMBtu / Therms

Comment

Fuel Saved Primary Heating Fu / Water Heating Fuel / Natural Gas / Oil / Electric / Propane / Wood / Coal / Kerosene / Other

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings

Life (years)

Units kWh / MMBtu / Therms

Comment

Fuel Saved Primary Heating Fu / Water Heating Fuel / Natural Gas / Oil / Electric / Propane / Wood / Coal / Kerosene / Other

Notes :

Client Name:
Client ID:
Alt. Client ID:

NEAT Data Collection Form
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MHEA Data Collection Form

Audit Name:

Client Name:

Client ID:

Alternate Client ID:

Assigned to (Auditor):

Length:

Width:

Height:

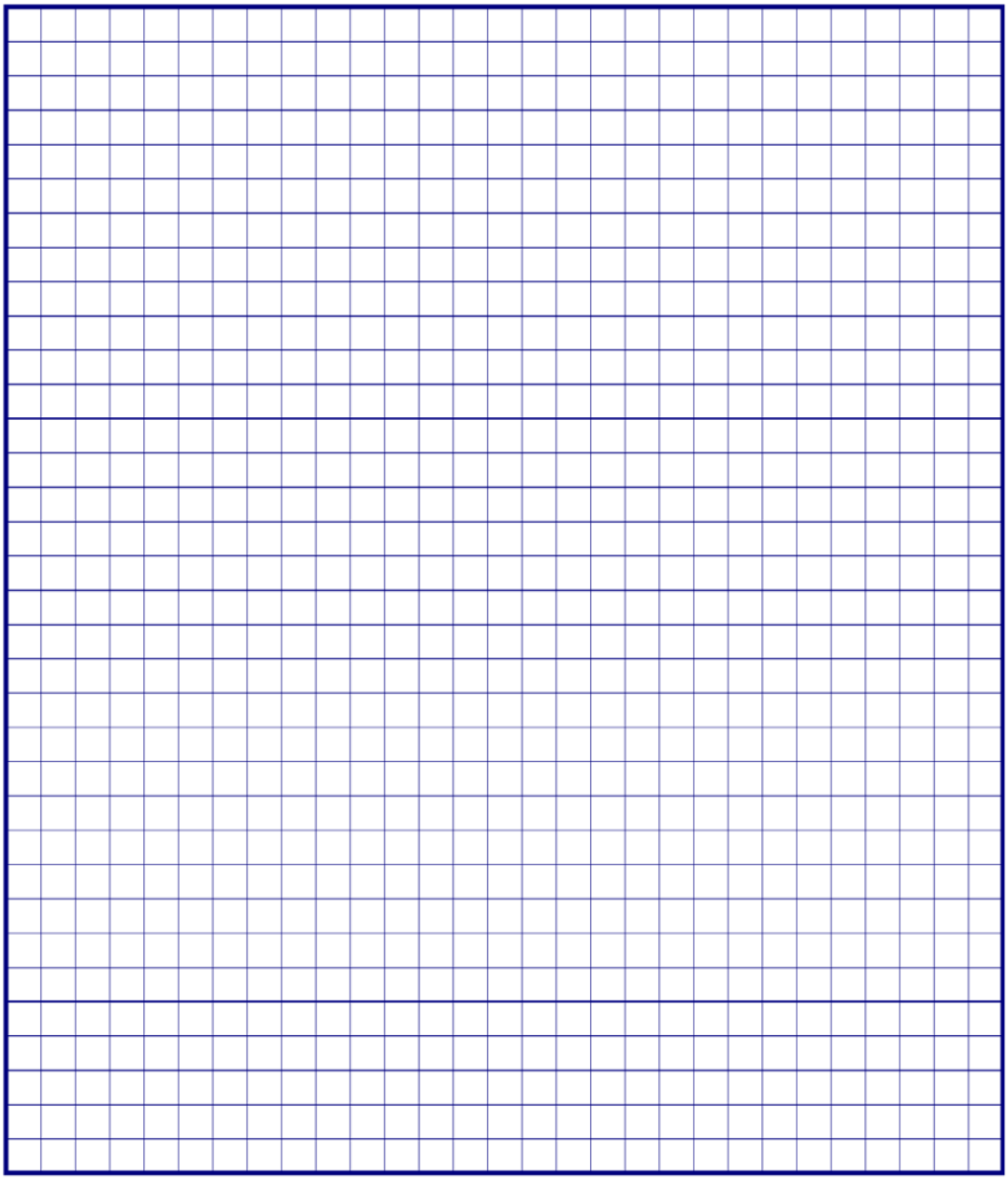
Wind Shielding: Well Shielded Normal Shielding Exposed

Home Leakiness: North Medium Loose

Outdoor Water Heater Closet: ☐

Comment:

Site Diagram



Client Name:
Client ID:
Alt. Client ID:

MHEA Data Collection Form
Form Run On: 11/3/2011

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Walls

Wall Stud Size 2x2 2x3 2x4 2x6

Orientation of Long Wall North South East West

Wall Ventilation Vented Not Vented

Uninsulatable Area (sq ft)

Additional Cost ($)

Insulation Type Thickness

Batt/Blanket (in)

Loose Fill (in)

Foam Core (in)

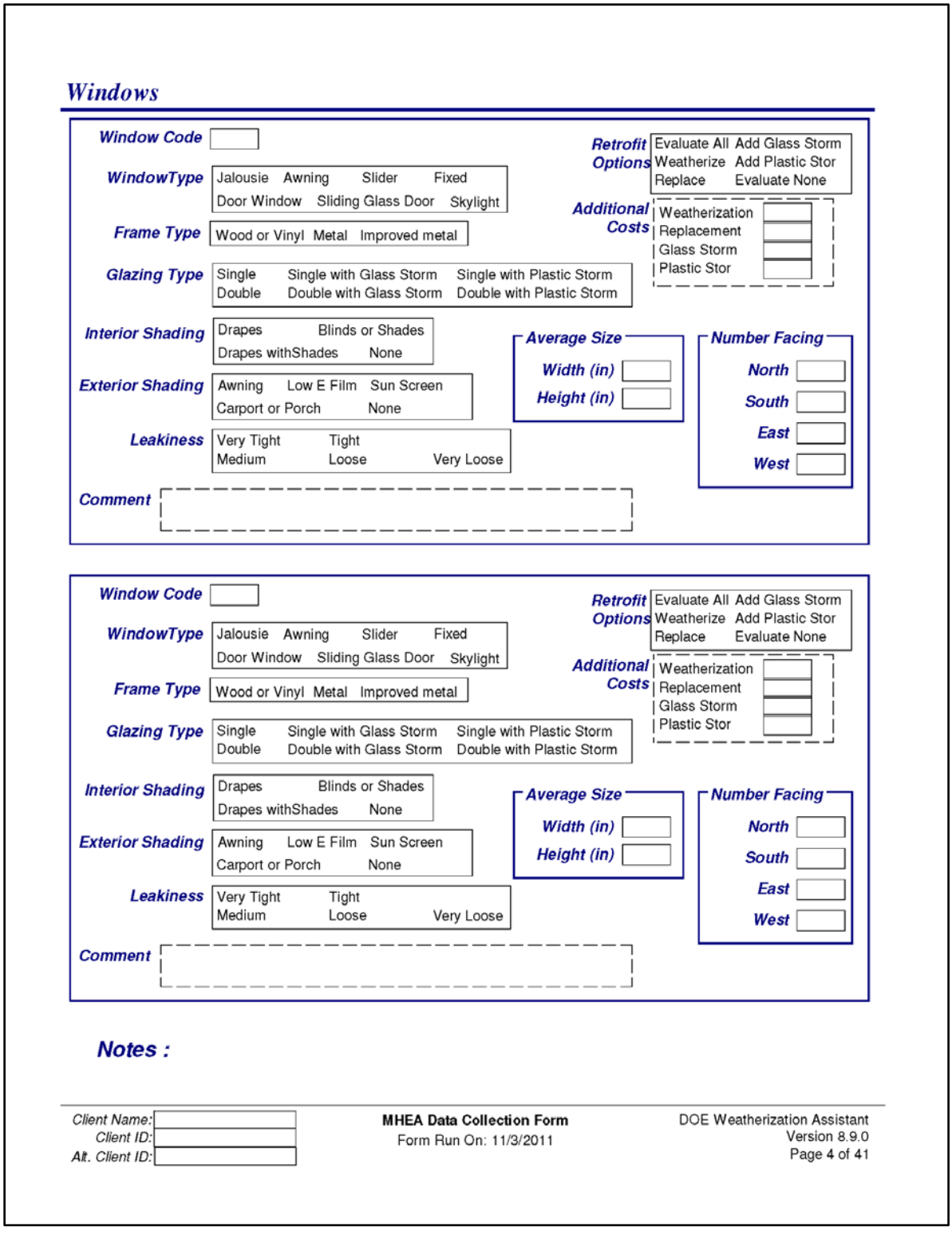
Carport/Porch Roof

Length (ft)

Width (ft)

Orientation North South East West

Comment



Windows

Window Code

WindowType: Jalousie Awning Slider Fixed / Door Window Sliding Glass Door Skylight

Frame Type: Wood or Vinyl Metal Improved metal

Glazing Type: Single Single with Glass Storm Single with Plastic Storm / Double Double with Glass Storm Double with Plastic Storm

Interior Shading: Drapes Blinds or Shades / Drapes withShades None

Exterior Shading: Awning Low E Film Sun Screen / Carport or Porch None

Leakiness: Very Tight Tight / Medium Loose Very Loose

Comment

Retrofit Options: Evaluate All Add Glass Storm / Weatherize Add Plastic Stor / Replace Evaluate None

Additional Costs: Weatherization, Replacement, Glass Storm, Plastic Stor

Average Size: Width (in), Height (in)

Number Facing: North, South, East, West

Window Code

WindowType: Jalousie Awning Slider Fixed / Door Window Sliding Glass Door Skylight

Frame Type: Wood or Vinyl Metal Improved metal

Glazing Type: Single Single with Glass Storm Single with Plastic Storm / Double Double with Glass Storm Double with Plastic Storm

Interior Shading: Drapes Blinds or Shades / Drapes withShades None

Exterior Shading: Awning Low E Film Sun Screen / Carport or Porch None

Leakiness: Very Tight Tight / Medium Loose Very Loose

Comment

Retrofit Options: Evaluate All Add Glass Storm / Weatherize Add Plastic Stor / Replace Evaluate None

Additional Costs: Weatherization, Replacement, Glass Storm, Plastic Stor

Average Size: Width (in), Height (in)

Number Facing: North, South, East, West

Notes :

Client Name:
Client ID:
Alt. Client ID:

MHEA Data Collection Form
Form Run On: 11/3/2011

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Two additional pages of Windows input forms exist in the MHEA Data Collection Forms.

Doors

Door Code

Door Type
- Wood, Hollow Core
- Wood, Solid Core
- Standard Manufactured Home Door
- Insulated Steel

Comment

Number Facin
North
South
East
West

Size
Width (in)
Height (in)

Storm Door Present ?
Replacement Door Required ?
Additional Cost ($/Door)

Door Code

Door Type
- Wood, Hollow Core
- Wood, Solid Core
- Standard Manufactured Home Door
- Insulated Steel

Comment

Number Facin
North
South
East
West

Size
Width (in)
Height (in)

Storm Door Present ?
Replacement Door Required ?
Additional Cost ($/Door)

Door Code

Door Type
- Wood, Hollow Core
- Wood, Solid Core
- Standard Manufactured Home Door
- Insulated Steel

Comment

Number Facin
North
South
East
West

Size
Width (in)
Height (in)

Storm Door Present ?
Replacement Door Required ?
Additional Cost ($/Door)

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Ceiling

Roof Type Flat / Bowstring / Pitched

Roof Color White or Reflective / Normal or Weathered

Height of Roof (in) _____ *Bowstring roofs only*

Joist Size 2 X 4 / 2 X 6 / 2 X 8 *Flat roofs only*

Insulation to Add (in) _____ *Center of pitched roofs only*

Existing Insulation

Batt/Blanket (in) _____

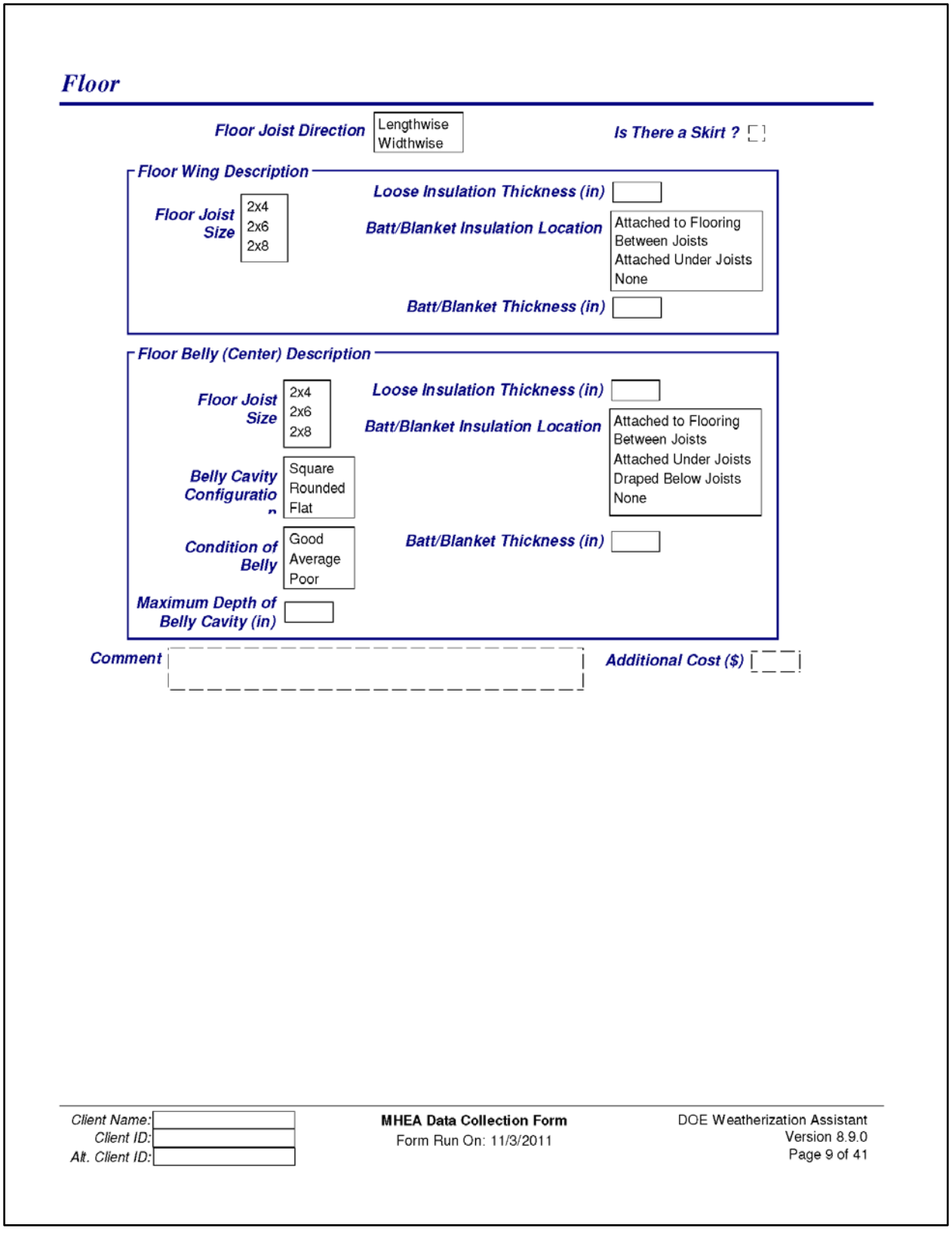
Loose Fill (in) _____

Foam Core (in) _____

Cathedral Ceiling (%) _____

Additional Cost ($) _____

Comment _____



Floor

Floor Joist Direction: Lengthwise / Widthwise

Is There a Skirt ? ☐

Floor Wing Description

Floor Joist Size: 2x4 / 2x6 / 2x8

Loose Insulation Thickness (in):

Batt/Blanket Insulation Location: Attached to Flooring / Between Joists / Attached Under Joists / None

Batt/Blanket Thickness (in):

Floor Belly (Center) Description

Floor Joist Size: 2x4 / 2x6 / 2x8

Loose Insulation Thickness (in):

Batt/Blanket Insulation Location: Attached to Flooring / Between Joists / Attached Under Joists / Draped Below Joists / None

Belly Cavity Configuration: Square / Rounded / Flat

Condition of Belly: Good / Average / Poor

Batt/Blanket Thickness (in):

Maximum Depth of Belly Cavity (in):

Comment:

Additional Cost ($):

Walls (Addition)

Wall Stud Size 2x2 2x3 2x4 2x6

Addition Orientation North South East West

Wall Ventilation Vented Not Vented

Additional Cost ($)

Insulation Type Thickness

Batt/Blanket (in)

Loose Fill (in)

Foam Core (in)

Wall Configuration

Maximum Wall Height at Interior Wall
Maximum Wall Height in Center of Addition
All Addition Wall the Same Height

Interior wall

Max Height (ft)

Min Height (ft)

Comment

Windows (Addition)

Window Code

WindowType Jalousie Awning Slider Fixed / Door Window Sliding Glass Door Skylight

Frame Type Wood or Vinyl Metal Improved metal

Glazing Type Single Single with Glass Storm Single with Plastic Storm / Double Double with Glass Storm Double with Plastic Storm

Interior Shading Drapes Blinds or Shades / Drapes withShades None

Exterior Shading Awning Low E Film Sun Screen / Carport or Porch None

Leakiness Very Tight Tight / Medium Loose Very Loose

Comment

Retrofit Options Evaluate All Add Glass Storm / Weatherize Add Plastic Stor / Replace Evaluate None

Additional Costs
- Weatherization
- Replacement
- Glass Storm
- Plastic Stor

Average Size
- Width (in)
- Height (in)

Number Facing
- North
- South
- East
- West

Window Code

WindowType Jalousie Awning Slider Fixed / Door Window Sliding Glass Door Skylight

Frame Type Wood or Vinyl Metal Improved metal

Glazing Type Single Single with Glass Storm Single with Plastic Storm / Double Double with Glass Storm Double with Plastic Storm

Interior Shading Drapes Blinds or Shades / Drapes withShades None

Exterior Shading Awning Low E Film Sun Screen / Carport or Porch None

Leakiness Very Tight Tight / Medium Loose Very Loose

Comment

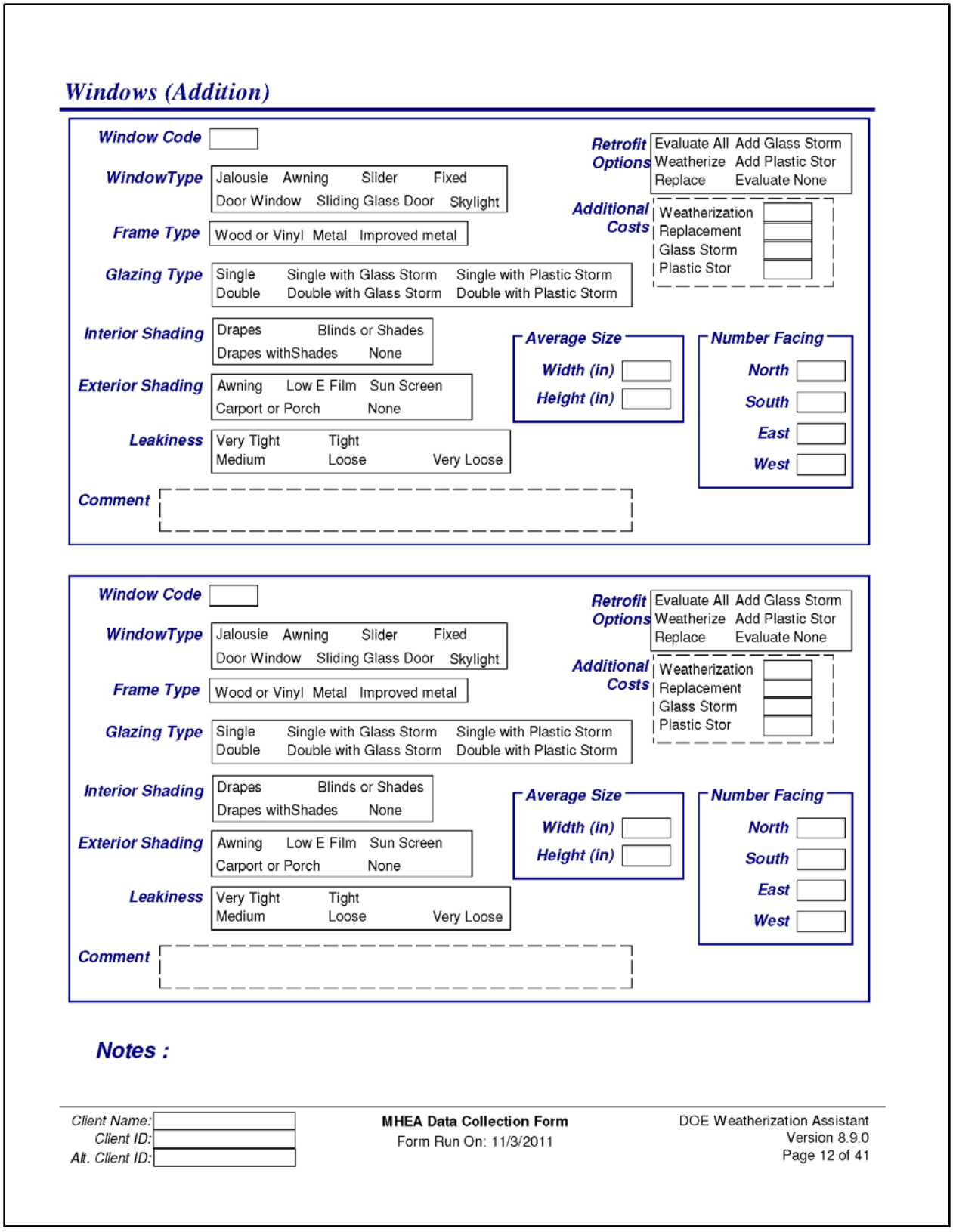
Retrofit Options Evaluate All Add Glass Storm / Weatherize Add Plastic Stor / Replace Evaluate None

Additional Costs
- Weatherization
- Replacement
- Glass Storm
- Plastic Stor

Average Size
- Width (in)
- Height (in)

Number Facing
- North
- South
- East
- West

Notes :



Windows (Addition)

Window Code

WindowType — Jalousie, Awning, Slider, Fixed, Door Window, Sliding Glass Door, Skylight

Frame Type — Wood or Vinyl, Metal, Improved metal

Glazing Type — Single, Single with Glass Storm, Single with Plastic Storm, Double, Double with Glass Storm, Double with Plastic Storm

Interior Shading — Drapes, Blinds or Shades, Drapes withShades, None

Exterior Shading — Awning, Low E Film, Sun Screen, Carport or Porch, None

Leakiness — Very Tight, Tight, Medium, Loose, Very Loose

Comment

Retrofit Options — Evaluate All, Add Glass Storm, Weatherize, Add Plastic Stor, Replace, Evaluate None

Additional Costs — Weatherization, Replacement, Glass Storm, Plastic Stor

Average Size — Width (in), Height (in)

Number Facing — North, South, East, West

Window Code

WindowType — Jalousie, Awning, Slider, Fixed, Door Window, Sliding Glass Door, Skylight

Frame Type — Wood or Vinyl, Metal, Improved metal

Glazing Type — Single, Single with Glass Storm, Single with Plastic Storm, Double, Double with Glass Storm, Double with Plastic Storm

Interior Shading — Drapes, Blinds or Shades, Drapes withShades, None

Exterior Shading — Awning, Low E Film, Sun Screen, Carport or Porch, None

Leakiness — Very Tight, Tight, Medium, Loose, Very Loose

Comment

Retrofit Options — Evaluate All, Add Glass Storm, Weatherize, Add Plastic Stor, Replace, Evaluate None

Additional Costs — Weatherization, Replacement, Glass Storm, Plastic Stor

Average Size — Width (in), Height (in)

Number Facing — North, South, East, West

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Doors (Addition)

Door Code

Door Type: Wood, Hollow Core; Wood, Solid Core; Standard Manufactured Home Door; Insulated Steel

Comment

Number Facin: North, South, East, West

Size: Width (in), Height (in)

Storm Door Present ?

Replacement Door Required ?

Additional Cost ($/Door)

Door Code

Door Type: Wood, Hollow Core; Wood, Solid Core; Standard Manufactured Home Door; Insulated Steel

Comment

Number Facin: North, South, East, West

Size: Width (in), Height (in)

Storm Door Present ?

Replacement Door Required ?

Additional Cost ($/Door)

Door Code

Door Type: Wood, Hollow Core; Wood, Solid Core; Standard Manufactured Home Door; Insulated Steel

Comment

Number Facin: North, South, East, West

Size: Width (in), Height (in)

Storm Door Present ?

Replacement Door Required ?

Additional Cost ($/Door)

Notes :

Ceiling (Addition)

Joist Size: 2x4 / 2x6 / 2x8

Roof Color: White or Reflective / Normal or Weathered

Additional Cost ($):

Insulation Type Thickness

Batt/Blanket (in):

Loose Fill (in):

Foam Core (in):

Comment:

Floor (Addition)

Floor Type
- Crawl Space
- Slab on Grade
- Exposed Floor

Joist Size
- 2 x 4
- 2 x 6
- 2 x 8

Floor Dimensions

Length (ft) [ ]

Width (ft) [ ]

Batt/Blanket Location
- Attached to Flooring
- Between Joists
- Attached Under Joists
- None

Insulation Type Thickness

Batt/Blanket (in) [ ]

Loose Fill (in) [ ]

Depth Available for Added Insulation (in) [ ]

Comment [ ]

Heating System (Primary)

Equipment Type: Furnace / Heat Pump / Space Heater / None

Tune-up Mandatory ☐

Include in SIR ☐

Fuel Type: Natural Gas, Oil, Electricity, Propane, Wood, Coal, Kerosene, Other

Capacity(kBTU/hr)

Efficiency

Efficiency Units: Steady State / AFUE / HSPF / COP

Duct Location: Floor / Ceiling / None

Duct Insulation Location: Above Duct / Below Duct / Around Duct or Ductboard / None

Percent Total Heat Supplied (%)

Programmable Thermostat ☐

Comment

Notes :

Heating System (Secondary)

Equipment Type
- Furnace
- Heat Pump
- Space Heater
- None

Fuel Type

Natural Gas	Wood
Oil	Coal
Electricity	Kerosene
Propane	Other

Capacity(kBTU/hr)

Efficiency

Efficiency Units
- Steady State
- AFUE
- HSPF
- COP

Comment

Notes :

Heating System (Replacement)

Equipment Type: Furnace / Heat Pump / Space Heater / None

Replacement Required ☐

Include in SIR ☐

Fuel Type: Natural Gas, Oil, Electricity, Propane, Wood, Coal, Kerosene, Other

Cos
- **Labor ($)**
- **Material ($)**

Capacity(kBTU/hr)

Efficiency

Efficiency Units: Steady State / AFUE / HSPF / COP

Duct Location: Floor / Ceiling / None

Duct Insulation Location: Above Duct / Below Duct / Around Duct or Ductboard / None

Comment

Notes :

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Conducted During Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Conducted During Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Heat Rise

	Conducted During Audit	Insp.
Return Temp (F)		
Supply Temp (F)		
Temp Rise (F)		
Listed/Rated Temp Rise (F)		

Comment

VENT TESTS

Venting Informatio

Damper Type: None found / Electric / Thermal / Barometric / None found but one is recommended / Other

Damper Condition: Good / Fair / Poor (but working) / Broken (not working) / Broken (replacement recommended) / None / Not applicable

Chimney Type: Masonry - Lined / Masonry - Unlined / Metal / None / Other

Chimney Condition: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue Type: Metal Single Wall / Metal Double Wall / PVC / Other

Flue Conditio: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue / Damper Diameter (in)

Combustion System Type: Sealed / Unsealed

Combustion Air Intake: Adequate / Present but inadequate / None / Other

☐ Other Venting Related Problems

Normal Operating Conditions Draft Measurement

	Conducted During Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

Notes :

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Fan Limit Controls

- [ ] Control Settings are Adjustable
- [ ] Limit Controls Not Working

Fan On Setting (F) [ ]
Fan Off Setting (F) [ ]
High Limit Setting (F) [ ]

Burner and Pilot

Burner Type: [ ] Ribbon [ ] Power [ ] Upshot [ ] Flame Retention [ ] Other

Pilot Type: [ ] Standing Pilot (on in summer) [ ] Standing Pilot (off in summer) [ ] Hot Surface [ ] IID [ ] Other

Burner Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Pilot Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Blower and Belt

Blower Type: [ ] Direct Drive [ ] Belt Drive

Belt Size [ ] (inches or size code)

Blower Condition: [ ] Clean [ ] Dirty [ ] Plugged

Belt Play (in) [ ]

Motor Current (amps) [ ]

Belt Condition: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Accessories

Humidifier: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

Electronic Air Cleaner: [ ] Good [ ] Fair [ ] None [ ] Not applicabl [ ] Poor (but working) [ ] Broken (not working

AC Coil: [ ] Clean [ ] Fair [ ] Dirty [ ] Plugged [ ] None

Air Filter

Filter Size (length x width, in) [ ]

Filter Condition: [ ] Clean [ ] Fair [ ] Dirty [ ] Plugged [ ] None

Comment

Notes :

Client Name: [ ]
Client ID: [ ]
Alt. Client ID: [ ]

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Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

INSPECTIONS

Other Items

- ☐ Cracked Heat Exchanger
- ☐ Insufficient Clearance from Combustibles

Electric Service Switch: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

- ☐ Gas Leak Present
- ☐ Fuel Shutoff Valve Not Present
- ☐ Drip Leg Not Present
- ☐ Any Other Heating System Problems

Comment

THERMOSTAT DETAILS

Thermostat Type: Mechanical (bimetallic strip) / Mechanical (mercury bulb) / Electronic (no setback) / Electronic (with setback) / Power Pile / Other

Daytime Thermostat Setting (F) ____

Nighttime Thermostat Setting (F) ____

- ☐ Relocate Thermostat

Anticipator Current (amps) ____

Anticipator Setting (0-1) ____

- ☐ Anticipator Adjustment Needed

Comment

Notes :

Cooling System (Primary)

AC Unit Type
- Central Air Conditioner
- Window or Room Air Condition
- Heat Pump
- Evaporative Cooler
- None

Tune-up Mandatory ☐

Include in SIR ☐

Capacity(kBTU/hr) ☐

Efficiency ☐

Efficiency Units
- COP
- EER
- SEER

Duct Location
- Floor
- Ceiling
- None

Duct Insulation Location
- Above Duct
- Below Duct
- Around Duct or Ductboard
- None

Floor Area Cooled (%) ☐

Comment

Notes :

Cooling System (Secondary)

AC Unit Type
- Central Air Conditioner
- Window or Room Air Condition
- Heat Pump
- Evaporative Cooler
- None

Capacity(kBTU/hr)

Efficiency

Efficiency Units
- COP
- EER
- SEER

Floor Area Cooled (%)

Comment

Notes :

Cooling System (Replacemen

AC Unit Type
- Central Air Conditioner
- Window or Room Air Condition
- Heat Pump
- Evaporative Cooler
- None

Replacement Required ☐

Include in SIR ☐

Capacity(kBTU/hr) ☐

Efficiency ☐

Labor ($) ☐

Material ($) ☐

Efficiency Units
- COP
- EER
- SEER

Duct Location
- Floor
- Ceiling
- None

Duct Insulation Location
- Above Duct
- Below Duct
- Around Duct or Ductboard
- None

Comment

Notes :

Client Name:		**MHEA Data Collection Form**	DOE Weatherization Assistant
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Alt. Client ID:			Page 25 of 41

Ducts / Infiltration

AIR and DUCT LEAKAGES

Evaluate Duct Sealing? ☐

Duct Leakage Method

- Whole House Blower Door Measurement
- Blower Door Subtraction (sealed and unsealed registers and grills)
- Duct-Blower Measurements
- Pressure Pan Measurements

Whole House Blower Door Measurements

	Before Weatherization (Existing)	After Weatherization (Target or Actual)
Air Leakage Rate(cfm)		
at House Pressure Difference (Pa)		
Infiltration Reduction Cost ($)		
Comment		

Whole House Blower Door Measurements

	Before Weatherization	After Duct Sealing	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
Infiltration Reduction Cost ($)			
Duct Sealing Cost ($)			

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

Comment

Client Name:
Client ID:
Alt. Client ID:

MHEA Data Collection Form
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Ducts / Infiltration (Continued)

AIR and DUCT LEAKAGES (Continued)

BLOWER DOOR SUBTRACTION

	Before Weatherization	After Duct Sealing	After Weatherization (Target or Actual)
With Registers/Grills Open			
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
With Registers/Grills Sealed			
Air Leakage Rate (cfm)			
at House Pressure Difference (Pa)			
Duct/House Pressure Diff. (Pa)			

Infiltration Reduction Cost ($)

Duct Sealing Cost ($)

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

Comment

WHOLE HOUSE BLOWER DOOR MEASUREMENT

	Before Weatherizatio	After Weatherization
Air Leakage Rate (CFM)		
at House Pressure Difference (Pa)		

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)		
Return (Pa)		

DUCT BLOWER MEASUREMENTS

	Before Duct Sealing		After Duct Sealing	
	Total	Outside *	Total	Outside *
Fan Flow (CFM)				
at Duct Pressure (Pa)				
House Pressure (Pa) wrt outside				

* 'Outside' readings are taken while the house / outdoor pressure differential provided by a blower door is maintained at the same level as the duct / outdoor pressure differential created by the duct-blower. Thus the 'Duct Pressure' and the 'House Pressure wrt outside' should be equal.

Comment

Infiltration Reduction Cost ($)

Duct Sealing Cost ($)

Ducts / Infiltration (Continued)

AIR and DUCT LEAKAGES (Continued)

PRESSURE PAN MEASUREMENTS

	Pre Duct Sealing	Post Duct Sealing
Sum of Pressure Pan Reading (Pa)		
House Pressure (Pa) wrt outside		

	Pre Infiltration Reduction	Post Infiltration Reduction/Targe
Whole House Leakage (CFM)		
at Pressure Differential (Pa)		

DUCT OPERATING PRESSURES

	Pre Duct Sealing	Post Duct Sealing
Supply (Pa)		

Duct Sealing Cost ($)	
Infiltration Reduction Cost ($)	
Comment	

Notes :

Ducts / Infiltration (Continued)

BLOWER DOOR READINGS (Optional)

Audit
Pre-Install
During Install
Post-Install
Inspection
Other

Test Date	Conducted During (pick from list)	Equipment Used	Air Leakage Rate(cfm)	Building Pressure Differential (Pa)	Corrected CFM at 50 Pa	Comments

Notes :

Ducts / Infiltration (Continued)

ZONAL PRESSURES (Optional)

Audit	
Pre-Install	
During Install	
Post-Install	
Inspection	
Other	

Attic	Exterior Wall
Side Attic	Interior Wall
Kneewall	Basement
Ceiling Joist Space	Crawl Space
Attached Garage	Mobile Home Belly
Unheated Addition	Other

Conducted During (pick from list)	Building Pressure Differential (Pa)	Zone Pressure Location (pick from list or describe)	Zone Pressure (Pa)	Ducts Present	Comments
				☐	
				☐	
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				☐	

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Ducts / Infiltration (Continued)

PRESSURE BALANCE READINGS (Optional)

Family Room	Bdrm1
Living Room	Bdrm2
Dining Room	Bdrm3
Kitchen	Bdrm4
Bath1	Basement
Bath2	Addition
Bath3	Other

Location (pick one or describe)	Initial Pressure (Pa)	Final Pressure (Pa)	Comments

Notes :

Ducts / Infiltration (Continued)

PRESSURE PAN READINGS (Optional)

Family Room	Bdrm1
Living Room	Bdrm2
Dining Room	Bdrm3
Kitchen	Bdrm4
Bath1	Basement
Bath2	Foyer
Bath3	Hallway
	Other

Register #	Location (pick one or describe)	Register Type	Initial Pressure (Pa)	Final Pressure (Pa)	Comments
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
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		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			
		Supply Return			

Notes :

Base Load - Water Heater

Existing Equipment

Manufacturer | Model

Fuel: Natural Gas / Electricity / Propane

Rated Input | Input Units: kBTU / kW

Location: Heated Space / Unconditioned Space / Unintentionally Heated Space

Energy Factor | Recovery Efficiency (%)

Gallons

☐ Water Heater Wrap Present

Insulation Type: Fiberglass / Polyurethane

Insulation Thickness (in)

☐ Water Heater Pipe Insulation Present

Label R Value

Replacement Equipment

Manufacturer

Model

Fuel: Natural Gas / Electricity / Propane

Rated Input

Input Units: kBTU / kW

Gallons

Installation Cost ($)

Additional Cost ($)

Energy Factor

Recovery Efficiency (%)

Shower Heads

Number of Showerheads | Average GPM

Minutes of Shower Use Per Day

Comment

Notes :

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAIL

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading In Flue (ppm)		

Comment

VENT TESTS

Venting Information

Damper Type: None found / Electric / Thermal / Barometric / None found but one is recommended / Other

Damper Conditio: Good / Fair / Poor (but working) / Broken (not working) / Broken (replacement recommended) / None / Not applicable

Chimney Type: Masonry - Lined / Masonry - Unlined / Metal / None / Other

Chimney Condition: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue Type: Metal Single Wall / Metal Double Wall / PVC / Other

Flue Conditio: Good / Fair / Poor (but working) / Broken (not working) / None / Not applicable

Flue / Damper Diameter (in)

Combustion Air Intake: Adequate / Present but inadequate / None / Other

Any Other Venting Related Problems?

Normal Operating Conditions Draft Measurement

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

Notes :

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAILS (Continued)

INSPECTIONS

Fuel Related

- ☐ Insufficient Clearance from Combustibles
- Electric Service Switch: [Good | Fair | Poor (but working) | Broken (not working) | None | Not applicable]
- ☐ Gas Leak Present
- ☐ Fuel Shutoff Valve Not Present
- ☐ Drip Leg Not Present

Water Related

- Hot Water Temp (F) [ ]
- ☐ Supply Temperature Adjustment Needed
- ☐ Pressure Relief Piping Needed
- ☐ Water Leak Present

- ☐ Other Water Heating Problem

Comment [ ]

Notes :

Base Load - Refrigerator

Existing Equipment

Manufacturer

Model

Style: Top Freezer / Bottom Freezer / Side by Side / Single Door / Single Door with Freezer / Other

Defrost: Automatic / Manual / Partial Automatic / Other

Size (cu ft)

Location: Heated Space / Unconditioned Space / Unintentionally Heated Space

Height (in) Width (in) Depth (in)

Consumption

Label/Database Annual Consumption

kWh / yr

Age: Less than 5 years / 5 to 10 years / 10 to 15 years / More than 15 years

Door Seal Condition: Good / Fair - Some Wear / Poor - Gaps Visible

OR

Metered Consumption

Manual Defrost

Metering Minutes

Metering Reading (kWh)

Includes Defrost Cycle

Temperature (F)

Adjusted Consumption kWh/yr

Replacement Equipment

Manufacturer

Model

Style: Top Freezer / Bottom Freezer / Side by Side / Single Door / Single Door with Freezer / Other

Defrost: Automatic / Manual / Partial Automatic / Other

kWh / yr

Size (cu ft)

Height (in) Width (in) Depth (in)

Installation Cost ($)

Add'l Cost ($)

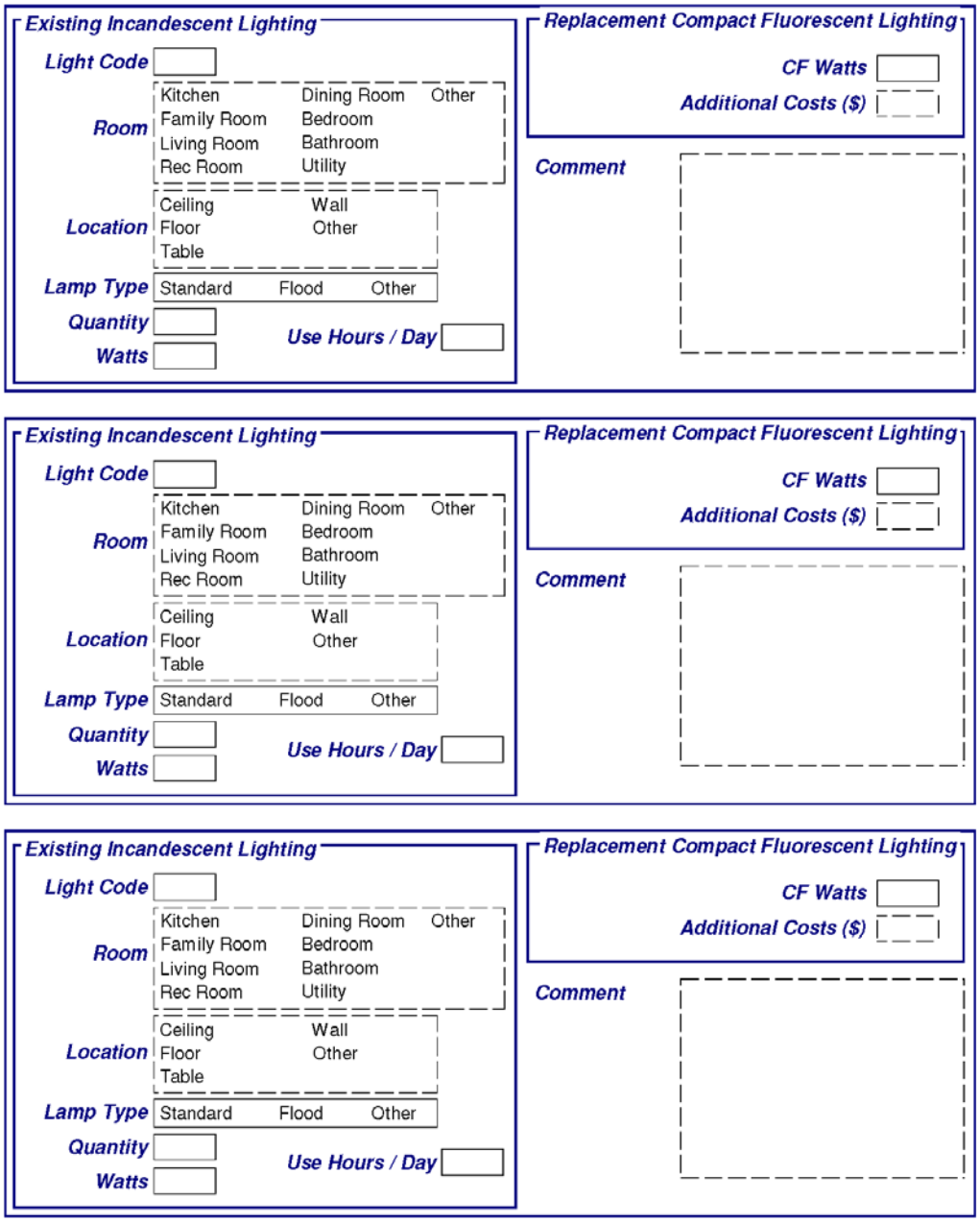
Adjusted Consumption kWh/yr

Annual Savings kWh/yr

Comment

Notes :

Baseload - Lighting Systems



Health & Safety

WHOLE HOUSE

- ☐ Smoke Detector is Needed
- ☐ CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment

BUILDING SHELL

Attic

- ☐ Recessed Lights Present
- ☐ Chimney / Flue Shielding Incorrec
- ☐ Wiring Problems
- ☐ Ventilation Inadequate
- ☐ Water Leaks Present
- ☐ Moisture Problems Evident
- ☐ Other Problems

Walls

- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Moisture Problems Evident
- ☐ Other Problems

Basement / Crawlspace

- ☐ Vapor Barrier Needed
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Plumbing Leaks Present
- ☐ Moisture Problems Evident
- ☐ Other Problems

Comment

Notes :

Health & Safety (Continued)

EQUIPMENT

Worst Case Condition Draft Measurements - Space Heating System(

Date	Conducted During	On Which Heating System	Outdoor Temp (F)	Draft (Pa or in H20)	Spillage Time (sec)	Comments
	Audit / Post-Install / Pre-Install / Inspection / During Install / Other					
	Audit / Post-Install / Pre-Install / Inspection / During Install / Other					
	Audit / Post-Install / Pre-Install / Inspection / During Install / Other					

Worst Case Condition Draft Measurements - Water Heating

Date	Conducted During	Outdoor Temp (F)	Draft (Pa or in H20)	Spillage Time (sec)	Comments
	Audit / Post-Install / Pre-Install / Inspection / During Install / Other				
	Audit / Post-Install / Pre-Install / Inspection / During Install / Other				

Wood Stove / Fireplace

- ☐ Wood Stove / Fireplace is Present
- ☐ Improper Venting
- ☐ Combustion Air is Inadequate

Clothes Dryer

- ☐ Improper Venting

Cook Stove

- CO Measurement Oven (ppm) ☐
- CO Measurement Burner 1 (ppm) ☐
- CO Measurement Burner 2 (ppm) ☐
- CO Measurement Burner 3 (ppm) ☐
- CO Measurement Burner 4 (ppm) ☐
- ☐ Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen
☐ Missing	☐ Missing
☐ Not Operational	☐ Not Operational
☐ Improper Venting	☐ Improper Venting

Comment

Itemized Costs

Measure Name
Cost ($) Include in SIR? ☐
Material
Annual Energy Savings Units kWh / MMBtu / Therms Fuel Saved
Life (years)
Comment

Primary Heating Fu | Electric | Kerosene
Water Heating Fuel | Propane | Other
Natural Gas | Wood
Oil | Coal

Measure Name
Cost ($) Include in SIR? ☐
Material
Annual Energy Savings Units kWh / MMBtu / Therms Fuel Saved
Life (years)
Comment

Primary Heating Fu | Electric | Kerosene
Water Heating Fuel | Propane | Other
Natural Gas | Wood
Oil | Coal

Measure Name
Cost ($) Include in SIR? ☐
Material
Annual Energy Savings Units kWh / MMBtu / Therms Fuel Saved
Life (years)
Comment

Primary Heating Fu | Electric | Kerosene
Water Heating Fuel | Propane | Other
Natural Gas | Wood
Oil | Coal

Measure Name
Cost ($) Include in SIR? ☐
Material
Annual Energy Savings Units kWh / MMBtu / Therms Fuel Saved
Life (years)
Comment

Primary Heating Fu | Electric | Kerosene
Water Heating Fuel | Propane | Other
Natural Gas | Wood
Oil | Coal

Notes :

Itemized Costs (Continued)

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings **Units** kWh / MMBtu / Therms

Life (years)

Comment

Fuel Saved

Primary Heating Fu	Electric	Kerosene
Water Heating Fuel	Propane	Other
Natural Gas	Wood	
Oil	Coal	

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings **Units** kWh / MMBtu / Therms

Life (years)

Comment

Fuel Saved

Primary Heating Fu	Electric	Kerosene
Water Heating Fuel	Propane	Other
Natural Gas	Wood	
Oil	Coal	

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings **Units** kWh / MMBtu / Therms

Life (years)

Comment

Fuel Saved

Primary Heating Fu	Electric	Kerosene
Water Heating Fuel	Propane	Other
Natural Gas	Wood	
Oil	Coal	

Measure Name

Cost ($) **Include in SIR?** ☐

Material

Annual Energy Savings **Units** kWh / MMBtu / Therms

Life (years)

Comment

Fuel Saved

Primary Heating Fu	Electric	Kerosene
Water Heating Fuel	Propane	Other
Natural Gas	Wood	
Oil	Coal	

Notes :

Client Name:
Client ID:
Alt. Client ID:

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Client Surveys

CLIENT INFORMATION

Client ID: 11_348
Client Name: Tanner, David
Alt. Client ID:
Address: 114 Athens
Anytown
US 01234

AGENCY INFORMATION

Agency Name: Demonstration Agency
Address: 725 Jefferson St.
Any City
US 11111
Office Phone: (123) 456-7890
Office Email: agencyemail@localisp.net

Contact Name	Home Ph	Work Ph	Cell Ph	Contact Type	Primary Applican	Comment
Tanner, David	(111) 764-5687	(111) 764-3789	(111) 764-9902	Applicant/Person of Record	☑	
Tanner, John		(254) 567-8908		Applicant/Person of Record	☐	Son of primary applicant

Client Surveys

Survey Name Intake Survey

	Question	Answer	Comment
1	Age of dwelling (year built)	(1952)	
2	Thermostat setting - Day	72	
3	Thermostat setting - Night	65	
4	Existing setback thermostat?	No	
5	Setback thermostat properly used?	NA	
6	Install setback thermostat?	No	
7	Client comfort at temperature settings (specify location of drafts, warm rooms, cold rooms)	Not totally	Draft near back door
8	Suuply/returns in cold rooms? Specify.	No	
9	Basement used as living space? If yes, describe.	No	
10	Basement temperature during winter?	45	
11	Attic use (storage, other)	No	
12	How will attic use affect attic insulating?	No	
13	Rooms closed off during winter (locate and explain)?	No	
14	Age (years)	4	
15	Describe repairs in last 3 years	Roof patched	
16	Routine maintenance (Yes or No)?	No	
17	Describe routine maintenance	None	
18	Does the dwelling have icicles or ice dams (Yes or No)? Explain if Yes.	No	
19	Does the dwelling have moisture problems, mold or mildew (Yes or No)? Explain if Yes.	No	
20	Does the dwelling have freezing pipes (Yes or No)? Explain if Yes.	No	
21	Does the client have recurrent headaches, itching or burning eyes while at home (Yes or No)? Explain if Yes.	No	
22	Other (specify)		

NEAT Recommended Measures

Agency	Demonstration Agency	State	US	Run On	8/24/2011 2:51:53 P	RunID	1314211913
Client ID	11_348			Version	8.9.0.5 (2/10/2012)	AuditID	267501792

Audit Name	11_348SB	Audit Date	8/24/2011
Client Name	Tanner, David	Auditor	AT
Weather File	SAMPLEUS.WX	Setup Library Name	Demonstration Setup Library

Comment

Annual Energy and Cost Savings

Index	Recommended Measure	Components	Heating (MMBtu)	Heating ($)	Cooling (kWh)	Cooling ($)	BaseLoad (kWh)	BaseLoad ($)	Total (MMBtu)
1	Infiltration Redctn		3.0	30	23	2	0	0	3.1
2	Low Flow Showerheads		0.0	0	0	0	259	18	0.9
3	DWH Pipe Insulation		0.0	0	0	0	197	14	0.7
4	Smart Thermostat		5.9	59	0	0	0	0	5.9
5	Attic Ins. R-30	UA1	12.3	123	158	11	0	0	12.9
6	DWH Tank Insulation		0.0	0	0	0	411	29	1.4
7	Fill Ceiling Cavity	FA3	7.3	73	102	7	0	0	7.7
8	Insulate and seal attic access		0.0	0	0	0	0	0	0.7
9	Attic Ins. R-30	FA1	7.7	77	93	7	0	0	8.0
10	Attic Ins. R-30	FA4	1.1	11	13	1	0	0	1.1
11	Lighting Retrofits	LT1	0.0	0	0	0	686	48	2.3
12	Kneewall Insulation	FA2	1.6	16	3	0	0	0	1.6
13	Refrigerator Rplcmnt		0.0	0	0	0	1778	124	6.1
14	Wall Insulation	WLE-1,WLN-1,WLN-2,WLS-2,WLW-1	6.8	68	56	4	0	0	7.0
15	Window Replacement	WD4	1.3	13	-7	0	0	0	1.2

Energy Saving Measure Economics

Index	Recommended Measure	Components	Measure Savings ($/yr)	Measure Cost ($)	Measure SIR	Cumulative Cost ($)	Cumulative SIR
1	Anticipator Adjustment Needed		0	20	0.0	20	0.0
2	Repair Roof		0	80	0.0	100	0.0
3	Infiltration Redctn		32	250	1.1	350	0.8
4	Low Flow Showerheads		18	20	10.7	370	1.3
5	DWH Pipe Insulation		14	15	9.6	385	1.6
6	Smart Thermostat		59	75	9.5	460	2.9
7	Attic Ins. R-30	UA1	134	270	7.8	730	4.7
8	DWH Tank Insulation		29	40	7.5	770	4.9

Index	Recommended Measure	Components	Measure Savings ($/yr)	Measure Cost ($)	Measure SIR	Cumulative Cost ($)	Cumulative SIR
9	Fill Ceiling Cavity	FA3	81	221	5.7	991	5.0
10	Insulate and seal attic access		7	30	3.7	1021	5.0
11	Attic Ins. R-30	FA1	83	353	3.7	1374	4.7
12	Attic Ins. R-30	FA4	12	50	3.6	1424	4.6
13	Lighting Retrofits	LT1	48	38	3.3	1462	4.6
14	Kneewall Insulation	FA2	16	91	2.8	1553	4.5
15	Refrigerator Rplcmnt		124	800	1.8	2353	3.6
16	Wall Insulation	WLE-1,WLN-1,WLN-2,WLS-2,WLW-1	72	854	1.3	3208	3.0
17	Window Replacement	WD4	12	346	0.6	3554	0.0
18	CO Monitor is Needed		0	70	0.0	3624	0.0
19	Install Bathroom Exhaust Fan		0	270	0.0	3894	0.0

Materials

Index	Material	Type	Quantity	Units
1	Wall Insulation	Blown Cellulose - 2x4 Filled	846	SqFt
2	Attic Insulation	Blown Cellulose - R-30	748	SqFt
3	Kneewall Insulation	Fiberglass Batts - R-13	120	SqFt
4	Smart Thermostat		1	Each
5	Window Replacement		2	Each
6	Compact Fl.	13 Watt	4	Each Lamp
7	DHW Tank Insulation		1	Each
8	DHW Pipe Insulation		1	Each
9	Low Flow Shower Heads		1	Each
10	Attic Insulation	Blown Cellulose - 5 in.	437	SqFt
11	New Refrigerator	AS22M8*	1	Each
12	CO monitor (+)		1	Each
13	Bathroom exhaust fan (+)		1	Each
14	R-30 faced batt insulation (+)		1	Each

Pre/Post Retrofit Energy and Loads

	Pre Retrofit		Post Retrofit	
	Heating	Cooling	Heating	Cooling
Annual load (MBtu/yr)	64.0	18.6	29.2	13.9
Annual Energy (MBtu/yr)	86.4	5.9	39.4	4.4
Heat loss/gain (kBtu/hr)	52.5	20.3	27.0	9.5
Output required (kBtu/hr)(ton)	63.0	2.0	31.0	1.0

Annual Energy and Cost Savings (Adjusted)

Index	Recommended Measure	Components	Heating (MMBtu)	Heating ($)	Cooling (kWh)	Cooling ($)	BaseLoad (kWh)	BaseLoad ($)	Total (MMBtu)
1	Infiltration Redctn		2.8	28	23	2	0	0	2.9

Index	Recommended Measure	Components	Heating (MMBtu)	Heating ($)	Cooling (kWh)	Cooling ($)	BaseLoad (kWh)	BaseLoad ($)	Total (MMBtu)
2	Low Flow Showerheads		0.0	0	0	0	259	18	0.9
3	DWH Pipe Insulation		0.0	0	0	0	197	14	0.7
4	Smart Thermostat		5.5	55	0	0	0	0	5.5
5	DWH Tank Insulation		0.0	0	0	0	411	29	1.4
6	Attic Ins. R-30	UA1	11.5	115	158	11	0	0	12.0
7	Fill Ceiling Cavity	FA3	6.8	68	102	7	0	0	7.2
8	Insulate and seal attic access		0.0	0	0	0	0	0	0.7
9	Attic Ins. R-30	FA1	7.2	72	93	7	0	0	7.5
10	Attic Ins. R-30	FA4	1.0	10	13	1	0	0	1.0
11	Lighting Retrofits	LT1	0.0	0	0	0	686	48	2.3
12	Kneewall Insulation	FA2	1.5	15	3	0	0	0	1.5
13	Refrigerator Rplcmnt		0.0	0	0	0	1778	124	6.1
14	Wall Insulation	WLE-1,WLN-1,WLN-2,WLS-2,WLW-1	6.3	63	56	4	0	0	6.5
15	Window Replacement	WD4	1.2	12	-7	0	0	0	1.2

Energy Saving Measure Economics (Adjusted)

Index	Recommended Measure	Components	Measure Savings ($/yr)	Measure Cost ($)	Measure SIR	Cumulative Cost ($)	Cumulative SIR
1	Anticipator Adjustment Needed		0	20	0.0	20	0.0
2	Repair Roof		0	80	0.0	100	0.0
3	Infiltration Redctn		30	250	1.0	350	0.7
4	Low Flow Showerheads		18	20	10.7	370	1.3
5	DWH Pipe Insulation		14	15	9.6	385	1.6
6	Smart Thermostat		55	75	8.9	460	2.8
7	DWH Tank Insulation		29	40	7.5	500	3.2
8	Attic Ins. R-30	UA1	126	270	7.3	770	4.6
9	Fill Ceiling Cavity	FA3	76	221	5.3	991	4.8
10	Insulate and seal attic access		7	30	3.7	1021	4.7
11	Attic Ins. R-30	FA1	78	353	3.5	1374	4.4
12	Attic Ins. R-30	FA4	11	50	3.3	1424	4.4
13	Lighting Retrofits	LT1	48	38	3.3	1462	4.3
14	Kneewall Insulation	FA2	15	91	2.6	1553	4.2
15	Refrigerator Rplcmnt		124	800	1.8	2353	3.4
16	Wall Insulation	WLE-1,WLN-1,WLN-2,WLS-2,WLW-1	67	854	1.2	3208	2.8
17	Window Replacement	WD4	11	346	0.5	3554	0.0
18	CO Monitor is Needed		0	70	0.0	3624	0.0
19	Install Bathroom Exhaust Fan		0	270	0.0	3894	0.0

Materials (Adjusted)

Index	Material	Type	Quantity	Units
1	Wall Insulation	Blown Cellulose - 2x4 Filled	846	SqFt
2	Attic Insulation	Blown Cellulose - R-30	748	SqFt
3	Kneewall Insulation	Fiberglass Batts - R-13	120	SqFt

Audit Name: 11_348SB *Client:* 11_348 *Date:* 8/24/2011 *Page 3 of 6*

Index	Material	Type	Quantity	Units
4	Smart Thermostat		1	Each
5	Window Replacement		2	Each
6	Compact Fl.	13 Watt	4	Each Lamp
7	DHW Tank Insulation		1	Each
8	DHW Pipe Insulation		1	Each
9	Low Flow Shower Heads		1	Each
10	Attic Insulation	Blown Cellulose - 5 in.	437	SqFt
11	New Refrigerator	AS22M8*	1	Each
12	CO monitor (+)		1	Each
13	Bathroom exhaust fan (+)		1	Each
14	R-30 faced batt insulation (+)		1	Each

Heating Energy Consumption Comparison

Month	Day	Days in Period	Consumption		Degree Days	
			Actual	Predicted	Actual	Predicted
1	15	30	161	179	815	913
2	17	33	180	213	690	1090
3	14	25	114	123	585	669
4	16	33	33	90	312	549
5	13	27	55	29	144	215
6	15	33	17	14	42	117
7	15	30	0	2	11	19
8	14	30	0	1	15	9
9	16	33	11	3	95	36
10	17	31	44	24	253	182
11	13	27	71	64	507	401
12	12	29	121	125	726	688
Total		361	807	867	4195	4888
%Difference			7.4		16.5	

Approximate Component Contributions to Peak HEATING Load

Component Type	Component Name	Area or Volume (Inf)	Pre Retrofit Load (Btu/h)	Post Retrofit Load (BTU/h)
Wall	WLE-1	224	1949.5	1266.0
Wall	WLN-1	234	2036.5	1322.6
Wall	WLN-2	90	783.3	508.7
Wall	WLS-1	234	2036.5	2036.5
Wall	WLS-2	90	783.3	508.7
Wall	WLW-1	208	1810.2	1175.6
Window	WD1	16	509.2	509.2
Window	WD2	16	509.2	509.2
Window	WD4	16	509.2	590.7
Window	WD5	8	254.6	254.6
Window	WD6	8	254.6	254.6
Door	DR1	20	408.7	408.7

Component Type	Component Name	Area or Volume (Inf)	Pre Retrofit Load (Btu/h)	Post Retrofit Load (BTU/h)
Door	DR2	20	408.7	408.7
Attic	UA1	300	12039.9	660.4
Attic	FA1	392	5366.1	778.2
Attic	FA2	120	1642.7	485.2
Attic	FA3	437	5287.1	1416.8
Attic	FA4	56	766.6	111.2
Foundation	F1	840	6895.4	6895.4
Infiltration	Inf	10320	8250.7	6875.5
Total heat loss	Tot	0	52501.7	26976.4
Duct loss	Duct	319	10500.3	4046.5
Output required	Output	0	63002.1	31022.8

Approximate Component Contributions to Peak COOLING Load

Component Type	Component Name	Area or Volume (Inf)	Pre Retrofit Load (Btu/h)	Post Retrofit Load (BTU/h)
Wall	WLE-1	224	541.2	351.5
Wall	WLN-1	234	565.4	367.2
Wall	WLN-2	90	217.4	141.2
Wall	WLS-1	234	304.0	304.0
Wall	WLS-2	90	217.4	141.2
Wall	WLW-1	208	502.5	326.4
Window	WD1	16	336.0	336.0
Window	WD2	16	576.0	576.0
Window	WD4	16	963.2	963.2
Window	WD5	8	168.0	168.0
Window	WD6	8	288.0	288.0
Door	DR1	20	113.5	113.5
Door	DR2	20	113.5	113.5
Attic	UA1	300	5112.9	386.8
Attic	FA1	392	2779.9	454.3
Attic	FA2	120	851.0	272.7
Attic	FA3	437	2540.5	771.8
Attic	FA4	56	397.1	64.9
Foundation	F1	840	0.0	0.0
Infiltration	Inf	10320	1918.5	1646.1
People	People	2	552.0	552.0
Appliances	Appl	1	1200.0	1200.0
Total Sensible	TotS	0	20258.1	9538.1
Ducts	Ducts	0	2025.8	953.8
Total (with ducts)	TotW	0	22283.9	10491.9
Size (tons)	Size	0	1.9	0.9
Latent Load (inf)	LatentI	0	1312.8	1126.4
Latent Load (occ)	LatentO	0	460.0	460.0
Latent Load (tot)	LatentT	0	1772.8	1586.4
Total Load	Total	0	24056.7	12078.3
Size (tons)	Size	0	2.0	1.0

Special Notes

NOTE: Heat loss and Output required are only guides to sizing equipment.
NOTE: See NEAT User's Manual for further sizing details.
NOTE: Read cautions in NEAT User's Manual related to sizing results.
NOTE: (+) in the Materials list indicates there are more related User Defined Materials.

Comments

Type	Code	Comment
Wall	WLE-1	1st story west wall.
Wall	WLN-1	1st story north wall. Height of 9' includes joist space.
Wall	WLN-2	2nd story north wall.
Wall	WLS-1	1st story south wall. Height of 9' includes joist space.
Wall	WLS-2	2nd story south wall.
Wall	WLW-1	1st story west wall.
Infiltration		Target (post weatherization) blower door reading estimated assuming that wall insulation would not be installed because there is already a 1" batt installed. Infiltration reduction cost is a typical value.

Retrofit Measures NOT Considered

Attic insulation R38
Duct insulation
Water heater replacement

NEAT Input Report

Since adding the capability of specifying "NEAT Insulation Types" in the setup library (see Section 14.7, *NEAT Insulation Types*), the NEAT Input Report has lost its ability to specify the "Added Insulation Type" entries for those components whose added types can be so specified. The entries will remain blank. For example, see page C-105 following. If the user frequently specifies multiple insulation types for any of these building components and relies on the information in the NEAT Input Report, he/she could use the Comment field on the component form to designate the added insulation type being specified. This will then be visible in the Comment field on the NEAT Input Report for that component.

NEAT Input Report

Client Information

Client ID	11_348
Alt. Client ID	
Client Name	Tanner, David
Address	114 Athens
Unit No.	
City	Oak Ridge
State	TN
Zip	37830
County	
Other Geo. Ident.	

Occupants

Number of: Occupants	2
Elderly	1
Disabled	0
Native American	0
Children	0
Primary Language	English

Dwelling

Dwelling Type	Site Built
Primary Heat. Fuel	Natural Gas
Secondary Heat. Fuel	
Previously Weatherized	☐
Year	
Ownership	Owned
High Energy Use	☐
High Energy Burden	☐
Low Cost/No Cost	☐
Year Built	1952

Comment

Energy Index

Floor Area (sq ft)	1290
Heating Degree Days (base 65 F)	3400
Total Heating (BTU/HDD/sq ft)	22.3

	Fuel Type	Annual Cost	Estim. % for heating
Primary Heating Fuel	Natural Gas	$978.00	100
Secondary Heating Fuel			

Contact Information

Contact Name	Home Ph	Work Ph	Cell Ph	Contact Type	Primary Applican	Comment
Tanner, David				Applicant/Person of Record	☐	

Audit Information

Audit Information

Audit Name	11_348SB	Number of Conditioned Stories	1.5
Assigned To	Tor, Audrey	Audit Floor Area (sq. ft.)	1290
Current Status	Recommendations Generated On 8/24/2011	Billing Adjust	☑
Comment		Impute Cooling	☐

Libraries

Setup Library	Demonstration Setup Library	Setup Library Description	
Fuel Costs	Agency Fuel Prices		
Supply Library	Demonstration Supply Library	Supply Library Description	Supply library for demonstration
Weather File	SAMPLEUS.WX		

Photo Folder: C:\ProgramData\Weatherization Assistant 8-9\photos

Audit Status History

Type	Status	Date	Changed By	Comment
NEAT Audit	Recommendations Generated On	8/24/2011	MBG	
NEAT Audit	Recommendations Generated On	8/24/2011	MBG	

Walls

		Existing Insulation		Added Insulation				
Wall Code	WLE-1	Type	Fiberglass Batts	Type				
Wall Type	Platform Frame	R Value	3	Additional Cost ($)				
Stud Size	2 x 4							
Exterior Type	Wood							
Exposed To	Outside (Ambient)	Orientation	West	Gross Area (sq ft)	224	Measure #	1	
Comment	1st story west wall.							

		Existing Insulation		Added Insulation				
Wall Code	WLN-1	Type	Fiberglass Batts	Type				
Wall Type	Platform Frame	R Value	3	Additional Cost ($)				
Stud Size	2 x 4							
Exterior Type	Wood							
Exposed To	Outside (Ambient)	Orientation	North	Gross Area (sq ft)	270	Measure #	1	
Comment	1st story north wall. Height of 9' includes joist space.							

Walls

Wall Code	WLN-2	Existing Insulation Type	Fiberglass Batts	Added Insulation Type			
Wall Type	Platform Frame	R Value	3	Additional Cost ($)			
Stud Size	2 x 4						
Exterior Type	Wood						
Exposed To	Outside (Ambient)	Orientation	North	Gross Area (sq ft)	98	Measure #	1
Comment	2nd story north wall.						

Wall Code	WLS-1	Existing Insulation Type	Fiberglass Batts	Added Insulation Type			
Wall Type	Platform Frame	R Value	3	Additional Cost ($)			
Stud Size	2 x 4						
Exterior Type	Wood						
Exposed To	Buffered Space	Orientation	South	Gross Area (sq ft)	270	Measure #	2
Comment	1st story south wall. Height of 9' includes joist space.						

Wall Code	WLS-2	Existing Insulation Type	Fiberglass Batts	Added Insulation Type			
Wall Type	Platform Frame	R Value	3	Additional Cost ($)			
Stud Size	2 x 4						
Exterior Type	Wood						
Exposed To	Outside (Ambient)	Orientation	South	Gross Area (sq ft)	98	Measure #	1
Comment	2nd story south wall.						

Wall Code	WLW-1	Existing Insulation Type	Fiberglass Batts	Added Insulation Type			
Wall Type	Platform Frame	R Value	3	Additional Cost ($)			
Stud Size	2 x 4						
Exterior Type	Wood						
Exposed To	Outside (Ambient)	Orientation	West	Gross Area (sq ft)	224	Measure #	1
Comment	1st story west wall.						

Windows

Window Code	WD1	Average Size Width (in)	24	Retrofit Options	Evaluate All
Window Type		Height (in)	48	Include in SIR	☐
FrameType	Wood or Vinyl			Additional Cost Weatherization ($/window)	
Glazing Type	Single with Metal Storm	Number on this Wall Wall Code	WLN-1	Replacement ($/window)	
Interior Shading		Number	2	Low E ($/window)	
Exterior Shading (%	0			Storm ($/window)	
Leakiness	Medium				
Comment					

Windows

Window Code	WD2	Average Size		Retrofit Options	Evaluate All
Window Type		Width (in)	24	Include in SIR	☐
FrameType	Wood or Vinyl	Height (in)	48	Additional Cost	
Glazing Type	Single with Metal Storm	Number on this Wall		Weatherization ($/window)	
Interior Shading		Wall Code	WLS-1	Replacement ($/window)	
Exterior Shading (%	0	Number	2	Low E ($/window)	
Leakiness	Medium			Storm ($/window)	
Comment					

Window Code	WD4	Average Size		Retrofit Options	Replace
Window Type		Width (in)	24	Include in SIR	☐
FrameType	Wood or Vinyl	Height (in)	48	Additional Cost	
Glazing Type	Single with Metal Storm	Number on this Wall		Weatherization ($/window)	
Interior Shading		Wall Code	WLW-1	Replacement ($/window)	
Exterior Shading (%	20	Number	2	Low E ($/window)	
Leakiness	Medium			Storm ($/window)	
Comment					

Window Code	WD5	Average Size		Retrofit Options	Evaluate All
Window Type		Width (in)	24	Include in SIR	☐
FrameType	Wood or Vinyl	Height (in)	48	Additional Cost	
Glazing Type	Single with Metal Storm	Number on this Wall		Weatherization ($/window)	
Interior Shading		Wall Code	WLN-2	Replacement ($/window)	
Exterior Shading (%	0	Number	1	Low E ($/window)	
Leakiness	Medium			Storm ($/window)	
Comment					

Window Code	WD6	Average Size		Retrofit Options	Evaluate All
Window Type		Width (in)	24	Include in SIR	☐
FrameType	Wood or Vinyl	Height (in)	48	Additional Cost	
Glazing Type	Single with Metal Storm	Number on this Wall		Weatherization ($/window)	
Interior Shading		Wall Code	WLS-2	Replacement ($/window)	
Exterior Shading (%	0	Number	1	Low E ($/window)	
Leakiness	Medium			Storm ($/window)	
Comment					

Doors

Doors

Door Code: DR1
Door Type: Solid Core Wood
Area (sq ft): 20
Storm Door Condition: Adequate
Leakiness: Medium
Comment:

Optional Dimensions
Width (in):
Height (in):

Number on this Wall
Wall Code: WLN-1
Number: 1

Replacement Door Required ☐
Include in SIR ☐
Additional Cost ($/door):

Door Code: DR2
Door Type: Solid Core Wood
Area (sq ft): 20
Storm Door Condition: Adequate
Leakiness: Medium
Comment:

Optional Dimensions
Width (in):
Height (in):

Number on this Wall
Wall Code: WLS-1
Number: 1

Replacement Door Required ☐
Include in SIR ☐
Additional Cost ($/door):

Unfinished Attics

Attic Code: UA1
Attic Type: Unfloored
Joist Spacing (in): 24
Area (sq ft): 300
Roof Color: Normal or Weathered
Comment:

Existing Insulation
Type: None
Depth (in):

Added Insulation
Measure #: 1
Type:
Added R Value or Max. Depth (in):
Additional Cost ($):

Finished Attics

Attic Code: FA1
Attic Area Type: Outer Ceiling Joist
Attic Floor Type: Unfloored
Area (sq ft): 392
Roof Color: Normal or Weathered
Comment:

Existing Insulation
Type: Fiberglass Batts
Depth (in): 1

Added Insulation
Measure #: 1
Type:
Added R Value or Max. Depth (in):
Additional Cost ($):

Finished Attics

		Existing Insulation		Added Insulation	
Attic Code	FA2	Type	Fiberglass Batts	Measure #	
Attic Area Type	Kneewall	Depth (in)	1	Type	
Attic Floor Type				Added R Value or Max. Depth (in)	
Area (sq ft)	120			Additional Cost ($)	
Roof Color	White, Reflective, or Sha				
Comment					

		Existing Insulation		Added Insulation	
Attic Code	FA3	Type	Fiberglass Batts	Measure #	2
Attic Area Type	Roof Rafter	Depth (in)	1	Type	
Attic Floor Type				Added R Value or Max. Depth (in)	
Area (sq ft)	437			Additional Cost ($)	
Roof Color	Normal or Weathered				
Comment					

		Existing Insulation		Added Insulation	
Attic Code	FA4	Type	Fiberglass Batts	Measure #	3
Attic Area Type	Collar Beam	Depth (in)	1	Type	
Attic Floor Type	Unfloored			Added R Value or Max. Depth (in)	
Area (sq ft)	56			Additional Cost ($)	
Roof Color	Normal or Weathered				
Comment					

Foundations

Foundation Code: F1 | Foundation Type: Unintentionally Conditioned | Measure #: 1

Floor

Area (sq ft)	840	Added Insulation Type	
Existing Insulation R Value	0	Additional Cost ($)	

Sill

Floor Joist Size (in)	8	Added Insulation Type	
Perimeter to Insulate (ft)	116	Additional Cost ($)	

Foundation Wall

Height (ft)	8	Perimeter (ft)	116	Added Insulation Type	
Height Exposed (%)	25	Existing Insulation R Value	0	Additional Cost ($)	

Comment:

Heating Systems

System Code: HS1
Heat Supplied (%): 100
Primary System: ☑
Equipment Type: Forced Air Furnace
Manuf.:
Model:
Fuel: Natural Gas
Location: Unintentionally Heated Space
Eliminate with Primary System Replacement: ☐
Comment:

Uninsulated Supply Duct Sections

Supply Duct Location: Subspace

	Type	Length (ft)	Width (in)	Height (in)	Diameter (in)
1)	Rectangular	30	24	12	
2)	Round	40			8
3)	Round	35			6

Required Heating System Details

Input Units: No Input
Input Rating:
Output Capacity (kBTU/hr): 70
Steady State System Efficiency (%): 78
Condition: Fair
Smart Thermostat? ☐
Heat Pump HSPF: or
Year Purchased:

Automatic Vent Damper
Present ? ☐
Recommended ? ☐
Flue Diameter (in): 6

Pilot Light / IID
IID ? ☑ Pilot Light ? ☐
On in Summer ? ☐

Power Burner ? ☐

Retention Head
Present ? ☐
Recommended ?

System Retrofit
Options: Evaluate All
Fuel: Natural Gas

	Standard	High Efficiency
System AFUE	81	92
Labor Cost	$500.00	$600.00
Material Cost	$1,100.00	$1,800.00

Heating Systems (Continued

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)	70	70
Flue Gas Temp (F)	570	470
Net Stack Temp (F)	500	400
Percent Oxygen (%)	10	9
Percent Carbon Dioxide (%)	6	7
Smoke Number		
Steady State Efficiency (%)		78

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)	30	10
Free Air Reading in Flue (ppm)	58	18

Heat Rise

	Audit	Insp.
Return Temp (F)	68	68
Supply Temp (F)	120	125
Temp Rise (F)	52	57
Listed/Rated Temp Rise (F)		

Comment: Tune-up performed.

VENT TESTS

Venting Information

Damper Type	None found
Damper Condition	Not applicable
Chimney Type	Masonry-Lined
Chimney Condition	Fair
Flue Type	Metal Single Wall
Flue Condition	Fair
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	Adequate
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)	30	25
Draft (Pa or Inches of Water)	6	8
Spillage Time (sec)	30	15

Comment:

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☑
Electric Service Switch	Good
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment: Tell occupants to move clothes away from furnace.

THERMOSTAT DETAILS

Thermostat Type	Mechanical (mercury bulb)
Daytime Thermostat Setting (F)	72
Nighttime Thermostat Setting (F)	65
Relocate Thermostat	☐
Anticipator Current (amps)	0.2
Anticipator Setting (0-1)	0.4
Anticipator Adjustment Needed	☑

Comment:

Heating Systems (Continued)

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable	☐	Fan On Setting (F)	95
Limit Control Not Working	☐	Fan Off Setting (F)	90
		High Limit Setting (F)	170

Burner and Pilot

Burner Type	Ribbon	Pilot Type	Standing Pilot (on in summer)
Burner Condition	Fair	Pilot Condition	Fair

Blower and Belt

Blower Type	Belt Drive	Belt Size	14
Blower Condition	Dirty	Belt Play (in)	0.5
Motor Current (amps)			
Belt Condition	Poor (but working)		

Accessories

Humidifier	None
Electronic Air Cleaner	None
AC Coil	Fair

Air Filter

Filter Size (length x width, in)	24 x 30
Filter Condition	Dirty

Comment: Adjust fan limit control settings.

Cooling Systems

Cooling Systems

AC Code	AC1
Equipment Type	Heat Pump
Manufacturer	
Model	
Floor Area Cooled (sq ft)	1290
Capacity (kBtu/hr)	30
SEER	
Year Manufactured	2001

Required Retrofits

Replacement Required	☑
Tune-up Mandatory	☐
Include in SIR	☑

Comment:

Ducts / Infiltration - Air and Duct Leakage

Evaluate Duct Sealing ? ☐ Duct Leakage Method:

WHOLE HOUSE BLOWER DOOR MEASUREMENTS

	Before Weatherization (Existing)	After Weatherization (Target or
Air Leakage Rate(cfm)	3000	2500
at House Pressure Difference (Pa)	50	50
Infiltration Reduction Cost ($)	$250.00	
Comment	Target (post weatherization) blower door reading estimated assuming that wall insulation would not be installed because there is already a 1" batt installed. Infiltration reduction cost is a typical value.	

Duct / Infiltration - Blower Door Readings (Optional)

No data were entered for this audit.

Ducts / Infiltration Zonal Pressure Readings (Optional)

No data were entered for this audit.

Ducts / Infiltration Pressure Balance Readings (Optional)

No data were entered for this audit.

Ducts / Infiltration Pressure Pan Readings (Optional)

No data were entered for this audit.

Base Load - Water Heater

Existing Equipment

Manufacturer	A. O. SMITH WATER PRODUCTS CO.
Model	DEN-52
Fuel	Electricity
Location	Unconditioned Space
Size (gal)	50
Rated Input	4.5
Input Units	kW
Energy Factor	0.86
Recovery Efficiency (%)	0.98
Water Heater Wrap Present	☐
Water Heater Pipe Insulation Present	☐
Label R Value	
Insulation Thickness (in)	1.5
Insulation Type	Fiberglass

Replacement Equipment

Manufacturer	A. O. SMITH WATER PRODUCTS CO.
Model	FGSE-50-230E
Fuel	Natural Gas
Rated Input	40
Input Units	kBTU
Size (gal)	50
Energy Factor	0.65
Recovery Efficiency (%)	0.8
Installation Cost	$450.00
Additional Cost	
Replacement Required	☐
Include in SIR	☐

Shower Heads

Number of Showerheads	1
Avg. GPM	3.2
Minutes of Shower Use Per Day	10

Comment

Base Load - Water Heater (Continued)

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)	70	
Flue Gas Temp (F)	470	
Net Stack Temp (F)	400	
Percent Oxygen (%)	8	
Percent Carbon Dioxide (%)	7	
Smoke Number		
Steady State Efficiency (%)	79	

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)	15	
Free Air Reading in Flue (ppm)	24	

Comment:

VENT TESTS

Venting Information

Damper Type	None found
Damper Condition	Not applicable
Chimney Type	Masonry-Lined
Chimney Condition	Fair
Flue Type	Metal Single Wall
Flue Condition	Fair
Flue/Damper Diameter (in)	6
Combustion Air Intake	Adequate

☐ Any Other Venting Related Problems?

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)	30	
Draft (Pa or Inches of Water)	6	
Spillage Time (sec)	20	

Comment:

INSPECTIONS

Fuel Related

- ☐ Insufficient Clearance from Combustibles
- Electric Service Switch Condition: Not applicable
- ☑ Gas Leak Present
- ☐ Fuel Shutoff Valve Not Present
- ☐ Drip Leg Not Present

Water Related

- Hot Water Temp (F): 120
- ☐ Supply Temperature Adjustment Needed
- ☐ Pressure Relief Piping Needed
- ☐ Water Leak Present

☐ Other Water Heating Problem

Comment:

Base Load - Refrigerator

Base Load - Refrigerator

Existing Equipment

Manufacturer: ADMIRAL
Model: AS1ND205
Style: Side by Side
Defrost: Automatic
Height (in):
Width (in):
Depth (in):
Size (cu ft): 20.1
Location: Heated Space

Label Annual Consumption

kWh / yr: 1980
Age: 15 or more years
Door Seal Condition: Fair - Some Wear

OR

Metered Consumption

Metering Minutes:
Metering Reading (kWh):
Temperature (F):
☐ Manual Defrost
☐ Includes Defrost Cycle

Replacement Equipment

Manufacturer: ADMIRAL
Model: AS22M8*
Style: Side by Side
Defrost: Automatic
kWh / yr: 724
Material Cost: $700.00
Other Cost: $100.00
Height (in):
Width (in):
Depth (in):
Size (cu ft): 21.7

Comment

Base Load - Lighting System

			Existing Incandescent				Replacement CFL		
Light Code	Room	Location	Lamp Type	Quantity	Watts	Hours per Day	CF Watts	Addl. Cost	Comment
LT1	Dining Room	Ceiling	Standard	4	60	10	13		

Health & Safety

Health & Safety

WHOLE HOUSE

- ☐ Smoke Detector is Needed
- ☑ CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment

BUILDING SHELL

Attic

- ☑ Recessed Lights Present
- ☐ Chimney / Flue Shielding Incorrect
- ☐ Wiring Problems
- ☐ Ventilation Inadequate
- ☐ Water Leaks Present
- ☐ Moisture/Mold Problems Evident
- ☑ Vermiculite Present
- ☐ Other Problems

Walls

- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Moisture Problems Evident
- ☐ Lead Based Paint is Likely
- ☐ Asbestos in Siding is Likely
- ☐ Other Problems

Basement / Crawlspace

- ☐ Vapor Barrier Needed
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Plumbing Leaks Present
- ☐ Moisture/Mold Problems Evident
- ☐ Other Problems

Comment

Health & Safety (Continued)

Health & Safety (Continued)

EQUIPMENT

Wood Stove / Fireplace

- ☐ Wood Stove / Fireplace is Present
- ☐ Improper Venting
- ☐ Combustion Air is Inadequate

Clothes Dryer

- ☐ Improper Venting

Cook Stove

- CO Measurement Oven (ppm)
- CO Measurement Burner 1 (ppm)
- CO Measurement Burner 2 (ppm)
- CO Measurement Burner 3 (ppm)
- CO Measurement Burner 4 (ppm)
- ☐ Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen	Air-to-Air Heat Exchanger
☑ Missing	☐ Missing	☐ Exists
☐ Not Operational	☐ Not Operational	☐ Not Operational
☐ Improper Venting	☐ Improper Venting	

Comment

Itemized Costs

Description	Cost	Include in SIR?	Material	Energy Savings (mBTU/yr)	Units (of energy saved)	Life of measure (years)	Fuel Type Saved	Comment
Install Bathroom Exhaust Fan	$270.00	☐	Bathroom exhaust fan (+)					
CO Monitor is Needed	$70.00	☐	CO monitor (+)					
Anticipator Adjustment Needed	$20.00	☑						
Repair Roof	$80.00	☑						
Insulate and seal attic access	$29.60	☑	R-30 faced batt insulation (+)	0.7	MBtu	20		

Utility Bills

Utility Bills

Billing Type	Billing Period	Billing Units	First Period Days	Base Temp	Base Load	Comment
Heating	Pre-Retrofit	Therms	30	65	28.9	

#	Month	Day	Usage	DegreeDays
1	1	15	190	815
2	2	17	212	690
3	3	14	138	585
4	4	16	65	312
5	5	13	81	144
6	6	15	49	42
7	7	15	15	11
8	8	14	14	15
9	9	16	43	95
10	10	17	74	253
11	11	13	97	507
12	12	12	149	726

NEAT Heating System Summary

Client ID: 11_348 Alt. Client ID:
Client Name: Tanner, David

Heating Systems

System Code: HS1
Heat Supplied (%): 100
Primary System: ☑
Equipment Type: Forced Air Furnace
Manuf.:
Model:
Fuel: Natural Gas
Location: Unintentionally Heated Space
Eliminate with Primary System Replacement: ☐
Comment:

Uninsulated Supply Duct Sections

Supply Duct Location: Subspace

	Type	Length (ft)	Width (in)	Height (in)	Diameter (in)
1)	Rectangular	30	24	12	
2)	Round	40			8
3)	Round	35			6

Required Heating System Details

Input Units: No Input
Input Rating:
Output Capacity (kBTU/hr): 70
Steady State System Efficiency (%): 78
Condition: Fair
Smart Thermostat? ☐
Heat Pump HSPF: or
Year Purchased:

Automatic Vent Damper
Present ? ☐
Recommended ? ☐
Flue Diameter (in): 6

Pilot Light / IID
IID ? ☑ Pilot Light ? ☐
On in Summer ? ☐

Power Burner ? ☐

Retention Head
Present ? ☐
Recommended ?

System Retrofit
Options: Evaluate All
Fuel: Natural Gas

	Standard	High Efficiency
System AFUE	81	92
Labor Cost	$500.00	$600.00
Material Cost	$1,100.00	$1,800.00

Heating Systems (Continued)

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)	70	70
Flue Gas Temp (F)	570	470
Net Stack Temp (F)	500	400
Percent Oxygen (%)	10	9
Percent Carbon Dioxide (%)	6	7
Smoke Number		
Steady State Efficiency (%)		78

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)	30	10
Free Air Reading in Flue (ppm)	58	18

Heat Rise

	Audit	Insp.
Return Temp (F)	68	68
Supply Temp (F)	120	125
Temp Rise (F)	52	57
Listed/Rated Temp Rise (F)		

Comment: Tune-up performed.

VENT TESTS

Venting Information

Damper Type	None found
Damper Condition	Not applicable
Chimney Type	Masonry-Lined
Chimney Condition	Fair
Flue Type	Metal Single Wall
Flue Condition	Fair
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	Adequate
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)	30	25
Draft (Pa or Inches of Water)	6	8
Spillage Time (sec)	30	15

Comment:

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☑
Electric Service Switch	Good
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment: Tell occupants to move clothes away from furnace.

THERMOSTAT DETAILS

Thermostat Type	Mechanical (mercury bulb)
Daytime Thermostat Setting (F)	72
Nighttime Thermostat Setting (F)	65
Relocate Thermostat	☐
Anticipator Current (amps)	0.2
Anticipator Setting (0-1)	0.4
Anticipator Adjustment Needed	☑

Comment:

Heating Systems (Continued)

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable	☐	Fan On Setting (F)	95
Limit Control Not Working	☐	Fan Off Setting (F)	90
		High Limit Setting (F)	170

Burner and Pilot

Burner Type	Ribbon	Pilot Type	Standing Pilot (on in summer)
Burner Condition	Fair	Pilot Condition	Fair

Blower and Belt

Blower Type	Belt Drive	Belt Size	14
Blower Condition	Dirty	Belt Play (in)	0.5
Motor Current (amps)			
Belt Condition	Poor (but working)		

Accessories

Humidifier	None
Electronic Air Cleaner	None
AC Coil	Fair

Air Filter

Filter Size (length x width, in)	24 x 30
Filter Condition	Dirty

Comment: Adjust fan limit control settings.

NEAT Pressure Diagnostics

Client ID: 11_348 Alt. Client ID:
Client Name: Tanner, David

Blower Door Readings (Existing)

No data were entered for this audit.

Blower Door Readings (New)

Test Date	Conducted During	Equipment Used	Air Leakage Rate(cfm)	House Pressure Difference (Pa)	Corrected CFM at 50 Pa	Comment
	(pick from list below)					

Conducted During list

Audit	Pre-Install
During Install	Post-Install
Inspection	Other

Zone Pressure Location list

Attic	Side Attic	Ceiling Joist Space	Kneewall
Exterior Wall	Interior Wall	Basement	Crawl Space
Mobile Home Belly	Attached Garage	Unheated Addition	Other

Zonal Pressure Readings (Existing)

No data were entered for this audit.

Zonal Pressure Readings (New)

Conducted During	Building Pressure Differential (Pa)	Zone Pressure Location	Zone Pressure (Pa)	Ducts Present	Comment
(pick from list)		(pick from list or describe)			

Pressure Balance Readings (Existing)

No data were entered for this audit.

Pressure Balance Readings (New)

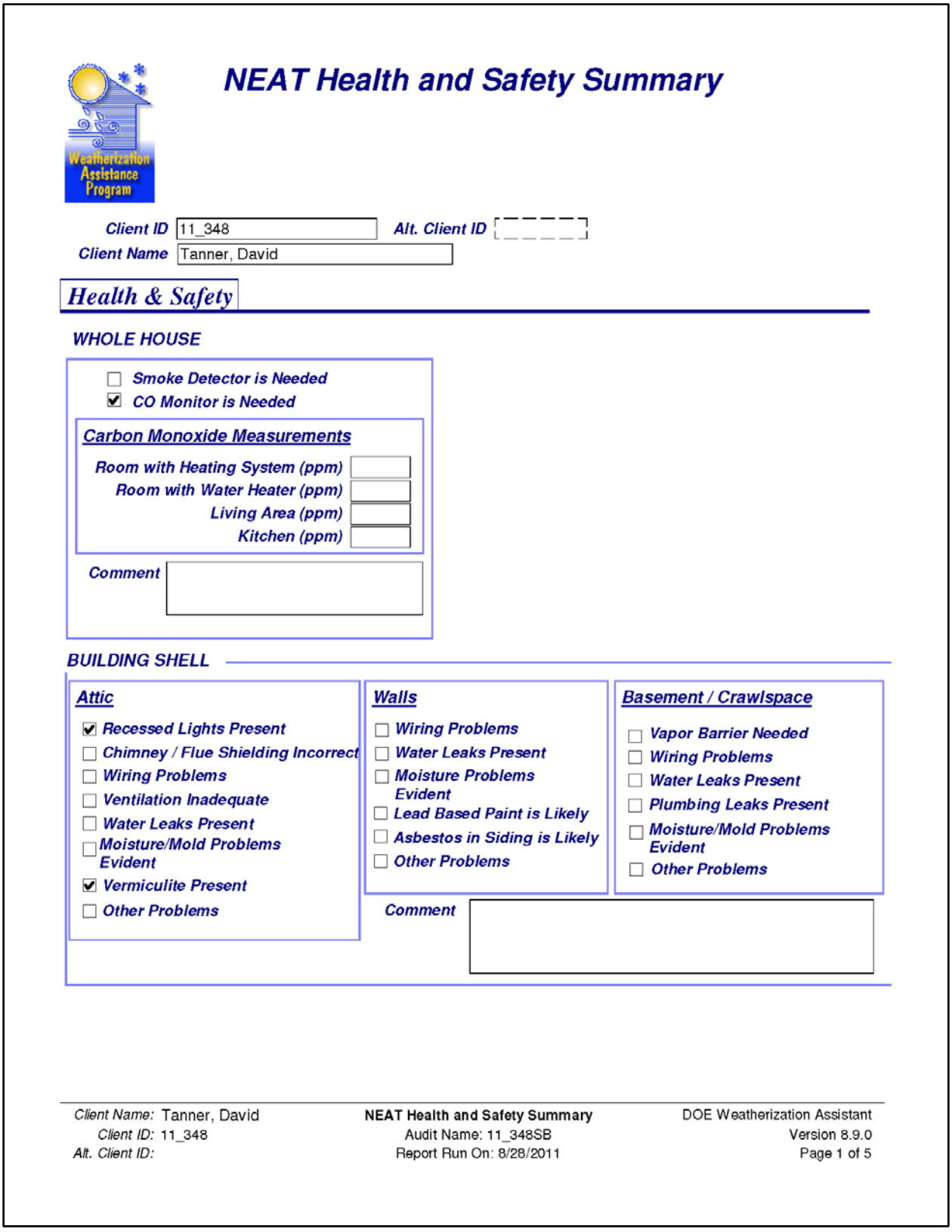
Location	Initial Pressure (Pa)	Final Pressure (Pa)	Comment

Pressure Pan Readings (Existing)

No data were entered for this audit.

Pressure Pan Readings (New)

Register #	Location	Register Type	Initial Pressure (Pa)	Final Pressure (Pa)	Comment



NEAT Health and Safety Summary

Client ID: 11_348 Alt. Client ID:
Client Name: Tanner, David

Health & Safety

WHOLE HOUSE

- [ ] Smoke Detector is Needed
- [x] CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment:

BUILDING SHELL

Attic

- [x] Recessed Lights Present
- [ ] Chimney / Flue Shielding Incorrect
- [ ] Wiring Problems
- [ ] Ventilation Inadequate
- [ ] Water Leaks Present
- [ ] Moisture/Mold Problems Evident
- [x] Vermiculite Present
- [ ] Other Problems

Walls

- [ ] Wiring Problems
- [ ] Water Leaks Present
- [ ] Moisture Problems Evident
- [ ] Lead Based Paint is Likely
- [ ] Asbestos in Siding is Likely
- [ ] Other Problems

Basement / Crawlspace

- [ ] Vapor Barrier Needed
- [ ] Wiring Problems
- [ ] Water Leaks Present
- [ ] Plumbing Leaks Present
- [ ] Moisture/Mold Problems Evident
- [ ] Other Problems

Comment:

Health & Safety (Continued)

EQUIPMENT

Wood Stove / Fireplace

- ☐ Wood Stove / Fireplace is Present
- ☐ Improper Venting
- ☐ Combustion Air is Inadequate

Clothes Dryer

- ☐ Improper Venting

Cook Stove

CO Measurement Oven (ppm)	
CO Measurement Burner 1 (ppm)	
CO Measurement Burner 2 (ppm)	
CO Measurement Burner 3 (ppm)	
CO Measurement Burner 4 (ppm)	

- ☐ Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen	Air-to-Air Heat Exchanger
☑ Missing	☐ Missing	☐ Exists
☐ Not Operational	☐ Not Operational	☐ Not Operational
☐ Improper Venting	☐ Improper Venting	

Comment

Heating Systems

System Code: HS1
Heat Supplied (%): 100
Primary System: ☑
Equipment Type: Forced Air Furnace
Manuf.:
Model:
Fuel: Natural Gas
Location: Unintentionally Heated Space
Eliminate with Primary System Replacement: ☐
Comment:

Uninsulated Supply Duct Sections

Supply Duct Location: Subspace

	Type	Length (ft)	Width (in)	Height (in)	Diameter (in)
1)	Rectangular	30	24	12	
2)	Round	40			8
3)	Round	35			6

Required Heating System Details

Input Units: No Input
Input Rating:
Output Capacity (kBTU/hr): 70
Steady State System Efficiency (%): 78
Condition: Fair
Smart Thermostat?: ☐
Heat Pump HSPF: or
Year Purchased:

Automatic Vent Damper
Present ? ☐
Recommended ? ☐
Flue Diameter (in): 6

Pilot Light / IID
IID ? ☑
Pilot Light ? ☐
On in Summer ? ☐

Power Burner ? ☐

Retention Head
Present ? ☐
Recommended ?

System Retrofit
Options: Evaluate All
Fuel: Natural Gas

	Standard	High Efficiency
System AFUE	81	92
Labor Cost	$500.00	$600.00
Material Cost	$1,100.00	$1,800.00

Heating Systems (Continued

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)	70	70
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Percent Oxygen (%)	10	9
Percent Carbon Dioxide (%)	6	7
Smoke Number		
Steady State Efficiency (%)		78

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)	30	10
Free Air Reading in Flue (ppm)	58	18

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	Audit	Insp.
Return Temp (F)	68	68
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Comment: Tune-up performed.

VENT TESTS

Venting Information

Damper Type	None found
Damper Condition	Not applicable
Chimney Type	Masonry-Lined
Chimney Condition	Fair
Flue Type	Metal Single Wall
Flue Condition	Fair
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	Adequate
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)	30	25
Draft (Pa or Inches of Water)	6	8
Spillage Time (sec)	30	15

Comment:

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☑
Electric Service Switch	Good
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment: Tell occupants to move clothes away from furnace.

THERMOSTAT DETAILS

Thermostat Type	Mechanical (mercury bulb)
Daytime Thermostat Setting (F)	72
Nighttime Thermostat Setting (F)	65
Relocate Thermostat	☐
Anticipator Current (amps)	0.2
Anticipator Setting (0-1)	0.4
Anticipator Adjustment Needed	☑

Comment:

Heating Systems (Continued)

Heating Systems (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable	☐	Fan On Setting (F)	95
Limit Control Not Working	☐	Fan Off Setting (F)	90
		High Limit Setting (F)	170

Burner and Pilot

Burner Type	Ribbon	Pilot Type	Standing Pilot (on in summer)
Burner Condition	Fair	Pilot Condition	Fair

Blower and Belt

Blower Type	Belt Drive	Belt Size	14
Blower Condition	Dirty	Belt Play (in)	0.5
Motor Current (amps)			
Belt Condition	Poor (but working)		

Accessories

Humidifier	None
Electronic Air Cleaner	None
AC Coil	Fair

Air Filter

Filter Size (length x width, in)	24 x 30
Filter Condition	Dirty

Comment: Adjust fan limit control settings.

MHEA Recommended Measures

Agency	Demonstration Agency	State	US	Run On	9/26/2011 1:58:20 PM	RunID	1317059900
Client ID	11_353			Version	8.9.0.5 (2/10/2012)	AuditID	-274543188

Audit Name	11_353MH	Audit Date	9/26/2011
Client Name	Anderson, Grace	Auditor	AT
Weather File	SAMPLEUS.WX	Setup Library Name	Demonstration Setup Library
Comment	New comments		

Annual Energy and Cost Savings

#	Recommended Measure	Components	Heating (MMBtu)	Heating ($)	Cooling (kWh)	Cooling ($)	BaseLoad (kWh)	BaseLoad ($)	Total (MMBtu)
1	Seal Ducts		3.7	37	135	9	0	0	4.1
2	General Air Sealing		5.6	56	0	0	0	0	5.6
3	DWH Pipe Insulation		0.0	0	0	0	223	8	0.8
4	DWH Tank Insulation		0.0	0	0	0	531	18	1.8
5	Setback [heating]		2.3	23	0	0	0	0	2.3
6	Roof Cellulose Loose		4.2	42	368	26	0	0	5.4
7	Belly Cellulose Loose		4.6	46	-5	0	0	0	4.6
8	Refrigerator Replacement		0.0	0	0	0	922	65	3.1
9	Glass Storm Windows	WD4	0.3	3	-1	0	0	0	0.3

Energy Saving Measure Economics

#	Recommended Measure	Components	Measure Savings ($/yr)	Measure Cost ($)	Measure SIR	Cost ($)	Cumulative Savings ($/yr)	Cumulative SIR
1	Seal Ducts		46	320	1.2	320	46	1.2
2	General Air Sealing		56	250	1.9	570	103	1.5
3	DWH Pipe Insulation		8	15	5.5	585	110	1.6
4	DWH Tank Insulation		18	40	4.9	625	128	1.8
5	Setback [heating]		23	75	3.7	700	151	2.0
6	Roof Cellulose Loose		67	680	1.5	1380	219	1.8
7	Belly Cellulose Loose		45	573	1.2	1953	264	1.6
8	Refrigerator Replacement		65	620	1.2	2573	329	1.5
9	Glass Storm Windows	WD4	3	32	1.1	2605	331	1.5
10	Fix Wiring Problems (Attic)		0	120	0.0	2725	331	0.0

Materials

Index	Material	Quantity	Units

Index	Material	Quantity	Units
1	Duct sealing (setup cost)	1	Each
2	General air sealing (setup cost)	1	Each
3	DWH Pipe Insulation	1	Each
4	DWH Tank Insulation	1	Each
5	Setback thermostat	1	Each
6	Roof Insulation	40	Bag
7	Floor Insulation	39	Bag
8	Refrigerator	1	Ea
9	Glass storm windows	1	Each

Pre/Post Retrofit Energy Consumption

Pre Retrofit			Post Retrofit		
Heating (MMBtu)	Cooling(kWh)	BaseLoad(kWh)	Heating(MMBtu)	Cooling(kWh)	BaseLoad(kWh)
74.5	2180.9	2817.9	53.8	1684.3	1141.7

Approximate Component Contributions to Peak Heating Load

Component Type	Pre Retrofit Load (Btu/h)	Post Retrofit Load (BTU/h)
Wall	5764.1	5764.1
Floor	6089.9	3209.5
Roof	5355.5	1714.3
Windows	7394.4	5545.4
Doors	586.4	586.4
Infiltration	7984.5	2875.5
Duct Loss	3317.5	1969.5
Total	36492.2	21664.8

Special Notes

ManualJ sizing based on 70F indoor and 3F outdoor temp
10 Base case duct loss fraction
10 Retrofit case duct loss fraction
Sizing estimate are general guidelines only
Sizing estimate should be review by qualified heating contractor
(+) in the Materials list indicates there are more related User Defined Materials
Cumulative Expenditure Exceeds Limit of 2500 Dollars

Comments

Type	Code	Comment
Itemized	Fix Wiring Problems	In kitchen dropdown ceiling at lights.

Audit Name: 11_353MH *Client:* 11_353 *Date:* 9/26/2011 *Page 2 of 2*

MHEA Input Report

Client Information

Client ID	11_353
Alt. Client ID	
Client Name	Anderson, Grace
Address	210 North Illinois Ave
Unit No.	
City	Oak Ridge
State	TN
Zip	37830
County	
Other Geo. Ident.	

Occupants

Number of: Occupants	
Elderly	0
Disabled	0
Native American	0
Children	0
Primary Language	English

Dwelling

Dwelling Type	Mobile Home
Ownership	
Primary Heat. Fuel	
High Energy Use	☐
Secondary Heat. Fuel	
High Energy Burden	☐
Previously Weatherized	☐
Year Built	
Year	

Comment

Energy Index

Floor Area (sq ft)	
Total Heating (BTU/HDD/sq ft)	
Heating Degree Days (base 65 F)	

	Annual Cost	Estim. % for heating
Primary Heating Fuel		
Secondary Heating Fuel		

Contact Information

Contact Name	Home Ph	Work Ph	Cell Ph	Contact Type	Primary Applicant	Comment
Anderson, Grace				Applicant/Person of Record	☑	

Audit Information

Audit Information

Audit Name	11_353MH	Length	60
Assigned To	Tor, Audrey	Width	15
Current Status	Recommendations Generated On 9/26/2011	Height	7
Comment	New comments	Wind Shielding	Normal Shielding
		Home Leakiness	Medium
		☐ Billing Adjust	
		☐ Water Heater Closet	

Libraries

Setup Library	Demonstration Setup Library	Setup Library Description	Original Demonstration Library
Fuel Costs	Agency Fuel Prices		
Supply Library	Demonstration Supply Library	Supply Library Description	Supply library for demonstration
Weather File	SAMPLEUS.WX		

Photo Folder

Audit Status History

Type	Status	Date	Changed By	Comment
	Recommendations Generated On	11/4/2014	MBG	
	Recommendations Generated On	9/26/2011	MBG	

Walls

Wall Stud Size	2 x 4
Orientation of Long Wall	South
Type of Wall Ventilation	Not Vented

Insulation Type Thickness

Batt/Blanket (in)	3.5
Loose Fill (in)	0
Foam Core (in)	0

UninsulatableArea (sqft)	0
Added Cost	0

Carport/Porch Roof

Length (ft)	18
Width (ft)	12
Orientation	South

Comment

Windows

Windows

Window Code	WD1
Window Type	Slider
FrameType	
Glazing Type	Single Pane
Interior Shading	Blinds or Shades
Exterior Shading	None
Leakiness	Medium

Average Size

Width (in)	42
Height (in)	36

Number Facing

North	0
South	0
East	4
West	0

Retrofit Options	Evaluate All
Include in SIR	☐

Additional Cost

Weatherization ($/window)	
Replacement ($/window)	
Glass Storm ($/window)	
Plastic Storm ($/window)	

Comment

Window Code	WD2
Window Type	Fixed
FrameType	
Glazing Type	Single Pane
Interior Shading	None
Exterior Shading	None
Leakiness	Medium

Average Size

Width (in)	42
Height (in)	36

Number Facing

North	3
South	0
East	0
West	1

Retrofit Options	Evaluate All
Include in SIR	☐

Additional Cost

Weatherization ($/window)	
Replacement ($/window)	
Glass Storm ($/window)	
Plastic Storm ($/window)	

Comment

Window Code	WD3
Window Type	Slider
FrameType	
Glazing Type	Single Pane
Interior Shading	None
Exterior Shading	Carport or Porch
Leakiness	Medium

Average Size

Width (in)	42
Height (in)	36

Number Facing

North	0
South	0
East	0
West	1

Retrofit Options	Evaluate All
Include in SIR	☐

Additional Cost

Weatherization ($/window)	
Replacement ($/window)	
Glass Storm ($/window)	
Plastic Storm ($/window)	

Comment

Windows

Window Code: WD4
Window Type: Door Window
FrameType:
Glazing Type: Single Pane
Interior Shading: None
Exterior Shading: None
Leakiness: Medium

Average Size
Width (in): 24
Height (in): 24

Number Facing
North: 0
South: 0
East: 1
West: 0

Retrofit Options: Evaluate All
Include in SIR: ☐

Additional Cost
Weatherization ($/window):
Replacement ($/window):
Glass Storm ($/window):
Plastic Storm ($/window):

Comment:

Doors

Door Code: DR1
Type: Standard Manufactured Home D
'torm Door Present: ☐

Size
Width (in): 36
Height (in): 82

Number Facing
North: 0
South: 0
East: 1
West: 1

Replacement Door Required: ☐
Include in SIR: ☐
Additional Cost ($/door):

Comment:

Ceiling

Roof Type: Pitched
Roof Color: Normal or Weathered
Bowstring Height of Roof (in): 8
Pitched Roof Added Insul. (in): 12
Flat Roof Joist Size:

Insulation Type Thickness
Batt/Blanket (in): 2
Loose Fill (in): 0
Foam Core (in): 0.5

Addded Cost: 0
Cathedral Ceiling (%): 20
Step Wall Orientation: East

Comment:

Floor

Floor

Floor Joist Direction: Lengthwise

Is There a Skirt? ☐

Floor Wing Description

Floor Joist Size: 2 x 6

Loose Insulation Thickness (in): 0

Batt/Blanket Insulation Location: Attached Under Joi

Batt Insulation Thickness (in): 2

Floor Belly (Center) Description

Floor Joist Size: 2 x 6

Belly Cavity Configuration: Rounded

Condition of Belly: Average

Maximum Depth of Belly Cavity (in): 9

Loose Insulation Thickness (in): 0

Batt/Blanket Insulation Location: Draped Below Jois

Batt Insulation Thickness (in): 2

Comment:

Walls (Addition)

Wall Stud Size: 2 x 4

Addition Orientation: North

Wall Ventilation: Not Vented

Insulation Type Thickness

Batt/Blanket (in): 3.5

Loose Fill (in): 0

Foam Core (in): 0

Additional Cost: 0

Wall Configuration: All Addition Walls the Same Height

Interior Wall

Max Height (ft): 8

Min Height (ft): 8

Comment:

Windows (Addition)

Windows (Addition)

Window Code	AWD1
Window Type	Slider
FrameType	Wood or Vinyl
Glazing Type	Double Pane
Interior Shading	Blinds or Shades
Exterior Shading	None
Leakiness	Tight

Average Size

Width (in)	60
Height (in)	24

Number Facing

North	1
South	0
East	1
West	0

Retrofit Options	Evaluate None
Include in SIR	☐

Additional Cost

Weatherization ($/window)	
Replacement ($/window)	
Glass Storm ($/window)	
Plastic Storm ($/window)	

Comment

Doors (Addition

Door Code	ADR1
Type	Solid Core Wood
torm Door Present	☐

Size

Width (in)	36
Height (in)	80

Number Facing

North	0
South	0
East	1
West	0

Replacement Door Required	☐
Include in SIR	☐
Additional Cost ($/door)	

Comment

Ceiling (Addition)

Joist Size	2 x 6
Roof Color	Normal or Weathered
Addded Cost	0

Insulation Type Thickness

Batt/Blanket (in)	0
Loose Fill (in)	8
Foam Core (in)	0

Comment

Floor (Addition)

Floor (Addition)

Floor Type	Crawl Space	Batt/Blanket Location	Between Joists
Joist Size	2 x 6		

Floor Dimensions

Length (ft)	15
Width (ft)	10

Insulation Type Thickness

Batt/Blanket (in)	6
Loose Fill (in)	0

Depth Available for Added Insulation (in): 0

Comment:

Heating - Primary

Equipment Type	Furnace
Fuel Type	Natural Gas
Capacity (kBtu/hr)	80
Efficiency (%)	75
Efficiency Units	Steady State
Duct Location	Floor
Duct Insulation Location	Below Duct
Percent Total Heat Supplied (%)	100
Programmable Thermosta	☐

☐ Tune-up Mandator

Average Indoor Temperature (F

Day	68
Night	68

Comment:

Heating - Primary (Continued)

Heating - Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Heat Rise

	Audit	Insp.
Return Temp (F)		
Supply Temp (F)		
Temp Rise (F)		
Listed/Rated Temp Rise (F)		

Comment

VENT TESTS

Venting Information

Damper Type	
Damper Condition	
Chimney Type	
Chimney Condition	
Flue Type	
Flue Condition	
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☐
Electric Service Switch	
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment

THERMOSTAT DETAILS

Thermostat Type	
Daytime Thermostat Setting (F)	
Nighttime Thermostat Setting (F)	
Relocate Thermostat	☐
Anticipator Current (amps)	
Anticipator Setting (0-1)	
Anticipator Adjustment Needed	☐

Comment

Heating Primary (Continued)

Heating Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable	☑	Fan On Setting (F)	
Limit Control Not Working	☑	Fan Off Setting (F)	
		High Limit Setting (F)	

Burner and Pilot

Burner Type		Pilot Type	
Burner Condition		Pilot Condition	

Blower and Filter

Blower Condition		Filter Location	
Motor Current (amps)		Filter Size (length x width, in	
		Filter Condition	

Air Filter

Accessories

Humidifier	
Electronic Air Cleaner	
AC Coil	

Comment

Heating - Secondary

No data were entered for this audit.

Heating - Replacement

Heating - Replacement

Equipment Type	Furnace
Fuel Type	Natural Gas
Capacity (kBtu/hr)	80
Efficiency (%)	92
Efficiency Units	AFUE
Duct Location	Floor
Duct Insulation Location	Below Duct

Cost

Labor	600
Material	1200

Replacement Required ☐ Include Replacement Costs in Home Retrofit ☐

Comment

Cooling - Primary

AC Unit Type	Central Air Conditioner
Capacity (kBtu/hr)	24
Efficiency	9
Efficiency Units	SEER
Duct Location	Floor
Duct Insulation Location	Below Duct
Floor Area Cooled (%	80

Comment

Cooling - Secondary

AC Unit Type	Window or Room Air Conditioner
Capacity (kBtu/hr)	5
Efficiency	9.7
Efficiency Units	EER
Floor Area Cooled (%)	20

Comment

Cooling - Replacement

Cooling - Replacement

AC Unit Type	Central Air Conditioner
Capacity (kBtu/hr)	24
Efficiency	16
Efficiency Units	SEER
Duct Locatio	Floor
Duct InsulationLocation	Below Duct
Replacement Required	☐
Include in SIR	☐
Comment	

Cost

Labor	500
Material	1500

Ducts / Infiltration - Air and Duct Leakages

Evaluate Duct Sealing ? ☑ Duct Leakage Metho: Pressure Pan Measurements

PRESSURE PAN MEASUREMENTS

	Before Duct Sealing	After Duct Sealing
Sum of Pressure Pan Readings (Pa)	18	2

	Before Weatherizatio n (Existing)	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)	3000	1500
at House Pressure Difference (Pa)	50	50

Infiltration Reduction Cost ($)	$250.00
Duct Sealing Cost ($)	$320.00
Comment	

DUCT OPERATING PRESSURES

	Before Duct Sealing	After Duct Sealing
Supply (Pa)	35	40
Return (Pa)		

Ducts / Infiltration Blower Door

No data were entered for this audit.

Ducts / Infiltration Zonal Press

No data were entered for this audit.

Ducts / Infiltration Pressure Balance Readings (Optional)

No data were entered for this audit.

Ducts / Infiltration Pressure Pan Readings (Optional)

No data were entered for this audit.

Base Load - Water Heater

Existing Equipment

Manufacturer	BRADFORD WHITE CORPORATION		
Model	M-4-403T***N-12		
Fuel	Natural Gas	Rated Input	40
Location	Heated Space	Input Units	kBTU
Size (gal)	40	Energy Factor	0.63
		Recovery Efficiency (%)	0.82
Water Heater Wrap Present	☐		
Water Heater Pipe Insulation Present	☐		
Label R Value			
Insulation Thickness (in)	1		
Insulation Type	Fiberglass		

Replacement Equipment

Manufacturer	
Model	
Fuel	
Rated Input	
Input Units	
Size (gal)	
Energy Factor	
Recovery Efficiency (%)	
Installation Cost	
Additional Cost	
Replacement Required	☐
Include in SIR	☐

Shower Heads

Number of Showerheads		Avg. GPM	
Minutes of Shower Use Per Day			

Comment

Base Load - Water Heater (Continued)

Base Load - Water Heater (Continued)

OPTIONAL WATER HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Comment

VENT TESTS

Venting Information

Chimney Type
Chimney Condition
Flue Type
Flue Condition
Flue/Damper Diameter (in)
Combustion Air Intake
☐ Any Other Venting Related Problems?

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

INSPECTIONS

Fuel Related

☐ Insufficient Clearance from Combustibles
Electric Service Switch Condition
☐ Gas Leak Present
☐ Fuel Shutoff Valve Not Present
☐ Drip Leg Not Present

Water Related

Hot Water Temp (F)
☐ Supply Temperature Adjustment Needed
☐ Pressure Relief Piping Needed
☐ Water Leak Present

☐ Other Water Heating Problem

Comment

Base Load - Refrigerator

Base Load - Refrigerator

Existing Equipment

Manufacturer: General Electric
Model: TBF14DR
Style:
Defrost:
Height (in):
Width (in):
Depth (in):
Size (cu ft): 14.2
Location: Heated Space

Label Annual Consumption

kWh / yr: 1488
Age: 15 or more years
Door Seal Condition:

OR

Metered Consumption

Metering Minutes:
Metering Reading (kWh,
Temperature (F):
☐ Manual Defrost
☐ Includes Defrost Cycle

Replacement Equipment

Manufacturer: AMANA
Model: 86851
Style:
Defrost:
kWh / yr: 789
Material Cost: $520.00
Other Cost: $100.00
Height (in):
Width (in):
Depth (in):
Size (cu ft): 17.8

Comment:

Base Load - Lighting Systems

No data were entered for this audit.

Health & Safety

Health & Safety

WHOLE HOUSE

- ☐ Smoke Detector is Needed
- ☐ CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment

BUILDING SHELL

Attic
- ☐ Recessed Lights Present
- ☐ Chimney / Flue Shielding Incorrect
- ☑ Wiring Problems
- ☐ Ventilation Inadequate
- ☐ Water Leaks Present
- ☐ Moisture/Mold Problems Eviden
- ☐ Other Problems

Walls
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Moisture/Mold Problems Evident
- ☐ Other Problems

Crawlspace
- ☐ Vapor Barrier Needed
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Plumbing Leaks Present
- ☐ Moisture/Mold Problems Evident
- ☐ Other Problems

Comment

Health & Safety (Continued)

Health & Safety (Continued)

EQUIPMENT

Wood Stove / Fireplace

- ☐ Wood Stove / Fireplace is Present
- ☐ Venting is Incorrect
- ☐ Combustion Air is Inadequate

Clothes Dryer

- ☐ Improper Venting

Cook Stove

CO Measurement Oven (ppm)	
CO Measurement Burner 1 (ppm)	
CO Measurement Burner 2 (ppm)	
CO Measurement Burner 3 (ppm)	
CO Measurement Burner 4 (ppm)	

☐ Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen
☐ Missing	☐ Missing
☐ Not Operational	☐ Not Operational
☐ Improper Venting	☐ Improper Venting

Comment

Itemized Costs

Description	Cost	Include in SIR?	Material	Energy Savings (mBTU/yr)	Units (of energy saved)	Life of measure (years)	Fuel Type Saved	Comment
Fix Wiring Problems (Attic)	$120.00	☐						In kitchen dropdown ceiling at lights.

Utility Bills

Utility Bills

Billing Type	Billing Period	Billing Units	First Period Days	Base Temp	Base Load	Comment
Heating	Pre-Retrofit	Therms	30	65		

#	Month	Day	Usage	DegreeDays
1	1	29	250	1108
2	2	27	293	968
3	3	30	182	715
4	4	28	141	350
5	5	31	65	238
6	6	29	47	96
7	7	30	36	38
8	8	31	35	0
9	9	28	36	32
10	10	30	57	246
11	11	29	106	680
12	12	31	181	905

MHEA Heating System Summary

Client ID 11_353 **Alt. Client ID**
Client Name Anderson, Grace

Heating - Primary

Equipment Type	Furnace
Fuel Type	Natural Gas
Capacity (kBtu/hr)	80
Efficiency (%)	75
Efficiency Units	Steady State
Duct Location	Floor
Duct Insulation Location	Below Duct
Percent Total Heat Supplied (%)	100
Programmable Thermostat	☐

☐ Tune-up Mandator

Average Indoor Temperature (F

Day	68
Night	68

Comment

Heating - Primary (Continued)

Heating - Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Heat Rise

	Audit	Insp.
Return Temp (F)		
Supply Temp (F)		
Temp Rise (F)		
Listed/Rated Temp Rise (F)		

Comment

VENT TESTS

Venting Information

Damper Type	
Damper Condition	
Chimney Type	
Chimney Condition	
Flue Type	
Flue Condition	
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☐
Electric Service Switch	
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment

THERMOSTAT DETAILS

Thermostat Type	
Daytime Thermostat Setting (F)	
Nighttime Thermostat Setting (F)	
Relocate Thermostat	☐
Anticipator Current (amps)	
Anticipator Setting (0-1)	
Anticipator Adjustment Needed	☐

Comment

Heating Primary (Continued)

Heating Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable ☑
Limit Control Not Working ☑
Fan On Setting (F)
Fan Off Setting (F)
High Limit Setting (F)

Burner and Pilot

Burner Type
Burner Condition
Pilot Type
Pilot Condition

Blower and Filter

Blower Condition
Motor Current (amps)

Air Filter

Filter Location
Filter Size (length x width, in)
Filter Condition

Accessories

Humidifier
Electronic Air Cleaner
AC Coil

Comment

Heating - Secondary

No data were entered for this audit.

Heating - Replacement

Heating - Replacement

Equipment Type	Furnace
Fuel Type	Natural Gas
Capacity (kBtu/hr)	80
Efficiency (%)	92
Efficiency Units	AFUE
Duct Location	Floor
Duct Insulation Location	Below Duct

Cost

Labor	600
Material	1200

Replacement Required ☐ Include Replacement Costs in Home Retrofit ☐

Comment

MHEA Pressure Diagnostics

Client ID: 11_353 Alt. Client ID:
Client Name: Anderson, Grace

Blower Door Readings (Existing)

No data were entered for this audit.

Blower Door Readings (New)

Test Date	Conducted During	Equipment Used	Air Leakage Rate(cfm)	House Pressure Difference (Pa)	Corrected CFM at 50 Pa	Comment
	(pick from list below)					

Conducted During list

Audit	Pre-Install
During Install	Post-Install
Inspection	Other

Zone Pressure Location list

Attic	Side Attic	Ceiling Joist Space	Kneewall
Exterior Wall	Interior Wall	Basement	Crawl Space
Mobile Home Belly	Attached Garage	Unheated Addition	Other

Zonal Pressure Readings (Existing)

No data were entered for this audit.

Zonal Pressure Readings (New)

Conducted During	Building Pressure Differential (Pa)	Zone Pressure Location	Zone Pressure (Pa)	Ducts Present	Comment
(pick from list)		(pick from list or describe)			

Pressure Balance Readings (Existing)

No data were entered for this audit.

Pressure Balance Readings (New)

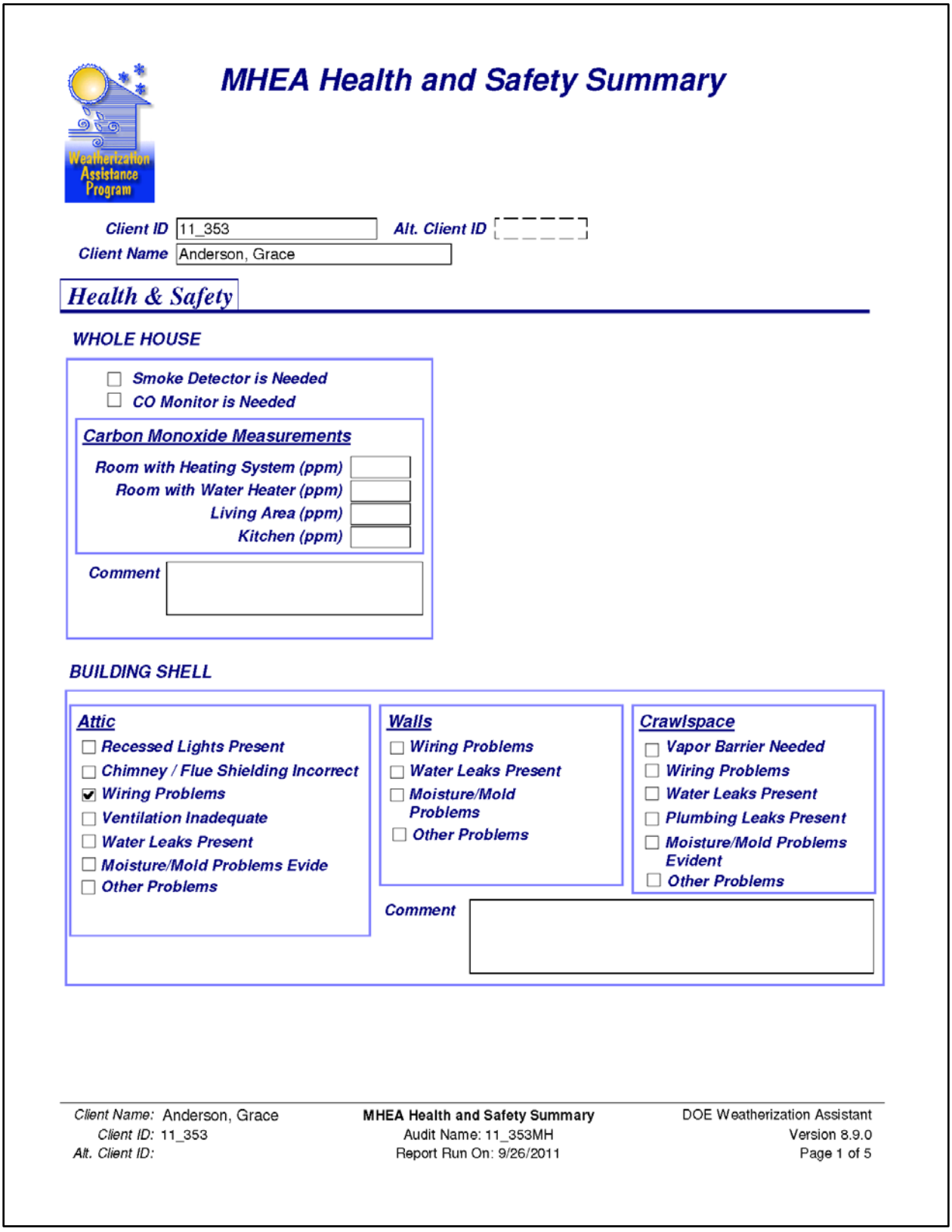
Location	Initial Pressure (Pa)	Final Pressure (Pa)	Comment

Pressure Pan Readings (Existing)

No data were entered for this audit.

Pressure Pan Readings (New)

Register #	Location	Register Type	Initial Pressure (Pa)	Final Pressure (Pa)	Comment



MHEA Health and Safety Summary

Client ID: 11_353 Alt. Client ID:
Client Name: Anderson, Grace

Health & Safety

WHOLE HOUSE

- ☐ Smoke Detector is Needed
- ☐ CO Monitor is Needed

Carbon Monoxide Measurements

Room with Heating System (ppm)	
Room with Water Heater (ppm)	
Living Area (ppm)	
Kitchen (ppm)	

Comment:

BUILDING SHELL

Attic
- ☐ Recessed Lights Present
- ☐ Chimney / Flue Shielding Incorrect
- ☑ Wiring Problems
- ☐ Ventilation Inadequate
- ☐ Water Leaks Present
- ☐ Moisture/Mold Problems Evide
- ☐ Other Problems

Walls
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Moisture/Mold Problems
- ☐ Other Problems

Crawlspace
- ☐ Vapor Barrier Needed
- ☐ Wiring Problems
- ☐ Water Leaks Present
- ☐ Plumbing Leaks Present
- ☐ Moisture/Mold Problems Evident
- ☐ Other Problems

Comment:

Health & Safety (Continued)

EQUIPMENT

Wood Stove / Fireplace

- ☐ Wood Stove / Fireplace is Present
- ☐ Venting is Incorrect
- ☐ Combustion Air is Inadequate

Clothes Dryer

- ☐ Improper Venting

Cook Stove

CO Measurement Oven (ppm)	
CO Measurement Burner 1 (ppm)	
CO Measurement Burner 2 (ppm)	
CO Measurement Burner 3 (ppm)	
CO Measurement Burner 4 (ppm)	

☐ Gas Leak Present

Exhaust Fans

Bathrooms	Kitchen
☐ Missing	☐ Missing
☐ Not Operational	☐ Not Operational
☐ Improper Venting	☐ Improper Venting

Comment

Heating - Primary

Equipment Type	Furnace
Fuel Type	Natural Gas
Capacity (kBtu/hr)	80
Efficiency (%)	75
Efficiency Units	Steady State
Duct Location	Floor
Duct Insulation Location	Below Duct
Percent Total Heat Supplied (%)	100
Programmable Thermostat	☐

☐ Tune-up Mandator

Average Indoor Temperature (F

Day	68
Night	68

Comment

Heating - Primary (Continued)

Heating - Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS

OPERATIONAL TESTS

Flue Gas Analysis

	Audit	Insp.
Combustion Air Inlet Temp (F)		
Flue Gas Temp (F)		
Net Stack Temp (F)		
Percent Oxygen (%)		
Percent Carbon Dioxide (%)		
Smoke Number		
Steady State Efficiency (%)		

Carbon Monoxide

	Audit	Insp.
In Flue (ppm)		
Free Air Reading in Flue (ppm)		

Heat Rise

	Audit	Insp.
Return Temp (F)		
Supply Temp (F)		
Temp Rise (F)		
Listed/Rated Temp Rise (F)		

Comment

VENT TESTS

Venting Information

Damper Type	
Damper Condition	
Chimney Type	
Chimney Condition	
Flue Type	
Flue Condition	
Flue / Damper Diameter (in)	
Combustion System Type	
Combustion Air Intake	
Other Venting Related Problems	☐

Normal Operating Conditions Draft Measurements

	Audit	Insp.
Outdoor Temp (F)		
Draft (Pa or Inches of Water)		
Spillage Time (sec)		

Comment

INSPECTIONS

Other Items

Cracked Heat Exchanger	☐
Insufficient Clearance from Combustibles	☐
Electric Service Switch	
Gas Leak Present	☐
Fuel Shutoff Valve Not Present	☐
Drip Leg Not Present	☐
Any Other Heating System Problems	☐

Comment

THERMOSTAT DETAILS

Thermostat Type	
Daytime Thermostat Setting (F)	
Nighttime Thermostat Setting (F)	
Relocate Thermostat	☐
Anticipator Current (amps)	
Anticipator Setting (0-1)	
Anticipator Adjustment Needed	☐

Comment

Heating Primary (Continued)

Heating Primary (Continued)

OPTIONAL HEATING SYSTEM DETAILS (Continued)

FURNACE COMPONENTS

Limit Controls

Control Settings are Adjustable ☑
Limit Control Not Working ☑
Fan On Setting (F)
Fan Off Setting (F)
High Limit Setting (F)

Burner and Pilot

Burner Type
Burner Condition
Pilot Type
Pilot Condition

Blower and Filter

Blower Condition
Motor Current (amps)

Air Filter

Filter Location
Filter Size (length x width, in)
Filter Condition

Accessories

Humidifier
Electronic Air Cleaner
AC Coil

Comment

Work Order

WORK ORDER INFORMATION

Work Order Name: WO/11_348/JT/1
Work Order Type: Weatherization
Audit Name: 11_348SB

CLIENT INFORMATION

Client Name: Tanner, David
Client ID: 11_348
Alt. Client ID:

Address: 114 Athens
Oak Ridge, TN 37830

CLIENT CONTACT INFORMATION

Tanner, David

Applicant/Person of Record ☐

AGENCY INFORMATION

Agency: Demonstration Agency
Address: 725 Jefferson St.
Any City, US 11111

Agency Phone: (123) 456-7890
Fax: (234) 567-8901
Email Address: agencyemail@localisp.net

Agency Contact: Tor, Audrey

Work Phone:
Cell Phone:
Email Address:

CONTRACTOR / CREW INFORMATION

Company:
Address:
,
Contact: Contractor, John

Work Phone:
Cell Phone:
Email Address:

Company Name & License Number: _____

Contractor's Signature: _____

COMMENT

Measures

Measure 2 Repair Roof — **Components** — **Inspected** ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Unspecified	Misc Material	Each	1	$80.00	$80.00	1	$135.00	$135.00

Other Detail

Measure Sub Total: $80.00 **Sub Total:** $135.00

Field Notes:

Measure 3 Infiltration Redctn — **Components** — **Inspected** ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Miscellaneous Su	Infiltration Reduction	Each	1	$250.00	$250.00	1	$250.00	$250.00

Other Detail

Measure Sub Total: $250.00 **Sub Total:** $250.00

Field Notes:

Measure 5 DWH Pipe Insulation — **Components** — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	DHW Pipe Insulation	Each	1	$5.00	$5.00	1	$5.00	$5.00
2	Labor	DHW Pipe Insulation	Each	1	$10.00	$10.00	1	$10.00	$10.00

Other Detail

Measure Sub Total: $15.00 **Sub Total:** $15.00

Field Notes:

Measure 7 DWH Tank Insulation — **Components** — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Hot Water Equip	DHW Tank Insulation	Each	1	$15.00	$15.00	1	$15.00	$15.00
2	Labor	DHW Tank Insulation	Each	1	$25.00	$25.00	1	$25.00	$25.00

Other Detail

Measure Sub Total: $40.00 **Sub Total:** $40.00

Field Notes:

Measure 8 Attic Ins. R-30 — **Components** UA1 — Inspected

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	300	$0.30	$90.00	440	$0.30	$132.00
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	300	$0.60	$180.00	440	$0.60	$264.00

Other Detail

Measure Sub Total: $270.00 Sub Total: $396.00

Field Notes:

Measure 9 Fill Ceiling Cavity — **Components** FA3 — Inspected

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - 5 in.	SqFt	437	$0.17	$73.77	437	$0.17	$73.77
2	Labor	Attic Insulation - Blown Cellulose - 5 in.	SqFt	437	$0.34	$147.49	437	$0.34	$147.49

Other Detail

Measure Sub Total: $221.26 Sub Total: $221.26

Field Notes:

Measure 10 Insulate and seal attic access — **Components** — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Unspecified	R-30 faced batt insulation (+)	Each	1	$29.60	$29.60	1	$29.60	$29.60

Other Detail

Measure Sub Total: $29.60 — Sub Total: $29.60

Field Notes:

Measure 11 Attic Ins. R-30 — **Components** FA1 — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	392	$0.30	$117.60	392	$0.30	$117.60
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	392	$0.60	$235.20	392	$0.60	$235.20

Other Detail

Measure Sub Total: $352.80 — Sub Total: $352.80

Field Notes:

Measure 12 Attic Ins. R-30 — **Components** FA4 — Inspected

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	56	$0.30	$16.80	56	$0.30	$16.80
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	56	$0.60	$33.60	56	$0.60	$33.60

Other Detail

Measure Sub Total: $50.40 — Sub Total: $50.40

Field Notes:

Measure 14 Kneewall Insulation — **Components** FA2 — Inspected

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Kneewall Insulation - Fiberglass Batts - R-13	SqFt	120	$0.26	$31.20	120	$0.26	$31.20
2	Labor	Kneewall Insulation - Fiberglass Batts - R-13	SqFt	120	$0.50	$60.00	120	$0.50	$60.00

Other Detail

Measure Sub Total: $91.20 — Sub Total: $91.20

Field Notes:

Measure 16 Wall Insulation — **Components** WLE-1,WLN-1,WLN-2,WLS-2,WLW-1 — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Wall Insulation - Blown Cellulose - 2x4 Filled	SqFt	846	$0.26	$219.96	710	$0.26	$184.60
2	Labor	Wall Insulation - Blown Cellulose - 2x4 Filled	SqFt	846	$0.75	$634.50	710	$0.75	$532.50

Other Detail

Measure Sub Total: $854.46 **Sub Total:** $717.10

Field Notes:

Measure 17 Window Replacement — **Components** WD4 — Inspected ☐

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Windows	Window Replacement	SqFt	16	$6.00	$96.00	16	$6.00	$96.00
2	Labor	Window Replacement	SqFt	16	$0.00	$0.00	16	$0.00	$0.00
3	Other	Window Replacement	Each Window	2	$125.00	$250.00			

Other Detail

Measure Sub Total: $346.00 **Sub Total:** $96.00

Field Notes:

Measure 18 CO Monitor is Needed — **Components** — **Inspected**

Comment

#	Material / Labor	Description /Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Health and Safety	CO monitor	Each	1	$40.00	$40.00	1	$40.00	$40.00
2	Labor	Labor	Hour	1	$30.00	$30.00	1	$30.00	$30.00

Other Detail

Measure Sub Total: $70.00 **Sub Total:** $70.00

Field Notes:

Work Order Grand Total: $2,670.72 **Grand Total:** $2,464.36

Work Order Bid (ID)

WORK ORDER INFORMATION

Work Order Name: WO/11_348/JT/1
Work Order Type: Weatherization
Audit Name: 11_348SB

CLIENT INFORMATION

Client ID: 11_348

AGENCY INFORMATION

Agency: Demonstration Agency
Address: 725 Jefferson St.
Any City, US 11111

Agency Phone: (123) 456-7890
Fax: (234) 567-8901
Email Address: agencyemail@localisp.net

Agency Contact: Tor, Audrey

Work Phone:
Cell Phone:
Email Address:

CONTRACTOR / CREW INFORMATION

Company:
Address:
,
Contact: Contractor, John

Work Phone:
Cell Phone:
Email Address:

Company Name & License Number: _____

Contractor's Signature: _____

COMMENT

Measures

Measure 2 Repair Roof — Components — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Unspecified	Misc Material	Each	1					
	Other Detail								

Measure Sub Total: Sub Total:

Field Notes:

Measure 3 Infiltration Redctn — Components — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Miscellaneous Su	Infiltration Reduction	Each	1					
	Other Detail								

Measure Sub Total: Sub Total:

Field Notes:

Measure 5 DWH Pipe Insulation — Components — Inspected

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	DHW Pipe Insulation	Each	1					
2	Labor	DHW Pipe Insulation	Each	1					
Other Detail									

Measure Sub Total: Sub Total:

Field Notes:

Measure 7 DWH Tank Insulation — Components — Inspected

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Hot Water Equip	DHW Tank Insulation	Each	1					
2	Labor	DHW Tank Insulation	Each	1					
Other Detail									

Measure Sub Total: Sub Total:

Field Notes:

Measure 8 Attic Ins. R-30 — **Components** UA1 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	300					
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	300					

Other Detail

Measure Sub Total: **Sub Total:**

Field Notes:

Measure 9 Fill Ceiling Cavity — **Components** FA3 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - 5 in.	SqFt	437					
2	Labor	Attic Insulation - Blown Cellulose - 5 in.	SqFt	437					

Other Detail

Measure Sub Total: **Sub Total:**

Field Notes:

Measure 10 Insulate and seal attic access — **Components** — **Inspected**

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
10	Unspecified	R-30 faced batt insulation (+)	Each	1					

Other Detail

Measure Sub Total: **Sub Total:**

Field Notes:

Measure 11 Attic Ins. R-30 — **Components** FA1 — **Inspected**

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	392					
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	392					

Other Detail

Measure Sub Total: **Sub Total:**

Field Notes:

Measure 12 Attic Ins. R-30 — **Components** FA4 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Attic Insulation - Blown Cellulose - R-30	SqFt	56					
2	Labor	Attic Insulation - Blown Cellulose - R-30	SqFt	56					

Other Detail

Measure Sub Total: Sub Total:

Field Notes:

Measure 14 Kneewall Insulation — **Components** FA2 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Kneewall Insulation - Fiberglass Batts - R-13	SqFt	120					
2	Labor	Kneewall Insulation - Fiberglass Batts - R-13	SqFt	120					

Other Detail

Measure Sub Total: Sub Total:

Field Notes:

Measure 16 Wall Insulation — **Components** WLE-1,WLN-1,WLN-2,WLS-2,WLW-1 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Insulation	Wall Insulation - Blown Cellulose - 2x4 Filled	SqFt	846					
2	Labor	Wall Insulation - Blown Cellulose - 2x4 Filled	SqFt	846					

Other Detail

Measure Sub Total: | Sub Total:

Field Notes:

Measure 17 Window Replacement — **Components** WD4 — Inspected ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Windows	Window Replacement	SqFt	16					
2	Labor	Window Replacement	SqFt	16					
3	Other	Window Replacement	Each Window	2					

Other Detail

Measure Sub Total: | Sub Total:

Field Notes:

Measure 18 CO Monitor is Needed — **Components** — **Inspected** ☐

Comment

#	Material / Labor	Description / Comment	Units	Estimated Qty	Estimated Unit Cost	Estimated Total	Actual Qty	Actual Unit Cost	Actual Total
1	Health and Safety	CO monitor	Each	1					
2	Labor	Labor	Hour	1					

Other Detail

Measure Sub Total: **Sub Total:**

Field Notes:

Work Order Grand Total: **Grand Total:**

Appendix D. Development of Customized Reports

D.1 Introduction

Versions of the Weatherization Assistance database software prior to 8.2.6 contained a set of static, predefined reports in the wa.mde database front-end file. The format of those existing reports and the number of available reports could not be changed by users of the Weatherization Assistant. The desire for customized and user-specific reports has been a stated objective since the first versions of Weatherization Assistant that stored data in a standard database file format. For this reason, and because the system used for development (MS Access) has useful tools for visual query and report development, it was decided to make the Weatherization Assistant reporting module open source.

Starting with Version 8.2.6, all of the report objects, the queries used by those reports, and the Visual Basic source code modules used to generate reports were moved to a separate database file that can be modified by users. The only requirement to modify existing reports or create new reports is:

1. A copy of the Microsoft Access database program (Access 2002/2003 or later)

2. A working knowledge of query and report development in that environment (a somewhat specialized skill that is becoming more common with time)

This document is written for Weatherization Assistant users who wish to modify existing reports or develop new ones. Note that all new or modified reports in the customized reporting database file can be selected and run from the main Weatherization Assistant user interface. This document explains the inner workings of the customized reporting database file that is available for download in source code form with the current Weatherization Assistant release. Included here are descriptions of the tables and other objects that can be copied/edited, or extended along with some detailed examples. There is not much hand holding when it comes to describing the basic features and operations of MS Access, so you may need to refer back to the help material for that application depending on your experience.

D.2 Conventions

This document contains a number of references to various systems, files, or objects that need to be clarified. So this is really a brief glossary.

wa.mde	This refers to the main front-end database file for the Weatherization Assistant application. This is a compiled MS Access 2002/2003 application that is linked to the Weatherization Assistant Backend database file as well as the Customized Reporting database file.
Backend	This refers to the database file containing all of the actual data collected on forms in wa.mde. It is stored in MS Access 2002/2003 MDB format for easy access but direct manipulation of the table data is discouraged due to the number of data cross checks built into the wa.mde forms. Each of the tables containing data is linked to the wa.mde front end and the waReport.mdb Customized Reporting database. Changes in the existing structures in the file can damage it, making it unusable. However, it is possible to make additive changes like adding new tables, new relationships, or new fields to existing tables.
waReport.mdb	This refers to the open source customized reporting database file that is the subject of this document. In the normal distribution, this file is named waReport.mde since it is distributed in compiled format. It is in MS Access 2002/2003 format and contains linkages to the same Backend tables as wa.mde. The wa.mde front end is linked to the customized reporting database in either open source (mdb) or compiled (mde) format. The links to the backend tables in the reporting module are managed automatically by the wa.mde front end. The open source version of the customized reporting database file (mdb format) is available as a separate download from the Weatherization Assistance Program sponsored site on which the main program is posted.

D.3 Download Instructions

The main distribution of Weatherization Assistant is a self-extracting executable file that includes a copy of the current reporting database file in MDE format (compiled). Weatherization Assistant is distributed as a single file that follows the naming convention:

waX-X-X-XSS.exe — where X-X-X-X is the version number and SS an optional code for distributions to a specific state.

In the same directory on the web where this distribution file is located you should also find another file named:

waReportXXXX.zip — This is the corresponding waReport.mdb file (zipped). It is an Access 2002/2003 database file that was used to compile the waReport.mde file contained in the main installation file. It is necessary to download this file only if you plan to modify or add reports yourself.

D.4 Help Available

This document is the main help provided for knowledgeable users wishing to develop their own reports. Some technical assistance may be available on a case-by-case basis. Contact the technical assistance for the Weatherization Assistant program for details. Please read Appendix D.12, *Handling Upgrades*, to learn about limitations and cautionary notes.

D.5 Requirements

The Weatherization Assistant was developed in MS Access 2002/2003. Most of the instructions in this document are specific to that version. This is an older version of the software that may only be available from second hand sources (eBay). However, it is possible to use more recent versions of the program for report development. Refer to Appendix D.11, *Using More Recent Versions of Access*, for specific instructions in using other versions of Access to develop reports.

D.6 Operations

This section contains a description of the operation of the wa.mde Weatherization Assistant front end reporting. When the wa.mde front-end makes a list of available reports or calls for a specific report, it opens the customized reporting database file as another task on the Windows task bar. The report is then opened, previewed, or printed from the customized reporting database. In this way, all the reports defined in the customized reporting file are immediately visible and can be called from the regular wa.mde user interface.

The wa.mde file contains a link (Main Menu/Link Form) that stores the complete path name of the reporting database file. The reporting database can be in either MDE (compiled) or MDB (uncompiled/open) file formats. This last point is important as it gives you the ability to update and distribute reports in either format. The MDE format is compiled and cannot be altered whereas the MDB file is open and can be altered by anyone with a copy of MS Access installed on their computer.

Because the full path to the file is stored, the naming convention and location of the reporting database is not fixed. The reporting database file is referred to as waReport.mdb by convention in this document, but really it can be any file in either MDB or MDE format. It is recommended that the reporting database file be located on the same disk as the Weatherization Assistant front end file (wa.mde) on the local machine for best performance. It is not recommended that the waReport.mdb/mde file be shared over a network. The waReport.mdb (or mde) MUST be in Access 2002/2003 file format. See Appendix D.11, *Using More Recent Versions of Access*, for details.

The waReport.mdb file contains all the report, query, and Visual Basic modules necessary to create the reports. It also has access to the same backend data as the wa.mde file through dynamically adjusted table linkages. When you use wa.mde to link to a new backend file, the table linkages are refreshed in BOTH the wa.mde file and the currently linked waReport.mdb file. This ensures that waReport.mdb is linked to the same data as the wa.mde and it allows the waReport.mdb to be run independent of wa.mde for testing purposes.

When wa.mde calls for a report, it first tests to see if the DatesRequired field in tblzReport is checked. If so, the date range pop-up form is displayed and start/end

dates are collected. Then tblzReportSetup in waReport.mdb is filled in by wa.mde. This table in the reporting database is how ALL parameters are passed from wa.mde to waReport.mdb. See Appendix D.7, *Reference for tblzReport*, for details for each field. The configuration of tblzReport is crucial if you are adding a new report and want that report visible in the Weatherization Assistant user interface.

Calling for a report from wa.mde starts a new MS Access task on the Windows task bar so users see a 'Report' entry on the task bar for each open report. Multiple reports can be open at the same time limited only by the memory resources on the host computer. When any report is closed, the associated Reporting task (instance of Access) is also closed. If the report includes external file references, then instances of the associated display application remain open and must be closed manually. Printing reports to paper leaves no extra tasks opened.

D.7 Reference for tblzReport

(where waReport.mdb makes reports visible to wa.mde)

This section contains a complete listing of all of the fields in tblzReport. The first thing to realize is that new user developed report objects are ONLY visible to wa.mde IF there is an active record pointing to that report in this table. This way you can have several reports in various stages of development stored in the waReport.mdb file without having to expose them in the wa.mde user interface. You can also insert records and use the Active field to turn off those reports that you don't want visible to users.

Field Name	**Description**
UI	The User Interface code in which this report is visible. Note that this is typically set to the string 'ALL' indicating that the visibility of the report should not be restricted to a certain UI code.
Group	This is a drop-down selector indicating in which wa.mde form the report should be listed. The choices are as follows. Agency: Agency form Client: The Client form

Field Name	Description	
	NAudit:	NEAT Audit form (site built)
	MAudit:	MHEA Audit form (mobile home)
	FAudit:	MFEA Audit form (multi-family
	WorkOrder:	The Work Order form
	Library:	The Setup Library form
	Supply:	The Supply Library form
SortOrder	Controls the order of appearance in the drop-down list of reports in wa.mde. The list of report entries gets sorted on this value for display only.	
ReportNum	A report grouping can be made up of several individual Access report objects and/or external files. In this way you can create aggregate reports made from several objects. A unique index on the combination of the ReportID and ReportNum is defined for tblzReport, thus the combination of the ReportID and ReportNum fields must be unique. See Appendix D.9, *Aggregate Reports*, for more details.	
ReportID	Each report grouping in tblzReport must have a unique ReportID index. This is the index used internally by the program to reference this particular group of reports By convention ReportIDs 1 through 100 are reserved for use by the wa.mde program. IMPORTANT: When adding custom reports (new records to tblzReport) be sure to use ReportIDs > 100. Most reports are single Access reports so each report has its own record in tblzReport. It is only in cases where several Access reports are combined into a single Aggregate report where the same ReportID is shared with several tblzReport records. See Appendix D.9, *Aggregate Reports*, for more details.	
Active	This is a checkbox field indicating if a report record is active. You can selectively make reports visible in wa.mde using this flag.	

Field Name	Description
	Only records with the Active check will be displayed in the drop-down lists of available reports
Default	Within each Group, one record can be identified as the default report. This is the report that is automatically selected in the report selection drop-down list when the form identified by the Group field is opened in wa.mde.
Description	This is the description of the report that is displayed in the drop-down list. For aggregate reports, only the first record for the ReportID is used. This is a separate field from the title of the report although they are likely to be similar.
Title	This is the string used at the title area of the MS Access report. This allows the use of a standard header where the title string at the top of the report gets replace with the string you enter here.
DatesNeeded	This checkbox determines if the date range dialog box should be displayed prior to opening the report. This date range dialog fills in the ReportDateRangeStart and the ReportDateRangeEnd fields in tblzReportSetup. See Appendix D.10, *Reference for tblzReportSetup,* for more information.
Type	This drop-down selection should be set to 'report' for MS Access report objects and to 'file' for external files. External file types supported include any file types for which Window has a default viewer and printer defined.
Name	This field contains the object name for MS Access report objects (Type = report) or the pathname of the external file (Type = file). If the Type = 'file' then this name can be a absolute pathname (e.g., c:\yourpath\yourfile.txt) or a are relative pathname (e.g., yourfile.txt). Relative pathnames are relative to the location of the waReport.mdb file.
OutFilePrefix	Snapshot is one of the output options for MS Access reports. This string provides the file name prefix used in the generation of the

Field Name	Description
	snapshot (.snp) output files. Microsoft provides a free viewer for snapshot files.
PreviewPages	This is the number of pages displayed in the report Preview window. It only applies to Preview type output. Good choices are 2 for portrait type reports and 1 for landscape.
PreviewMax	If checked, the preview window size is maximized and the report takes up the whole application client area. It is a good choice to Preview reports maximized.

D.8 External Files

You can specify the pathname to an external file as a report object. The only limitation is that the computer generating the report must have an application registered for the file extension you list. For example, if you can assume that every computer has software to handle MSWord files with the .doc extension, you can list the name of a .doc file as a report. In that case the Type field is set to 'file' and the Name field contains the path name to the .doc file. The path name can be an absolute path name or a name relative to the path where the waReport.mdb is installed. This may be the best way to include certain boiler-plate type information before or after a normal Access report.

D.9 Aggregate Reports

Most reports will be comprised of a single MS Access report object. In those cases a single record in tblzReport corresponds with a single MS Access report object. In that case the record would have a unique ReportID and ReportNum = 1.

However, there may be instances where you would like several report objects and perhaps some external files (like a boiler-plate in MSWord for instance) previewed or printed as a group in a certain order. You can accomplish this by creating a group of records in tblzReport all sharing the same ReportID. In that case, the ReportNum controls the order of display and printing of the report elements. See the Appendix D.8, *External Files*, for more information about incorporating external files as a report or in a report group.

The table tblzReport contains a sample aggregate report that by default is turned off (InActive). It demonstrates how two Access reports and one external text file can be combined into a single aggregate report.

Note that if multiple Access reports are opened in preview mode, the Windows main task menu at the bottom of the screen is used to switch between the different preview windows for the different. When any of the reports are closed, the reporting database closes and you return to the wa.mde front end.

D.10 Reference for tblzReportSetup

(how wa.mde passes values to waReport.mdb)

This table contains just a single record that includes all of the parameters last passed between wa.mde and the waReport.mdb reporting database. These values are normally only written by wa.mde but they can be manipulated manually in cases where waReport.mdb is being tested independent of wa.mde. In some instances fields in this table need to be used in record selection criteria of named queries. In each of those cases, a public Visual Basic function has been provided in the basReportCalc module to simplify query development. Refer to existing queries in waReport.mdb for examples of how the functions are used to simplify query selection criteria. The reference of fields below shows the name of the public function where applicable.

Field Name	**Description**
Title	This is the string to be used as the title for the report being generated. It is copied from the tblzReport.Title field at the time the report is generated. basReportCalc.ReportTitle() as String
Period	String description of period ie. "6/1/04 to 6/31/04". This is used in the report header. This is non-null only if the ReportDateRangeStart or ReportDateRangeEnd fields are non-null.
ReportDateRangeStart	If the DatesNeeded checkbox is marked in tblzReport, then wa.mde will prompt for the start date and fill in the

Field Name	Description
	date here. basReportCalc.ReportStart() As Date
ReportDateRangeEnd	If the DatesNeeded checkbox is marked in tblzReport, then wa.mde will prompt for the end date and fill in the date here. basReportCalc.ReportEnd() As Date
ReportSubLabel	This is the the Report Center Label copied from wa.mde MainMenu/Preferences providing a general user configurable report header string. This overlaps the ReportSubLabelLeft and Right, so typically only one of the two is used.
ReportSubLabelLeft	This is the the Report Left Label copied from wa.mde MainMenu/Preferences providing a general user configurable report header string. This overlaps the ReportSubLabel, so typically only one of the two is used.
ReportSubLabelRight	This is the the Report Right Label copied from wa.mde MainMenu/Preferences providing a general user configurable report header string. This overlaps the ReportSubLabel, so typically only one of the two is used.
ProgramLogo1	This is the full path name to a bitmap (.bmp) file used for the graphic in the upper LEFT hand corner of the report header. It is also used as the LEFT hand side graphic for the wa.mde Main Menu and is set using the Main Menu/Preferences form in wa.mde.
ProgramLogo2	This is the full path name to a bitmap (.bmp) file used for the graphic in the upper RIGHT hand corner of the report header. It is also used as the RIGHT hand side graphic for the wa.mde Main Menu and is set using the Main

Field Name	Description
	Menu/Preferences form in wa.mde.
RecordID	This is the long integer identifier for the current record for the current form in wa.mde. Which record is used depends on the Group field in the tblzReport table. Here is the name of the table and the long integer ID associated
	Group RecordID is
	Agency Null, See ReportAgencyName below
	Client tblClient.ClientID
	NAudit tblNJob.JobID
	MAudit tblMJob.JobID
	FAudit tblFJob.JobID
	WorkOrder tblWorkOrder.WorkOrderID
	Library tblLib.LibID
	Supply tblSupply.SupplyID
	basReportCalc.RecordID() as Long
ReportAgencyName	The name of the associated tblAgency.AgencyName field regardless of the Group.
	basReportCalc ReportAgencyName() as String
ReportAgencyState	The name of the associated tblAgency.AgencyState field

Field Name	Description
	regardless of the Group.
	basReportCalc ReportAgencyState() as String
ReportID	The ReportID field from tblzReport for the report currently being generated
OutputType	What type of output is being called for:
	Preview = Access Report Preview window
	Print = Hard Copy to the Default Windows Printer
	Snap = An MS Access snapshot file
LinkPath	The full pathname to the backend database file currently linked to the wa.mde AND the waReport.mdb database files. This pathname is used to dynamically maintain these links.

Example 1: How to Alter an Existing Report

Here is a step-by-step example of how to modify an existing report. The first step is to make copies of all the query and report objects. Avoid editing existing object since those object may change on the next upgrade and you would have difficulty merging the changes into existing objects. By creating new objects, upgrading to the next version is made much simpler because you simply copy your custom/new objects into the new waReport.mdb file.

Suppose you would like to add the Work Phone for the contractor assigned to the Open Work Order report visible from the Agency form. Here is an outline of steps to perform:

1. Examine tblzReport and notice that rptAgencyOpenWorkOrders contains the report of interest

2. Make a copy of that report object. NOTE: pick a simple prefix for all of your copies (makes it easier to spot your customized objects when it comes time to migrate your changes to the next version). Suppose your prefix is “abc_” so copy

3. rptAgencyOpenWorkOrders → abc_rptAgencyOpenWorkOrders

4. Notice that the report is based (Record Source) on the named query qry_rptAgencyOpenWorkOrders. So make a copy of that as well.

5. qry_rptAgencyOpenWorkOrders → abc_qry_rptAgencyOpenWorkOrders

6. Now we can just work on the copies leaving the original objects unchanged. First, change the Record Source property of your copy of the report to your new copy of the query.

7. Now modify your copy of the query with the MS Access query design tool. Add the WorkPhone field from tblContact to the list of fields reported by the query. Save your changes.

8. Modify the details section of your copy of the abc_rptAgencyOpenWorkOrders report object. Add a new text control linked to the new WorkPhone field in the query. Save your changes.

9. Test your new report manually. See Appendix D.13, *Testing During Development*, for hints for testing. When your changes are working to your satisfaction, it is time to register the report in tblzReport.

10. The way to update tblzReport is to make a copy of the existing record for the work order report (ReportID = 21). Copy this to a new record and make the following changes:

11. ReportID = 101 (or some number > 100)

12. Description = “New Open Work Orders” (some unique description)

13. Name = abc_qry_rptAgencyOpenWorkOrders (the name of your new report object)

14. You might optionally disable the old copy of this report by turning off the Active flag for the previous version in tblzReport. That makes it invisible in the wa.mde front end.

15. Now the new report should show up in the wa.mde Agency form. If you don't see the new report, check to be sure you are linked to the correct reporting file using the wa.mde Link form. Test run it from there. If everything is working, you are ready to distribute. If you are working with a version of Access other than Access 2002/2003, you will need to save your work as an Access 2002/2003 file for wa.mde to reference it correctly.

Example 2: How to Create a New Report

The best way to create a new report is to start from an existing one. This way you get all the standard header controls and code to manage report open, close, and NoData events. Look at the code behind one of the reports to see the standard (fairly simple code) to hand the Open, Close, and NoData events. Let say you want to develop a new report based on the Client table to perform some economic summaries.

1. First create a query that contains the records you are interested in. In this case an existing query (qry_MeasureCost) shows the economics for each measure in each work order associated with each client. We can define a new query with this query as its source. The new query joins two tables and set the criteria including a date range and does the summary across work order measures. The new query has been left in the waReport.mdb for example purposes and is named abc_qrySampleClientSummary. This query summarizes the estimated and actual initial costs as well as the estimated and actual savings to investment ratios (SIR). NOTE: the query does not limit the work orders or client records considered by any status settings but it does limit the records with criteria for the Agency Name, State, and start/end dates.

2. Now develop the report object based (Record Source) on that query. In this case I started with a copy of the Open Work Order report, then deleted all the objects in the detail section leaving the standard report header and page footer unchanged. That is the quickest way to get a new report. Then I changed the Record Source property to the new query and created a simple page header and detail section. Report generation is a fairly involved process well beyond the

scope of this document but the MS Access help material may help you. The resulting report is saved as an example in the waReport.mdb database named abc_rptSampleClientSummary.

3. The final step is to register the new report in tblzReport so it is visible from wa.mde. Again the quickest method is to copy an existing record then make changes. In this case I copied the record for the Open Work Order report and modified the following:

4. ReportID = 102 (or something > 100)

5. SortOrder = 40 (so it shows up last in the list)

6. Description

7. Title

8. DatesNeeded (yes, checked)

The tlbzReport record is not checked Active since this record is in the table only for example purposes. Change the record to Active to test the report from the wa.mde Agency form.

D.11 Using More Recent Versions of Access

Although a copy of Access 2002/2003 is recommended, you can use more recent versions of the MS Access database software for report development with a little extra effort.

If using Access 2007 to develop your customized reports, opening the waReport.mdb file should automatically prompt you to convert the file to this later Access file format. Allow the conversion to occur. Perform your development. You should be able to manually open reports using the backend data that you were linked to at the time you did the conversion. When finished, choose “Save As” “Access 2002–2003 Database” using a file name that retains “waReport” and then adds characters to identify the report file as a modification of the original.

Access 2010 will automatically recognize the file format as Access 2002–2003. The software allows you to make your changes, then automatically saves the file back into this same format.

You are restricted to releasing your report updates in MDB (open source) format unless you have a full copy of MS Access 2002/2003, which allows you to create an MDE (compiled) file in that format.

D.12 Handling Upgrades

There are a number of potential pit falls associated with updates that can be anticipated and accounted for. The basic problem is that development of the Weatherization Assistant will continue with likely changes to existing objects and new objects in waReport.mdb. Each distribution will have a waReport.mdb file available but it is up to users to migrate their changes to these new versions.

A potential conflict arises if you modify an existing object in your copy of waReport.mdb while that same object is updated between versions. The best way to avoid such conflicts is to follow the following principles:

1. Never modify an existing object, always make a copy and edit just the copy

2. Use a unique prefix for all new object names

An example might help to illustrate. Suppose you want to modify the Quarterly report (rptAgencyQuarterlyUnits) to suit a particular reporting requirement. First, notice that this report is based on a set of queries.

qry_QuarterlyUnit

qry_QuarterlyUnitDetail

qry_QuarterlyUnitDetailOther

qry_QuarterlyUnitDetailOtherSum

qry_QuarterlyUnitDetailSum

The first order of business is to make copies of all these objects. To make it easier to spot the custom object you create, pick a simple prefix to use consistenty. Let's assume that your prefix is ABC, so do the following copies:

rptAgencyQuarterlyUnits → abc_rptAgencyQuarterlyUnits

qry_QuarterlyUnit → abc_qry_QuarterlyUnit

qry_QuarterlyUnitDetail → abc_ qry_QuarterlyUnit

qry_QuarterlyUnitDetailOther → abc_qry_QuarterlyUnitDetailOther

qry_QuarterlyUnitDetailOtherSum → abc_qry_QuarterlyUnitDetailOtherSum

qry_QuarterlyUnitDetailSum → abc_ qry_QuarterlyUnitDetailSum

Now change only the new copies. First make sure the references within the new objects consistently point to just the new copies of the queries and reports. Next you can make the custom changes to your copied objects. The main idea is that the original objects remain unchanged and all new objects have a consistent naming convention with your prefix. To complete this example you would also update tblzReport to enable the new report and perhaps disable the previous version. See Appendix D.7, *Reference for tblzReport,* for details.

Now comes the important part relative to upgrades. When a new Weatherization Schema is release, obtain a copy of the new waReport.mdb then import (File/Get External Data/Import) your customized objects with the easily identified prefix FROM the existing waReport.mdb TO the new version. Providing that no table objects or fields have been renamed or removed (should normally be the case), then all of your custom objects should import and run in the new version. The final step is to update tblzReport in the new version to reflect the changes you made in the previous version. Using ReportIDs > 100 for any records you add or modify will make the process simpler. Appendix D.7, *Reference for tblzReport*, contains some hints on making that upgrade process easier.

D.13 Testing During Development

Here are some suggestions that may help during the development of new reports.

1. Use wa.mde to enter data into the backend database to provide your sample database. When you link to your waReport.mdb file in development, the table links are automatically refreshed. You can optionally use the Tools/Add Ins/Linked Table Manger to manage the links manually in the customized reporting database file.

2. Use wa.mde to call up your new report. Once the record is entered into tblzReport, the new report should show up in the appropriate drop-down list of available reports. You may have to close and re-open the form where the drop-down list of reports is displayed (to refresh the drop-down list) if you keep wa.mde open.

3. An important point to remember is that you do not have to use wa.mde to open the report. If you open the waReport.mdb file directly you can open reports manually. The database window is not automatically displayed so press F11 on start-up if you open waReport.mdb manually. The entries in tblzReportSetup from the last call using wa.mde are saved and can be reused. This may be a more convenient method for opening the report for testing numerous small changes.

D.14 Relationships View

To better understand the existing queries and reports, it may help to look at the relationships view of the Weatherization Assistant backend database. The database has a hierarchical structure with defined relationships between the various tables containing the raw data. It is necessary to have a working understanding of these relationships when you design new queries and reports. The database relationships view is available in either the Backend MDB file or the Customized Reporting database MDB file. Here is the basic outline of the relationships at the highest level of the database starting with the Agency table. Many of the sub-tables are not shown in this view for the sake of clarity.

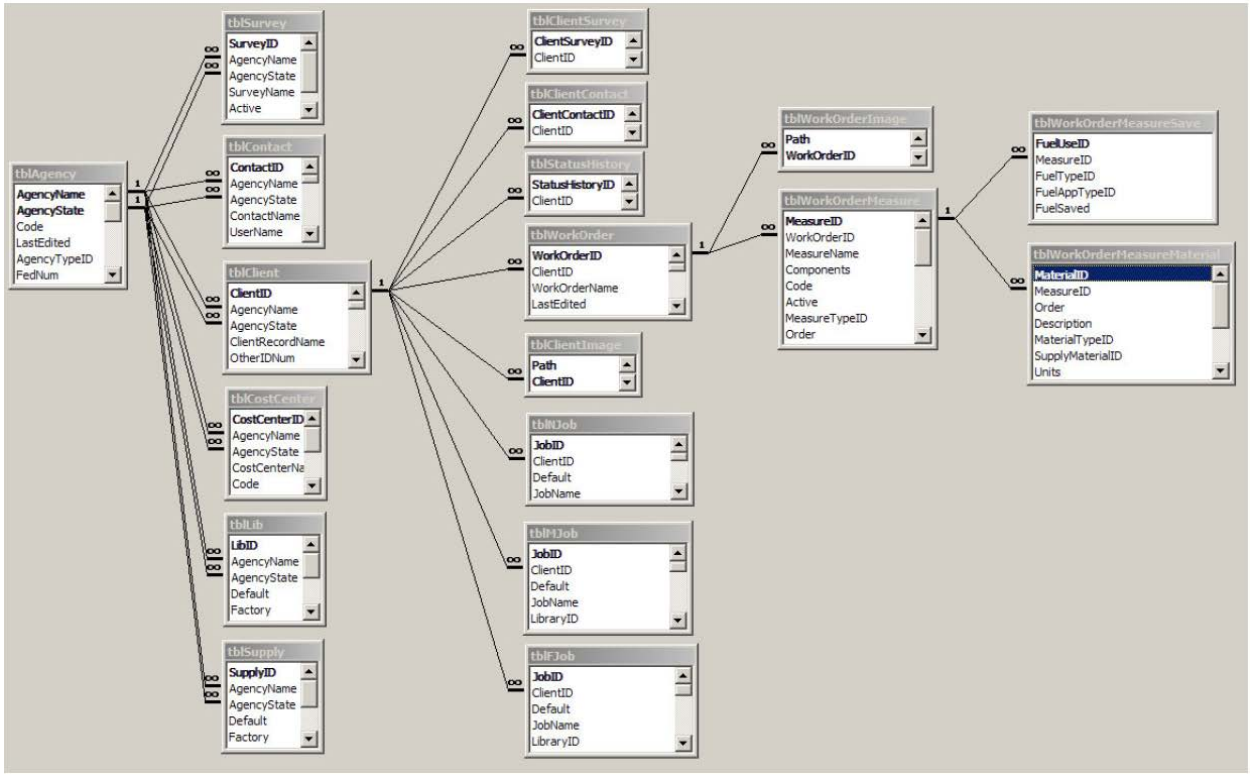


Figure D.1. The relationships view of the Weatherization Assistant backend database.

Appendix D: Development of Customized Reports

Appendix E. Window Leakiness

E.1 Introduction

The "Leakiness" data field in the Weatherization Assistant is found under the "Windows" tab of both NEAT and MHEA. The "Leakiness" field allows the user to describe the existing air leakage characteristics of each window entered. This input is used to calculate the energy savings due to reduced air infiltration for three window retrofit measures: window replacement, storms windows, and window weatherization (i.e., sealing). For each window retrofit measure, NEAT and MHEA add the energy savings due to reduced air infiltration to other energy savings associated with the measure to obtain the total energy savings.

Five options are allowed under the "Leakiness" data field: Very Tight, Tight, Medium, Loose, and Very Loose. Guidance on the applicability of these options is provided below for each of the various window types that can be specified in NEAT and MHEA: Jalousie, Awning, Slider, Fixed, Door Window, Sliding Glass Door, and Skylight. The options that are typical for windows encountered in homes served by the Weatherization Assistance Program are also identified.

The guidance provided below is based primarily on the condition of the frame, sashes, and weatherstripping. Once a leakiness level is selected using the guidance below, it should be modified as follows to take into account the condition of the window panes and the presence of a storm window:

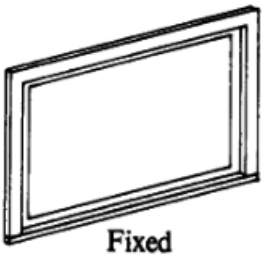
- Condition of window panes
    - No adjustment should be made if the window pane is cracked or if less than 2 sq. in. of glass is missing in the window (e.g., up to about a 1.5 in. diameter hole or a 1.5 in. × 1.5 in. glass section).
    - Degrade the leakiness one level if 2 to 9 sq. in. of glass is missing in the window (e.g., about a 1.5 in. to 3.5 in. diameter hole or a 1.5 in. × 1.5 in. to 3 in. × 3 in. glass section).
    - Degrade the leakiness two levels if 9 to 25 sq. in. of glass is missing in the window (e.g., about a 3.5 in. to 5.5 in. diameter hole or a 3 in. × 3 in. to 5 in. × 5 in. glass section).

- Specify the window to be **Very Loose** if more than 25 sq. in. of glass is missing in the window (e.g., a hole bigger than about a 5.5 in. diameter or a 5 in. × 5 in. square).

- **Presence of storm window** – Upgrade the leakiness one level if a storm window in average or better condition is installed.

E.2 Fixed Window, Door Window, and Skylight

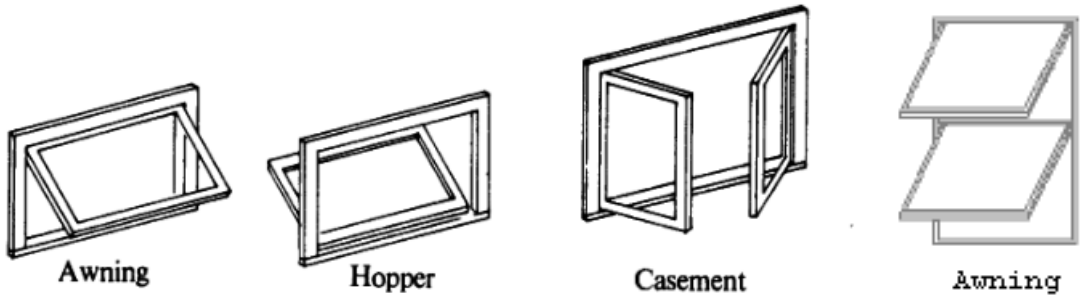
Fixed-type windows are sealed in their frames and cannot be opened. Fixed-type windows include large picture windows, decorative windows in doors, and most skylights (i.e., windows in the ceiling). *The leakiness of a typical fixed window, door window, or skylight is **Very Tight**.*


Fixed

E.3 Awning Window (Including Hopper and Casement Window)

The awning window type used in NEAT and MHEA includes hopper and casement windows. Most awning, hopper, and casement windows have just a single sash, although casement windows can have two sashes and awning windows can have two or three sashes. The sash of an awning window is hinged at the top of the window frame and opens outward and upward. The sash of a hopper window is hinged at the bottom of the window frame so that the window tilts open at the top. The sash of a casement window is hinged on the side of the window frame and swings out right or left. On a casement window with two sashes, a vertical framing member is often present in the middle of the window that houses a locking mechanism (not shown in the figure below).

These types of windows are often operated by a cranking mechanism. In awning and hopper windows with two or three sashes, a common crank is usually present so that the sashes open and close together at the same angle. When closed, the sashes press against the window frame and any installed weatherstripping to form a seal. In windows with multiple sashes, the sashes are usually designed to fit together at their interface when closed to form a tight seal. A lock or latch is usually present that further helps seal the window by drawing the sashes tightly against the frame, each other, and/or any installed weatherstripping.



Awning, hopper, and casement windows with a single sash are generally tighter than other types of moveable windows. *The leakiness of a typical single-sash awning, hopper, or casement window is **Tight**, while the leakiness of a typical multiple-sash awning, hopper, or casement window is **Medium**.*

- Very Tight – The sashes and window frame fit together snuggly to form a complete seal when the window is closed. The sashes and frame are in excellent condition, or they can be in average condition if weatherstripping in good condition is also present. The cranking and locking mechanisms are typically operable and assist in securely pulling the sashes and window frame together. Typical of a new window.

- ☞ **Tight (typical of a window with a single sash) — No visible gaps are observed between the sashes or between the sashes and the window frame when the window is closed. The sashes and frame are in average condition. Weatherstripping can be absent or deteriorated. The cranking and locking mechanisms are typically operable and assist in securely pulling the sashes and window frame together.**

- ☞ **Medium (typical of a window with multiple sashes) — Small gaps up to 1/8 in. are observable between the sashes and/or between the sashes and the window frame when the window is closed, even with the aid of a locking mechanism. The sashes and frame are in average to poor condition. Weatherstripping is usually absent or deteriorated.**

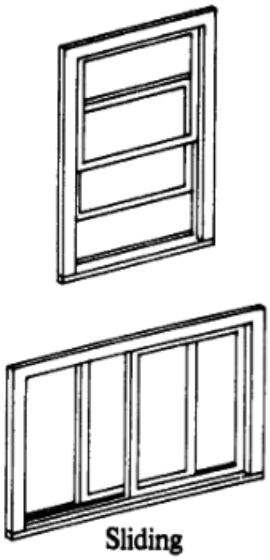
- Loose — Gaps up to 1/4 in. are observable between the sashes at their interface when the window is closed as much as the cranking and locking mechanism allow, and/or gaps up to 1/2 in. are observable between the sashes and the window frame when the window is closed. The sashes and frame are in poor

condition, and may be warped or not square. Weatherstripping is absent or ineffective.

- Very Loose — Gaps 1/4 in. or greater are observable between the sashes at their interface when the window is closed, and/or gaps 1/2 in. or more are observable between the sashes and the window frame when the window is closes. The sashes and frame are in very poor condition and are likely warped or not square. Weatherstripping is absent or ineffective. The locking mechanism may not be able to be engaged.

E.4 Slider Window and Sliding Glass Door

A vertical slider window has at least one sash that slides up and down within the window frame. In a double-hung slider window, both sashes slide vertically past one another. Only the bottom sash slides up and down in a single-hung slider window. A horizontal slider window (designated as "Sliding" in the figures) or sliding glass door has at least one sash that slides horizontally within the window or door frame. A locking mechanism is often present on a slider window that draws the two sashes together at their interface and helps press each moveable sash into the window frame.



Horizontal slider windows and sliding glass doors are usually in poorer condition and, thus, leakier than comparable vertical slider windows. *The typical leakiness of an original double- or single-hung vertical slider window is **Medium** if installed in a house built in the 1960s and before, and **Tight** if installed in a house built in the 1970s and after. The leakiness of a typical horizontal slider window or sliding glass door is **Medium**.*

- Very Tight — The moveable sashes and window frame fit together tightly as designed when the window is closed such that no gaps are present. The sashes and frame are in excellent condition. Each moveable sash is secure and tight in its track. The moveable sashes are able to be closed such that the window locking mechanism can be fully engaged. Weatherstripping is present and in good condition. Typical of a new window.

- ☞ **Tight (typical of an original double- or single-hung vertical slider window installed in a home built in the 1970s or later) — No visible gaps are observed between the sashes or between the moveable sashes and the window frame when the window is closed. The sashes and frame are in average condition. Each moveable sash is secure in its track although some play may be present. The moveable sashes are able to be closed such that the window locking mechanism can be engaged, although perhaps not fully. Weatherstripping is present and in good to fair condition.**

- ☞ **Medium (typical of an original double- or single-hung vertical slider window installed in a home built in the 1960s or earlier, a horizontal slider window, or a sliding glass door) — Small gaps up to 1/8 in. are observable between the sashes at their interface and/or between the moveable sashes and the window frame when the window is closed. The sashes and frame are in average condition. Each moveable sash is operable in its track although some play is likely. The moveable sashes may not sit perfectly horizontal or vertical when closed. The locking mechanism may not be able to be engaged. Weatherstripping is absent or deteriorated.**

- Loose — Gaps up to 1/4 in. are observable between the sashes at their interface when the window is closed, and/or gaps up to 1/2 in. are observable between the moveable sashes and the window frame. The sashes and frame are in poor condition. Each moveable sash may be loose in its track. The moveable sashes likely do not sit horizontal or vertical when closed. The locking mechanism may not be able to be engaged. Weatherstripping is absent or ineffective.

- Very Loose — Gaps 1/4 in. or greater are observable between the sashes at their interface when the window is closed, and/or gaps 1/2 in. or more are observable between the moveable sashes and the window frame. The sashes and frame are in poor condition. Each moveable sash may no longer fit in its track. The moveable sashes likely do not sit horizontal or vertical when closed. There may be considerable movement (rattling) between sashes. The locking mechanism is likely to be inoperative. Weatherstripping is absent or ineffective.

E.5 Jalousie Window

A jalousie window is made up of multiple horizontally-mounted glass louvers or slats. The glass louvers are usually 3 in. to 5 in. wide and are mounted in a metal panel. A crank typically rotates the glass louvers outward like a shutter when open. The glass louvers overlap each other slightly when closed. *The leakiness of a typical jalousie window is **Loose**.*


Jalousie

- Very Tight — Generally not applicable to jalousie windows.
- Tight — Generally not applicable to jalousie windows.
- Medium — A tight glass-to-glass seal is visually obtained at the overlap of all the glass louvers when the window is closed. The cranking mechanism is in good working order. All window panes are securely attached to the cranking mechanism. Typical of a new window.
- ☞ **Loose (typical) — Small gaps up to 1/8 in. are observable between the glass louvers when the window is closed. One or two of the glass louvers may not be securely attached to the cranking mechanism. The cranking mechanism may not be able to fully rotate the glass louvers to their fully closed position.**
- Very Loose — Gaps 1/8 in. or greater are observable between the glass louvers when the window is closed. Multiple glass louvers may not be securely attached to the cranking mechanism. The cranking mechanism is likely not able to fully rotate the glass louvers to their fully closed position.