

Nebraska

WaWEB

USERS MANUAL

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Last Updated

June 25th, 2026

WaWEB Login	1
Account Form	1
GENERAL LAYOUT AND NAVIGATION	3
Entering Data	5
Navigation between Fields	5
User Details Form	6
AGENCY FORMS	7
LIBRARY FORMS (RELEVANT TO NEAT & MHEA)	8
NEAT Audit.....	14
Audit Form	14
Building information.....	15
Libraries:.....	16
General Information Block	16
Shell Forms	19
Walls.....	20
Wall Information	21
Windows	21
Existing Window	23
Doors.....	23
Existing doors	24
Unfinished Attics	25
Finished Attics.....	27
Foundation Forms.....	29
Systems Forms	31
HVAC Forms	31
Duct System Form	36
Infil./Duct Leakage Form	38
Baseloads Forms (required)	41
Water Heating Forms	41

Refrigerator Forms	43
Lighting Forms	45
Other Forms	46
Health and Safety Forms	46
Whole House Form	47
Equipment.....	47
Building Shell	48
Space Heating Worse Case Measurements.....	50
Water Heater Worse Case Draft Measurements	50
ASHRAE 62.2 Ventilation Calculation	51
Itemized Costs Forms	53
Incidental Repair Measure (IRM).....	54
Utility Bills	54
RUNNING NEAT AND VIEWING RESULTS.....	54
NEAT WORK ORDER FORMS	57
MHEA Audit	62
Audit Form	62
General Information Block	64
Shell Forms	65
Wall Forms	66
Windows Forms	68
Door Forms	69
Ceiling	71
Floor Forms.....	73
Addition Forms.....	76
Systems Forms	76
HVAC Form.....	76
Ducts form	77
Ducts/Infiltration form	78

Baseloads Forms	80
Water Heating form	80
Refrigerator form.....	80
Lighting form	81
Other Forms	81
Health and Safety form	81
Itemized Costs form	81
RUNNING MHEA AND VIEWING RESULTS	81
Audit Recommendations.....	81
Reports	84
CREATING AN MHEA WORK ORDER	84

WaWEB Login

Weatherization Assistant Login - Nebraska

Release Notes: 10.06.005 (2026-01-06 12:43:00)

Weatherization Assistant is a suite of residential building energy auditing tools developed for use in the U.S. Department of Energy Weatherization Assistance Program (WAP).

Earlier versions were written for Windows® operating systems and ran locally on user computers. Version 10 moves Weatherization Assistant to a modern, online, environment and incorporates NEAT (single-family), MHEA (manufactured housing), MuITEA (multifamily), and Health & Safety audit tools in one accessible location.

Release Notes v10.06.005

Use CTRL+F5 (Windows) or Cmd+R (Mac) to clear cache at first login

Fixes:

General

- **HVAC Efficiency - Year Manufactured** - Added automatic equipment efficiency population for years 2024-2026.
- **Water Heating - Recovery efficiency** - Corrected issue where recovery efficiency check mark disappears after clicking "Apply".
- **Agency Filtering - Long/Complex Name** - Corrected filtering by Agency issue on Accounts and Audit forms when Agency name includes special characters. *[user reported]*
- **Weather Station - Typo Correction** - Corrected typo for NM Weather Station "Santa Fe County Municipal Ap". *[user reported]*
- **Work Orders - Measure Materials and Labor Details** - Corrected intermittent issue resulting in library item display and item saving problems. Limited to specific operating

Login

DOE Weatherization Assistance Program

Weatherization Assistant
Version: 10.06.005

Username: CraigSc

Password: [redacted]

Login

Important Information:
Update completed - WAweb available as of 11pm EDT May 2

 **SCEP**
STATE & COMMUNITY ENERGY PROGRAMS

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To request assistance or report an issue please contact the [Weatherization Assistant Helpdesk](#)

 **OAK RIDGE**
National Laboratory

Log into the web-based Weatherization Assistant using a link and login information (username and password) provided by the Department of Water, Energy and Environment (DWEE). The link will often be in the form of “wa-ne.ornl.gov”. The right side is where you enter your login information. The left side of the login window provides updates made to the latest release of the software. It is recommended to use CTRL+F5 to clear cache at first login.

Also note, at the bottom of the page there is a link for the Weatherization Assistant Helpdesk with Oak Ridge National Laboratory (ORNL). Anytime you have a question about a issue with a audit, this is a good resource use.

Account Form

The Account Details form will open upon login. (See Figure 1.2). The Account Details page is where you can select a existing account from the “All Accounts” section at the bottom or create a new one. You must access and fill in a new Account form (i.e., set up an account for a house, building, or project) before you run NEAT or MHEA Audit or create a work order. The Account form can be accessed by selecting Account → View Account on the menu bar

(guests are not allowed access to the Account form). To create a new account, select the New button on the task bar of the Account form. The Copy button on the task bar can also be used to create a new account. In the Account form, you can enter account information about the house, building, or project such as its name, number (e.g., job number), and address. The only required fields are Agency, Account Name, Account Number, and State. The information in the DOE Quarterly Report field set is data used by Weatherization Assistance Program Grantees in reporting results to DOE and is optional within Weatherization Assistant, as are the Primary Language and Utility Account fields.

Figure 1.2

Account Details

Account Information

Agency: Community Action Partnership of Lanca... Address: 1234 A Street State: NE

Account Name: Sample Unit: Anywhere Zip Code+4: 68521-0000

Account Number: 001 City: Lincoln Geographic Identifier:

Other ID Number:

DOE Quarterly Report

Building Type: Primary Heating Fuel: Number of Occupants: 2

Number of Units: High Energy User: Elderly: 1

Rentals: High Energy Burden: Disabled:

Owner Occupied: Previously Weatherized: Native American:

Leveraged: Year Weatherized: Children: 1

Other Information

Primary Language: English

Utility Account 1:

Utility Account 2:

Comments

New Copy Delete Completion Report OK Apply Cancel

All Accounts (50)

Agency	Account Name	Account Number	City	State	Building Type	# Audits	# Work Order Details	Last Edited
Community Action Partnership of ...	Kim Larson	2026-013	Lincoln	NE	Mobile Home	1	1	05-07-2026 12:16 ...
Blue Valley Community Action	Clinton Wolf	138 clear creek	Columbus	NE	Single-Family Site Built	1	0	05-07-2026 10:03 ...
Southeast Nebraska Community ...	BRETT SMITH	110	TECUMSEH	NE	Single-Family Site Built	1	0	05-06-2026 4:22 PM
Community Action Partnership of ...	Vacant 9102-4	9102-4	Beaver City	NE	Single-Family Site Built	1	0	05-06-2026 4:09 PM
Community Action Partnership of ...	Karen Westmoreland	9102-3	Beaver City	NE	Single-Family Site Built	1	0	05-06-2026 12:29 ...
Community Action Partnership of ...	Kimberly Howell	9102-2	Beaver City	NE	Single-Family Site Built	1	0	05-06-2026 10:43 ...
Community Action Partnership of ...	Vacant 9102-1	9102-1	Beaver City	NE	Single-Family Site Built	1	0	05-06-2026 8:15 AM

Page 1 of 19 Displaying 1 - 50 of 904

Account Information

Agency – Choose from the drop-down menu the agency that is affiliated the audit

Account Name – Enter an account name. It is not recommended to enter the client's name. However, the field will accept the client's name.

Account Number – File number.

State – The state the house is located in.

Zip Code – Five-digit Zip code of property including the four-digit number after the five-digit zip code.

Use website [ZIP Code™ Lookup | USPS](#) to find the four-digit code for the address you are working on.

Optional fields are: Other ID number, Address, Unit , City, and Geographic Identifier.

Information can be entered into these fields but are not necessary for the audit to run.

Doe Quarterly Report - The required fields are:

Building Type – From the drop-down menu choose the building type that best describes the building you are auditing.

Number of Occupants (total) – enter the number of occupants on the LIHEAP application.

Leveraged - Check is box if any other funding sources are being used to help weatherized the home.

Recommended fields (unless a rental unit) are:

Number of units – Enter the number of units in the building.

Rentals - Enter the number of units rented by other occupants.

Owner Occupied – Enter the number of units that are occupied by the owner.

Note: these fields are used when modeling a rental, or muti-unit dwelling. They should be filled out if you are modeling a rental, or multi-unit property.

Primary heating fuel – from the drop-down menu choose the primary fuel of the home.

High Energy User – Check this box if the client is a high energy user. A high energy user is a low-income household whose residential energy expenditure exceeds the median level of residential expenditures for all low-income households in the State.

High Energy Burden – Check this box if the client is a high energy burden. A high energy burden is a low-income household whose residential energy burden (residential (energy) expenditures divided by the annual income of that household) exceeds the median level of the energy burden for all low-income households in the State.

Previously Weatherized – Check this box if house was previously weatherized.

Year Weatherized – If house was previously weatherized enter the year it was weatherized.

Optional fields are the remaining Number of Occupants (Elderly, Disabled, Native American, and Children), high energy user, high energy burden.

Other Information, all fields are optional.

Primary Language – From the drop-down menu choose the primary language of the client.

Page 26 of 120

Utility Account 1- Enter the name of the utility

Utility Account 2 – Enter the name of the utility.

GENERAL LAYOUT AND NAVIGATION

A typical form displayed on the WAweb has 4 sections:

1. Menu Bar at the top
2. Main form below the Menu Bar that has data input fields

3. Task Bar below Main Form for creating and Saving data
4. All Accounts Table at the bottom that shows all the records that you can select to be shown on the main form.

1. The **Menu Bar** provides access to the administrative Forms (agency, contacts, cost centers, account, and user), audits (NEAT, MHEA & MulTEA), work orders, and libraries needed to run NEAT, MHEA & MulTEA (Economic Parameter Set, Fuel Cost, Measure Cost Set, Key Parameter Set, Supply, and Defined Measure Set). The menu bar also provides a link to obtain more information about the Weatherization Assistant, access release notes, and log out.

2. The **Main Form** will have the title at the top left and have input fields for data. Data input fields are frequently grouped within a boundary that is called a field set. Data input fields are typically ghosted if not relevant in certain contexts or grayed if read-only. Some data input fields display a tooltip when you hover over the field, which describes the field, the acceptable format, and/or the acceptable range of the input. Data input in individual fields may be required or optional. The form cannot be saved if a required field is left blank or the input is out of range or in an incorrect format. If these issues occur, a red border will appear around the required field and a validation failure message will appear when OK or Apply are selected.

3. The **Task Bar** contains New, Copy, and Delete options to create or delete a record. Selecting OK saves the record and closes the form. Selecting Apply saves the record but leaves the form open. Selecting Cancel closes the form without saving the entries made.

4. The **All Accounts Table** at the bottom of the form shows all the records that you can select to be shown on the main form. Select a record in the table to display it in the main form. The table has a title bar and header row at the top. In addition, there is a pagination bar at the bottom. The column headers show key field names of the form. When you hover over a column header, a drop-down button will appear on the right. Selecting this button will allow you to sort the records in ascending or descending order. In addition, it provides a means to hide or unhide columns of the table. The table can further be customized by changing the order and width of the columns. To change the width of a column, drag the boundary of the column heading left or right. To change the width of a column to fit the contents, double-click the boundary to the right of the column header. To change the order of the columns, drag the column heading to a new location.

In the table, the magnifying glass on the right of the header row, which is available on some Forms, is the filter toggle to show or hide a filter bar below the header row. To filter the records, select the filter toggle and enter the filtering criteria for one or more columns. To clear all the filters, select the cross below the filter toggle. In addition you may select the buttons on the pagination bar at the bottom to navigate between pages. Fifty audits are displayed per page with arrows to toggle through pages.

Entering Data

The audit system accepts information through three main types of input controls:

Field: This is a standard entry box where users can type either numbers or letters using the keyboard.

Combo Box: This input typically contains a predefined list of options to select from. It appears similar to a regular field but includes a small drop-down arrow on the right side that opens the available choices.

Check Box: A check box is a small square that can be either checked or left empty. When it is checked, it generally indicates a “yes” response to the related question.

Navigation between Fields

You can use the [Tab] and [Shift-Tab] keys to cycle through the controls in forward or reverse order. Use the [Up Arrow] and [Down Arrow] to choose the pre-selection entries in the drop-down box. In some cases, the Enter key can also be used to navigate to the next field.

Buttons

New Button - use this button to create a new record.

Copy Button - this allows you to copy from one record to another, eliminating duplicate entries. Particularly useful when entering data in wall, window, and door sections of the audit, or you want to model two audits with same characteristics but want to see different outcomes.

Deleting Button - in All Accounts select the record you want to delete and then select the delete button. Caution: in some cases, you can delete a complete account, instead of deleting a single record.

OK Button - you need to push the OK button to save the data you entered in a field. Selecting OK saves the record and closes the form.

Apply Button -, you need to push the apply button to save the data you entered in a field. Selecting Apply saves the record but leaves the form open. If you don't hit apply after you enter the data, a pop-up message will appear asking you if you want to continue.

Cancel Button - selecting Cancel closes the form without saving the entries made.

Report Button - here is where you can preview, print, or snapshot file any report associated with the record.

Getting Help – If at any time you are not sure what information you should be entering into a field, place your cursor inside the field you need help entering data and a pop-up will appear with a description of what data you need to enter that field.

Required Fields - if a field is a required field and you move out of the field without entering a value, the field will turn red, and the audit will not let you move on without entering a value.

Recommended Fields – if a field is a recommended field, it is recommended that you enter a value into the field but is not required for you to move forward to the next data entry field. If you choose not to enter information into the recommended field the audit will still run with that field left blank.

Optional Field – Optional fields are just that, optional. Audit will run without entering information into them.

User Details Form

Figure 1.6 shows the option to select the User form (Figure 1.7; guests are not allowed access to the User form). Select User → View User on the menu bar to see the user records created by the entity that provided you with your login information. The Privilege Level field lists the privilege level that was assigned to you. Your privilege level determines your access to different Forms and records. You may have one of six privilege levels. The User Privilege levels and their responsibilities and levels of access are summarized in Table 1.8.

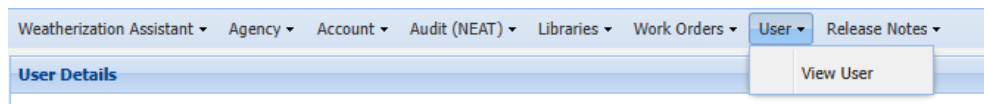


Figure 1.6 Accessing the User Details form from the Menu bar.

A screenshot of the 'User Details' form. The form is divided into several sections: 'Login Information' (Username: AuditChamb, Password, Confirm Password, Old Password, Privilege Level: Agency Administrator), 'Agency Information' (Agency: Nebraska Department of Environment and Energy, Auditor: [checked], Active: [checked]), 'Person Information' (Prefix, First: Lynn, Middle Init, Last: Chamberlin, Suffix, Company, Title), 'Contact Information' (Address, Unit Number, City, State: NE, Zip code: 68509, Work Phone, Cell Phone, Home Phone, Fax, Email, Web Page URL), and 'Comments'. At the bottom, there are buttons for 'New', 'Assign to Additional Agency', 'Delete', 'OK', 'Apply', and 'Cancel'.

Figure 1.7 User Details.

Entity	User privilege level	Scope of access	Responsibilities (in bold) and level of access to records						
			User records	Agency records	Library records	Account records	Audit records	Work orders	
ORNL/ developer	Site Administrator	All state-specific databases	- Must create at least one State Administrator per state - Can edit own user record - Can create or edit other user records	- Have no restriction to create and edit records (for troubleshooting)					
Grantee	State Administrator	State database	- Can edit own user record except privilege level - Can create or edit other State Administrators - Must create at least one Agency Administrator per agency - Can view users for all agencies	Must create all agencies in the state	Can view libraries, accounts, audits, and work orders				
Agency personnel and associates	Agency Administrator	Agency records	- Can edit own user record except privilege level and agency information - Must create all other users in their agency	Can edit their agency record	Can create or edit all libraries, accounts, audits, and work orders				
	Lead Auditor		- Can edit own user record except privilege level and agency information - Can view other user records in their agency	Can view their agency record	Can create and edit all libraries	Can create and edit all accounts, audits, and work orders			
	Auditor			Can view libraries					
		Guest		No access					Can view all audits and work orders

Figure 1.8 User privilege.

Login Information - is where you go to create a new user, give the user a password and privilege level. Note: Agency Administrators, and Lead Auditor have privileges that will allow them to make changes in Libraries, where the Auditor, Guest, DOE Read Only can only enter data or read data.

Agency information - is where you select the agency the user is associated with. Check the “Auditor”, and the “Active” box if the user is going to enter audits into WAweb. By leaving the “Active box unchecked, the user will be an audit associated with the agency but will not be able to enter audits into WAweb.

Personal and Contact Information – Here is where you will enter the personal information of the user. The only fields that need information in is first and last names, and State. All other data fields are optional. It is recommended that you add a unique identifier to the last name to identify the privilege given to the user (agency administrator AA, Lead Auditor LA, Auditor, AA, etc.).

AGENCY FORMS

The agency Forms—Agency Details, Agency Contact, and Agency Cost Center—can be accessed by selecting Agency on the menu bar (Figure 1.9; guests are not allowed access to the agency Forms). Select Agency → Agency Details to see the agency record (Figure 1.10) to which you have been assigned. The agency may have been created by ORNL or your state. If you are an Agency Administrator, you may want to add, edit, or update the information as needed. The only required fields on this form are Agency Name, Agency Type, and State. Make sure the Active checkbox is selected to have the agency name listed on the Agency drop-down field on the Audit form for NEAT & MHEA.

Weatherization Assistant ▾ Agency ▾ Account ▾ Audit (NEAT) ▾ Libraries ▾ Work Orders ▾ User ▾ Release Notes ▾ Admin Tools ▾

Agency Details

Agency Name: [Text Field] Address: [Text Field]
 Agency Type: [Dropdown] Unit Number: [Text Field]
 Active: ☒ City: [Text Field]
 State: [Dropdown]

Figure 1.9 Accessing the Agency forms from the menu bar.

Agency Details

Agency Name: Nebraska Department of Environment and Energy Address: P.O. Box 98922
 Agency Type: Other Unit Number: [Text Field]
 Active: ☒ City: Lincoln
 EIN: [Text Field] State: NE Zip Code: 68509
 Contract Number: [Text Field] Work Phone: 4024712186
 Other ID Number: [Text Field] Fax Number: [Text Field]
 Email: lynn.chamberlin@nebraska.gov
 Web Page URL: [Text Field]

Comments

Figure 1.10 Agency Detail form.

The Agency Contact form (relevant to NEAT and MHEA only) is used to enter information on certain individuals associated with the agency, specifically Contractors, Suppliers, and In-house crew members. The information on the Agency Details form is used to assign recommended measures to contractors and suppliers in the Supply Library and Work Order.

The Agency Cost Center form (relevant to NEAT and MHEA only) is used to set up cost centers or funding sources, to which the cost for individual recommended measures can be assigned.

LIBRARY FORMS (RELEVANT TO NEAT & MHEA)

Six libraries can be accessed from the menu bar by selecting Libraries → [Library Name], as shown in Figure 1.11 (guests are not allowed access to the library Forms). The described libraries are used only by NEAT, MHEA & MulTEA.

Weatherization Assistant ▾ Agency ▾ Account ▾ Audit (NEAT) ▾ Libraries ▾ Work Orders ▾ User ▾

NEAT

Agency: Nebraska Departm...
 Acct.: NEAT WaV10 Training
 Acct. #: 2024-001
 Audit: NEAT WaV10 Training
 Audit #: 1029

General

National Energy Audit Tool (NEA)

Agency: Nebraska
 Account Name: NEAT WaV
 Account Number: 2024-001
 Audit Name: NEAT WaV

Economic Parameters
 Fuel Costs
 Measure Costs
 Key Parameters
 Supply
 Defined Measures

Figure 1.11 Accessing the library forms from the menu bar.

- **Economic Parameter Set** – These libraries (Figure 1.12) provide the fuel price indices and modified uniform present value factors required to perform economic calculations in NEAT & MHEA. These are provided for 8 fuels for 30 years: electricity, natural gas, propane, fuel oil, kerosene, wood, coal, and other.

Figure 1.12 Economic Parameters Set Library form.

Economic Parameter Set Library

Economic Parameter Set Name: 2023 - Residential Midwest Average Economic Factors

Agency: United Way of the Midlands

Active for: NEAT: ☒ MHEA: ☒ MuITEA: ☒

Economic Parameter Set Details

Real Discount Rate (%): 3

The value shown here is used for illustrating the Modified UPV factors on this form. The Real Discount Rate shown in the NEAT/MHEA Key Parameter Set Library is used for actual SIR calculations.

Fuel Type	Year	Fuel Price Index	Modified UPV Factor
Electricity	0	1	1
Electricity	1	0.986336	0.957607
Electricity	2	0.968398	1.87042
Electricity	3	0.953235	2.74276
Electricity	4	0.935288	3.57375
Electricity	5	0.927542	4.37386

- **Fuel Cost** – These libraries (Figure 1.13) provide the costs for eight fuels used in NEAT & MHEA: electricity, natural gas, propane, fuel oil, kerosene, wood, coal, and other.

Figure 1.13 Fuel Cost Library form.

Fuel Cost Library

Fuel Cost Name: 2024-25 Nebraska 3-Year Average Residential Electricity

Agency: United Way of the Midlands

Active for: NEAT: ☒ MHEA: ☒ MuITEA: ☒

Fuel Cost Details

Fuel Type: Electricity

Units: kWh

Unit Cost (\$): 0.1293

Unit Heat Content (MMBtu): 0.003413 [Reset to default](#)

- **Measure Cost Set** – These libraries (Figure 1.14) collect overall measure cost information. They provide access to Retrofit Measure Cost Details Forms (Figure 1.15), which collect material and installation cost details for individual retrofit measures programmed into NEAT & MHEA for use in making economic calculations. These are provided separately for NEAT & MHEA. For NEAT and MHEA measures that have site- or system-specific costs, including air sealing, duct sealing, and replacement of HVAC equipment, water heaters, refrigerators, and lighting, costs are directly entered on the audit Forms and not in the Measure Cost Set Library. The NEAT Measure Cost Set Library also provides access to a form to enter NEAT insulation types.

Figure 1.14 NEAT/MHEA Measure Cost

Measure Cost Set Library

Measure Cost Set Name:

Agency:

Audit Type: ☐ NEAT ☒ MHEA ☐ MultiTEA

Is Active: ☒

Retrofit Measure List

Index	Measure Type	Measure Name	Lifetime	Is Active
6	Baseloads	Water Heater Replacement	13	Yes
7	Building Insulation	Wall Fiberglass Batt Insulation	30	Yes
8	Building Insulation	Wall Fiberglass Batt Insulation in Addition	30	Yes
9	Building Insulation	Wall Cellulose Loose Insulation	30	Yes
10	Building Insulation	Wall Cellulose Loose Insulation in Addition	30	Yes
11	Building Insulation	Wall Fiberglass Loose Insulation	30	Yes
12	Building Insulation	Wall Fiberglass Loose Insulation in Addition	30	Yes
13	Building Insulation	Floor Cellulose Loose Insulation	20	Yes
14	Building Insulation	Floor Cellulose Loose Insulation in Addition	20	Yes

Figure 1.15 Retrofit Measure Cost

Retrofit Measure Cost Details - V10

Measure Cost Set Name:

Measure Type:

Measure Name:

Lifetime (yr):

Is Active: ☒

Measure Description:

Cost Details

	Cost: \$	Units	
Material:	1.50	per SqFt	NDEE Default Cost
Labor:	2.00	per SqFt	NDEE Default Cost
Other:	300.00	per Each	NDEE Default Cost

- Insulation Types (NEAT and MHEA only)** – In the Measure Cost Library you will find the Insulation Types options. The NEAT Insulation Types form in the Setup Library allows you to define additional insulation types for each of these components to meet local needs.

When the Weatherization Assistant is initially installed, the added insulation types available for each of the shell components are displayed in greyed, outlined fields on the NEAT Insulation Types form. The names cannot be changed. Below these insulation type names are blank, editable fields into which you may enter the names of additional insulation types of your choosing. Once entered, these names will appear in the Library Measures Costs sections of the Setup Library in the building description forms of audits accessing the Setup Library, and in any reports that recommend a measure using these materials.

To the right of these material names are numeric fields giving the R-values per inch or total R-Value of the material you are defining. The R-values have dimensions h-ft²-F/Btu. Typical values corresponding to various insulation types may be found in building manufacturers' data sheets or in ASHRAE's (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) Handbook of Fundamentals. Entries

in these fields permit your defined insulation types to have the physical characteristics needed by the NEAT audit that you desire.

NEAT Insulation Types in the Library are preloaded by the State and should not be changed unless authorized by the State.

The image shows two overlapping software forms. The background form is the 'Measure Cost Set Library' and the foreground form is 'NEAT Insulation Types'.

Measure Cost Set Library (Background):

- Measure Cost Set Name: Mid 2026 Q12
- Agency: Community Action Partnership of Mid-Nebraska
- Audit Type: ☒ NEAT ☐ MHEA ☐ Multi
- Is Active: ☒ NEAT Insulation Types (5)
- Retrofit Measure List:**

Index	Measure Type	Measure Name	Lifetime	Is Active
1	Baseloads	Lighting Retrofits	...	Yes
2	Baseloads	Refrigerator Replacement	15	Yes
3	Baseloads	Water Heater Tank Insulation	13	Yes
4	Baseloads	Water Heater Pipe Insulation	13	Yes
5	Baseloads	Low Flow Showerheads	15	Yes
6	Baseloads	Water Heater Replacement	13	Yes
7	Building Insulation	Attic Insulation R11	30	Yes
8	Building Insulation	Attic Insulation R19	30	Yes
9	Building Insulation	Attic Insulation R30	30	Yes

NEAT Insulation Types (Foreground):

This form is divided into six sections for different building components, each with a table for insulation types (Type 1 to Type 6).

- Attic:**

Name	R-Value
Blown Cellulose	3.75
Blown Fiberglass	3.09
- Kneewall*:**

Name	R-Value
Fiberglass Batts	13
Blown Cellulose	13
- Wall*:**

Name	Value	Units
Blown Cellulose	3.71	R/in
- Floor:**

Name	R-Value
Fiberglass Batts	3.33
Blown Cellulose	3.71
Blown Fiberglass	3.05
2 part spray foam	6
- Sill*:**

Name	R-Value
Fiberglass Batts	19
Foamboard	10
2 part spray foam	12
- Foundation Wall*:**

Name	R-Value
Rigid Foam Board	10
2 part spray foam	12

At the bottom of the NEAT Insulation Types form, there is a note: "Insulation type names can be up to 30 characters in length" and "*Note: If you change an R-value, check the installation costs for that measure." Buttons for 'OK', 'Apply', and 'Cancel' are at the bottom right.

- **Key Parameter Set (NEAT and MHEA only)** – These libraries (Figure 1.16) provide flexibility to modify some of NEAT’s and MHEA’s inputs and assumptions. The existing values on these Forms may be replaced with information for your agency. These Forms are provided separately for NEAT and MHEA.

Figure 1.16

The image shows the 'NEAT/MHEA Key Parameter Set Library' form.

NEAT/MHEA Key Parameter Set Library:

- Key Parameter Set Name: NDEE NEAT Key Parameters v10
- Agency: Nebraska Department of Environment and Energy
- Audit Type: ☒ NEAT ☐ MHEA
- Active: ☒
- NEAT Key Parameters:**

Group	Key Parameter	Value	Units
Economics			
Economics	Real discount rate	3.00	%
Economics	Minimum acceptable SIR	0.50	Factor
Equipment			
Equipment	Low flow shower head flow rate	2.50	gal/min
Equipment	Refrigerator defrost cycle energy	0.08	kWh
Insulation			
Insulation	Avg annual outside film coeff	2.25	BTU/hr-sqft-F
- Comments:** (Empty text area)
- Buttons: New, Copy, Delete, OK, Apply, Cancel

- **Supply (NEAT and MHEA only)** – These libraries provide the ability to identify materials used within your program and their cost. Although primarily used in creating work orders, information entered for refrigerators, water heaters, and lighting can be accessed from within an audit. For each material, you can enter material properties, costs, and energy-related information.

- **Defined Measure Set (NEAT and MHEA only)** – These libraries (Figure 1.17) provide the ability to predefine weatherization activities, including 50 predefined health and safety measures, that are not addressed within the NEAT and MHEA library measures but are commonly encountered during an audit. Defining the measures on this form enables copying them to any audit as an itemized cost.

Figure 1.17 NEAT/MHEA Defined Measures Set Library Form

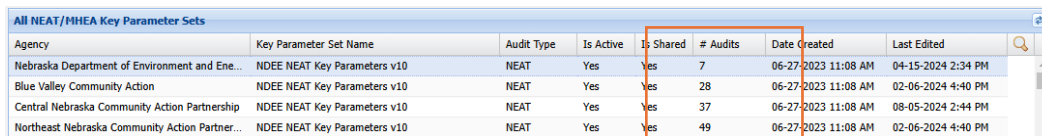
During initial setup, ORNL creates a new, read-only economic parameter set applicable to the United States and four census regions (Northeast, Midwest, South, and West)

each year when new parameters are issued by the National Institute of Standards and Technology, usually in May.

Department of Water, Energy and Environment (DWEE) will update the Fuel Cost once a year in the audit software. Subgrantees are responsible for updating and/or checking the prices on the other audit libraries every six (6) months. Please reference the NeWAP Policies and Procedures section on Fuel Costs for more information.

Likewise, for full compliance with Weatherization Assistance Program requirements, you will need to create your own NEAT and MHEA Measure Cost Set Libraries to reflect actual costs for your location and agency. ORNL has created example read-only Measure Cost Set Libraries for NEAT & MHEA that you can use as you become familiar with these audits.

Creating and Editing Libraries – The libraries can be created or edited only by Site Administrators, Agency Administrators, and Lead Auditors. To create a new library, access the library form and either (a) select New on the task bar and complete the form or (b) select an existing library record from the All [library type] table, select Copy on the task bar, and edit the input information as needed. It is recommended that new Economic Parameter Set and Key Parameter Set libraries be created using the latter approach. Be sure that the Active for NEAT or MHEA checkbox is selected for new Economic Parameter Set and Fuel Cost libraries that you create, and that the Active checkbox is selected for new Measure Cost Set, Key Parameter Set, Supply, and Defined Measure Set libraries to make the library available to select on the Audit form. Libraries created by ORNL during initial setup and those created on behalf of your state for access by all agencies in your state are read-only and designated as “Is Shared.” Furthermore, libraries in use for an existing audit become read-only. The Is Shared status of a library and the total number of existing NEAT and MHEA audits using that library can be viewed in the All table, as highlighted by the orange box in Figure 1.17. You cannot modify or delete an existing library that is shared or in use for an existing audit. You can only edit a copy of a shared or in-use library to use it for future audits. Further, you can only uncheck the Active checkbox for a shared or in- use library to make it unavailable for future audits.



All NEAT/MHEA Key Parameter Sets							
Agency	Key Parameter Set Name	Audit Type	Is Active	Is Shared	# Audits	Date Created	Last Edited
Nebraska Department of Environment and Ene...	NDEE NEAT Key Parameters v10	NEAT	Yes	Yes	7	06-27-2023 11:08 AM	04-15-2024 2:34 PM
Blue Valley Community Action	NDEE NEAT Key Parameters v10	NEAT	Yes	Yes	28	06-27-2023 11:08 AM	02-06-2024 4:40 PM
Central Nebraska Community Action Partnership	NDEE NEAT Key Parameters v10	NEAT	Yes	Yes	37	06-27-2023 11:08 AM	08-05-2024 2:44 PM
Northeast Nebraska Community Action Partner...	NDEE NEAT Key Parameters v10	NEAT	Yes	Yes	49	06-27-2023 11:08 AM	02-06-2024 4:40 PM

Figure 1.17 All table showing the Is Shared status and # of Audits for library records.

NEAT Audit

Once you have set up an account for a house, you can create and run NEAT on that house. NEAT has multiple Forms used to describe a house; each has a main form for data input and possibly an All table for record navigation (Section 1.3). NEAT also has an Audit Dock that is a static feature anchored on the left of each NEAT input form (Figure 2.1) and provides the means of accessing NEAT's various Forms and running the audit. The Audit Dock may not be displayed when creating a new audit until after the Audit form has been saved.

Audit Form

To create a new NEAT audit, select Audit (NEAT) on the menu bar and then select National Energy Audit Tool NEAT and then select “new” on the Audit form to create a new audit (State Administrators and Guests are not allowed to create an audit). Select Copy to create a new audit from an existing audit.

You may want to create a new audit using Copy to make multiple audits runs for a house (e.g., to evaluate different retrofit options or replacement equipment for a given house) but still see the results of previous runs.

When creating a new audit using New, fill in the Audit form first before entering information on the other forms. Also, you will need to fill in the Wall form before completing the Window and Door forms. In general, completing forms in top to bottom order from the Audit Dock is the best practice for Audit input.

The Audit Form is used to record basic audit details and to choose the weather files and libraries required to run the audit. Any fields that are active (not grayed out or read-only) must be completed.

At the top of the form, begin by selecting your **Agency** Next, choose the account by entering either the **Account Name** or **Account Number**—whichever you enter will automatically populate the other field based on information stored in the Account form.

After that, enter an **Audit Name** and the **Audit Date**. Then select the **Auditor Name** from the drop-down list, which includes all users within the Agency who are marked as both Active and assigned as an Auditor.

The **City** and **State** fields will automatically fill in using the account information. The **Audit Number** is also generated automatically by NEAT.

Weatherization Assistant Agency Account Audit (NEAT) Libraries Work Orders User Release Notes Options

NEAT

Agency: Nebraska Department of Environment
 Acct.: Dorothy M Swanson
 Acct. #: 2DAK152
 Audit: Swanson Residence
 Audit #: 1022

National Energy Audit Tool (NEAT)

Agency: Nebraska Department of Environment
 Account Name: Dorothy M Swanson
 Account Number: 2DAK152
 Audit Name: Swanson Residence

Audit Date: 08-29-2023
 Auditor: Craig Schieffer
 City: Dakota City
 State: NE
 Audit Number: 1022

Building Information

Occupants: 1
 Conditioned Stories: 1
 Infiltration Height (ft): 10

Floor Area (sq ft): 1260
 Number of Bedrooms: 2
 Wind Shielding: Normal Shielding

Libraries

Weather State: NE
 Weather Station: Norfolk Karl Stefan Mem Arpt
 Economic Parameters: 2022 - Residential Midwest Average
 Measure Costs: NDEE Measure Cost v10 Library NE
 Key Parameters: NDEE - OPPD NEAT Key Parameter
 Supply Library: NDEE Test Supply Library
 Defined Measures: NDEE DOE Approved Measure
 Billing Adjustment: ☐

Fuel Cost Details

Fuel Type	Cost	Unit
Electricity: 2022-23 Nebraska 3-Year Average Residential Electric	0.128	per kWh
Natural Gas: 2022-23 Nebraska 3-Year Average Residential Natural Gas	11.184	per MMBtu
Propane/LPG: 2022-23 Nebraska 3-Year Average Residential Propane	1.8448	per Gallon
Fuel Oil: 2022-23 Nebraska 3-Year Average Residential Heating Oil	2.9801	per Gallon
Kerosene: 2022-23 Nebraska 3-Year Average Residential Kerosene	5.04	per Gallon
Wood: 2022-23 Nebraska 3-Year Average Residential Wood	220	per Cord
Coal: 2022-23 Nebraska 3-Year Average Residential Coal	38.54	per Ton
Other: 2022-23 Nebraska 3-Year Average Residential Other	6.25	per MMBtu

New Copy Delete OK Apply Cancel

Reports

Icon Key
 Form is Required
 Form is Recommended
 Form is Optional
 Form is Completed

All Audits

Agency	Audit Name	Account Name	Account Number	City	State	Audit Date	Audit #	Auditor	Audit Status	Audit Last Edited
Nebraska Department of Environment	Swanson Residence	Dorothy M Swanson	2DAK152	Dakota City	NE	08-29-2023	1022	Craig Schieffer	Completed	01-28-2026 5:20 PM
Nebraska Department of Environment	Training Audit	Ima Audit Test-De...	ndee-12-01	Lincoln	NE	12-16-2024	1437	Lynn Chamberlin	Completed	04-01-2025 2:41 PM
Nebraska Department of Environment	IMA Audit Test	IMA Audit Test	NDEE-12-17	Lincoln	NE	12-17-2024	1455	Craig Schieffer	Completed	01-16-2025 1:55 PM
Nebraska Department of Environment	Single Story NGas	Ima Audit Test-De...	ndee-12-01	Lincoln	NE	12-16-2024	1011	Lynn Chamberlin	Completed	12-16-2024 3:52 PM
Nebraska Department of Environment	Two Story Natural Gas	Itsa Audit	002	Lincoln	NE	08-15-2023	1015	Lynn Chamberlin	Completed	05-30-2024 1:52 PM
Nebraska Department of Environment	NEAT Way10 - TEST - LL-1	RO NDEE	ndee123	Lincoln	NE	05-13-2024	1160	Red Opp	Completed	05-30-2024 1:28 PM
Nebraska Department of Environment	NEAT Way10 - TEST-SS	NDEE R/O	ndee-123	Gibson	NE	04-15-2024	1115	Red Opp	Completed	04-19-2024 1:38 PM

Page 1 of 1 Displaying 1 - 15 of 15

Building information

Occupants - Number of occupants on the LIHEAP application.

Conditioned Stories - Numbers of floors heated/cooled including basement. Include a basement if it is heated or cooled and most of its wall area is above-grade or walls are mostly below grade but has a door leading to the outside.

Infiltration Height - The vertical distance between the lowest and highest point defined in the pressure boundary.

Floor Area - Enter Sq/ft. of floored area that is conditioned. If more of the home is heated than cooled entered the total area of the heated area. The value should be total floor area not footprint. (two story with footprint of 1200 Sq/ft., enter 2400 Sq/ft.). Please see Section 4.0301 of the NeWAP Technical Standards "Determination of Conditioned, Unconditioned, and Buffer Spaces" for further guidance.

Number of Bedrooms - Enter number of bedrooms in house. If rooms are slept in but are not a designated sleeping area do not include (basement with bed)

Wind Shielding - Choose from one of the drop-down options.

Libraries:

Weather State - Select the closest State to the house you are modeling.

Weather Station - Select the closest city to the house you are modeling.

Economic Parameter Set, Measure Cost Set, Key Parameter Set, Supply Library, and Defined Measure Set - Choose from the drop down the library associated with your Agency. In some cases, there might be more than one Library listed, so make sure you are choosing the correct Library.

Fuel Cost Detail - Select for the drop down the library fuel cost associated with your Agency.

Finally, for NEAT to adjust energy savings estimates and recommend measures based on the actual pre-weatherization energy consumption of the home, select the Billing Adjustment checkbox.

General Information Block

At the top of the Audit Dock is an information block that shows key audit information entered on the Audit form for the audit that is currently active (i.e., being viewed). Links to each of NEAT's 16 data input Forms used to describe the house are provided below the information block. These links are organized into five groups:

- General
- Shell
- Systems
- Baseloads
- Other

Colored icons are presented beside these links to indicate if the form is:

Red Dot-Required Form to run the Audit.

Yellow Dot-Recommended form, data is not required to run audit

Green Dot-Optional Form, data is not required to run the audit but there is some optional fields that if applicable to the house you are working on you need to enter data into. (ducts, water heater, refrigerator, lighting, and itemized costs). Ducts on the ledger are a green dot and is considered a optional field. However, if you enter a heating system that delivers air through a duct system, the ducts field will turn red and becomes a required form.

Check Mark-Form is completed, and all required information has been entered.

The **Icon Key** at the bottom is for reference. Just know that selecting “**Run**” is not available until all required items are checked off.

After running the audit, the **Recommended Measures** Report will pop up in a new window automatically that will show what measure the audit has recommended. If at anytime you want to view the audit Input or Recommended Measures Report after you have closed out the report, you can select the Reports button and choose a report from the list provided.

NEAT

Agency:

Acct.:

Acct. #:

Audit:

Audit #:

General

 [✓ Audit](#)

Shell

 [✓ Walls](#)

 [✓ Windows](#)

 [✓ Doors](#)

 [✓ Unfinished Attics](#)

 [Finished Attics](#)

 [✓ Foundations](#)

Systems

 [✓ HVAC](#)

 [✓ Ducts](#)

 [✓ Infil./Duct Leakage](#)

Baseloads

 [✓ Water Heating](#)

 [✓ Refrigerator](#)

 [✓ Lighting](#)

Other

 [✓ Health and Safety](#)

 [✓ Itemized Costs](#)

 [Utility Bills](#)

Audit Recommendations

 [✓ Run](#)

 [View](#)

Reports



Icon Key

-  Form is Required
-  Form is Recommended
-  Form is Optional
-  Form is Completed

Shell Forms

Shell forms are used to document a home's building envelope, including walls, windows, doors, attics, and foundation areas. These forms define the thermal boundary of the house, allow you to choose applicable retrofit options, and capture any additional installation costs that are specific to the home but not already included in the Measure Cost Set Library.

At a minimum, NEAT requires at least one wall entry on the Wall form; all other shell forms are optional. These forms are also useful for describing attached homes, either side-by-side or stacked—where certain portions of the building enclosure do not lose heat to the outdoors.

In most cases, you will enter multiple wall sections and provide details on windows, doors, attics, and foundations as needed. The Wall, Attic, and Foundation forms include a “Measure #” field, which allows you to group similar sections together when analyzing retrofit options. Assign the same measure number to segments you want evaluated as a group, or use different numbers to assess them separately.

Many of the data input Forms in NEAT allow multiple records to be described for a building component. For example, in Figure 2.2, multiple walls are entered on the Wall form. These Forms have New and Copy options to create multiple records. For each record, a tab named by the user-entered code is created at the top of the form. The All table presented at the bottom of each of these Forms lists these records (i.e., the tabs) (Figure 2.3).

To complete 1 of the 16 NEAT data input Forms, select the form in the Audit Dock, input appropriate data in the main form, and select Apply to save the form or OK to save and exit the form. Select Cancel to exit the form without saving the entries that you just made. Select New or Copy (if applicable) to create additional records. The completed records will be listed in the All table. To view or edit an existing record, select the tab or the record in the All table.

On most of the Shell, Systems, and Baseloads Forms, field sets on the left of the main form describe a selected component of the existing building. A field set on the right of the main form describes retrofit measure technical details for the component. For cases in which the cost of a measure is site- or system-specific (including air sealing, duct sealing, replacement of HVAC equipment, water heaters, refrigerators, and lighting), the retrofit measure field sets can be used to directly enter the total costs associated with the measure because they cannot be described in the Measure Cost Set Library. In other cases, such as on the Shell Forms, the retrofit measure field sets can be used to enter an additional cost associated with installing the measure that will be added to the cost calculated from the Measure Cost Set Library.

Walls

Wall_E Wall_N Wall_S Wall_W

Wall Information

Wall Code: Wall_E

Wall Type: Platform Frame

Figure 2.2 Tabs on NEAT's Walls form.

Wall Code	Wall Type	Exterior Type	Exposed To	Orientation	Existing Insulation	Last Edited
Wall_E	Platform Fra...	Brick or Stone	Outside (Ambient)	East	Fiberglass Batts	04-28-2020 1:15 PM
Wall_N	Platform Fra...	Brick or Stone	Outside (Ambient)	North	Fiberglass Batts	04-28-2020 1:40 PM
Wall_S	Platform Fra...	Brick or Stone	Outside (Ambient)	South	Fiberglass Batts	04-28-2020 1:14 PM
Wall_W	Platform Fra...	Brick or Stone	Outside (Ambient)	West	Fiberglass Batts	04-28-2020 1:16 PM

Figure 2.3 All Walls table on Neat's Walls form.

NEAT evaluates all retrofit measures that are indicated as being active in the Measure Cost Set Library and applicable to the house. However, many of the data input Forms in NEAT provide the option to evaluate only certain measures for a component, which will exclude evaluation of other active measures for that component. In that case, NEAT also provides an option to include the energy savings and cost of the measure in calculating the package SIR. Measures for which “Required” is selected but that are not included in the package SIR are normally related to health and safety or are measures funded by a source other than the Weatherization Assistance Program. Measures with both “Required” and “Include in SIR” selected will be included in the package SIR and will always be recommended regardless of their SIR (this option is generally used for incidental repair measures).

Walls

NEAT

Agency:
 Acct. #:
 Audit:
 Audit #:

General

Audit

Shell

Walls

Windows

Doors

Unfinished Attics

Finished Attics

Foundations

Systems

HVAC

Ducts

Infil./Duct Leakage

Baseloads

Water Heating

Refrigerator

Lighting

Other

Health and Safety

Itemized Costs

Utility Bills

Audit Recommendations

Walls

* New Wall *

Wall Information

Wall Code:
 Wall Type:
 Stud Size:
 Exterior Type:
 Exposed To:
 Orientation:
 Gross Area (sq ft):

Existing Insulation

Type:
 R Value:

Added Insulation

Measure Number:
 Type:
 Additional Cost (\$):

Comments

New Copy Delete

OK Apply Cancel

Used to describe all the walls of the house that define the thermal boundary. Walls that differ by orientation, exposure (i.e., to the ambient conditions, buffered space (not directly exposed to ambient conditions but are adjacent to areas that are such as a garage, attic knee-wall, CAZ, or stairwell), construction, or insulation level should be described separately because the cost of insulating the walls and the energy savings from insulating the walls will differ. To describe all the exterior walls of a house most efficiently, you may

combine multistoried walls or separate wall segments that have the same orientation and construction. Wall insulation is a major measure.

All exterior walls and buffered walls adjacent to unconditioned spaces must be evaluated and considered for added insulation. This includes both walls exposed to ambient conditions and internal buffered walls, such as those adjacent to unconditioned stairways, combustion appliance zone (CAZ) closets, garages, or other semi-conditioned spaces.

Additional cost may be needed and will vary depending on job and method of insulating such as dense packing from interior or exterior.

Wall Information

Wall Code - Enter a unique code for each wall in the audit. The wall code identifies wall sections to you and the Weatherization Assistant. An ideal code is suggested to be less than 5 characters. (E.g., E1 as East Wall 1). The remaining fields, other than gross area, have drop-downs for selection.

Wall type, Stud size, Exterior type, Exposed To, and Orientation - Choose from the drop-down lists that best describes the wall you are modeling.

Gross Area - Add the Sq/ft of the wall you are modeling.

Existing Insulation

Type - Choose from the drop-down lists the type of insulation that exists in the wall cavity.
Page 32 of 120

R-Value - If there is insulation present you will need to enter the R-value of the existing insulation.

Added Insulation

Measure number - When modeling like kind walls use the same measure number. Wall(s) having different characteristics, select a different measure number for each different wall you are modeling. If you are modeling a buffer wall to be insulated, select the same measure number as you would if the walls were like kind.

Type - Choose from the drop-down list the type of insulation you want to add. If cavities are full (R-13), do not choose “none” choose blown cellulose.

Additional Cost – This field is used to add or subtract any additional cost associated with the wall you are modeling (additional labor, and ancillary costs).

Kneewalls - Do not model kneewalls in the wall form.

Windows

Windows

* New Window *

Existing Window

Window Code:

Window Type:

Frame Type:

Glazing Type:

Interior Shading:

Exterior Shading (%):

Leakiness:

Width (in):

Height (in):

Wall Code:

Number on This Wall:

Retrofits

Retrofit Options:

Include in SIR: ☐

Additional Costs

Window Sealing (\$/window):

Replacement (\$/window):

Low E (\$/window):

Storm (\$/window):

Comments

☐ Evaluate All: [Clear All](#) Additional Cost (\$/Window)

New Copy Delete OK Apply Cancel

Used to describe all the windows on the walls that are exposed to the outside. The number of each type of window or door is entered by their parent wall, or attic assembly in the case of skylights. Notably, a skylight cannot be defined and saved until after the associated attic assembly has been defined on the appropriate attic form. All replacement windows must be energy star rated with a minimum rated U-value of .30. Evaluate window replacement must be checked for all jobs to allow auditing software to determine most energy efficient measure.

Note: NEAT has a limit of 18 windows that can be input into the audit. Guidance from ORNL is as follows when you have more than 18 windows:

While we may not have a specific workaround to model more than 18 window types, I did want to communicate that you could perhaps use average window sizing for windows that are otherwise reasonably similar. Specifically, it is the total window area on a wall that matters the most. Window depth matters for overhang type shading calculations for south windows in terms of how they cast shadow on a window (e.g, taller windows will be less shaded). Window width matters for retrofit awning width and cost calculation.

Oakridge is calling for averaging the windows on any given wall. Normally we would lump “like size” windows on 1 wall to fit them all in. In the case that cannot be done as long as we are evaluating the same wall sq footage vs window square footage we will be evaluating the wall the correct way as far as heat loss. Then as far as evaluating the windows pick the windows the most similar in size and average them. If there happens to be 1 big window that can be left by itself. You would just need to average enough windows on a given wall together to fit them all in the audit.

Existing Window

Window Code - Enter a unique code for each window in the audit. The window code identifies window sections to you and the Weatherization Assistant.

Window Type, Frame Type, Glazing Type, Storm Window, Interior Shading, Exterior Shading, Leakiness, and Wall Code - Choose from the drop-down lists that best describes the window you are modeling.

Exterior Shading if you select overhang or awning from the drop down in the exterior shading field, the Overhang/Awning field will appear, and you will need to add numbers in inches to the Horizontal Projection and Distance from Lintel field. Note: If the distance from the Lintel to the overhang is greater than 24" you do not need to model the window with an overhang. If the windows are like kind windows on the same side of the house and some have overhangs within the 24" of the lenthils and the other don't, you will need to model those windows separately.

When selecting the leakiness of the window refer to [Microsoft Word - Window leakiness](#) for the correct selection.

Width & Height - Enter the width and height of windows in the width and height fields. Enter total number of windows on the wall in the number on this wall field.

Window Retrofit

When replacing a window, you need to make sure you are modeling the window by itself. You need to check the Replacement Window box, (do not check the Required box, or Include in SIR), choose the glazing type of the new window from the drop box, and add the U-value and SHGC (window manufacture) of the window you are replacing. Run the audit to see if the window can be replaced as an energy conservation measure ECM. If the audit doesn't call for the window to be replaced as an ECM, you can then request to DWEE to replace the window with Non DOE funds (Beyond Repair). Note: good documentation of why the window needs to be replaced (documentation, pictures, etc.) must be in the file. Windows can't be replaced if there isn't anything wrong with the window. Make all attempts to repair the window before you model the window to be replaced.

Additional cost - Add any additional ancillary costs to this field. If there are any additional repair cost associated with the replacement of the window (repairing sill, window frame, stool, etc.), you will need to enter those costs as an itemized cost in the Itemized cost tab and make the SIR box is checked, and make sure you tie the repair to the ECM of the window replacement if the audit calls for the window to be replaced as an ECM.

Doors

Doors

* New Door *

Existing Door

Door Code:
Door Type:
Area (sq ft):
Storm Door Condition:
Leakiness:

Optional Dimensions

Width (in):
Height (in):
Wall Code:
Number on This Wall:

Retrofits

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

Comments

New Copy Delete

OK Apply Cancel

Existing doors

Door Code - Enter a unique code for each wall in the audit.

Door type, Storm door condition, Leakiness, and Wall Code - Choose from the drop-down lists that best describes the door you are modeling.

Door Leakiness Guide:

- Tight fitting doors will be structurally sound and have fully functioning weather stripping including a tight fitting door sweep
- Medium fitting doors are in need of weatherstripping
- Loose fitting doors will be ill-fitted and have structural problems, noticeable leakage sites, and no or non-functioning weather-stripping.

Area - Enter the Sq/ft of the door you are modeling.

Width & Heights - Enter width and height of door to width and height field.

Number on This Wall - Enter total number of doors on the wall in the number on this wall field.

Door Retrofit

When replacing a door, you need to make sure you are modeling the Door by itself. NeWAP required door replacements to have an NFRC (National Fenestration Rating Council) tested U-factor of 0.17 or lower as well as other requirements. See Section 4.08 in the NeWAP Field Guide.

Do not check the Replacement Door Required box. Run the audit to see if the door can be replaced as an energy conservation measure ECM. If the audit doesn't call for the door to be replaced as an ECM, you can then request to DWEE to replace the door using Non DOE funds (Beyond Repair).

Note: good documentation of why the door needs to be replaced (documentation, pictures, etc.) must be in the file. Doors can't be replaced if there isn't anything wrong with the door. Make all attempts to repair the door before you model the door to be replaced.

Additional Cost - Add any additional ancillary costs to this field. If there are any additional cost associated with the replacement of the door (door frame, threshold, etc.), you will need to enter those costs as an itemized cost in the Itemized cost tab and make the SIR box is checked, and make sure you tie the repair to the ECM of the door replacement if the audit calls for the door to be replaced as an ECM by putting comments in the Note section.

Note: The audit will not allow you to model a door on a buffer wall. So, if you need to replace a door on a buffer wall you will need to replace it as a Beyond Repair measure using Non DOE funds.

Unfinished Attics

Unfinished Attics

A

Attic Information

Attic Code: A

Attic Type: Unfloored

Joist Spacing (in): 24

Area (sq ft): 1255

Roof Color: Normal or Weathered

Existing Insulation

Type: Blown Cellulose (R 3.75/in)

Depth (in): 12

Added Insulation

Measure Number: 1

Type: Blown Cellulose

Added R Value:

OR

Maximum Depth (in): 16

Additional Cost (\$):

Comments

3 bath fans need vented correctly

New Copy Delete OK Apply Cancel

Used to describe the attics in the house. The auditor can use deration calculation for attic insulation R-values to determine what R-value shall be entered into the audit. When insulation is missing, deteriorated or damaged a Parallel Path Equivalent R-Value calculation (i.e. Red Calc [Parallel Path R-Value | Building America Solution Center](#)) must be completed to evaluate the cost-effectiveness (SIR) of installing additional insulation. A copy of the calculation for Equivalent R-Value must be included in the client file.

The Unfinished Attic form is used to describe typical attic areas such as those built using ceiling joists and roof rafters or trusses and cathedral or flat ceilings. If an attic built from joists or trusses has flooring installed over the joists (e.g., plywood so that items may be stored in the attic), then it is Floored. Cathedral and flat ceilings are attic areas where the roof and interior ceiling are parallel. Max depth of insulation should be used when there is a physical limitation to the depth, as with floored or cathedral attics.

Attic Information

Attic Code - Enter a unique attic code for each attic space within the audit. An ideal code is suggested to be less than 5 characters.

Attic Types, and **Roof Color** - Choose from the drop-down lists that best describes the attic you are modeling.

Joist Space (in") - Enter the distance between the joist as a number in the joist spacing field.

Area - Enter the Sq/ft. of the attic in the area field.

Adding comments about the attic space location should be considered if a more complex roof system exists. Also commenting about hazards is recommended.

Existing Insulation

Type - Choose from the drop-down lists the type of insulation that exists in the attic. Include in the comment section details whenever existing insulation depth is adjusted to achieve equivalent existing R-value.

Depth - Add depth of existing insulation in depth field. All attics must have pictures of existing insulation and the depth of the existing insulation.

Added Insulation

Measure number - When modeling like kind attics use the same measure number. Attic(s) having different characteristics, select a different measure number for each different attic you are modeling.

Type - Choose from the drop-down selection the insulation you want the audit to model to add to the attic. Regardless of the level of existing insulation, always model the attic to receive more insulation.

Added R Value – Unfloored attic(s) leave this field blank.

For and open blow attic, first run the audit without any value in the added R-value or Max depth field. If after running the audit you don't achieve an R- value of 49 with existing insulation (existing insulation plus what the audit called for you to add) you can go back and add a value to the added R-value field that will bring the overall attic insulation depth to an R49, and re-run the audit to see if it will call for the amount you requested. If the individual SIR of the amount you requested is 1 or greater you can add that amount of insulation to the attic. If the audit doesn't call for the amount you requested or the individual SIR of that amount you requested is less than 1, you need to re-run the audit again with no number in the R-value and Max Depth fields and allow the audit to call for insulation that is cost effective. Either way, there must be a comment added to the comment section that you re-ran the audit to achieve the added R-value amount.

Floored attic, you must add a value to the Max Depth. This is the distance between the ceiling board and the attic floor.

Additional Cost - This field is used to add or subtract any additional cost associated with the attic you are modeling (additional labor, and ancillary costs).

Do not model “Outer Ceiling Joist in the unfinished attic form.

Finished Attics

Finished Attics

* New Finished Attic *

Attic Information

Attic Code:

Attic Type:

Floor Type:

Area (sq ft):

Roof Color:

Existing Insulation

Type:

Depth (in):

Added Insulation

Measure Number:

Type:

Added R Value:

OR

Maximum Depth (in):

Additional Cost (\$):

Comments

New Copy Delete OK Apply Cancel

The Finished Attic form is used to describe attic areas that result when a portion of the attic is included in the conditioned space of the home: outer ceiling joist, collar beam, knee wall, and roof rafter (Figure 2.5). Attic areas should generally be entered separately and have separate attic numbers. Added R-values should not be suggested therefore allowing the audit software to determine what is to be installed. The audit only generates funds for insulation and labor according to set up library cost. Verify that all libraries are up to date and accurate on a continual basis. Any additional cost must be entered as the exact amount to be used in the selected measure.

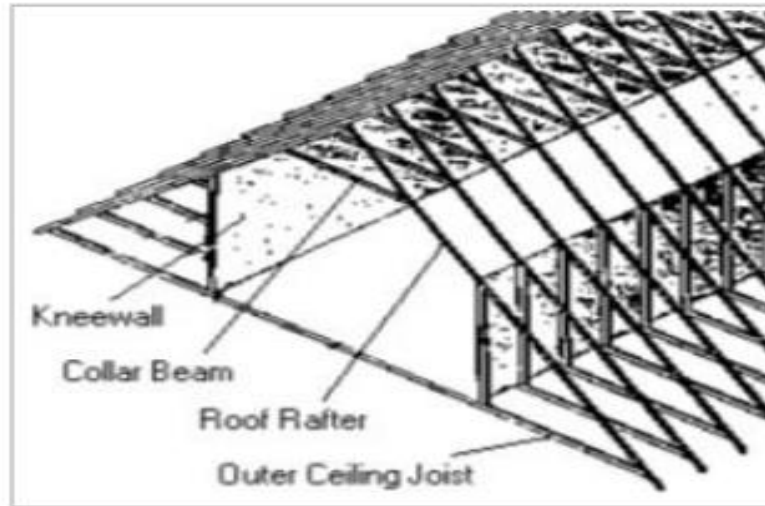


Figure 2.5 Components of a finished attic.

Attic Information

Attic Code - Enter a unique attic code for each attic space within the audit. An ideal code is suggested to be less than 5 characters.

Attic Types, Floor Type, and Roof Color - Choose from the drop-down lists that best describes the attic you are modeling. Adding comments about the attic space location should be considered if a more complex roof system exists. Also commenting about hazards is recommended.

Area - Enter the Sq/ft. of the attic in the area field.

Existing Insulation

Type - Choose from the drop-down lists the type of insulation that exists in the attic. Include in the comment section details whenever existing insulation depth is adjusted to achieve equivalent existing R-value. All attics must have pictures of existing insulation and the depth of the existing insulation.

Depth - Add depth of existing insulation in depth field.

Added Insulation

Measure Number - When modeling like kind attics use the same measure number. attic(s) having different characteristics, select a different measure number for each different attic you are modeling.

Type - Choose from the drop-down selection the insulation you want the audit to model to add to the attic. Regardless of the level of existing insulation, always model the attic to receive more insulation.

Added R Value – Unfloored attic(s) leave this field blank.

For and open blow attic, first run the audit without any value in the added R-value or Max depth field. If after running the audit you don't achieve an R- value of 49 with existing insulation (existing insulation plus what the audit called for you to add) you can go back and add a value to the added R-value field that will bring the overall attic insulation depth to an R49, and re-run the audit to see if it will call for the amount you requested. If the

individual SIR of the amount you requested is 1 or greater you can add that amount of insulation to the attic. If the audit doesn't call for the amount you requested or the individual SIR of that amount you requested is less than 1, you need to re-run the audit again with no number in the R-value and Max Depth fields and allow the audit to call for insulation that is cost effective. Either way must be a comment added to the comment section that you re-ran the audit to achieve the added R-value amount.

Max Depth value must be added for all Floored Attics, Roof Rafters and Narrow Collar Beam Attics. Enter the total (existing Plus added) depth, in inches, that insulation may attain. If no restriction exists, leave the field blank. For Floored Attic types, enter the distance between the ceiling board and attic floor (normally the joist height).

Additional Cost - This field is used to add or subtract any additional cost associated with the attic you are modeling (additional labor, and ancillary costs).

Note: when modeling a home with walk-up attic, model that wall(s), stairs as a kneewall in the finished attic form.

Foundation Forms

Foundations			
1			
Foundation Code:	1	Measure Number:	1
Foundation Type:	Unintentionally Conditioned		
Floor			
Area (sq ft):	1260	Added Insulation Type:	None
Existing Insulation R Value:	0	Additional Cost (\$):	
Sill			
Floor Joist Size (in):	7.25	Added Insulation Type:	Foam Board
Perimeter (ft):	13	Additional Cost (\$):	
Existing Insulation R value:	0		
Foundation Wall			
Height (ft):	5	Existing Insulation R Value:	0
Height Exposed (%):	50	Added Insulation Type:	Spray Foam
Perimeter (ft):	146	Additional Cost (\$):	300
Comments			
add 1 FT to wall height to include the flashing of the box sill with spray foam			
New Copy Delete		OK Apply Cancel	

This form is used to model foundation components of the home, including basements, crawlspaces, slab-on-grade floors, and floors exposed directly to outside air. Foundation insulation strategies may include insulating the floor, the sill (rim/band joist area), and/or

the foundation walls. The appropriate approach depends on the type of foundation, how the space is used, and which areas are currently insulated.

The foundation wall perimeter is determined by summing the lengths of all exterior foundation walls. In contrast, the sill perimeter is defined as only the portions of the sill (rim/band joist) that are both uninsulated and exposed to the outdoors. This distinction must be considered when entering values.

For basements and crawlspaces, NEAT will not recommend both floor insulation and sill and/or wall insulation for the same foundation.

If different sections of the foundation have varying insulation conditions (for example, some areas insulated and others not), each section should be entered separately as its own foundation, with corresponding square footage.

Foundation Code - Enter a unique code to identify the foundation.

Foundation Type- Select from the following options: conditioned, non-conditioned, vented non-conditioned, unintentionally conditioned, uninsulated slab, insulated slab, and exposed floor. Crawlspaces are typically vented non-conditioned, and basements are conditioned, non-conditioned, or unintentionally conditioned. The first four choices are used to describe a type of enclosed foundation space. A conditioned space is a temperature regulated space, either intentionally, or unintentionally, an unconditioned space is not temperature regulated but may or may not be Vented directly to the outdoors. If the thermal/pressure boundary is at the foundation walls & sills, then the space should be modeled as Conditioned. If the boundary is instead at the subfloor, then the space should be modeled as Unconditioned.

Exposed floors are used to describe a floor that is exposed directly to the outside air, such as a secondary story floor overhang or the floor of a house built on stilts or with pier and beam construction.

Measure number - When modeling like kind foundations use the same measure number. Foundation(s) having different characteristics, select a different measure number for each different attic you are modeling.

Floor

Area - Enter the Sq/ft. of the foundation in the area field.

Existing Insulation R Value – Enter the R Value of existing insulation.

Sill

Floor Joist Size - In inches enter the size of the floor joist. Add any R-value of any existing insulation in the floor. Choose from the drop down list the insulation you want the audit to model. If you choose “None” which means the condition prohibits insulation, you must note what the conditions are in the comment section.

Perimeter - Is the length of the sill perimeter unit of feet which is exposed to the outdoor air and is un-insulated.

Existing Insulation R Value – Enter the R Value of existing insulation.

Foundation Walls

Height - Enter the height of the foundation wall you are modeling.

Height Exposed % - Enter the height in a percentage that is exposed to the outside. If heights aren't uniformed entered and average height.

Perimeter - Is the length of the perimeter of the entire foundation space in feet which is exposed to the outdoor air.

Existing Insulation R Value – Enter the R Value of existing insulation.

Added Insulation Types - Choose from the drop down list the insulation you want the audit to model. Regardless of the level of existing insulation, always model the foundation to receive more insulation. If you are model a condition basement wall for insulation, select "condition basement wall" in the drop-down list.

Additional Cost - This field is used to add or subtract any additional cost associated with the foundation you are modeling (additional labor, and ancillary costs). Auditors should add Additional Costs when there may be a significant additional cost, such as to remove and replace drywall in order to install insulation. The audit only generates funds for insulation and labor according to set up library cost. Verify that all libraries are up to date and accurate on a continual basis. Any additional cost must be entered as the exact amount to be used in the selected measure.

Systems Forms

Systems Forms are used to describe the HVAC equipment, ducts, and infiltration and duct leakage associated with a house. You must enter one heating system and enter infiltration data on the Infiltration/Duct Leakage form to meet the minimum requirements of NEAT. The remaining Forms are optional unless deemed required based on other inputs. For example, the Duct form may be required depending on HVAC entries. The selections made in the HVAC form, especially regarding heating, will determine whether the Duct form remains optional or becomes required.

If the thermal/pressure boundary is placed at the foundation walls, the space is deemed conditioned. If the thermal/pressure boundary is placed at the subfloor, the space is deemed unconditioned.

HVAC Forms

HVAC Systems

2 1

Existing Equipment

HVAC System Code: 2

Equipment: Furnace - Forced Air

Location: Unconditioned Basement

Fuel: Primary: Electricity Backup:

Efficiency Input Method: Name Plate Efficiency

Year Manufactured:

Heating
Cooling

Efficiency: 98 %

Output Capacity: 15 kBtu/hr

Fraction of Load Served: 0.503 ☒ Estimate

Equipment Features:

☐ Atmospheric Burner
☐ Automatic Vent Damper
☒ IID ☐ Pilot Light ☐ On in Summer

Year Installed: 2010

Maintenance Status: Seldom or Never Maintained

Heating Setback Used: ☐

Retrofit Options to Evaluate

☒ **Install Smart Thermostat:** ☐ Required ☐ Include in SIR

Heating Nighttime Setback (°F): Daily Setback Hours: Additional Cost (\$):

☐ **Tune Up:** ☐ Required ☐ Include in SIR

Efficiency Improvements (%): Heating: Cooling: Additional Cost (\$):

☒ **Replace the Equipment:** ☐ Required ☐ Include in SIR

Equipment: Labor Cost (\$):

Fuel: Primary: Backup: Other Cost (\$):

Heating
Cooling

Efficiency: Output Capacity:

Fraction of Load Served: Also Replaces:

Comments

2.5 Ton Air Handler
Input 15 KW

New Copy Delete Optional: Operational Tests Vent Tests Furnace Components Boiler Components Inspections Thermostat OK Apply Cancel

Used to describe the heating and cooling equipment installed in the house and select retrofit options. In NEAT, you can describe as many equipment as are required to describe the heating and cooling sources in the house. All equipment that provides heating must be described in this form. The selected equipment may provide either heating or cooling or both. To describe the equipment, first enter the equipment type (and fuel if heating-only equipment) and then enter the data collected through proper manual testing for each appliance depending on fuel source in the applicable fields. Steady State Efficiency (SSE) shall be used when manually testing in the field for gas fired appliances if different from AFUE ratings. If SSE readings cannot be obtained, then AFUE ratings are acceptable to use, at original rated efficiency. Inputs related to equipment type and fuel will filter out other necessary inputs, as well as the retrofit options that will be available for evaluation. For example, selecting a space heater will disable tune up as a retrofit option. The Replace the Equipment retrofit option is always enabled for possible selection and is used to specify if the measure replaces one or more existing equipment described in other HVAC sub-Forms. Selecting a measure as required will disable other measures that are mutually exclusive to the required measure. Replacement required shall only be selected if a unit is non-operational or has major faulty H&S issues to where it is unsafe to operate the equipment for manual testing. When using replacement required if SIR is checked the audit will generate the potential allowable ECM SIR for the measure. If SIR is not checked it will be considered a H&S measure. H&S HVAC replacement should not have SIR checked. If there is no existing unit applicable one shall be installed as a H&S measure, if no DOE funds are used for the replacement system it can be modeled as existing.

Unlike in Weatherization Assistant Version 8, heating/cooling equipment inputs are not limited to primary and secondary systems. All existing heating and cooling equipment in the home must be entered as separate records. Weatherization Assistant Version 10 determines the primary system based on the Fraction of Load Served value that is either input or estimated by the software. Inputs made on any optional Forms (e.g., other field measurements or health and safety observations) are informational only and are not used in running the audit analysis

Existing Equipment

See **2.0608** of the NeWAP Technical Standards, “Solid Fuel Appliance Inspection and Testing”, sub Section “System Evaluation” for guidance on modeling the efficiency of solid fuel heating systems.

HVAC System Code (heating and cooling) - Enter a unique code to identify the foundation

Equipment (heating and cooling) - Choose from the drop-down lists the (furnace, boiler, space heater, heat pump, air conditioner, or evaporative cooler) that best describes the HVAC, or cooling equipment you are modeling.

Location (heating and cooling) - Choose from the drop-down lists the location that best describes the location of the equipment you are modeling.

Fuel (heating and cooling) - Choose from the drop-down lists the fuel that best describes the fuel of the heating equipment you are modeling.

Efficiency Input Method (heating and cooling) - Chose from the drop-down list that best describes the equipment you are modeling.

- Heating, choose either site measured, or name plate. Note all working furnaces must be tested and the steady state efficiency SSE must be used to model the heating equipment for replacement. If the heating equipment is not working, you can then use the name plate to model the furnace for replacement.
- Cooling, choose either name plate efficiency, or year manufactured. If you choose Year Manufactured the Year Manufactured field will populate and then enter the year the appliance was manufactured. If Name Plate Efficiency is used you must enter the SEER of the unit.

Efficiency – Enter a number and Chose from the drop-down list that best describes the equipment you are modeling.

- Heating, you must test for steady state efficiency on all furnaces, unless the unit is broken or functioning poorly, then you may enter the original AFUE of the unit. Enter the existing heating equipment efficiency as a percentage as measured SSE, or annual fuel utilization efficiency AFUE if the heating equipment was not working. If not found on the furnace, the AFUE can be calculated by taking the input capacity x AFUE = output capacity. For example, an input of 75 KBTU with a fan-induced furnace (AFUE can be assumed to be 80% for this type). Output capacity = $75 \times 0.8 = 60$ KBTU
 - Electric furnaces AFUE should be entered as 100%, just know WaWEB will default it to 98% which is acceptable.

- Cooling, choose either name plate efficiency, or year manufactured. If you choose Year Manufactured the Year Manufactured field will populate and then enter the year the appliance was manufactured. If Name Plate Efficiency is used you must enter the SEER of the unit.

Output capacity – Enter a number and Chose from the drop-down list that best describes the equipment you are modeling.

- Heating equipment is a value either entered in kBtu/hr, Btu/hr, or kW. This number can also be found on some name plates of the equipment.
- Cooling equipment it is a value either entered in kBtu/hr, Btu/hr, or Tons. This number can also be found on some name plates of the equipment.

Fraction of Load Served (heating and cooling) - Enter value that is either input or estimated by the software. Example, if there is one heating equipment that serves the entire envelope of the house you would enter 1 in the field. If you had two heating equipment that served 50% of the entire envelope of the house, you would enter 0.50 for each heating equipment entered.

Equipment features - Check the boxes if the heating equipment you are modeling have an atmospheric burner, automatic vent damper, IID, pilot light and if it is on in the summer.

Year installed (heating and cooling) - Choose from the drop down list the year the heating or cooling equipment was installed. If unknown, you can look it up by using the serial number.

Maintenance status - Choose from the drop-down list that best describes the maintenance status of the heating equipment you are modeling.

Heating setback used - Check the box if the heating equipment is using a setback thermostat.

Retrofit Options to Evaluate

All entries on this section of the form will be ghosted until you check on of the three boxes. Once the box is checked the fields under that checked box will appear and you can start entering your data into those fields.

The Required boxes - This box is checked after you have run the audit the first time and the measure was not called for as Energy Conservation Measure ECM. By checking the required box, it should push the measure to be replaced or installed as a Health & Safety measure.

The Include in SIR boxes - When this box is checked with the required box the audit will call for that measure as a repair measure if the individual SIR is below one, or it will call for the measure to be an ECM measure if the individual SIR is 1 or above. We do not allow the auditor to call for a measure to be installed, so this is not a state-preferred method.

Install Smart Thermostat

At Energy Auditor's discretion, a set-back thermostat may be installed if the NEAT/MHEA Audit calls for it. The Energy Auditor must first determine if the client is capable of re-setting the thermostat. See Section 2023.05 for more information.

Heating Nighttime/Daily Setback - Enter the number the thermostat will be setback at nighttime and a number the thermostat will be setback in the daytime.

Additional Cost - If there is any additional cost associated with the cost or installation of the thermostat other than what is entered in the measure library enter the cost here.

Tune-Up

Efficiency Improvement (%) - 1-2% is typical. 2-5% possible if the unit is old, has not been recently tuned, and is tuned using diagnostic equipment.

Additional Cost - If there is any additional cost associated with the cost or installation of the thermostat other than what is entered in the measure library enter the cost here.

Replace the Equipment

Equipment - Choose from the drop-down list the heating equipment that best describes the heating system you are modeling for replacement.

Fuel - Choose from the drop down list, the fuel type of the heating equipment you are replacing.

Material, Labor, and Other Cost - Is where you will enter the cost to replace the new heating equipment, and any other cost associated with the replacement of the equipment. Note: The Other Cost field will only accept the value of \$500 or less. If costs associated with the replacement is greater than \$500, add that material and labor cost to the material and labor of the heating system.

Efficiency - Enter the heating equipment efficiency as a percentage as measured AFUE.

Output Capacity - For a heating equipment it is a value either entered in kBtu/hr or Btu/hr.

Fraction of load served - This is copied from the existing equipment and selected Also Replaces equipment.

Also Replaces - If more than one heating equipment has been entered into the audit, this is where you can choose from the drop-down list, the other equipment you want to model to be replaced.

Note: If the existing heating equipment has a health and safety issue, you must first model the heating equipment as an ECM before you can replace the heating equipment as a Health & Safety measure.

Nonexistent Unit - If the unit is nonexistent and will be replaced as a health and safety measure (regardless of the funding source) the auditor must first enter into the energy audit the furnace that is going to be installed into the home, and then run the energy audit with the other measures to ensure that other Energy Conservation Measure (ECM) are truly cost effective.

Inoperable Unit - If the unit is inoperable and the auditor wants to model the furnace for replacement, the auditor must enter the furnace into the audit as it was originally designed and installed (capacity, AFUE, and % of condition space).

The auditor can use the data from the data plate to determine the AFUE, this can be done by dividing the design output by the input.

Heat Pump - If using Name Plate Efficiency the HSPF can be found using the serial number. If Year Manufactured is used you will need to enter the SEER.

Comment - In the Comment field, enter all material and labor associated with replacement of the heating system.

Duct System Form

Duct Systems

Supply | Supply 2 | Return

Existing Equipment

Duct System Code:

Duct Type: ☒ Supply ☐ Return

HVAC Systems Served: Heating: Cooling:

Duct Location:

Duct Insulation:

Use Defaults: ☐

Surface Area (sq ft):

Insulation R-value:

Number of Return Registers:

Add Insulation

Measure Number:

Added R-value:

Additional Cost (\$):

Comments

New Copy Delete OK Apply Cancel

The Duct Forms (conditionally required) - Used to describe the supply and return ducts for ducted HVAC equipment. A duct system with varying characteristics (e.g., location, insulation) must be described as multiple segments. All ducted HVAC equipment must be selected as served by at least one supply duct. All supply and return ducts shall be considered for modeling and properly entered in the software as is. Default methods can be used for surface area or manual entry is allowable with proper measurements of width height and length or diameter. To evaluate a duct insulation measure, you must enter the measured duct surface area and insulation R-value. If sufficient details relating to duct size and/or surface area and insulation R-value are unknown, then Weatherization Assistant Version 10 can estimate the values by selecting Use Defaults (Figure 2.6). To calculate these estimates and view the results, select the Use Defaults checkbox. To edit the values, clear the Use Defaults checkbox and input other values. Select Apply or OK to save the inputs.

Use Defaults:	☒
Surface Area (sq ft):	345.6
Insulation R-value:	0

Figure 2.6 Use Defaults checkbox selected.

Existing Equipment

Duct System Code - Enter a unique duct system code,

Duct Type - Select the duct type you want the audit to model to insulate.

HVAC System Served, Duct Location, Duct Insulation - Choose from the drop-down lists that best describes the duct(s) you are modeling. Enter the measured duct surface area and insulation R-value.

Note: when selecting “conditioned space” as the option in the duct location drop-down list the audit will not evaluate any duct insulation.

Use Defaults – Recommended. If sufficient details relating to duct size and/or surface area and insulation R-value are unknown, then Weatherization Assistant Version 10 can estimate the values by selecting Use Defaults.

Surface Area sq/ft – Enter the surface area of the entire duct system.

Duct Dimensions Button – By clicking this button you can calculate the surface area of the duct system.

Insulation R Value – Add the existing R Value on the existing duct work.

Add Insulation

Measure Number - When modeling like kind ducts use the same measure number.

Duct(s) having different characteristics, select a different measure number for each different duct system you are modeling.

Added R Value – Enter the R Value you want the duct(s) insulated too.

Additional Cost - This field is used to add or subtract any additional cost associated with the foundation you are modeling (additional labor, and ancillary costs).

Infil./Duct Leakage Form

Ducts and Infiltration

Evaluate Duct Sealing: ☒

Duct Leakage Method: Whole House Blower Door Measurements

Whole House Blower Door Measurements

	Before Weatherization (Existing)	After Duct Sealing and Before Other Weatherization (Target or Actual)	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)	3000	2700	1800
at House Pressure Difference (Pa)	50	50	50

Duct Operating Pressures

	Before Duct Sealing	After Duct Sealing
Supply (Pa)	25	27
Return (Pa)	25	27

Costs

Infiltration Reduction (\$): 300
Duct Sealing (\$):

Comments

Delete

Optional Measurements: Blower Doors Zonal Pressures Pressure Pans Room Pressure Balances

OK Apply Cancel

The Ducts/Infiltration Forms (required) - Used to enter air and duct leakage data to evaluate the effectiveness of infiltration reduction work and duct sealing. The data input fields on the Ducts/Infiltration form change depending on whether duct sealing will be evaluated and, if so, which method will be used.

To evaluate infiltration reduction as a retrofit measure, you must, at a minimum, enter the pre-weatherization whole-house air leakage rate (usually measured), an estimated or target rate after weatherization, house pressure differences for these rates, and the cost of the infiltration reduction work. Use the NeWAP Target Blower Door Calculation to achieve your After Weatherization Target number.

Evaluate Duct Sealing Button – Select this button and choose the “Duct Leakage Method” you want to use to evaluate duct sealing when ducts are located outside the thermal boundary. DWEE recommends using the “Whole House Blower Door Method” when it is determined that duct sealing needs to be evaluated. If more quantitative diagnostics are needed (Duct Subtraction Method or Duct Blaster) contact DWEE for further guidance.

Whole House Blower Door Measurement (From ORNL on 2/19/26)

When using the Whole House Blower Door Measurement method on the Ducts and Infiltration form, there is no single standard value or percentage to enter for the “After Duct Sealing and Before Other Wx” or “After Weatherization” fields. Those entries are intended to reflect estimated post-weatherization blower-door leakage, not default values.

In the NEAT/MHEA modeling logic, when only duct sealing is performed, the model assumes the envelope leakage does not change. Therefore, any reduction in whole-house CFM50 is attributed to reduced duct leakage.

If the duct leakage is not measured, a practical approach is to estimate how much duct leakage reduction is realistic based on duct condition. Please see below for additional information:

Determining reasonable values for duct related fields for Whole House Blower Door Measurement Method

1. Based on existing duct condition, estimate how much duct leakage reduction you can achieve (e.g., 1/2, 1/3,... or 1/N of existing duct leakage)
2. Enter $CFM50_{postductseal} = CFM50_{prewx} - (N-1) \times 100$
3. Enter 25 Pa for supply and return duct operating pressures before and after duct sealing (assumed; simplifies calculations)

Note: You can estimate what percentage of the total leakage is from the ducts with these equations:

- Before Duct Sealing: $(1.98 \times N) / (\text{central system capacity in kBtu/h})$
- After Duct Sealing: $1.98 / (\text{central system capacity in kBtu/h}), \text{ after duct sealing}$

Example:

- Assume measured air leakage rate before weatherization = 3000 cfm@50Pa
- Assume duct sealing would reduce duct leakage to 1/4 of existing duct leakage

- Given these assumptions, $\text{CFM50_postductseal} = 3000 - (4-1) \times 100 = 3000 - 300 = 2700 \text{ cfm@50Pa}$
- Further, if this duct serves a 60 kBtu/h furnace, then based on 25Pa duct operating pressure, duct leakage % would be
 - Before Duct Sealing: $1.98 \times 4 / 60 = 13.3\%$
 - After Duct Sealing: $1.98 / 60 = 3.3\%$

Ducts and Infiltration
B

Evaluate Duct Sealing: A
Duct Leakage Method:

Whole House Blower Door Measurements

Whole House Blower Door Measurements

C

D

E

	Before Weatherization (Existing)	After Duct Sealing and Before Other Weatherization (Target or Actual)	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)	3000	2700	1800
at House Pressure Difference (Pa)	50	50	50

Duct Operating Pressures

	Before Duct Sealing	After Duct Sealing
Supply (Pa)	25	27
Return (Pa)	25	27

F

G

Costs

Infiltration Reduction (\$): 300
H

Duct Sealing (\$):
I

A Evaluate Duct Sealing-Select this button and choose the “Duct Leakage Method” you want to use to evaluate duct sealing when ducts are located outside the thermal boundary.

B Duct Leakage Method, choose Duct testing method, DWEE recommends choosing Whole House Blower Door Measurement

C Before Weatherization -Initial Blower Door reading and House Pressure Difference (50 Pa is standard)

D-After Duct Sealing and Before other Weatherization-Follow formula and guidance above from Oakridge National Laboratory for calculating Duct Leakage Reduction.

E-After Weatherization-Use NeWAP Target Blower Door Calculator to achieve Target Blower Door

F Before Duct Sealing-With the air handler fan on and Blower Door off, use a manometer and static pressure probe to measure the supply and return duct pressures (WRT the interior) at the register nearest and farthest from the furnace for each supply trunk (both sides of furnace). Enter the average of the readings.

G After Duct Sealing- Add 2 Pa to the Before Duct Sealing pressure and enter here in both supply and return.

40

H Infiltration Reduction- Enter the cost of all the infiltration work you want done on the home. Any recommended materials or components associated with infiltration reduction costs must be itemized in detail in the comments box.

I Duct Sealing \$-Duct Sealing Cost

Optional forms

A set of optional forms (Blower Doors, Zonal Pressures, Pressure Pans, and Room Pressure Balances) can be used to enter measurements made during the infiltration and duct leakage measurements or health and safety observations related to the HVAC systems. Information entered on these optional forms is not used in running an audit.

Baseloads Forms (required)

Baseloads Forms are used to describe water heating retrofits, refrigerator replacement, and lighting retrofits. These Forms are used to evaluate specific retrofit measures.

Water Heating Forms

The screenshot displays the 'Water Heating' form interface, which is divided into several sections for data entry:

- Existing Equipment:** Includes dropdowns for Manufacturer (Richmond Water Heaters), Model (6E50-D), Equipment Type (Storage), and Location (Conditioned Space). It also has input fields for Fuel (Electricity), Input Units (KW), Rated Input (4.5), Rated Storage Capacity (50 gal), Energy Factor (0.75), Uniform Energy Factor, First-Hour Rating (gal), and Recovery Efficiency (with an 'Estimate' checkbox). Checkboxes for 'Water Heater Wrap Present' and 'Water Heater Pipe Insulation Present' are also present.
- Original Tank Insulation:** Features input fields for R Value (1), Thickness (in), and a dropdown for Type.
- Showerheads:** Includes input fields for Number of Showerheads (2), Flow Rate (gpm) (2.5), and Shower Use (min/day) (10).
- Replacement:** Contains a 'Pick from Supply Library' dropdown (No Replacement Water Heaters), and input fields for Manufacturer, Model, Equipment Type (Storage), Fuel (Electricity), Input Units (KW), Rated Input (4.5), Rated Storage Capacity (50 gal), Uniform Energy Factor (0.93), First-Hour Rating (50 gal), Recovery Efficiency (with an 'Estimate' checkbox), Installation Cost (\$), Additional Cost (\$), Replacement Required (checked), and Include in SIR (checked).
- Comments:** A large text area at the bottom for additional notes.

At the bottom of the form, there is a 'Delete' button and a tabbed interface with 'Optional Water Heating Details' selected, alongside 'Operational Tests', 'Vent Tests', and 'Inspections'. 'OK', 'Apply', and 'Cancel' buttons are located on the far right.

Water heater specifications may be available from the AHRI Directory of Certified Product Performance (www.ahridirectory.org).

Used to enter information necessary to evaluate for water heating retrofit measures: tank insulation, pipe insulation, low-flow showerheads, and water heater replacement. You may describe the existing water heater by selecting from the list of manufacturer and model

number, which will autofill the energy use characteristics of the water heater, or by directly entering the data on the form collected from the manufacturer's data plate. To evaluate a water heater replacement, you may either select a water heater you have already described in the Supply Library, which will autofill the data, or directly enter the data on the form from the manufacturer's data plate.

Existing Equipment

Manufacturer - Choose from the drop-down list the manufacturer of the water heater you are modeling.

Model - Choose from the drop-down list the model of the water heater you are modeling.

Equipment Type - Choose from the drop-down list that best describes the type of equipment you are modeling.

Location - Choose from the drop-down list the location that best describes the location the water heater is in.

Fuel - Choose from the drop-down list the fuel of the water heater you are modeling.

Input Units - Choose from the drop-down list either KBtu per hour for gas, or KW for electric.

Rated Input - Enter the numeric value of the water heater you are modeling.

Rated Storage Capacity - Enter the gallons of the water heater you are modeling.

Energy Factor, Uniform Energy Factor, First-Hour Rating (gal), and Recovery Efficiency - Will autofill if you select the water heater from the manufacturer and model list, otherwise you will need to look up the values. This can be done by using the AHRI Directory website.

[AHRI Certification Directory](#)

Water Heater Wrap Present - - Check box and choose the insulation type of the existing insulation and fill in a value either in R-value, or Thickness. You only need one value for the audit to run.

Water Heater Pipe Insulation Present - Check the box if water lines have 6'ft of pipe wrap on both hot and cold side of the water line. By leaving the box unchecked the audit will model to install pipe wrap.

Showerheads

Showerheads replacement is allowed. 2.5 GPM or less is allowed.

Number of Showerheads - Enter in the number of showerheads you are going to model for replacement.

Shower Use - Enter in minutes per day showers are taken.

Flow Rate - Measure the gallons per minute the showerheads use and enter the number here.

Replacement

When modeling a water heater for replacement choose from the Pick from Supply Library drop-down list the water heater you want to model for replacement. All the information should autofill, do not check the Replacement Required box and run the audit to see if the water heater will be replaced as an Energy Conservation Measure ECM. If the water heater does not appear on the Recommend Measure report, and the water heater has a Health &

Safety issue, then go back to the water heater form and check the Replacement Required box, do not check the Include in SIR box. Rerun the audit, the water heater should now be replaced as a health & safety measure. **Replacement of a water heater is always to be modeled as an energy conversation measure ECM first before you replace it as a health and safety measure.**

Refrigerator Forms

Refrigerator

Existing Equipment

Manufacturer: Model:

Style: Defrost:

Size (cu ft): Location:

Consumption

Source: ☒ Nameplate or Database ☐ Metered

Nameplate or Database

Rated Consumption (kWh/yr): Age:

Door Seal Condition:

Metered

Metering Minutes: Manual Defrost: ☐

Meter Reading (kWh): Includes Defrost Cycle: ☐

Space Temperature (°F):

Available Space Dimensions

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

Replacement

Pick from Supply Library:

Manufacturer:

Model:

Style: Defrost:

Rated Consumption (kWh/yr): Size (cu ft):

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

Installation Cost (\$):

Additional Cost (\$):

Adjusted Consumptions

Existing Refrigerator (kWh/yr):

Replacement Refrigerator (kWh/yr):

Annual Savings (kWh/yr):

Adjusted consumptions and savings reported on this form assume that the refrigerators are in heated spaces. Final calculations will be based on the actual location.

Comments

Delete

Used to enter information necessary to evaluate a refrigerator replacement. Here, you specify the energy use characteristics of the existing and replacement refrigerators. For the existing refrigerator, you may either select from the list of manufacturers and model numbers in the library, which will autofill the data, or directly enter the data on the form. All refrigerators being considered for replacement must be metered with an approved metering device or model number entered from the audit database and the results logged on the Base Load Record.

Existing Equipment

Manufacture, Style, Model, Defrost, and Location - Choose from the drop-down list that best describes the appliance you are modeling.

Size (cu/ft) – Enter the size of the appliance.

Consumption

Source – Choose the method you are going to use to model the appliance, either “Name Plate”, or “Metered”. Depending on the method you choose, the greyed-out section below the source will populate and you can then fill in the appropriate information.

Nameplate or Database

If you selected to model the replacement using the nameplate.

Rated Consumption – Enter the kilowatt hours per year the energy the appliance uses.

Age – Choose from the drop-down box the age of the appliance that best describes the refrigerator.

Door Seal Condition - Choose from the drop-down box the door seal condition of the refrigerator that best describes the appliance.

Metered

If you selected to model the replacement using metered method.

Metering Minutes – Enter the minutes the appliance was metered.

Meter Reading – Enter the kilowatt hours the appliance was metered.

Manual Defrost – Check this box if you must manually defrost the appliance.

Includes Defrost Cycle – Check this box if the appliance was metered during it defrost cycle.

Available Space

Height, Width, and Depth - Enter the height, width, and depth of the appliance.

Replacement

Pick from Supply Library – If you have entered replacement appliances in the “Supply Library”, pick from the pre-loaded appliances that best describes the appliance you want to model for replacement.

Manufacturer – Enter the name of the manufacturer.

Model – Enter the model of the appliance.

Style, and Defrost - Choose from the drop-down box that best describes the appliance.

Rate Consumption – Enter in kilowatt hours per year the energy the appliance uses.

Size (cu/ft) – Enter the size of the appliance.

Height, Width, and Depth - Enter the height, width, and depth of the appliance.

Installation Cost – Enter the cost of the appliance.

Additional Cost – Enter any additional cost associated with the installation of the appliance (delivery, set-up, etc.).

Lighting Forms

The screenshot shows a software form titled "Lighting" with a tab labeled "1". The form is divided into three main sections:

- Lighting Information:** Contains fields for "Lighting Code:" (value: 1), "Room:" (dropdown: Bathroom), and "Location:" (dropdown: Ceiling).
- Existing Lighting System:** Contains fields for "Pick from Supply Library:" (value: No Replacement Lighting), "Lamp Type:" (dropdown: Incandescent), "Number of Lamps:" (value: 1), "Size (watts):" (value: 60), "Usage (hr/day):" (value: 2.5), "Brightness (lumens):" (empty), and "Color Temperature (K):" (empty).
- Retrofit Lighting System:** Contains fields for "Retrofit Options:" (dropdown: Replace Lamps), "Pick from Supply Library:" (value: No Replacement Lighting), "Lamp Type:" (dropdown: LED), "Number of Lamps:" (value: 1), "Size (watts):" (value: 8.8), "Usage (hr/day):" (value: 2.5), "Brightness (lumens):" (value: 800), "Color Temperature (K):" (empty), "Installation Cost (\$/bulb):" (value: 1), "Additional Cost (\$/bulb):" (empty), and "Additional Cost (\$):" (empty).

Below these sections is a "Comments" area with a large text input field. At the bottom of the form are buttons for "New", "Copy", "Delete", "OK", "Apply", and "Cancel".

Used to describe lighting replacement retrofits. You may specify the quantity, usage, and energy use characteristics of the existing and replacement lighting and cost of the replacement lighting. For the existing and/or replacement lighting system, you may either select lighting you have already described in the Supply Library, which will autofill the energy and cost data, or directly enter the data on the form.

Lighting Information

Lighting Code – Enter a unique lighting code

Room – Choose from the drop-down list that best describes the room the lighting is in.

Location - Choose from the drop-down list that best describes the location the lighting is in.

Existing Lighting System

Pick from Supply Library – If light is pre-load in the Supply Library, choose from the drop-down list that best describes the existing lighting

Lamps Type - Choose from the drop-down list that best describes the lamp type.

Number of Lamps – Enter the number of bulbs that you are modeling for replacement. (25 max per home).

Size (watts) – Enter the wattage of the existing bulbs you are modeling for replacement.

Usage – Enter amount of time the light is on per day (1.5hrs min).

Retrofit Lighting

Pick from Supply Library - If light is pre-loaded in the Supply Library, choose from the drop-down list that best describes the lighting you are modeling to replace existing bulbs with.

Retrofit Options, and Lamp Type - Choose from the drop-down list that best describes lighting you are modeling to replace.

Size (watts) - Enter the wattage of the bulbs you are modeling for replacement.

Usage - Enter amount of time the light is on per day (1.5hrs min).

Installation Cost – enter the cost to install lighting

Additional Cost (\$/bulb) – enter any additional cost for replacing bulb.

Additional cost (\$) - Enter any additional cost associated with the installation of the lighting.

Note brightness(lumens) and color temperature (K) are optional fields and don't need to be fill-out for the audit to run.

Other Forms

Other Forms can be used to describe health and safety observations in the home; repair or health and safety measures or your own energy measure; and utility bills.

Health and Safety Forms

Can be used to enter health and safety measurements and observations that you have made of the house. Items on this form help identify potential health and safety hazards related to the whole house, equipment, and shell; record worst-case draft measurements for space heating equipment and the water heater; and determine ventilation requirements to comply with ASHRAE Standard 62.2 2016.

Whole House Form

Health and Safety

Whole HouseEquipmentBuilding ShellSpace Heating Worst Case Draft MeasurementsWater Heater Worst Case Draft MeasurementsASHRAE 62.2 Ventilation Calculation

Health and Safety Devices

Smoke Detector is Needed:☐☐

Carbon Monoxide (CO) Monitor is Needed:☐☐

Carbon Monoxide Measurements

Room with Heating System (ppm):

Room with Water Heater (ppm):

Living Area (ppm):

Kitchen (ppm):

Comments

DeleteOKApplyCancel

The Whole House form can be used to identify the need for smoke detectors and carbon monoxide monitors and to record the carbon monoxide concentrations in various rooms of the house. The carbon monoxide concentration (ambient) should be recorded for rooms having combustion-based space heating or water heating, a kitchen having a gas/propane cook stove, and the living area.

Equipment

Health and Safety

Whole House **Equipment** Building Shell Space Heating Worst Case Draft Measurements Water Heater Worst Case Draft Measurements ASHRAE 62.2 Ventilation Calculation

Wood Stoves/Fireplaces

Wood Stove/Fireplace is Present: ☐ ...

Improper Venting: ☐ ...

Combustion Air is Inadequate: ☐ ...

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: ☐ ...

Clothes Dryer

Improper Venting: ☐ ...

Exhaust Fans

Bathrooms	Kitchen	Air-to-Air Heat
Missing: ☐ ...	Missing: ☐ ...	Exists: ☐
Not Operational: ☐ ...	Not Operational: ☐ ...	Not Operational: ☐ ...
Improper Venting: ☐ ...	Improper Venting: ☐ ...	

Comments

Delete OK Apply Cancel

The Equipment form can be used to identify health and safety issues related to equipment in the house. Worst condition draft measurements may be recorded for any combustion-based heating systems described under the Heating tabs of NEAT and MHEA and any water heaters. Improper venting is a concern for wood stoves, fireplaces, clothes dryers, and exhaust fans. Wood stoves and fireplaces may also have inadequate combustion air and bathroom(s), or kitchen exhaust fans may be missing or not operational. Individual burner and oven carbon monoxide measurements can be recorded for a gas cook stove and a gas leak associated with the gas stove may also be identified. The existence of an air-to-air heat exchanger may be indicated.

Building Shell

Health and Safety

Whole House | Equipment | **Building Shell** | Space Heating Worst Case Draft Measurements | Water Heater Worst Case Draft Measurements | ASHRAE 62.2 Ventilation Calculation

Attics	Walls	Basements/Crawlspaces
Recessed Lights Present: ☐ ...	Wiring Problems: ☐ ...	Vapor Barrier Needed: ☐ ...
Chimney/Flue Shielding Incorrect: ☐ ...	Water Leaks Present: ☐ ...	Wiring Problems: ☐ ...
Wiring Problems: ☐ ...	Moisture/Mold Problems Evident: ☐ ...	Water Leaks Present: ☐ ...
Ventilation Inadequate: ☐ ...	Lead Based Paint is Likely: ☐ ...	Plumbing Leaks Present: ☐ ...
Water Leaks Present: ☐ ...	Asbestos in Siding is Likely: ☐ ...	Moisture/Mold Problems Evident: ☐ ...
Moisture/Mold Problems Evident: ☐ ...	Other Problems: ☐ ...	Other Problems: ☐ ...
Vermiculite Present: ☐ ...		
Other Problems: ☐ ...		

Comments

Delete OK Apply Cancel

The Building Shell form can be used to identify health and safety issues in the attics, walls, and basement/crawlspaces of the house. The health and safety issues that can be identified include wiring problems, water leaks, plumbing leaks, moisture/mold problems, the presence of lead-based paint in walls, asbestos in vermiculite attic insulation or wall siding, and recessed lighting, as well as problems associated with the ventilation and the chimney/flue, and the need of a vapor barrier in the basement. All areas can also be described as having Other Problems, which could be explained in the comments.

Space Heating Worse Case Measurements

Health and Safety

Whole HouseEquipmentBuilding Shell**Space Heating Worse Case Draft Measurements**Water Heater Worse Case Draft MeasurementsASHRAE 62.2 Ventilation Calculation

Date Conducted:

Conducted During:

On Heating System:

Outdoor Temperature (F):

Draft (Pa or Inches of Water):

Spillage Time (sec):

Comments

All Worst Case Condition Draft Measurements

Date Conducted	Conducted During	Heating System	Outdoor Temperature (F)	Draft (Pa or Inches of Water)	Spillage Time (sec)	Last Edited
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NewCopyDeleteOKApplyCancel

When conducting worse case draft test for water heater and/or space heating systems, select the appropriate time of the test from the “Conducted During” drop-down. Draft measurement will not apply. Spillage time will be 2 minutes for warm vent, and 5 minutes for cold.

Water Heater Worse Case Draft Measurements

Health and Safety

Whole House | Equipment | Building Shell | Space Heating Worst Case Draft Measurements | **Water Heater Worst Case Draft Measurements** | ASHRAE 62.2 Ventilation Calculation

Date Conducted: 2026-01-07 *** THIS IS A COPY ***

Conducted During: Audit

Outdoor Temperature (F): 58

Draft (Pa or Inches of Water): -0.4

Spillage Time (sec): 0

Comments

All Worst Case Condition Draft Measurements

Date Conducted	Conducted During	Outdoor Temperature (F)	Draft (Pa or Inches of Water)	Spillage Time (sec)	Last Edited
2026-01-07	Audit	58	-0.4	0	01-07-2026 2:27 PM

New Copy Delete OK Apply Cancel

When conducting worse case draft test for water heater and/or space heating systems, select the appropriate time of the test from the “Conducted During” drop-down. Draft measurement will not apply. Spillage time will be 2 minutes for warm vent, and 5 minutes for cold.

ASHRAE 62.2 Ventilation Calculation

Health and Safety

Whole House | Equipment | Building Shell | Space Heating Worst Case Draft Measurements | Water Heater Worst Case Draft Measurements | **ASHRAE 62.2 Ventilation Calculation**

ASHRAE Standard 62.2 Version: ☒ 2016 ☐ 2019

Weather State: NE

Weather Station: Norfolk Karl Stefan Mem Arpt

Floor Area (sqft): 1260

Infiltration Height (ft): 10

Number of Bedrooms: 2

Number of Occupants: 1

☐ Use number of occupants for ventilation calculation (i.e., if exception to ASHRAE 62.2 occupant density calculation applies)

Dwelling Unit Type: Detached

Common Wall Area (sqft):

Exterior Envelope Area (sqft):

Kitchen and Bath Exhaust Information

Space	Operable Window	PreWx CFM Deficit	Target CFM Deficit	PostWx CFM Deficit
☒ Bathroom 1	☒	50 0	50 0	50 0
☒ Bathroom 2	☒	50 0	50 0	50 0
☐ Bathroom 3	☐			
☐ Bathroom 4	☐			
☐ Bathroom 5	☐			
☒ Kitchen 1	☒	100 0	100 0	100 0
☐ Kitchen 2	☐			

Blower Door Measurements

	PreWx	Target	PostWx
Air Leakage Rate (cfm):	2000	1400	590
House Pressure Difference (Pa):	50	50	50
Continuous Ventilation Needed (cfm):	0	8.28	38.38

Comments

Install 60.3 cfm continuous ventilation that accounts for the target 1400 cfm infiltration rate and target exhaust rates in bathrooms (50 cfm, 50 cfm) and kitchen (100 cfm).

Delete OK Apply Cancel

The Ventilation form is used to check compliance with ASHRAE Standard 62.2 and provides recommendations to achieve compliance. Indicate if the exception to the ASHRAE Standard 62.2 whole-building mechanical system requirement applies to the dwelling unit. Then, select the ASHRAE Standard 62.2 version with which to check compliance. The options are 2016 or 2019. Nebraska is using ASHRAE Standard 62.2 2016.

Weather State, Weather Station, Floor Area, Infiltration Height, Number of Bedroom, and Number of Occupants - Are read-only fields that you entered on the Audit form and that are pertinent to the ventilation calculations are displayed.

Use Number of Occupants for Ventilation Calculation - Check the box if the exception to the ASHRAE 62.2 occupant density calculation applies. **Nebraska uses the default method and does not check this box unless Auditor is sure the home is overcrowded (5 people in a one bedroom home for example) or big home with low occupants (2 people living in a 5 bedroom home).**

Dwelling Unit Types - Choose from the drop-down list that best describes the dwelling you are modeling. Choosing Detached or Vertically Attached no entry is needed in the common wall, and exterior envelope area fields.

Common Wall Area (sq/ft) - If horizontally attached is your choice in Dwelling Unit Type, enter the area of the common wall field.

Exterior Envelope Area (sq/ft) - If horizontally attached is your choice in Dwelling Unit Type, enter the area of the exterior envelope area field.

Kitchen and Bath Exhaust Information

Enter observations and measurements about the kitchen and bath exhausts; these inputs will be used in calculating the mechanical ventilation requirement as well as recommending any prescriptive measures.

Space – Check the box of the number of bathroom(s) and Kitchen(s) that inside the dwelling.

Operable Window – Check this box if there is one operable window in the bathroom(s), and Kitchen(s).

PreWx, Target, and PostWx CFM/Deficit

CFM – Enter the cfm (as measured) of the fan.

Deficit – Once you check a bathroom or kitchen box, there will be a value auto filled in the deficit field (50 cfm for bath, and 100 cfm for kitchen). After entering a value in the cfm field and if you check the operable window box the audit will deduct those values from the value in the deficit field. If the cfm, and operable window (if applicable) value is larger than the number in the deficit field there is no additional cfm needed for that area. If there is a number remaining in the deficit field after deducting the cfm and operable window (if applicable) values, that is the deficiency number needed for that area.

Blower Door Measurements

Air Leakage Rate (cfm) – PostWx and Target number will be auto filled from the values entered in the Infiltration/Duct Leakage form. PostWx field will need to be filled in after the final blower door number has been ran.

House Pressure Difference (Pa) – PostWx and Target number will be auto filled from the values entered in the Infiltration/Duct Leakage form. PostWx field will need to be filled in with the pressure the final blower door number was ran at (50pa).

Continuous Ventilation Needed (cfm) – Read only field and if there is a number in the field that is the number of whole house ventilation needed in the home.

Currently Nebraska does not use this form, but rather uses RED CALC.

Itemized Costs Forms

The screenshot shows a software window titled "Itemized Costs". At the top, there are four tabs: "Fix Other Probl...", "IRM Attic A ...", "Fix Improper V...", and "Vapor Barrier ...". The "IRM Attic A ..." tab is selected.

The main area is divided into two columns. The left column is titled "Itemized Cost Measure" and contains the following fields:

- Measure Name: A text box containing "IRM Attic A Access".
- Cost (\$): A text box containing "113.5". To its right is a checkbox labeled "Include in SIR:" which is checked.
- Material: A text box containing "5 sq ft 3/4 ply, 2 layers R10 foam board, 9 ft flap w/s".
- Annual Energy Savings: A text box and a "Units:" label with a dropdown arrow.
- Life (yr): A text box.
- Fuel Saved: A text box and a dropdown arrow.

The right column is titled "Defined Measures" and contains:

- A label "Copy from Defined Measures, including Health and Safety Measures (101-150)".
- A dropdown menu with the text "Select a measure to copy".
- A label "Referenced Defined Measure" above a text box.
- A button labeled "Clear Reference to Defined Measure".

Below these columns is a large text area labeled "Comments".

At the bottom of the window is a toolbar with buttons: "New", "Copy", "Delete", "OK", "Apply", and "Cancel".

Can be used to enter necessary General Heat Waste, Repairs and Health and Safety measures associated with recommended energy measures and their costs. You can also use this form to enter your other DOE approved User Defined Measures not addressed

under the Measure Cost Set Library. The costs for these measures can be entered as the Sub Grantee receives and chooses the winning bid or contractor price for each measure from appropriate contractors. Please reference the NeWAP Policies and Procedures manual in the section labeled “Nebraska Specific User Defined Measures” on page 27 for more information.

Use the drop-down box to choose the applicable measure. NEAT and MHEA provide you with a mechanism to predefine measures that you commonly encounter by defining them in the Setup Library, then copying them into any audit to which they apply. NEAT and MHEA also allow you to copy from a library of predefined standard repair and health and safety measures that is a part of all setup libraries.

Use the "Clear Reference to User Defined Measure" button to eliminate the reference of the existing item definition on the Itemized Costs form to the pre-defined item in your Setup Library.

Incidental Repair Measure (IRM)

An IRM must be first attached to an ECM (for example gutters can be attached to attic, walls, or floor to solve moisture issues). That ECM must hold an allowable SIR. If the IRM materials and labor drop the ECM SIR below acceptable then you can enter it as an itemized cost with an SIR included, that way it adds that measure to your cumulative SIR.

An IRM according to DOE is "A repair necessary for the effective performance or preservation of newly installed weatherization materials, but not part of a standard installation. IRM installations must be associated with a specific ECM or group of ECMs. IRMs must be justified by written and photo documentation in the client file. IRM costs must be included the SIR calculation of the total package of weatherization measures."

Ancillary items are materials needed to properly perform that measure and are an allowable cost under the measure (for example insulation rods, baffles, junction markers, depth markers, etc. are all ancillary items.) For example IRM's could be things such as attic or crawl space access door repairs or replacement, wall ceiling or floor repairs, gutters, sump pumps, waterline insulation, are all incidental repairs and need to be listed that way in the work order as IRM materials and IRM labor.

Utility Bills

State of Nebraska does not use this section.

RUNNING NEAT AND VIEWING RESULTS

Audit recommendations – You can run NEAT after you have entered all the information for the house on the data input Forms. The Run on the Audit Dock link will be activated as soon as all the required data input Forms have been completed. When you select Run, the status of the run will be displayed, and the Recommended Measures Report will be opened in a separate window. Once an audit has been run, the link to View will be activated. You can select View to see a NEAT Recommended Measures Report that has already been created and saved from a previous run.

Figure 2.7 shows the title page of the NEAT Recommended Measures Report. The title page identifies your Agency, Account, Audit, and Audit Run; provides key information you have entered on the Agency, Account, and Audit Forms; and provides additional information about the audit run to track the audit results.

NEAT Recommended Measures Report	
Weatherization Assistant Online Version: 10.05.002	
AGENCY INFORMATION	
Agency:	ORNL
Address:	1 Bethel Valley Road, P.O. Box 2008, Oak Ridge TN
Phone Number:	855-241-5755
Email:	helpdesk@ornl.gov
ACCOUNT INFORMATION	
Account Name:	Audit Tool Comparisons
Account Number:	Audit Tool Comparisons
Other ID Number:	
Address:	NY
Comments:	
RETROFIT MEASURE RUN DETAILS	
Run On:	January 11, 2023 3:29 PM
Engine Version:	v10.05.002
Run Identifier:	20230111.032855338
AUDIT INFORMATION	
Audit Name:	Sample NEAT for manual
Audit Number:	2433
Auditor:	Jyothis Anand
Audit Date:	July 14, 2021
Last Edited On:	January 11, 2023 3:29 PM
Comments:	
Building Information	
Occupants:	3
Conditioned Stories:	1
Floor Area (sq ft):	789
Account Name: Audit Tool Comparisons Account Number: Audit Tool Comparisons Other ID Number: NEAT Recommended Measures Report Printed On: January 11, 2023 2:34 PM Page 1 of 5 Agency: ORNL Audit Name: Sample NEAT for manual Audit Number: 2433	

Figure 2.7 NEAT Recommended Measures Report: title page.

After the title page, the report lists all the recommended measures along with their estimated energy and cost savings, measure costs and SIRs, and primary material quantities needed to perform them (Figure 2.8).

Annual Energy and Cost Savings										
Index	Recommended Measure	Components	Heating		Cooling		BaseLoad		Total	
			(MMBtu)	(\$)	(kWh)	(\$)	(kWh)	(\$)	(MMBtu)	(\$)
1	Lighting Retrofits	LT1	0.0	\$0	0	\$0	206	\$30	0.7	\$30
2	Lighting Retrofits	LT2	0.0	\$0	0	\$0	263	\$38	0.9	\$38
3	Low Flow Showerheads	Water Heating	0.0	\$0	0	\$0	421	\$18	1.4	\$18
4	Water Heater Tank Insulation	Water Heating	0.0	\$0	0	\$0	476	\$21	1.6	\$21
5	Insulate and Seal Attic Access	Itemized Cost	0.0	\$0	0	\$0	0	\$0	0.7	\$9
6	Refrigerator Replacement	Refrigerator	0.0	\$0	0	\$0	1,915	\$277	6.5	\$277
7	Water Heater Pipe Insulation	Water Heating	0.0	\$0	0	\$0	260	\$11	0.9	\$11
8	Weatherize Window	WD3,WD1,WD2	6.0	\$77	-46	-\$7	0	\$0	5.9	\$70
9	General Air Sealing	Ducts/Infiltration	9.7	\$123	-22	-\$3	0	\$0	9.7	\$120
10	Water Heater Replacement	Water Heating	0.0	\$0	0	\$0	1,362	\$59	4.7	\$59

Economics						
Index	Recommended Measure	Components	Measure Savings (\$/yr)	Measure Cost (\$)	Measure SIR	
Incidental Repairs						
1	Repair Roof	51		\$0	\$80	0.00
Weatherization Measures						
2	Lighting Retrofits	LT1		\$30	\$24	9.58
3	Lighting Retrofits	LT2		\$38	\$32	9.17
4	Low Flow Showerheads	Water Heating		\$18	\$30	6.71
5	Water Heater Tank Insulation	Water Heating		\$21	\$45	4.48
6	Insulate and Seal Attic Access	Itemized Cost		\$9	\$30	4.17
7	Refrigerator Replacement	Refrigerator		\$277	\$800	4.07
8	Water Heater Pipe Insulation	Water Heating		\$11	\$30	3.68
9	Weatherize Window	WD3,WD1,WD2		\$70	\$300	1.80
10	General Air Sealing	Ducts/Infiltration		\$120	\$600	1.56
11	Water Heater Replacement	Water Heating		\$59	\$450	1.28
Total				\$652	\$2,421	2.67

*Total (Package) SIR excludes Health and Safety measures.

Materials				
Index	Material	Type	Quantity	Units
1	Weatherize Window	Weatherize Window Materials	10	Each Window
2	Water Heater Tank Insulation	Water Heater Tank Insulation Wrap	1	Each
3	Water Heater Pipe Insulation	R-1.85 (1/2") Water Pipe Insulation	1	Each
4	Low Flow Showerheads	Low Flow Showerhead	1	Each
5	General Air Sealing	General Air Sealing	1	Each Measure
6	Replacement Lighting	CFL Lamp 13.0 watts	4	Each
7	Replacement Lighting	CFL Lamp 15.0 watts	4	Each
8	New Refrigerator		1	Each
9	New Water Heater		1	Each
10	R-30 faced batt insulation		1	Each

Figure 2.8 NEAT Recommended Measures Report: recommended measures.

If you entered utility bills on the Utility Bills form, the report will also provide a revised set of tables for the recommended measures based on adjusted estimates of energy and cost savings and SIRs, and a comparison of NEAT's estimates of the house's heating and/or cooling energy consumptions with the utility bills. Notably, NEAT's estimates are based on TMY3 (Typical Meteorological Year 3) weather data, whereas the utility bills reflect energy consumption for the actual weather that occurred during the billing period. If you also entered degree days associated with the utility bills, they will be compared with the TMY3 weather data used to make the home's energy estimates so that you can determine the degree to which differences between predicted energy consumptions and utility bills might be due to weather differences.

The report also provides other information such as the annual loads and energy consumptions (in MMBtu/yr), peak (i.e., design) loads (in kBtu/hr), and output required (in kBtu/hr for heating and tons for cooling) for the house before and after weatherization (Figure 2.9).

House Loads and Energy Consumptions				
	Before Weatherization		After Weatherization	
	Heating	Cooling	Heating	Cooling
Annual Load (MMBtu/yr)	43.2	30.2	32.6	31.0
Annual Energy (MMBtu/yr)	63.9	8.8	48.1	9.1
Design Day Heat Loss/Gain (kBtu/hr)	37.9	16.1	34.5	15.0
Design Day Output Required (kBtu/hr)(ton)	45.5	1.6	39.7	1.5

Peak Heating Load				
Component Type	Component Name	Area or Volume (Infiltration)	Before Weatherization Load (Btu/h)	After Weatherization Load (Btu/h)
Wall (Btu/h)	WL1-N	348	3,096.3	3,096.3
Wall (Btu/h)	WL2-S	348	3,096.3	3,096.3
Wall (Btu/h)	WL3-E	624	5,552.1	5,552.1
Wall (Btu/h)	WL4-W	640	5,694.4	5,694.4
Window (Btu/h)	WD1	32	2,091.4	2,091.4
Window (Btu/h)	WD2	32	993.1	993.1
Window (Btu/h)	WD3	16	545.0	545.0
Door (Btu/h)	DR1	20	428.2	428.2
Door (Btu/h)	DR2	20	428.2	428.2
Attic (Btu/h)	A1	1,000	3,242.1	3,242.1
Foundation (Btu/h)	Crawlspace1	1,000	3,637.3	3,637.3
Infiltration (Btu/h)	Inf	16,000	9,144.5	5,715.3
Total heat loss (Btu/h)	Tot	0	37,949.1	34,519.9
Duct loss (Btu/h)	Duct	405	7,589.8	5,178.0
Output required (Btu/h)	Output	0	45,538.9	39,697.9

Peak Cooling Load				
Component Type	Component Name	Area or Volume (Infiltration)	Before Weatherization Load (Btu/h)	After Weatherization Load (Btu/h)
Wall (Btu/h)	WL1-N	348	899.8	899.8
Wall (Btu/h)	WL2-S	348	899.8	899.8
Wall (Btu/h)	WL3-E	624	1,613.4	1,613.4
Wall (Btu/h)	WL4-W	640	1,654.8	1,654.8
Window (Btu/h)	WD1	32	980.5	980.5
Window (Btu/h)	WD2	32	940.2	940.2
Window (Btu/h)	WD3	16	1,298.4	1,298.4
Door (Btu/h)	DR1	20	124.4	124.4
Door (Btu/h)	DR2	20	124.4	124.4
Attic (Btu/h)	A1	1,000	1,832.8	1,832.8
Foundation (Btu/h)	Crawlspace1	1,000	623.0	623.0
Infiltration (Btu/h)	Inf	16,000	3,340.8	2,272.8
People (Btu/h)	People	2	552.0	552.0
Appliances (Btu/h)	Appl	1	1,200.0	1,200.0
Total Sensible (Btu/h)	TotS	0	16,084.5	15,016.4
Ducts (Btu/h)	Ducts	0	2,412.7	2,252.5
Total (with ducts) (Btu/h)	TotW	0	18,497.2	17,268.9
Size (tons)	Size	0	1.5	1.4
Latent Load (inf) (Btu/h)	LatentI	0	0.0	0.0
Latent Load (occ) (Btu/h)	LatentO	0	460.0	460.0
Latent Load (tot) (Btu/h)	LatentT	0	460.0	460.0
Total Load (Btu/h)	Total	0	18,957.2	17,728.9
Size (tons)	Size	0	1.6	1.5

Figure 2.9 NEAT Recommended Measures Report: annual loads, energy consumption, and peak load components before and after weatherization.

Reports – The Reports drop-down field on the Audit Dock is used to select two reports associated with the NEAT audit (attached below). The Audit Input report provides a printout of all the inputs made in NEAT. The Audit Recommendations report provides the NEAT Recommended Measures Report for the most recent run of the audit (equivalent to the View link).

NEAT WORK ORDER FORMS

A work order is typically created for the measures recommended by running an audit. To create a work order for a previously run NEAT audit, select View at the bottom of the Audit

Dock. This will open the Recommended Measures Report in a separate window. Switch to the Weatherization Assistant window and select the View Measures button on the task bar at the bottom of the NEAT Audit Recommendations window (Figure 2.10) to open the Audit Run Measures form.

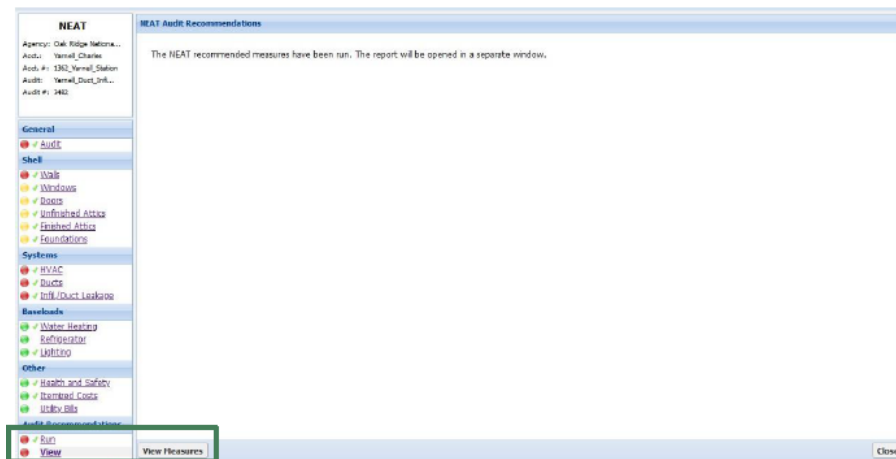


Figure 2.10 NEAT audit showing View and View Measures

The Audit Run Measures form (Figure 2.11) displays seven buttons at the top, the Audit Run Measures sub-form in the middle, and the Unit Costs for Measure: [Measure Name] table at the bottom. The Select All, Unselect All, Invert Selections, Same Contractor, and Same Cost Center buttons help users complete the Audit Run Measures sub-form quickly. The Create Work Order button creates work orders based on information provided in the Audit Run Measures sub-form. The Close button exits the form.

Audit Run Measures

Select All Unselect All Invert Selections Same Contractor Same Cost Center Create Work Order Close

#	Measure Name	Contractor/In-House Crew	Cost Center	Components	Work Order	Estimated Cost	STR
1	Repair Roof			Itemized Cost	☒	\$80.00	0.0
2	Lighting Retrofits			LT1	☒	\$24.00	9.6
3	Lighting Retrofits			LT2	☒	\$32.00	9.2
4	Low Flow Showerheads			Water Heater	☒	\$30.00	6.7
5	Water Heater Tank Insulation			Water Heater	☒	\$45.00	4.5
6	Insulate and Seal Attic Access			Itemized Cost	☒	\$29.60	4.2
7	Refrigerator Replacement			Refrigerator	☒	\$800.00	4.1
8	Water Heater Pipe Insulation			Water Heater	☒	\$30.00	3.7
9	Weatherize Window			WD3,WD1,WD2	☒	\$300.00	1.8
10	General Air Sealing			Ducts/Infiltration	☒	\$600.00	1.6
11	Water Heater Replacement			Water Heater	☒	\$450.00	1.3

Unit Costs for Measure: Water Heater Replacement

Component	Cost Type	Measure Description	Quantity	Units	Unit\$	Comment
Water Heater	Installation	New Water Heater, 50 gal, Natural Gas, S...	1	Each	\$450.00	Cost from form
Water Heater	Additional	New Water Heater, 50 gal, Natural Gas, S...	1	Each	\$0.00	Cost from form

Figure 2.11 Audit Run Measures form.

The Audit Run Measures sub-form displays (a) un-editable fields under columns # (that reflect the order in which measures appear on the Recommended Measures Report), Measure Name, Components (that show the name of component[s] associated with

the measure), and Estimated Cost and SIR (that display the measure cost and SIR used by the audits to make their initial recommendations); (b) drop-down fields under Contractor/In-House Crew and Cost Center columns, which allow you to assign each measure to a contractor and the cost of implementing each measure to a funding source or program, respectively; and (c) checkboxes under the Work Order column to indicate which measure to transfer to the work orders.

The Unit Costs for Measure: [Measure Name] table shows a breakdown of Estimated Cost for a measure selected in the Audit Run Measures sub-form. For a selected measure, the table lists as many cost types as were defined in the Retrofit Cost Details or Defined Measures library Forms and in various building description Forms. For each cost type, Measure Description, Quantity, Unit, Units\$ (i.e., cost per unit), and Comment specifying the source form for the cost per unit are displayed.

To create work orders, you must select the checkbox under the Work Order column for each measure you want transferred to a work order. Measures not selected will not be sent to a work order. You may prefer to not send a specific measure to a work order if a work order already exists that includes the measure or if you do not want to consider certain recommended measures. You may use the Select All, Un-Select All, and Invert Selections buttons to select all recommended measures, unselect all, or invert the current selections.

You may select a Contractor/In-House Crew to assign each measure to a contractor. The selection will determine how many work orders are created from the measure list. All measures assigned the same contractor will be included in the same work order. The choices displayed in the drop-down list will be all agency contacts defined as Contractor or Crew on the Agency Contact form. All measures with an unassigned Contractor that are selected for transfer to a work order will be assigned to the same work order with the contractor undesignated. After assigning one measure to a contractor, you may use the Same Contractor button to assign all additional measures to that contractor.

If you are tracking costs incurred by different funding sources or programs, you may select a Cost Center to assign the cost of implementing each measure to the appropriate Cost Center. The choices available in the drop-down list will be those you have defined on the Agency Cost Center form. If the entry is left un- assigned, work orders can still be developed, but total costs over multiple audits will not be tracked. The costs assigned to the various cost centers are not the Estimated Costs. They are the actual costs declared in the work orders themselves. After assigning one measure to a cost center, you may use the Same Cost Center button to assign all measures to that cost center.

When you are ready to create the work orders based on the information provided on the Audit Run Measures sub-form, select the Create Work Order button. If you have

previously created work orders from this specific audit, the Create Work Order pop-up form (Figure 2.12) will be displayed and will ask your preference among three options:

- Save the previously generated Work Order and create new ones,
- Replace the previously generated Work Order with new ones, or
- Cancel the creation of Work Orders.

Select an option and then select OK to save and close the pop-up form. Any work orders not created from this audit will be unaffected by the request to create work orders from the Audit Run Measures form of this audit. Thus, if you used the Work Orders form from the menu bar to create work orders for an account, then you ran an audit for the same account and were asked to create work orders based on the audit recommendations, the two sets of work orders would exist for the same client. This is intended to address situations where agencies may implement some measures outside an audit (such as from a priority list) but use the audit for recommendations on other measures.

Figure 2.12 Create Work Order pop-up form.

The program will next display the Information pop-up window (Figure 2.13) indicating how many work orders were created because of your selections on the Audit Run Measures sub-form. This should correspond to the number of unique contractors (including undesignated) that you indicated on the Audit Run Measures sub-form. Select OK to acknowledge and close the pop-up window. Select Close to exit the Audit Run Measures form.

#	Measure Name	Contractor/In-House Crew	Cost Center	Components	Work Order	Estimated Cost	SIR
1	Repair Roof	General Contractor	Weatherization Funding	Itemized Cost	☒	\$80.00	0.0
2	Lighting Retrofits	Electrical Contractor	Weatherization Funding	LT1	☒	\$24.00	9.6
3	Lighting Retrofits	Electrical Contractor	Weatherization Funding	LT2	☒	\$32.00	9.2
4	Low Flow Showerheads	General Contractor	Weatherization Funding	Water Heater	☒	\$30.00	6.7
5	Water Heater Tank Insulation	General Contractor	Weatherization Funding	Water Heater	☒	\$45.00	4.5
6	Insulate and Seal Attic Access	General Contractor	Weatherization Funding	Itemized Cost	☒	\$29.60	4.2
7	Refrigerator Replacement	Electrical Contractor		Refrigerator	☒	\$800.00	4.1
8	Water Heater Pipe Insulation	Mechanical Contractor		Water Heater	☒	\$30.00	3.7
9	Weatherize Window	General Contractor		Window, WD1, WD2	☒	\$300.00	1.8
10	General Air Sealing	General Contractor		Seals/Infiltration	☒	\$600.00	1.6
11	Water Heater Replacement	Mechanical Contractor		Water Heater	☒	\$450.00	1.3

Figure 2.13 Information pop-up window for successfully created work orders.

After creating work orders from the audit recommendations, you may access them from the All table on the Work Order Details form (Figure 2.14) and view measure details on

the Work Order Measures form (Figure 2.15). See Section 1.8 for information about making changes to a work order or measure details.

The screenshot shows the 'Work Order Details' form with the 'Work Order Measures' tab selected. The form contains several sections:

- Work Order Information:** Includes fields for Work Order (Sample NEAT Audit 0_WO_003), Account Name (Sample Account), Account Number (S001), Agency (Sample Agency), State (TN), Audit Name (Sample NEAT Audit 0), Supply Library (Sample Supply Library), Contractor/Crew (Mechanical Contractor), and Work Order Type (Weatherization).
- Account Information:** Includes Client Name and Alt Id fields.
- Work Order Economic Summary:** Includes Number of Active Measures, Cumulative Estimated Cost, and Cumulative Actual Cost fields.
- Status:** A section titled 'Work Order Status' showing a table with columns: Status Type, Current Status, Updated By, Comments, Date, and Revised On. The table contains one record: 'Work Order' created from the Measures form on 03-27-2024.
- Comments:** A text area for adding comments.
- Buttons:** New, Copy, Delete, Work Order, OK, Apply, Cancel.
- All Work Orders (90):** A table listing all work orders with columns: Agency, Work Order, Account Name, Account Number, Audit Name, Audit #, Audit Type, and Last Edited. It shows three records for Sample Agency.

Figure 2.14 Work Orders created for a NEAT audit.

The screenshot shows the 'Work Order Measures' form with the 'Work Order Measures' tab selected. The form contains several sections:

- Work Order:** Sample NEAT Audit 0_WO_003.
- Measure Type:** Baseloads.
- Measure Name:** Water Heater Pipe Insulation.
- Order #:** (Empty field).
- Active:** ☒.
- Components:** Water Heater.
- Cost Center:** Weatherization Funding.
- Show Components:** (Link).
- Materials/Labor Details:** A table with columns: #, Type, Copy From Supply, Description, Units+, Est Qty, Est\$/Unit, Est Total, Act Qty, Act\$/Unit, and Act Total. It lists three items: Hot Water Equipment (R-1.85 (1/2") Water Pipe Insulation) with estimated quantities of 5, 10, and 15.
- Comments:** A text area for adding comments.
- Buttons:** New, Copy, Delete, Measure, OK, Apply, Cancel.
- All Work Order Measures (2):** A table listing all measures with columns: Measure Name, Components, Cost Center, and Last Edited. It shows two records: 'Water Heater Pipe Insulation' and 'Water Heater Replacement'.

Figure 2.15 Work Order measure details for a NET measure.

MHEA Audit

Audit Form

To start a new MHEA audit, go to the **Audit** menu, choose **MHEA**, and then click **New** on the Audit form. (Note: users with State Administrator or Guest roles do not have permission to create new audits.)

If you want to base a new audit on an existing one, select **Copy**. This is useful when running multiple scenarios for the same home, such as comparing different retrofit strategies or equipment options while still keeping earlier results available for reference.

When creating a new audit using **New**, fill in the Audit form first before entering information on the other forms.

Manufactured Home Energy Audit (MHEA)			
Agency:	Oak Ridge National Laboratory	Audit Date:	08-08-2022
Account Name:	Duct-Envelope Sealing Tests	Auditor:	Charles Amoo
Account Number:	NEAT-MHEA INF-Ducts-1	City:	Anytown
Audit Name:	Bl Testing - Engine 495	State:	TN
		Audit Number:	3534
Building Information			
Occupants:	6	Number of Bedrooms:	2
Length (ft):	50	Wind Shielding:	Normal Shielding
Width (ft):	12	Outdoor Water Heater Closet:	☐
Exterior Wall Height (ft):	7.5		
Infiltration Height (ft):	7.5		
Libraries			
Weather State:	LA	Fuel Cost Details	
Weather Station:	Baton Rouge Metropolitan Airport	Electricity:	2020 - Average US Residential Electricity Costs
Economic Parameters:	2020 - Residential US Average Ec	Cost:	0.1309 per kWh
Measure Costs:	Default (ORNL) MHEA Measure Co	Natural Gas:	2020 - Average US Residential Natural Gas Costs
Key Parameters:	Default MHEA Key Parameters v1.0	Cost:	9.85 per Mcf
Supply Library:	Test Supply Library	Propane/LPG:	2020 - Average US Residential Propane Costs
Defined Measures:	ORNL Initial Defined Measures	Cost:	1.926 per Gallon
Billing Adjustment:	☐	Fuel Oil:	None
		Cost:	0 per N/A
		Kerosene:	None
		Cost:	0 per N/A
		Wood:	None
		Cost:	0 per N/A
		Coal:	None
		Cost:	0 per N/A
		Other:	None
		Cost:	0 per N/A
New Copy Delete OK Apply Cancel			

The **Audit Form** is where you enter basic project details and choose the weather data files and libraries required to run the audit. Any fields that are active (not grayed out or read-only) must be completed.

Start by selecting your **Agency** at the top of the form. Then identify the account by entering either the **Account Name** or **Account Number**—once one is entered, the other will populate automatically based on the Account form.

Next, provide an **Audit Name** and the **Audit Date**. Choose the **Auditor Name** from the drop-down list, which includes all users within the Agency who are designated as both Active and assigned as an Auditor.

The **City** and **State** fields will automatically populate from the Account information, and the **Audit Number** will be generated by MHEA.

Building information

Occupants - Number of occupants on the LIHEAP application.

Length, Width, Exterior Wall Height, Infiltration Height, and Number of bedrooms -

Enter a value in the length, width, exterior wall height, infiltration height, and number of bedrooms.

Infiltration height is defined as the vertical distance between the highest and lowest above grade points within the pressure boundary according to ASHRAE 62.2.

Wind Shielding - Choose from the drop-down list the shielding that best describes the shielding of the mobile home.

Check the box if there is an outdoor water heater closet door present.

Libraries

Weather State - Select the closest State to the house you are modeling.

Weather Station - Select the closest city to the house you are modeling.

Economic Parameter Set, Measure Cost Set, Key Parameter Set, Supply Library, and

Defined Measure Set - Choose from the drop down the library associated with your Agency. In some cases, there might be more than one Library listed, so make sure you are choosing the correct Library.

Fuel Cost Detail - Select for the drop down the library fuel cost associated with your Agency.

For MHEA, to adjust energy savings estimates and recommend measures based on the actual pre-weatherization energy consumption of the home, select the **Billing Adjustment** checkbox.

General Information Block

MHEA
Agency:
Acct. #:
Audit #:

General

● **Audit**

Shell

● Walls

● Windows

● Doors

● Ceiling

● Floor

Addition

● Walls

● Windows

● Doors

● Ceiling

● Floor

Systems

● HVAC

● Ducts

● Ducts/Infiltration

Baseloads

● Water Heating

● Refrigerator

● Lighting

Other

● Health and Safety

● Itemized Costs

● Utility Bills

Audit Recommendations

● Run

● View

Reports ▼

Icon Key

● Form is Required

● Form is Recommended

● Form is Optional

✓ Form is Completed

The General Ledger is located at the left side of the MHEA audit tool. All sections of the ledger will remain shaded gray until an audit is created. The “Apply” button will need to be clicked on to populate the ledger.

Red Dot – Form is required for the audit to run.

Yellow Dot – Form is recommended. Although data is not required to run audit it is recommended you enter data into yellow dot fields.

Green Dot – Form is optional. Although data is not required to run audit there are some optional fields that if applicable to the house you are working on you need to enter data into (ducts, water heater, refrigerator, lighting, and itemized costs). Note: ducts on the ledger are a green dot and is considered an option field. However, if you enter a heating that delivers air through a duct system, the ducts from will turn red and becomes a required field.

Check Mark – Form is completed. When all required information is entered into the form there will be a check mark placed next to the dot to indicate the form is completed.

Also note the Icon Key at the bottom for reference. Selecting “Run” for Audit Recommendations is not available until all required items are checked off.

After running the audit, the recommendation report should open automatically for you to view and see what measures the audit has recommended. If at any time you want to review the audit input and recommendation reports after you have closed out of the reports, select the Reports button and choose from the list the report you want to reopen. It is from the reports button you can also save or print the reports.

Shell Forms

Shell Forms are used to describe the walls, windows, doors, ceiling, and floor of a manufactured home. Use these Forms to describe all the shell components in the home that define thermal boundary (as illustrated in Figure 3.5), select retrofit options, and describe any additional costs associated with the installation of the retrofit unique to the home being audited that is not described in the Measure Cost Set Library. Each of the shell Forms is required.



- | | |
|-------------------------|-------------------------|
| 1. Main beam | 7. Top plate |
| 2. Band joist | 8. Ceiling joist cavity |
| 3. Rough window opening | 9. Wall section |
| 4. Bowstring trusses | 10. Rough door opening |
| 5. Floor joists | 11. Vapor barrier |
| 6. Heating/AC duct | 12. Blown-in insulation |

Figure 3.5 Typical Mobile Home Components.

Wall Forms

Walls

Wall Information

Wall Stud Size:

Orientation of Long Wall:

Wall Ventilation:

Uninsulatable Wall Area (sq ft):

Additional Cost (\$):

Existing Insulation

Batt/Blanket (in):

Loose Fill (in):

Foam Core (in):

Carport/Porch Roof

Carport/Porch Present: ☐

Length (ft):

Width (ft):

Orientation:

Comments

Delete

OK

Apply

Cancel

Required and used to describe the four primary walls of the home that enclose the conditioned space of the home.

MHEA assumes that a manufactured home is rectangular in shape, the walls are wood-frame construction, and the walls facing different orientations have identical construction characteristics; therefore, MHEA uses only one form to describe all four primary walls (not including any addition that will be described on the addition tab of MHEA).

Wall Information

Wall Stud Size - Select the stud size used in framing the walls. The choices are 2×2, 2×3, 2×4, and 2×6. MHEA uses this information to calculate the wall R-value and the volume of wall cavity available for added insulation. Required.

Orientation of Long Wall - Select the closest compass direction that one of the long walls of the home faces. The choices are North, South, East, and West. For this entry, MHEA considers North the same as South and East the same as West, but you might adopt a convention such as entering the orientation of the front wall as the long wall. MHEA uses this information to calculate solar loads on the home. Required.

Wall Ventilation - Indicate whether the walls are vented or not vented. The walls of the mobile home may be intentionally ventilated to remove accumulated moisture by having

corrugated metal siding open at the bottom to provide space for air to flow between the exterior and interior wall materials. Small holes in the siding at the bottom and top of the exterior wall surface may be visible, allowing the air to circulate. MHEA degrades the wall R-value for ventilated walls. Required.

Uninsulatable Wall Area - Enter a numeric value.

Additional Cost - This field is used to add or subtract any additional cost associated with the walls you are modeling (additional labor, and ancillary costs).

Existing Insulation

Batt/Blanket, Loose Fill, or Foam Core - Enter the thickness of existing insulation type in inches. Enter 0 for insulation types that do not exist. MHEA uses this information to calculate the wall R-value and the volume of wall cavity available for additional insulation. A default value of 3.5 inches exists. Required.

Carport/Porch Roof

Carport/Porch Roof Present – Check box if carport, or porch roof is present. A carport/porch roof is a shelter with no walls that extends out from one wall of the mobile home. Often, this shelter is used to park a car or shade an outdoor sitting area.

Length, and Width - Enter the length and width of this carport/porch roof in feet. The length is the dimension parallel to the mobile home.

Orientation - Choose from the drop-down list the orientation of the carport/porch.

Windows Forms

The screenshot shows the 'Windows' form in a software application. The form is titled 'Windows' and has a tab labeled '* New Window *'. It is organized into several sections:

- Existing Window:** Contains fields for Window Code, Window Type, Frame Type, Glazing Type, Storm Window, Interior Shading, Exterior Shading, Overhang/Awning (Horizontal Projection (in) and Distance from Lintel (in)), Leakiness, Width (in), and Height (in).
- # of Windows on:** Contains fields for North, South, East, West, and Roof.
- Retrofits:** Contains a dropdown for Retrofit Options, a checkbox for Include in SIR, and a sub-section 'Additional Costs' with fields for Window Sealing (\$/window), Replacement (\$/window), Glass Storm (\$/window), and Plastic Storm (\$/window).
- Retrofits Table:** A table with columns 'Evaluate All', 'Clear All', and 'Additional Cost (\$/Window)'. It contains three rows: 'Weatherize Window', 'Replace Window', and 'Add Storm Window'. Each row has checkboxes for 'Required' and 'Include in SIR' and a field for 'Additional Cost (\$/Window)'. The 'Weatherize Window' row also has a 'Glazing Type' dropdown.
- Comments:** A large text area at the bottom for entering comments.

Required. Used to describe all the windows of the home (not including any addition that will be described on the addition tab of MHEA). The number of each type of window entered is entered by its orientation.

Existing Window

Window Code - Enter a unique code for each window in the audit. The window code identifies window sections to you and the Weatherization Assistant.

Window Type, Frame Type, Glazing Type, Storm Window, Interior Shading, Exterior Shading, Leakiness, and Wall Code - Choose from the drop-down lists that best describes the window you are modeling.

Exterior Shading if you select overhang or awning from the drop down in the exterior shading field, the Overhang/Awning field will appear, and you will need to add numbers in inches to the Horizontal Projection and Distance from Lintel field. Note: If the distance from the Lintel to the overhang is greater than 24" you do not need to model the window with an overhang. If the windows are like kind windows on the same side of the house and some have overhangs within the 24" of the lenthils and the other don't, you will need to model those windows separately.

When selecting the leakiness of the window refer to [Microsoft Word - Window leakiness](#) for the correct selection.

Width & Height - Enter the width and height of windows in the width and height fields. Enter total number of windows on the wall in the number on this wall field.

of Windows – Enter the number of windows that corresponds to each side of the home.

Window Retrofit

When replacing a window, you need to make sure you are modeling the window by itself. You need to check the Replacement Window box, (do not check the Required box, or Include in SIR), choose the glazing type of the new window from the drop box, and add the U-value and SHGC (window manufacture) of the window you are replacing. Run the audit to see if the window can be replaced as an energy conservation measure ECM. If the audit doesn't call for the window to be replaced as an ECM, you can then request to DWEE to replace the window with Non DOE funds (Beyond Repair). Note: good documentation of why the window needs to be replaced (documentation, pictures, etc.) must be in the file. Windows can't be replaced if there isn't anything wrong with the window. Make all attempts to repair the window before you model the window to be replaced.

Additional cost - Add any additional ancillary costs to this field. If there are any additional repair cost associated with the replacement of the window (repairing sill, window frame, stool, etc.), you will need to enter those costs as an itemized cost in the Itemized cost tab and make the SIR box is checked, and make sure you tie the repair to the ECM of the window replacement if the audit calls for the window to be replaced as an ECM.

Door Forms

The screenshot shows a software window titled "Doors" with a tab labeled "* New Door *". The window contains three main sections of input fields:

- Existing Door:** Includes fields for Door Code, Door Type (a dropdown menu), Width (in), Height (in), Storm Door Present (a checkbox), and Leakiness (a dropdown menu).
- Number of Doors Facing:** Includes four input fields for North, South, East, and West.
- Retrofits:** Includes three checkboxes: Replacement Door Required, Include in SIR, and an input field for Additional Cost (\$/door).

At the bottom of the form is a large text area labeled "Comments". The bottom of the window has a toolbar with "New", "Copy", and "Delete" buttons on the left, and "OK", "Apply", and "Cancel" buttons on the right.

Required. Used to describe all the exterior doors of the home. The number of each type of door entered is entered by its orientation.

Existing doors

Door Code - Enter a unique code for each wall in the audit.

Door type, Storm door condition, Leakiness, and Wall Code - Choose from the drop-down lists that best describes the door you are modeling.

Width & Heights - Enter width and height of door to width and height field.

Storm Door Present - Check box if storm door present and in good condition.

Leakiness – Choices are Tight, Medium, Loose.

Door Leakiness Guide:

- Tight fitting doors will be structurally sound and have fully functioning weather stripping including a tight fitting door sweep
- Medium fitting doors are in need of weatherstripping
- Loose fitting doors will be ill-fitted and have structural problems, noticeable leakage sites, and no or non-functioning weather-stripping.

Number of Doors Facing - Enter total number of doors on the wall in the number on this wall field.

Door Retrofit

When replacing a door, you need to make sure you are modeling the Door by itself. NeWAP required door replacements to have an NFRC (National *Fenestration* Rating Council) tested U-factor of 0.17 or lower as well as other requirements. See Section 4.08 in the NeWAP Field Guide.

Do not check the Replacement Door Required box. Run the audit to see if the door can be replaced as an energy conservation measure ECM. If the audit doesn't call for the door to be replaced as an ECM, you can then request to DWEE to replace the door using Non DOE funds (Beyond Repair).

Note: good documentation of why the door needs to be replaced (documentation, pictures, etc.) must be in the file. Doors can't be replaced if there isn't anything wrong with the door. Make all attempts to repair the door before you model the door to be replaced.

Additional Cost - Add any additional ancillary costs to this field. If there are any additional cost associated with the replacement of the door (door frame, threshold, etc.), you will need to enter those costs as an itemized cost in the Itemized cost tab and make the SIR box is checked, and make sure you tie the repair to the ECM of the door replacement if the audit calls for the door to be replaced as an ECM by putting comments in the Note section.

Note: The audit will not allow you to model a door on a buffer wall. So, if you need to replace a door on a buffer wall you will need to replace it as a Beyond Repair measure using Non DOE funds.

Ceiling

Ceiling Information

Roof Type:

Roof Color:

Joist Size:

Height of Roof at Center (in):

Insulation to Add at Center (in):

Additional Cost (\$):

Existing Insulation

Batt/Blanket (in):

Loose Fill (in):

Foam Core (in):

Cathedral Ceiling Information

Cathedral Ceiling (%):

Step Wall Orientation:

Comments

Delete

OK

Apply

Cancel

Required. Used to describe the ceiling (i.e., the roof) in the home (not including any addition that will be described on the addition tab of MHEA). To describe a roof, you must first select the roof type from the following options: Flat, Bowstring, and Pitched (Figure 3.6), enter the joist size for flat roofs, height of roof at center for bowstring roofs, or desired amount of insulation to add at center for pitched roofs (Figure 3.7); select the roof color; and describe the cathedral ceiling if one exists (see Figure 3.8 and Figure 3.9 for different cathedral ceiling configurations).

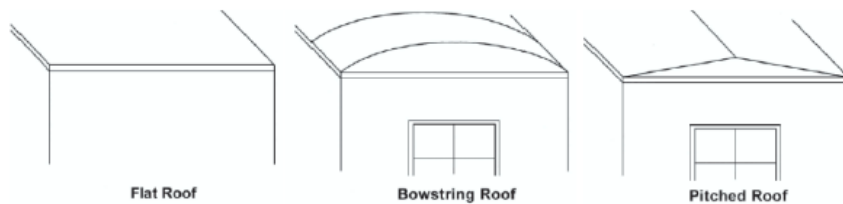


Figure 3.6 Typical manufactured roof configurations.

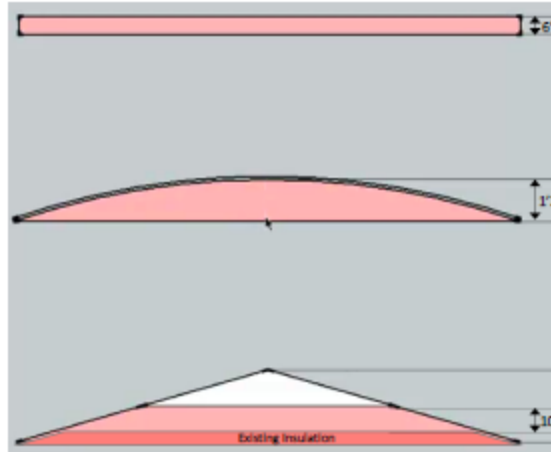


Figure 3.7 Section drawings of manufactured home roof configurations (from top to bottom: flat roof, bowstring roof, pitched roof).

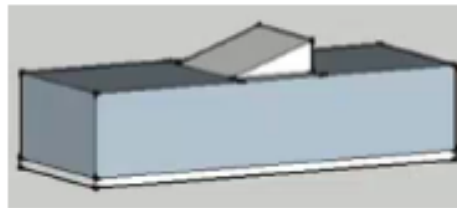


Figure 3.8 Sloped roof cathedral ceiling with step wall, typical with flat roofs.

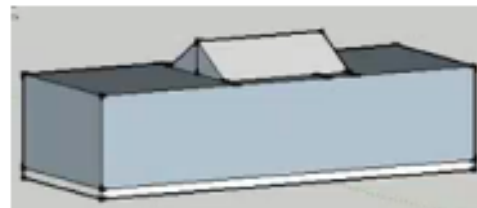


Figure 3.9 Cathedral ceiling configuration with no step wall, typical with pitched roofs.

Ceiling Information

Roof Type - Select the type of roof on the manufactured home: Flat, Bowstring, or Pitched.

Note: The ceiling screen will change depending on the roof type you enter.

Flat

Joist Size - Choose the appropriate joist size: 2x4, 2x6, or 2x8.

Bowstring

Height of Roof at Center - For bowstring roofs, enter the maximum height of the roof above the ceiling, in inches, disregarding any existing insulation.

Pitched

Insulation to Add at Center - Enter the number of inches of insulation you wish to consider adding to the existing insulation (if any). MHEA will not consider adding more than 12 inches of insulation.

Roof Color - From the drop-down list, enter the color of the roof: White, Reflective or Shaded, or Normal or Weathered. This field is important to complete because the color of the roof affects how solar energy impacts the heating and cooling loads of the addition.

Existing Insulation Section

Batt/Blanket - Enter the amount of existing insulation.

Loose Fill - Enter the amount of existing insulation.

Foam Core - Enter the amount of existing insulation.

Cathedral Ceiling Information

Cathedral Ceiling - Enter the percentage of floor area that is below an elevated portion of the ceiling.

Additional Cost - This field is used to add or subtract any additional cost associated with the roof you are modeling (additional labor, and ancillary costs).

Comment - Enter any comments associated with the ceiling here.

Floor Forms

Floor

Floor Information	Wing Description	Belly (Center) Description
Floor Joist Direction:	Floor Joist Size:	Floor Joist Size:
Skirt Present: ☐	Batt/Blanket Insulation Location:	Belly Cavity Configuration:
Additional Cost (\$):	Batt/Blanket Insulation Thickness (in):	Condition of Belly:
	Loose Insulation Thickness (in):	Maximum Depth of Belly Cavity (in):
		Batt/Blanket Insulation Location:
		Batt/Blanket Insulation Thickness (in):
		Loose Insulation Thickness (in):

Comments

Required. Used to describe the floor of the home, defined in MHEA to comprise wing and belly sections (Figure 3.10) (not including any addition that will be described on the addition tab of MHEA). The wing and belly sections are protected from outside elements (including water, wind, and rodents) using an insulation wrap attached to the underside of the floor joists. The space available for adding insulation depends on the direction and size of the floor joists, the location and thickness of the existing insulation in the wing and belly sections, and the belly cavity configuration (Figure 3.11). The manufactured home may also have skirting installed around the perimeter. When belly is damaged with missing insulation belly shall be listed as in poor condition and insulation levels derated using deration.

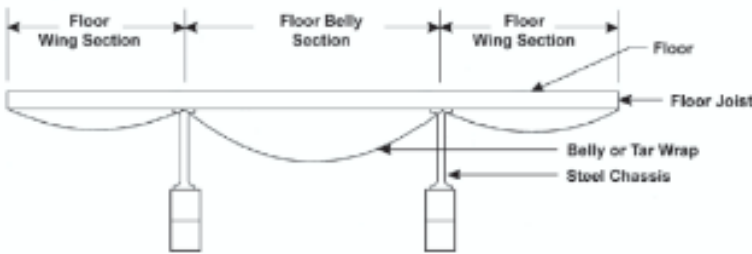


Figure 3.10 Widthwise floor joist direction.

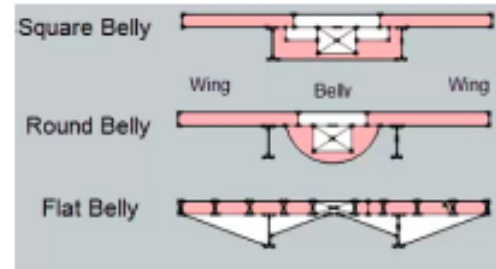


Figure 3.11 Typical manufactured home belly configuration.

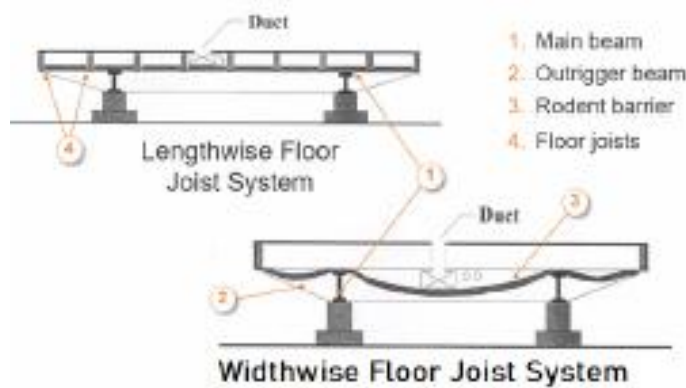


Figure 3.12 Manufactured home joist spacing and direction.

Floor Information

Floor Joist Direction - Enter the direction the floor joists are running. Use the drop-down box to make your selection: Lengthwise or Widthwise.

Skirt Present - Check this checkbox if a skirt is present.

Additional Cost - This field is used to add or subtract any additional cost associated with the floor you are modeling (additional labor, and ancillary costs).

Wing Description

Floor Joist Size - From the drop-down list, enter the size of the floor joist. Sizes to select from are: 2X4, 2X6, or 2X8.

Batt/Blanket Insulation Location - Indicate where the batt/blanket insulation is located in the wing sections. Refer to the illustration above. Select from the drop-down list: Attached to Flooring, Between Joists, Attached Under Joists, or None.

Batt/Blanket Insulation Thickness - Enter the amount of existing batt\blanket and loose-fill insulation. By entering a value greater than 0 inches, you are implying that the insulation exists. If you enter a thickness of 0 inches, MHEA assumes insulation of that type does not exist.

Loose Insulation Thickness - Enter the amount of existing batt\blanket and loose-fill insulation. By entering a value greater than 0 inches, you are implying that the insulation exists. If you enter a thickness of 0 inches, MHEA assumes insulation of that type does not exist.

Belly (Center) Description

Floor Joist Size - From the drop-down list, enter the size of the floor joist. Sizes to select from are: 2x4, 2x6, or 2x8.

Belly Cavity Configuration - Enter the configuration of the belly center cavity. The belly cavity is the deep section that runs the length of the home and usually houses the main supply air duct. Make your selection from the drop-down list: Square, Rounded, or Flat.

Condition of Belly - Enter the condition of the existing belly wrap. Choose from: Good, Average, or Poor.

Maximum Depth of Belly Cavity - Enter the maximum depth of the belly (in inches) as measured from the underside of the flooring to the lowest part of the belly.

Batt/Blanket Insulation Location - Indicate where the batt/blanket insulation is located in the wing sections. Refer to the illustration above. Select from the drop-down list: Attached to Flooring, Between Joists, Attached Under Joists, or None.

Batt/Blanket Insulation Thickness - Enter the amount of existing batt\blanket and loose-fill insulation. By entering a value greater than 0 inches, you are implying that the insulation exists. If you enter a thickness of 0 inches, MHEA assumes insulation of that type does not exist.

Loose Insulation Thickness - Enter the amount of existing batt\blanket and loose-fill insulation. By entering a value greater than 0 inches, you are implying that the insulation exists. If you enter a thickness of 0 inches, MHEA assumes insulation of that type does not exist. If insulation is partially

missing, derate it as appropriate. Refer to the table below or [Parallel Path R-Value - Residential Energy Dynamics \(redcalc.com\)](http://redcalc.com).

Table VI-1 -- Effective R-values of Batt Insulation

Measure d Batt Thickne ss (inches)	"Good" Effectiv e R- value (2.5 per inch)	"Fair" Effectiv e R- value (1.8 per inch)	"Poor" Effectiv e R- value (0.7 per inch)	1. Measure the insulation thickness. 2. Determine the condition of the installation using the following criteria: ☐ Good – No gaps or other imperfections ☐ Fair – Gaps over 2.5% of the insulated area. This equals 3/8 inch spacing along a 14.5 inch batt. ☐ Poor – Gaps over 5% of the insulated area. This equals 3/4 inch space along a 14.5 inch batt. 3. Look up the effective R-value of the installed insulation using the condition and measured inches.
0	0	0	0	
1	3	2	1	
2	5	4	1.5	
3	8	5	2	
4	10	7	3	
5	13	9	3.5	
6	15	11	4	
7	18	13	5	
8	20	14	5.5	
9	23	16	6	
10	25	18	7	
11	28	20	8	
12	30	22	8.5	

Addition Forms

Addition Forms are used to describe the walls, windows, exterior doors, ceiling, and floor of a conditioned room attached to the manufactured home. MHEA assumes that the manufactured home addition is rectangular in shape with wood-frame construction and has three exposed walls, a flat, shed or gable roof, and a crawlspace, slab on grade, or exposed floor (see Figure 3.13, Figure 3.14, and Figure 3.15). Use these Forms to describe all the shell components in the addition through which heat flows, select retrofit options, and describe any additional costs associated with the installation of the retrofit unique to the house being audited that are not described in the Measure Cost Set Library. If there is no addition, you do not need to access the addition Forms. However, if entry is begun on any one of the addition Forms, then the Walls form, Ceiling form, and Floor form must be completed. The Window and Door Forms are optional.

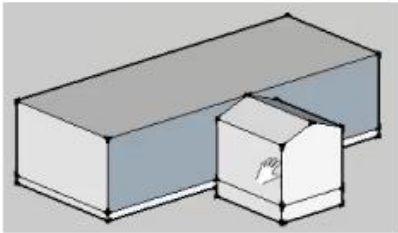


Figure 3.13 Gable roof configuration.

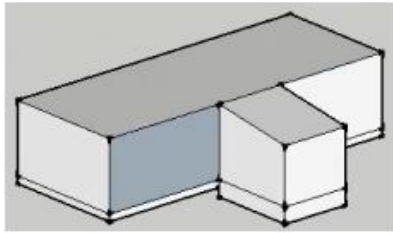


Figure 3.14 Shed roof configuration.

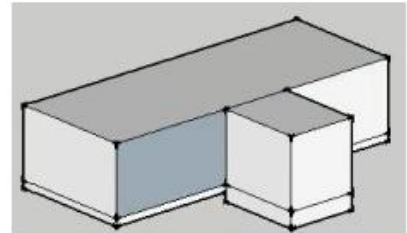


Figure 3.15 Flat roof configuration.

Systems Forms

Systems Forms are used to describe the HVAC systems, ducts, and duct leakage and infiltration associated with a manufactured home. You must enter one heating system and enter infiltration data on the Ducts/Infiltration form to meet the minimum requirements of MHEA. The remaining Forms are optional unless deemed required based on other inputs. For example, the Duct form may be required depending on HVAC entries. The selections made in the HVAC form, especially with regard to heating, will determine whether the duct form remains optional or becomes required. In most homes, though, both heating and cooling systems will be entered on the HVAC form.

HVAC Form

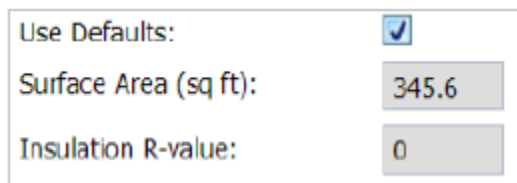
Required. Please see the NEAT section on inputting data into the MHEA HVAC section for more information. The HVAC section in MHEA is used to describe the heating and cooling equipment installed in the house and select retrofit options. In MHEA, you can describe as many equipment as are required to describe the heating and cooling sources in the house. At least one equipment that provides heating must be described in this form. The selected equipment may provide either heating or cooling or both. To describe an equipment, first enter the equipment type (and fuel if heating-only equipment) and then enter the data collected through proper manual testing for each appliance depending on fuel source in

the applicable fields. Steady State Efficiency (SSE) shall be used when manually testing in the field for gas fired appliances if different from AFUE ratings. If SSE readings cannot be obtained, then AFUE ratings at original rated efficiency are acceptable to use. Inputs related to equipment type and fuel will filter out other necessary inputs, as well as retrofit options that will be available for evaluation. For example, choosing a central heat pump will disable the retrofit option for installing a smart thermostat, and selecting a space heater will disable tune up as a retrofit option. The Replace the Equipment retrofit option is always enabled for possible selection and is used to specify if the measure replaces one or more existing equipment described in other HVAC sub-Forms. Replacement required selection procedure is the same process as outlined in the HVAC form section in NEAT.

Unlike in Weatherization Assistant Version 8, heating/cooling equipment inputs are not limited to primary and secondary systems. Each type of existing heating and/or cooling equipment in the home may be entered as separate records. Weatherization Assistant Version 10 determines the primary system based on the Fraction of Load Served value that is either input or estimated by the software. Inputs made on any optional Forms (e.g., other field measurements or health and safety observations) are informational only and are not used in running the audit analysis.

Ducts form

Conditionally Required. Please see the corresponding NEAT section for information for inputting data into the MHEA audit. Used to describe the supply and return ducts for ducted HVAC equipment. A duct system with varying characteristics (e.g., location, insulation) must be described as multiple segments. All ducted HVAC equipment must be selected as served by at least one supply duct. All supply and return ducts shall be considered for modeling and properly entered in the software as is. Default methods can be used for surface area or manual entry is allowable with proper measurements of width height and length or diameter. To evaluate a duct insulation measure, you must enter the measured duct surface area and insulation R-value. If sufficient details relating to duct size and/or surface area and insulation R-value are unknown, then Weatherization Assistant Version 10 can estimate the values. To calculate these estimates and view the results, select the Use Defaults checkbox (Figure 3.16). To edit the values, clear the Use Defaults checkbox and input other values. Select Apply or OK to save the inputs. Figure 3.17 shows the typical furnace and duct system layout in a mobile home.



Use Defaults:	☒
Surface Area (sq ft):	345.6
Insulation R-value:	0

Figure 3.16 Use default checkbox selected.

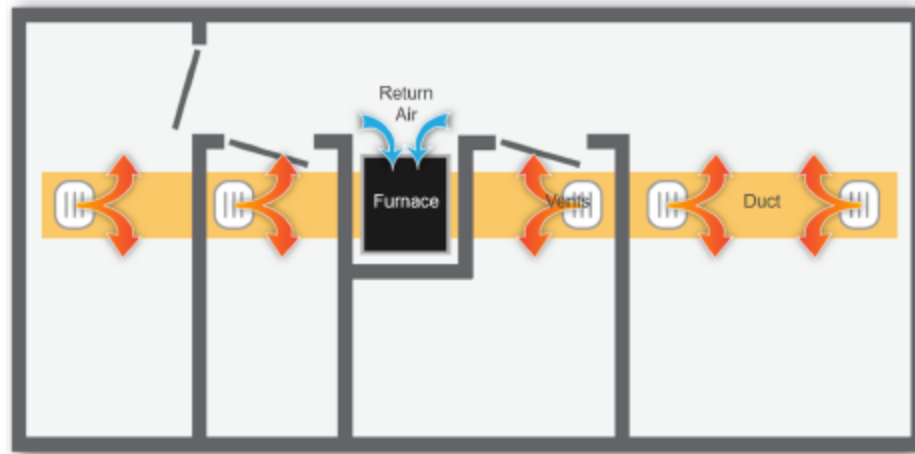


Figure 3.17 Typical furnace and duct system layout in a mobile home.

Ducts/Infiltration form

Required. Used to enter air and duct leakage data to evaluate the effectiveness of infiltration reduction work and duct sealing. The data input fields on the Ducts/Infiltration form change depending on whether duct sealing will be evaluated and, if so, which method—whole house blower door or duct blower measurements—will be used.

To evaluate infiltration reduction as a retrofit measure, you must, at a minimum:

- Enter the pre-weatherization whole-house air leakage rate,
- A After Weatherization estimated or target rate leakage rate using the NeWAP Target Blower Door Calculation,
- House pressure differences for these rates, and
- The cost of the infiltration reduction work.
- Duct Sealing Cost including material and labor.

Some correspondence has been found to exist between the sum of pressure pan measurements from all the supply registers in a manufactured home and the duct leakage to the outside. The pressure pan measurements, that is, the duct-to-house pressure difference at each supply register, are taken with the blower door depressurizing the house to 50 Pascal and a pressure pan attached to a manometer. No pressure difference indicates that the supply duct leading to the register is at the same pressure as the house and that little or no leaks to the outside exist in that branch of the ducts. The sum of these measurements from all supply registers corresponds to the total leakage of the ducts to the outside. This method of estimating duct leakage is normally appropriate only for manufactured homes.

In modeling duct sealing and duct insulation outside the building envelope in MHEA:

- Include duct sealing as part of a furnace replacement measure.

- Limited duct sealing may be modeled as a health and safety measure with reference to correcting issues with depressurization and natural drafting appliances.
- Model per guidance below for an Energy Conservation Measure for DOE funds (1.0 or above SIR) or LIHEAP funds (.5 or above SIR):
 1. In the **[Ducts/Infiltration]** category, select the **[Evaluate Duct Sealing]** box and select **[Pressure Pan Measurements]** from dropdown.

Evaluate Duct Sealing: ☒ Duct Leakage Method: Pressure Pan Measurements

Whole House Blower Door Measurements

	Before Weatherization (Existing)	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)	3000	1500
at House Pressure Difference (Pa)	50	50

Duct Operating Pressures

	Before Duct Sealing	After Duct Sealing
Supply (Pa)	35	37

Pressure Pan Measurements

	Before Duct Sealing (Existing)	After Duct Sealing (Target or Actual)
Sum of Pressure Pan Measurements (Pa)	20	12

2. Enter the following data:

Evaluate Duct Sealing: ☒ Duct Leakage Method: Pressure Pan Measurements

Whole House Blower Door Measurements

	Before Weatherization (Existing)	After Weatherization (Target or Actual)
Air Leakage Rate (cfm)	3000	1500
at House Pressure Difference (Pa)	50	50

Duct Operating Pressures

	Before Duct Sealing	After Duct Sealing
Supply (Pa)	35	37

Pressure Pan Measurements

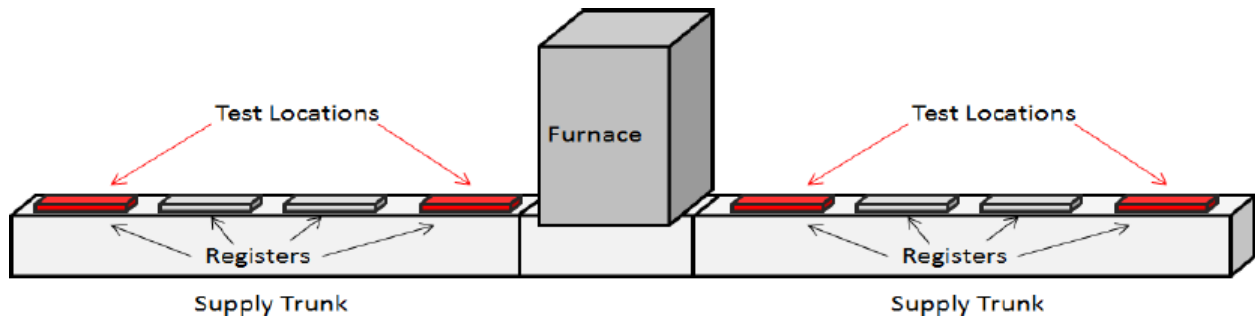
	Before Duct Sealing (Existing)	After Duct Sealing (Target or Actual)
Sum of Pressure Pan Measurements (Pa)	20	12

A - Before Duct Sealing – With the house depressurized to 50 Pa (WRT the outside) measure the pressure difference between each supply register and the house with a pressure pan and manometer. Enter the sum of all the measurements.

B - After Duct Sealing – Enter the total number of supply duct registers in the home **multiplied by NeWAP mobile home duct target of 2 pa.**

C - Before Duct Sealing - With the air handler fan on and Blower Door off, use a manometer and static pressure probe to measure the supply duct pressures(WRT the interior) at the register nearest and farthest from the furnace for each supply trunk(both sides of furnace). Enter the average of the readings.

D - After Duct Sealing – Add 2 Pa to the Before Duct Sealing pressure and enter here.



When only one (1) central return exists, DO NOT COVER WITH PRESSURE PAN. Place 2-3 inches of the hose in the return at the filter grill. Target duct operating pressures are 2 pa greater than measured operating pressure.

A set of optional Forms (Blower Doors, Zonal Pressures, Pressure Pans, and Room Pressure Balances) can be used to enter measurements made during the infiltration and duct leakage measurements or health and safety observations related to the HVAC systems. Information entered on these optional Forms is not used in running an audit.

Baseloads Forms

Baseloads Forms are used to describe water heating retrofits, refrigerator replacement, and lighting retrofits. These Forms are optional and are used to evaluate specific retrofit measures. Please see the corresponding NEAT sections on the appropriate measure for information on inputting data into the MHEA audit. Below is a short description of each.

Water Heating form

Used to enter information necessary to evaluate for water heating retrofit measures: tank insulation, pipe insulation, low-flow showerheads, and water heater replacement. You may describe the existing water heater by selecting from the list of manufacturer and model number, which will autofill the energy use characteristics of the water heater, or by directly entering the data on the form collected from the manufactures data plate. To evaluate a water heater replacement, you may either select a water heater you have already described in the Supply Library, which will autofill the data, or directly enter the data on the form from the manufacturers data plate.

Refrigerator form

Used to enter information necessary to evaluate a refrigerator replacement. Here, you may specify the energy use characteristics of the existing and replacement refrigerators. For the existing refrigerator, you may either select from the list of manufacturers and model numbers, which will autofill the energy use characteristics of the refrigerator, or directly enter the data on the form. For the replacement refrigerator, you may either select a

refrigerator you have already described in the Supply Library, which will autofill the data, or directly enter the data on the form. Refrigerator replacement process is outlined in the refrigerator form in the NEAT section.

Lighting form

Used to describe lamp replacement retrofits. You may specify the quantity, usage, and energy use characteristics of the existing and replacement lighting and cost of the replacement lighting. For the existing and/or replacement lighting, you may either select lighting you have already described in the Supply Library, which will autofill the energy and cost data, or directly enter the data on the form. All lighting retrofits are required by KHC to be energy star rated.

Other Forms

Other Forms can be used to describe health and safety observations in the home and repair or health and safety measures or your own energy measures. Please see the corresponding NEAT sections on the appropriate measure for information on inputting data into the MHEA audit. Below is a short description of each.

Health and Safety form

Can be used to enter health and safety-related measurements and observations that you have made of the home. Items on this form help identify potential health and safety hazards related to the whole house, equipment, and the shell; record worst-case draft measurements for space heating equipment and the water heater; and determine ventilation requirements to comply with ASHRAE Standard 62.2.

Itemized Costs form

Can be used to enter necessary General Heat Waste, Repairs and Health and Safety measures associated with recommended energy measures and their costs. Refer to the Itemized Cost Form for NEAT to see how to enter material and labor cost for an Incidental Repair Measure (IRM).

RUNNING MHEA AND VIEWING RESULTS

Audit Recommendations

You can Run MHEA after you have entered all the information for the home on the data input Forms. The Run on the Audit Dock link will be activated as soon as all the required data input Forms have been completed. When you select Run, the status of the run will be

displayed, and the Recommended Measures Report will be opened in a separate window. Once an audit has been run, the link to View will be activated. You can select View to see a MHEA Recommended Measures Report that has already been created and saved from a previous run.

MHEA Recommended Measures Report	
Weatherization Assistant Online Version: 10.05.002	
AGENCY INFORMATION	
Agency:	ORNL
Address:	1 Bethel Valley Road, P.O. Box 2008, Oak Ridge TN
Phone Number:	865-241-6705
Email:	helpdesk@ornl.gov
ACCOUNT INFORMATION	
Account Name:	Audit Tool Comparisons
Account Number:	Audit Tool Comparisons
Other ID Number:	
Address:	NY
Comments:	
DETAILS OF RUN INFORMATION	
Run On:	January 11, 2023 3:24 PM
Engine Version:	v10.05.002
Run Identifier:	26256111.050450439
AUDIT INFORMATION	
Audit Name:	Sample test for manual
Audit Number:	2432
Auditor:	Jyothi Asand
Audit Date:	November 9, 2022
Last Edited On:	January 11, 2023 3:24 PM
Comments:	
Building Information	
Occupants:	1
Length (ft):	60
Width (ft):	14
Exterior Wall Height (ft):	7.5
Wind Shielding:	Exposed
Home Leakiness:	Medium
Outdoor Water Heater Closet:	Yes
Account Name: Audit Tool Comparisons Account Number: Audit Tool Comparisons Other ID Number: MHEA Recommended Measures Report Printed On: January 11, 2023 2:32 PM Page 1 of 4 Agency: ORNL Audit Name: Sample test for manual Audit Number: 2432	

Figure 3.18 MHEA Recommended Measures Report: title page.

Figure 3.18 shows the title page of the MHEA Recommended Measures Report. The title page identifies your Agency, Account, Audit, and Audit Run; provides key information you have entered on the Agency, Account, and Audit Forms; and provides additional information about the audit run to track the audit results. After the title page, the report lists all the recommended measures along with their estimated energy and cost savings, measure costs and SIRs, and primary material quantities needed to perform them (Figure 3.19).

Annual Energy and Cost Savings										
Index	Recommended Measure	Components	Heating		Cooling		BaseLoad		Total	
			(MMBtu)	(\$)	(kWh)	(\$)	(kWh)	(\$)	(MMBtu)	(\$)
1	Low Flow Showerheads	Water Heating	0.0	\$0	0	\$0	256	\$34	0.9	\$34
2	Water Heater Pipe Insulation	Water Heating	0.0	\$0	0	\$0	159	\$21	0.5	\$21
3	Lighting Retrofits	L1	0.0	\$0	0	\$0	178	\$23	0.6	\$23
4	Water Heater Tank Insulation	Water Heating	0.0	\$0	0	\$0	230	\$30	0.8	\$30
5	General Air Sealing	Ducts/Infiltration	0.8	\$50	18	\$2	0	\$0	0.8	\$52
6	Roof Fiberglass Loose Insulation	Roof	1.1	\$70	609	\$80	0	\$0	3.2	\$149
7	Replace HVAC System	AC	5.7	\$365	2,337	\$306	0	\$0	13.7	\$671

Economics					
Index	Recommended Measure	Components	Measure Savings (\$/yr)	Measure Cost (\$)	Measure SIR
Weatherization Measures					
1	Low Flow Showerheads	Water Heating	\$34	\$23	18.42
2	Water Heater Pipe Insulation	Water Heating	\$21	\$15	15.18
3	Lighting Retrofits	L1	\$23	\$30	11.96
4	Water Heater Tank Insulation	Water Heating	\$30	\$40	8.28
5	General Air Sealing	Ducts/Infiltration	\$52	\$101	4.47
6	Roof Fiberglass Loose Insulation	Roof	\$149	\$672	3.43
7	Replace HVAC System	AC	\$671	\$4,000	2.07
Health and Safety Measures or Other Funding Sources					
8	Door Replacement	DR2	\$3	\$218	0.19
9	Smoke Detector is Needed	Itemized Cost	\$0	\$10	0.00
Total			\$983	\$5,108	2.54

Materials			
Index	Material	Quantity	Units
1	Low Flow Showerheads	1	Each
2	Water Heater Pipe Insulation	1	Each
3	LED Lamp 10.0 watts	3	Each Bulb
4	Water Heater Tank Insulation Wrap	1	Each
5	General Air Sealing	1	Each
6	Roof Fiberglass Loose Insulation	16	Bag
7	Replace HVAC System	1	Each
8	Door Replacement	1	Each Door

Figure 3.19 MHEA Recommended Measures Report: recommended measures.

If you entered utility bills on the Utility Bills form, the report would also provide a revised set of tables for the recommended measures based on adjusted estimates of energy and cost savings and SIRs, and a comparison of MHEA's estimates of the home's heating and/or cooling energy consumptions with the utility bills. MHEA's estimates are based on TMY3 weather data, whereas the utility bills reflect energy consumption for the actual weather that occurred during the billing period. If you also entered degree days associated with the utility bills, they will be compared with the TMY3 weather data used to make the home's energy estimates so that you can determine the degree to which differences between predicted energy consumptions and utility bills might be due to weather differences.

The report also provides other information such as the annual energy consumptions for heating, cooling, and baseloads and peak heating load of the home before and after weatherization (Figure 3.20).

House Energy Consumptions						
	Before Weatherization			After Weatherization		
	Heating (MMBtu)	Cooling (kWh)	Baseload (kWh)	Heating (MMBtu)	Cooling (kWh)	Baseload (kWh)
Annual Energy	13.2	6,734.4	0.0	5.6	3,752.8	-2.8
Peak Heating Load						
Component Type	Before Weatherization Load (Btu/h)		After Weatherization Load (Btu/h)			
Wall	3,280.8		3,280.8			
Floor	3,051.1		3,051.1			
Roof	2,624.2		1,090.3			
Windows	2,900.0		2,900.0			
Doors	410.1		311.1			
Infiltration	3,134.0		2,162.6			
Duct Loss	0.0		0.0			
Total	15,400.1		12,795.8			

Figure 3.20 MHEA Recommended Measures Report: energy consumption and peak heating load components before and after weatherization.

Reports

The Reports drop-down field on the Audit Dock can be used to select two reports associated with the MHEA audit (attached below). The Audit Input report provides a printout of all the input made in MHEA. The Audit Recommendations report provides the MHEA Recommended Measures Report for the most recent run of the audit (equivalent to the View link).

CREATING AN MHEA WORK ORDER

The process for creating an MHEA work order is the same as for NEAT. Please refer to NEAT Section, NEAT WORK ORDER FORMS.