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## APPLIED SCIENCE DIVISION

THE RESIDENTIAL STANDARDS DEMONSTRATION PROGRAM: COST ANALYSIS

E. Vine

May 1986



**APPLIED SCIENCE DIVISION**

Prepared for the U.S. Department of Energy under Contract DE-AC03-76SF00098

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## DISCLAIMER

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## SUMMARY

The Pacific Northwest is currently experiencing a dramatic and exciting transformation in the way the region produces and consumes energy. Prompted by federal legislation and local initiative, the region is promoting the conservation of energy as the primary energy resource. In the residential sector, energy efficiency standards (Model Conservation Standards, MCS) for new construction have been proposed, and a demonstration program (the Residential Standards Demonstration Program, RSDP) is underway to demonstrate to the homebuilding industry what the MCS are, how to comply with them, and increase the industry's familiarity with them.

Another objective of the RSDP is to document the cost-effectiveness of the MCS by collecting energy use and cost data on the homes participating in the program. In this report, we examined the costs associated with building energy efficient homes using real data compiled by builders and their sub-contractors (energy data will be presented at a later time).

All four states participating in the RSDP were represented in our analysis of 395 homes (out of 423 RSDP homes): 44 (11%) from Idaho, 67 (17%) from Montana, 59 (15%) from Oregon, and 225 (57%) from Washington. All the homes in the sample were energy efficient homes (i.e., there were no control homes). Three climate zones were represented: 233 (59%) in zone 1 (the fewest number of heating degree days), 85 (22%) in zone 2, and 77 (20%) in zone 3 (the greatest number of heating degree days). The median floor area of the entire sample was 1883 square feet; the mean floor area was 2047 square feet with a standard deviation of 740 square feet. Most of the homes in our sample were found to be designed to be more energy efficient, on the average, than the standard MCS home.

Several levels of analysis were used in examining the cost data for the entire sample and for each of the three climate zones: absolute, incremental, and normalized (absolute and incremental) costs (standardized by floor area and/or component area); and component (e.g., ceiling), subcomponent (e.g., attic insulation), and total costs. The discussion emphasizes median costs for they are less susceptible to the positive skew of outliers and, therefore, better represent the central tendency of the sample. We also present other statistical descriptors in our analysis: mean, standard deviation, range, and sample size.

Upon examining total incremental building costs normalized by **floor area**, we found the median cost was $\$2.76/ft^2$. For the average home in the sample with a median floor area of 1883 square feet, the total incremental cost would be $5,197. It is important to note that these costs include labor and materials, but exclude builder overhead, fees, and profit, and, therefore, the actual incremental costs would be somewhat larger. The median costs for the states and climate zones were as follows: Idaho ($\$2.15/ft^2$), Montana ($\$2.65/ft^2$), Oregon ($\$3.35/ft^2$), Washington ($\$2.79/ft^2$), climate zone 1 ($\$2.84/ft^2$), climate zone 2 ($\$2.65/ft^2$), and climate zone 3 ($\$2.65/ft^2$) (see Chapter 9 for more summary information).

Using incremental building component costs normalized by **component area** as a guide, we found that the largest median incremental component cost per square foot was glazing ($\$2.64/ft^2$). All other median component costs were below $\$1.00/ft^2$: doors ($\$0.92/ft^2$), walls ($\$0.60/ft^2$), ceiling ($\$0.34/ft^2$), floor ($\$0.25/ft^2$), air infiltration barriers ($\$0.12/ft^2$), and basement walls ($\$0.00/ft^2$). There was no clear-cut trend in the level of costs among climate zones or states (see Chapter 6 for more component summary information, and Chapter 7 for detailed analysis of selected component groups).

The RSDP findings from this cost analysis should be regarded as only indicative for MCS homes for the following reasons. First, due to different types of building codes and code enforcement among the states, the concept of "current practice" is very loosely defined and variable, and, therefore, the calculation of incremental costs, in which current practice costs are subtracted from energy efficient home costs, is subject to an unknown bias. Second, the cost data itself may be incorrect due to confusion and assumptions made by builders participating in the program. Third, the findings from this demonstration program are not generalizable due to the problem of self-selection in program participation. Fourth, this was the first time many of the builders ever attempted to build to this level of energy efficiency using innovative building materials and techniques. And fifth, the incremental costs calculated in this report are for energy efficient homes that, in general, achieve or go beyond the Model Conservation Standards (MCS) proposed by the Northwest Power Planning Council.

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# INTRODUCTION

The Pacific Northwest is currently experiencing a dramatic and exciting transformation in the way the region produces and consumes energy. Prompted by federal legislation and local initiative, the region is promoting the conservation of energy as the primary new energy resource. In the residential sector, energy efficiency standards for new construction have been proposed, and a demonstration program is underway to examine the costs and energy savings associated with building energy efficient homes. In this report, we examine the energy efficient construction costs reported by builders in this program. Our findings will be of interest not only to the building industry, government officials, and the general public in the Pacific Northwest, but also to those individuals and organizations outside this region who want to learn from this experience.

Prior to examining the cost data itself, we present an overview on the enabling federal legislation, the proposed residential conservation standards, and the demonstration program.

## THE NORTHWEST POWER ACT

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) (the "Northwest Power Act") was the federal legislation that directed that priority be given to the lowest cost sources of energy for meeting the electric energy needs in the Pacific Northwest, and, if all else was equal, then energy conservation was to have priority over all other resources. The Northwest Power Act also called for the establishment of the Northwest Power Planning Council (the Council), and specifically identified Model Conservation Standards as one of the elements to be contained in the Council's Power Plan.

## MODEL CONSERVATION STANDARDS

The Council adopted Model Conservation Standards (MCS) for new residential and commercial buildings in their 1983 Power Plan.[1] The MCS are designed to make new, electrically-heated residential homes more energy efficient by establishing "energy budgets" for space heating.

[1] While the standards are for both residential and commercial buildings, the discussion and analysis that follow pertain to the residential sector. For a description of the development of the MCS, see Eckman and Watson, 1984.

These performance standards vary by climate (there are three climate zones) as seen in Table 1. Climate Zone 1 encompasses most of the mild marine climate west of the Cascades; Climate Zone 2 is the more extreme climate east of the Cascades except for higher elevations; those elevations and most of western Montana are in Climate Zone 3.[2]

The MCS also offer a number of options to meet the energy budgets, such as insulation, glazing, heat pumps, solar features, and control of air leakage as shown in Table 2. This method of setting standards allows homebuilders wide design flexibility. Homes meeting the MCS are expected to use about one-third of the heating energy of an otherwise comparable home built to current standards.

The Council initially called for state and local governments and utilities to adopt the MCS by January 1986. It was expected that local or state government would adopt the standards in the form of building codes. These entitites would also be responsible for implementing and enforcing the codes. If political jurisdictions failed to adopt and enforce the standards or refused to carry out a program to achieve comparable energy savings, they would be subject to a 10 percent surcharge on the wholesale power they purchase from the Bonneville Power Administration (BPA) (as stated in the Northwest Power Act).

In December 1985, the Council revised their initial deadline and amended the standards to allow BPA and the utilities to offer marketing and financial assistance to help builders construct MCS homes (the BPA/Utility MCS Program). Utilities not participating in the Program may offer an alternative program so long as it is judged by BPA to produce equivalent savings. Utilities must choose to participate in the Program or submit their own equivalent program by September 1, 1986. The programs are to go into effect for 1987.

## RESIDENTIAL STANDARDS DEMONSTRATION PROGRAM

At the time the standards were adopted, there was no consensus within the building industry about either the additional costs involved in building to the standards or the energy savings which would result. To address these problems, the Council called for BPA to carry out a large scale demonstration program of homes built to the standards. The result was the Residential Standards Demonstration Program (RSDP).

[2]However, the climate zones associated with a particular building site were determined by the micro-climate heating degree days from the nearest weather station. Thus, Richland, Washington and Boise, Idaho have Climate Zone 1 homes despite being geographically in Climate Zone 2. Moreover, it is important to note that a home with 4001 heating degree days and one with 5999 heating degree days are both in the same climate zone despite a 50% difference in the severity of the weather.

**Table 1. Model Conservation Standards for New Residential Buildings: Space Heating Targets by Climate Zone**

| | Climate Zones | | |
|---|---|---|---|
| | 1<br>4000-6000 HDD* | 2<br>6000-8000 HDD* | 3<br>over 8000 HDD* |
| Single-Family | 2.0 kWh/ft$^2$/yr | 3.2 kWh/ft$^2$/yr | 3.2 kWh/ft$^2$/yr |
| Multi-Family | 1.2 kWh/ft$^2$/yr | 2.3 kWh/ft$^2$/yr | 2.8 kWh/ft$^2$/yr |

*HDD = Heating degree days at a base of 65°F.

**Table 2. Types of Options for Meeting the Model Conservation Standards**

- Relatively high levels of ceiling insulation (R-30 or R-38)
- Walls with insulation levels ranging from R-19 to R-31
- Underfloor insulation (over crawl spaces) of R-19 or R-30
- Perimeter insulation for slab-on-grade or basements (R-10 to R-15)
- Double or triple-glazed windows with "thermal breaks" (insulating material in the window frames to "break" the thermal path by which heat is lost)
- Insulated entry doors
- Control of air infiltration through careful caulking, weatherstripping, and installation of vapor barriers
- Use of dehumidifiers to avoid humidity problems
- Very low air infiltration designs incorporating continuous vapor barriers and air-to-air heat exchangers
- "Solar tempered" designs (south-oriented windows)
- Passive solar designs (south-oriented windows and the inclusion of thermal mass)
- Heat pumps as an alternative to high levels of insulation

REFERENCE: Eckman and Watson, 1984.

As stated in the final version of the Council's Power Plan (released in late 1983), the RSDP had two basic, interrelated objectives: (1) demonstrate to the homebuilding industry what the MCS are, how to comply with them, and increase the industry's familiarity with them; and (2) obtain more accurate estimates of the average energy savings and incremental costs associated with the MCS. In addition, data regarding the characteristics of the homes (e.g., indoor air quality, solar access, and operation of air-to-air heat exchangers) were also to be collected. The activities designed to meet these objectives were initiated in early 1984 by the energy agencies of the Northwest states (the Washington State Energy Office, the Oregon Department of Energy, the Idaho Department of Water Resources, and the Montana Department of Natural Resources and Conservation) with funding from BPA. Discretion in designing and implementing the RSDP was left to the states, resulting in a great amount of flexibility.[3]

To accomplish the first objective, briefings were held in the winter of 1984 throughout the region to inform homebuilders, architects, realtors, lenders, and members of the housing industry about the RSDP. In the spring of 1984, the states conducted builder training workshops which were open to the general public, but were particularly targeted to general contractors, subcontractors, designers, architects, local code officials, and others familiar with standard residential construction. Seven workshops were conducted in Washington, Oregon, and Idaho. Since the program was limited to the western portion of Montana, only two workshops were held in that state. Washington also scheduled seven additional sessions throughout the state.

The goal of the two-day workshops was to transfer a working understanding of the "hows" and "how not tos" of very energy efficient construction from current practicioners to those otherwise experienced builders who have not yet built super energy efficient homes. The contents of the workshops included a description of: (a) the model conservation standards, (b) how to design an energy efficient home, (c) construction documents, (d) inspection procedures, (e) monitoring of the program, (f) available technical assistance, (g) program requirements, and (h) cost accounting procedures. The training materials included slides of "at-the-site" applications, hands-on demonstrations, and a detailed manual the builder could use during actual design and construction.

To accomplish the second objective, the RSDP conducted the large scale monitoring of both construction costs and energy use in approximately 400 energy efficient (all-electric) homes. Heating energy use and costs of homes built to the MCS will be compared with those of homes built to current codes. The energy and cost data will be examined together to evaluate the cost-effectiveness of building homes to the MCS. Energy data are still being collected, and data collection is expected to continue until September 1986.

[3]For more information on the design aspect of the program, see Hart and Selby, 1984.

As part of the monitoring program, homes built to the MCS were "triple metered" as were a corresponding number of existing "control" homes (i.e., homes built in recent years to current energy codes). Triple metering involved the placing of separate kilowatt-hour meters on the heating circuit, the domestic hot water circuit, and the total load. Cooperating homeowners were paid to periodically record the meter readings and indoor and outdoor temperatures.

To achieve a more rigorous comparison, approximately 90 homes (a subset of the above 400) were built and monitored using a sophisticated multi-channel remote monitoring system to measure energy use, temperatures and other potentially important parameters every hour. These were sometimes matched pair homes which were two otherwise identical homes except that one was built to the MCS while the other one was built to the current energy code, with the control home being completely monitored.

The additional construction cost (i.e., incremental cost) of building a home to the MCS is the focus of this report. Incremental costs associated with the MCS were tracked by participating builders using a cost accounting system developed by the Energy Board of the National Association of Homebuilders in Area 15, state energy agencies, and BPA. The accounting system was taught to the builders during the training sessions through the use of a uniform cost accounting manual (see Appendix A). Using the manual, builders were asked to supply construction cost information on each component of the building to BPA. Those builders who constructed only MCS homes recorded actual material and labor costs for those elements of the home which differed from current code and estimated the costs of building those elements to current code. Those builders who built matched pair homes recorded actual costs for both the model standards and the current code homes. More detail on the types of items included in the accounting system is presented below.

## RSDP COST ANALYSIS

Lawrence Berkeley Laboratory (LBL) was selected by BPA to analyze the cost data collected during the RSDP. Using a cost accounting form (see Appendix A), builders and their subcontractors calculated the cost of building an energy efficient home by determining the costs of the following items: air-to-air heat exchanger, subfloor, framing, insulation, glazing, doors, fireplace, plumbing, electrical, HVAC (heating, ventilation and air conditioning), drywall, painting, vapor barrier (including caulking), passive solar, supervision, design, and loan interest. Also, they provided detailed cost information for the following specific types of building components (identified by insulation value (R-value or U-value), area, and type (e.g., wood or aluminum framed windows)): ceilings, floors, walls, basement walls, glass, air infiltration barriers, and doors.

In addition, builders estimated the costs of these components for homes they usually built to current standards ("current practice").[4] Additional information was provided on the cost accounting forms, including floor area, type of heating system, how builders complied with meeting the MCS, and site location.

Builders submitted their cost data to the state energy offices which reviewed the data for mathematical and logical consistencies. The states submitted the cost data to BPA which placed the data onto their computer system. A cost data tape was sent to LBL for review and analysis. LBL cleaned the data by eliminating data entry errors such as keypunch errors and cost reporting errors (some may remain). In cooperation with BPA, LBL analyzed the cost data using statistical software (SPSS-X), the results of which are presented in the following chapters. The discussion in each chapter emphasizes median costs for they are less susceptible to the positive skew of outliers and, therefore, better represent the central tendency of the sample. We also present other statistical descriptors in our analyses: mean, standard deviation, range, and sample size.

## ORGANIZATION OF REPORT

Chapter I briefly summarizes characteristics (e.g., average floor area, type of heating system, and energy efficiency) of 395 MCS homes (not control homes) while the remaining chapters deal explicitly with cost. Chapters II and III contain the analysis of absolute building costs while the other chapters contain analyses of incremental costs (the differences between building energy efficient homes and building to current practice). In Chapters IV, V, and VI, we examine the incremental costs of building components which are normalized by floor area and component area in the latter two chapters. Chapter VII contains the detailed analysis of the incremental costs of specific groups of building components; Appendix C contains the spreadsheet display that this chapter is based on. Chapter VIII contains the analysis of total incremental building costs for multi-family homes. In Chapter IX, we present total incremental building costs for single-family homes, and in the last chapter (Chapter X), we present our findings and conclusions.

## REFERENCES

1. Eckman, Tom, "How the standards grew: the blueprint." *Northwest Energy News* 3(2):10-12 (1984).

[4] A discussion of the problems encountered in estimating these costs is presented in the last chapter of this report.

**2.** Eckman, Tom and Richard Watson, "Model Conservation Standards for new construction: the region's best buy." In ACEEE 1984 Summer Study on Energy Efficiency in Buildings, Vol. G., pp. 3-15.

**3.** Hart, Wayne and Jane Selby, "Residential Standards Demonstration Program." In ACEEE 1984 Summer Study on Energy Efficiency in Buildings, Vol. G., pp. 16-27.

**4.** Watson, Richard H., "How the standards work: the showcase." *Northwest Energy News* 3(2):13-15 (1984).

# CHAPTER I

## HOUSING AND COMPLIANCE PATH SUMMARY

All four states participating in the Residential Standards Demonstration Program (RSDP) were represented in our analysis of 395 MCS homes: 44 (11%) from Idaho, 67 (17%) from Montana, 59 (15%) from Oregon, and 225 (57%) from Washington. All the homes in the sample were energy efficient homes (i.e., there were no control homes). Three climate zones were represented: 233 (59%) in zone 1 (the fewest number of heating degree days), 85 (22%) in zone 2, and 77 (20%) in zone 3 (the greatest number of heating degree days).[1] In Table 3 and in Figure 1, we show the relationship between state and climate zone.[2] The largest cell was composed of Washington homes in zone 1.

As seen in Table 4, the median floor area was 1883 square feet; the mean floor area was 2047 square feet with a standard deviation of 740 square feet. The size range of homes was very broad: 930 to 5717 square feet. Differences in mean floor area among states and climate zones appear to be minimal. The smallest average (mean) sized homes were in Oregon and climate zone 1, and the largest average (mean) sized homes were in Montana and climate zone 3.

Five major heating system types were represented in our sample. There were 140 homes heated by electric baseboard systems, 109 by central forced air, 83 by wall forced air, 32 by heat pumps, and 22 by radiant heat. In Figures 2 and 3, we show the distribution of heating systems by state and climate zone, respectively.

There are four ways a builder can fulfill the requirements of the MCS: one can comply with the prescriptive standard (following a path or following a path with tradeoffs (a point system)) or a performance standard (estimating an energy budget or meeting an overall thermal integrity (UA)). In complying with the MCS standards, 219 households used the component prescriptive point path, 121 used the component prescriptive path, 36 used the energy budget path, and 11 used the component performance path. In Figures 4 and 5, we show the distribution of compliance paths by state and climate zones, respectively.

We used number of points (based on the prescriptive point system) for characterizing the energy efficiency of homes. Zero points represents a MCS home, and more points indicates increasing energy efficiency. In some cases, upon inspecting a home, a house received negative points because it was found to be deficient in complying with the MCS standards. It is important to note that points are not cost-optimized, i.e., points are not related to cost-effectiveness. Builders are permitted trade-offs to give them flexibility in designing a home. Because the point

[1] See the Introduction for a description of the climate zones.

[2] All three climate zones are represented in Idaho, climate zones 1 and 2 are found in Oregon and Washington, and climate zone 3 covers the entire state of Montana.

| Table 3. State representation by climate zone | | | | |
|---|---|---|---|---|
| | Climate Zone 1 | Climate Zone 2 | Climate Zone 3 | Total |
| All cases | 233 | 85 | 77 | 395 |
| Idaho | 12 | 22 | 10 | 44 |
| Montana | 0 | 0 | 67 | 67 |
| Oregon | 48 | 11 | 0 | 59 |
| Washington | 173 | 52 | 0 | 225 |

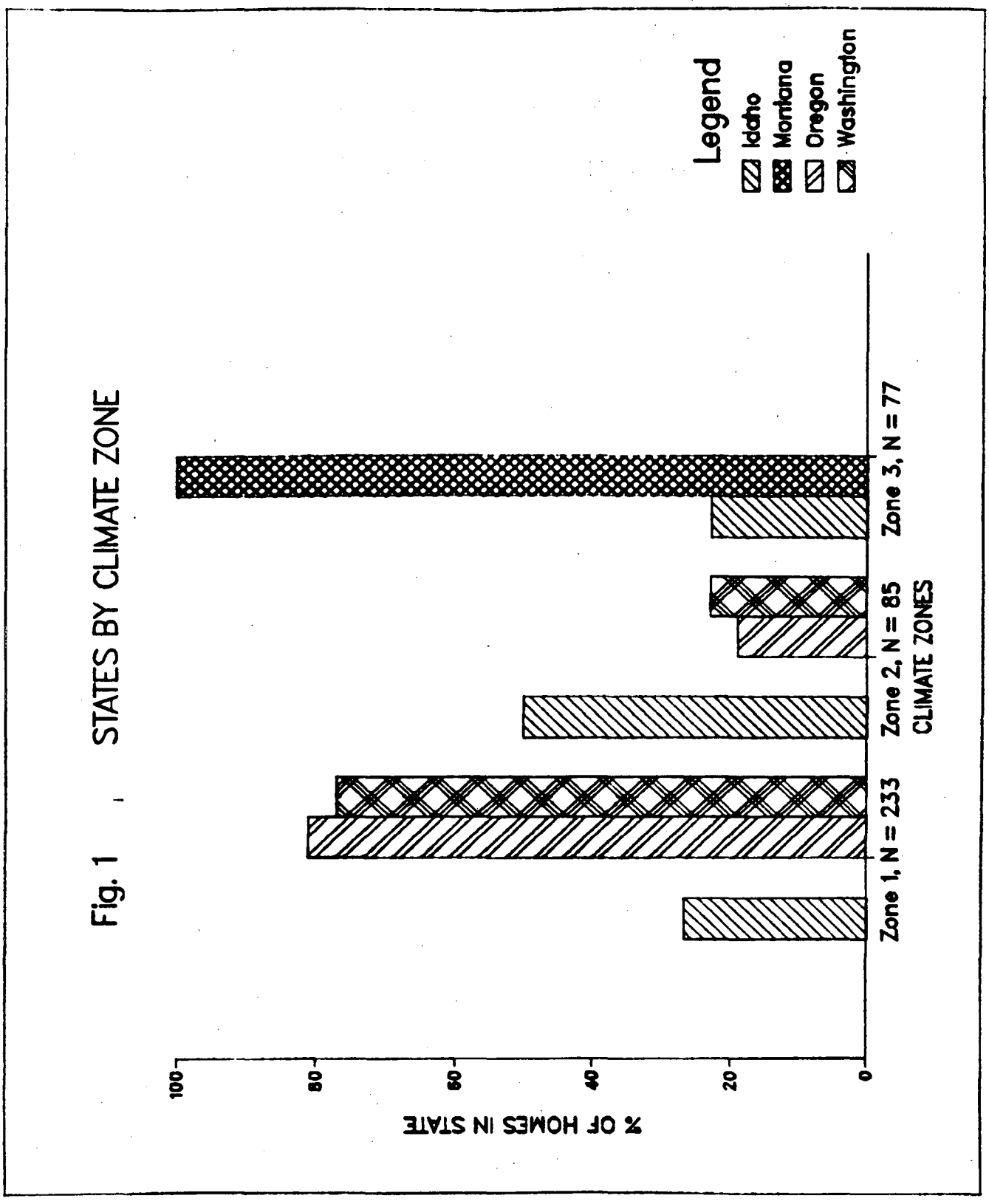


Fig. 1 STATES BY CLIMATE ZONE
Legend
Idaho
Montana
Oregon
Washington
% OF HOMES IN STATE
100
80
60
40
20
0
Zone 1, N = 233
Zone 2, N = 85
Zone 3, N = 77
CLIMATE ZONES

| Table 4. Floor area by state and climate zone | | | | | |
|---|---|---|---|---|---|
| | Mean ($ft^2$) | Standard Deviation ($ft^2$) | Median ($ft^2$) | Minimum-Maximum ($ft^2$) | Sample Size |
| All cases | 2047 | 740 | 1883 | 930-5717 | 395 |
| Idaho | 2072 | 738 | 1984 | 1128-4225 | 44 |
| Montana | 2252 | 665 | 2200 | 960-3690 | 67 |
| Oregon | 1874 | 637 | 1697 | 930-3464 | 59 |
| Washington | 2027 | 777 | 1820 | 1008-5717 | 225 |
| Climate zone 1 | 1923 | 720 | 1713 | 930-5702 | 233 |
| Climate zone 2 | 2200 | 792 | 1967 | 1176-5717 | 85 |
| Climate zone 3 | 2254 | 669 | 2208 | 960-3850 | 77 |

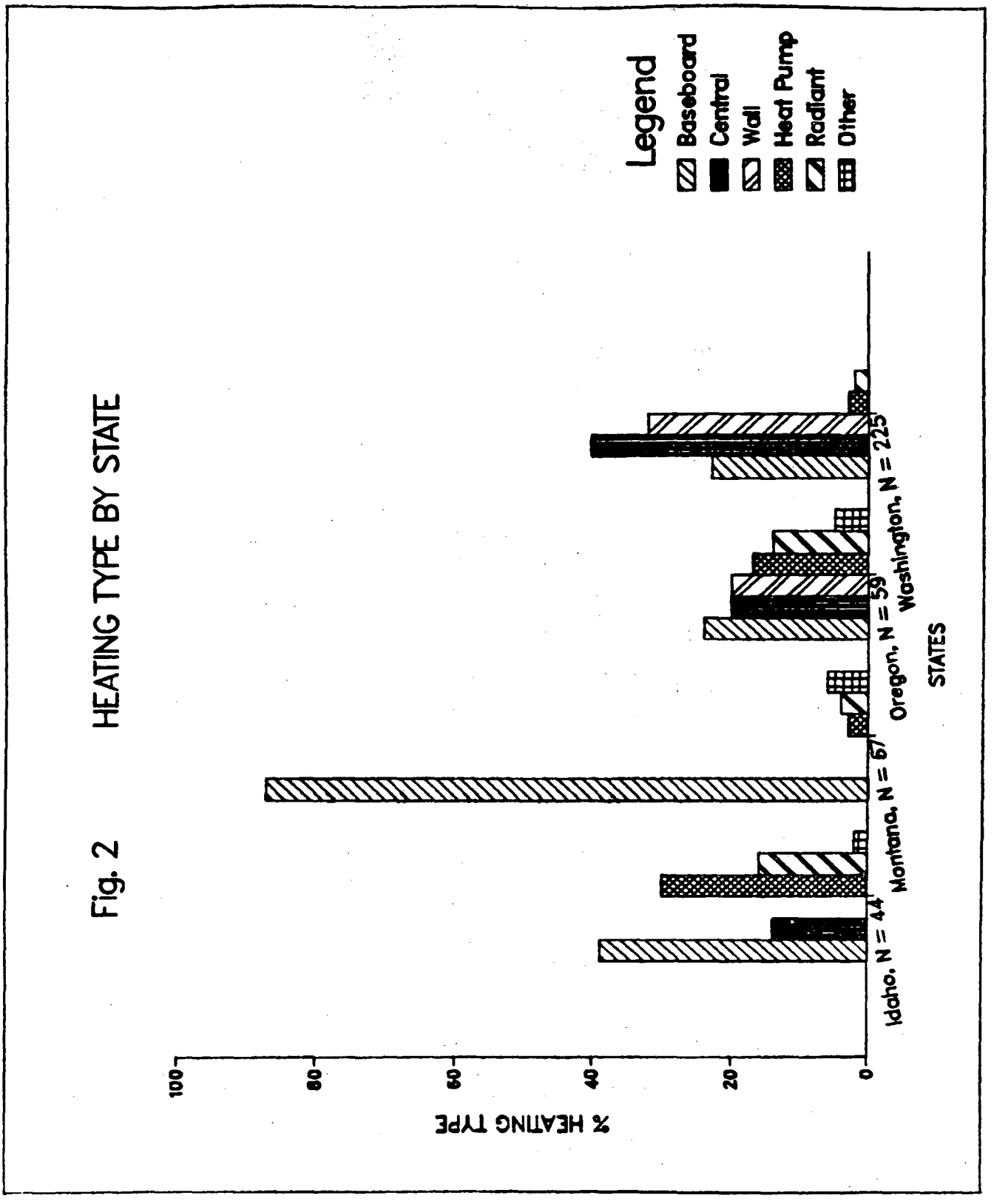


Fig. 2 HEATING TYPE BY STATE
Legend
Baseboard
Central
Wall
Heat Pump
Radiant
Other
% HEATING TYPE
100
80
60
40
20
0
Idaho, N = 44
Montana, N = 67
Oregon, N = 59
Washington, N = 225
STATES

Fig. 3 HEATING TYPE BY CLIMATE ZONE

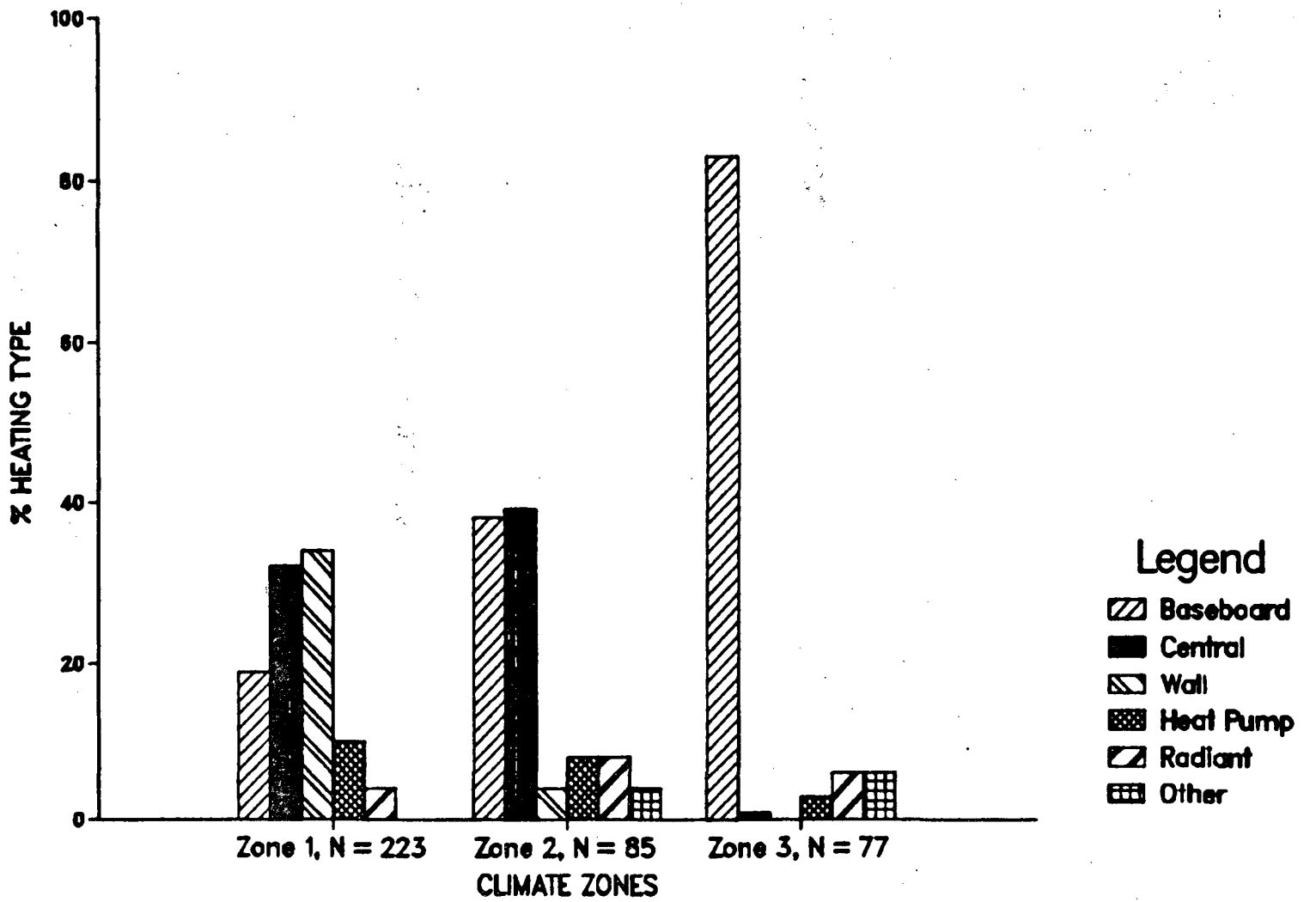


Fig. 4 COMPLIANCE PATH BY STATE

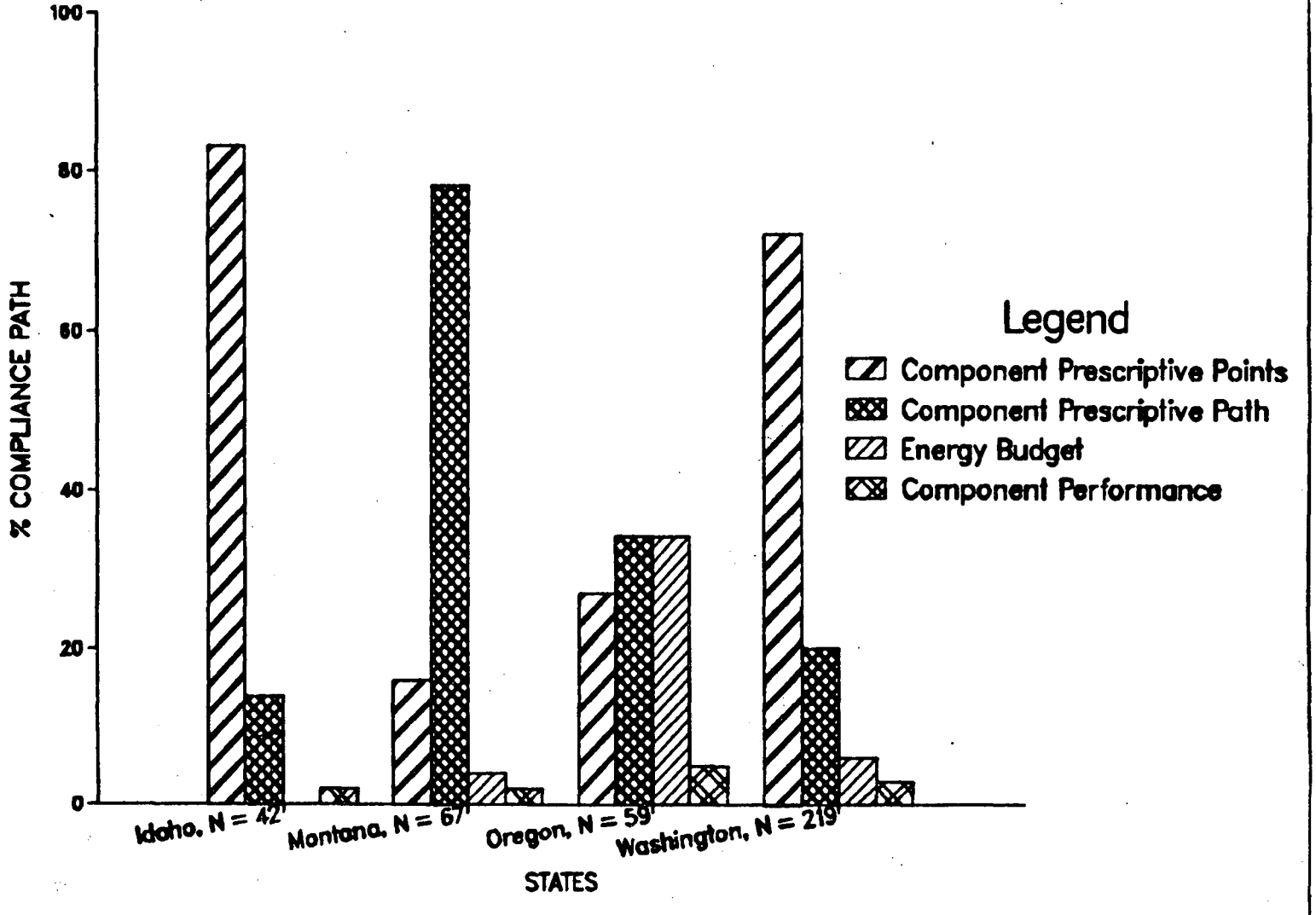
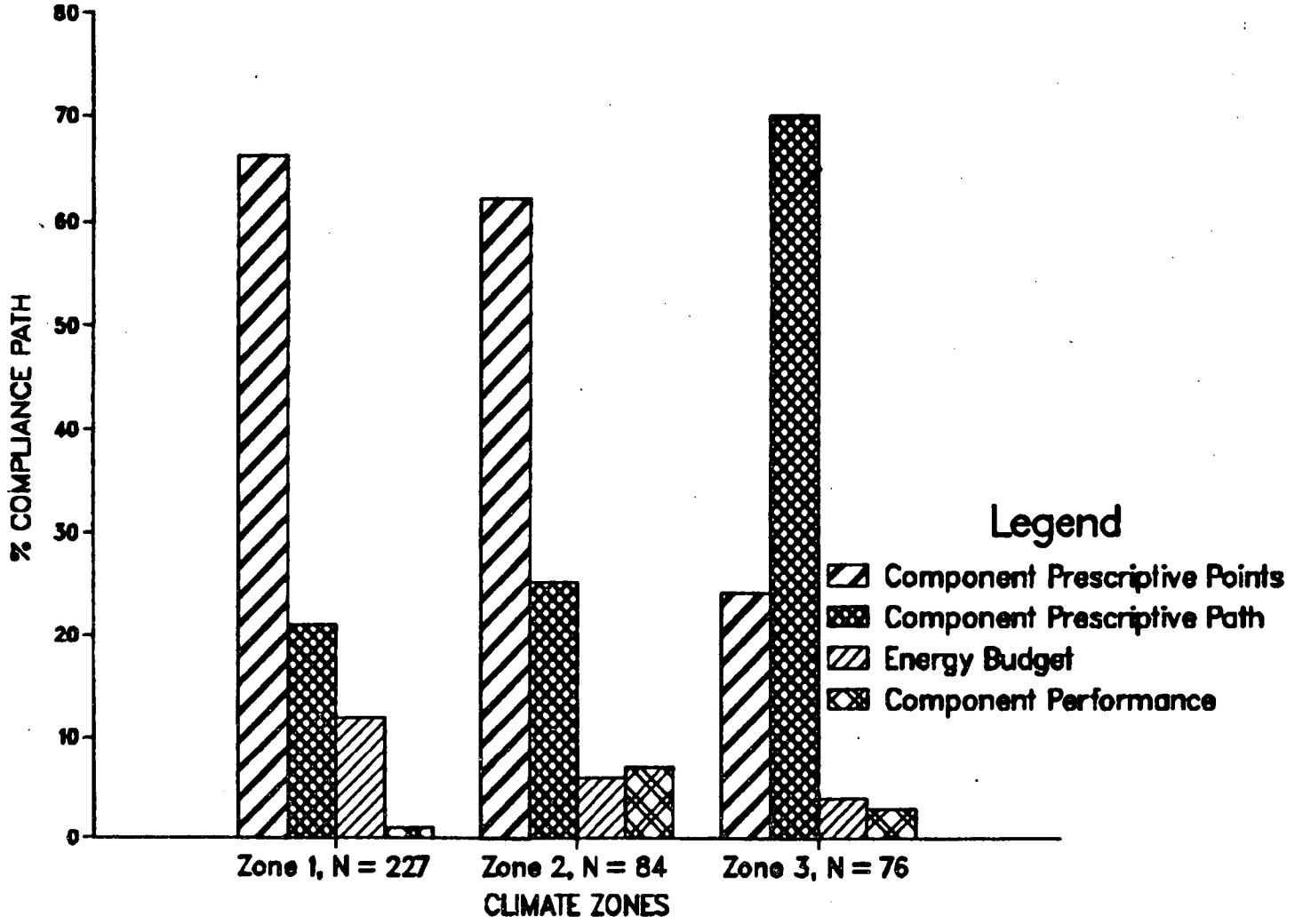


Fig. 5 COMPLIANCE PATH BY CLIMATE ZONE

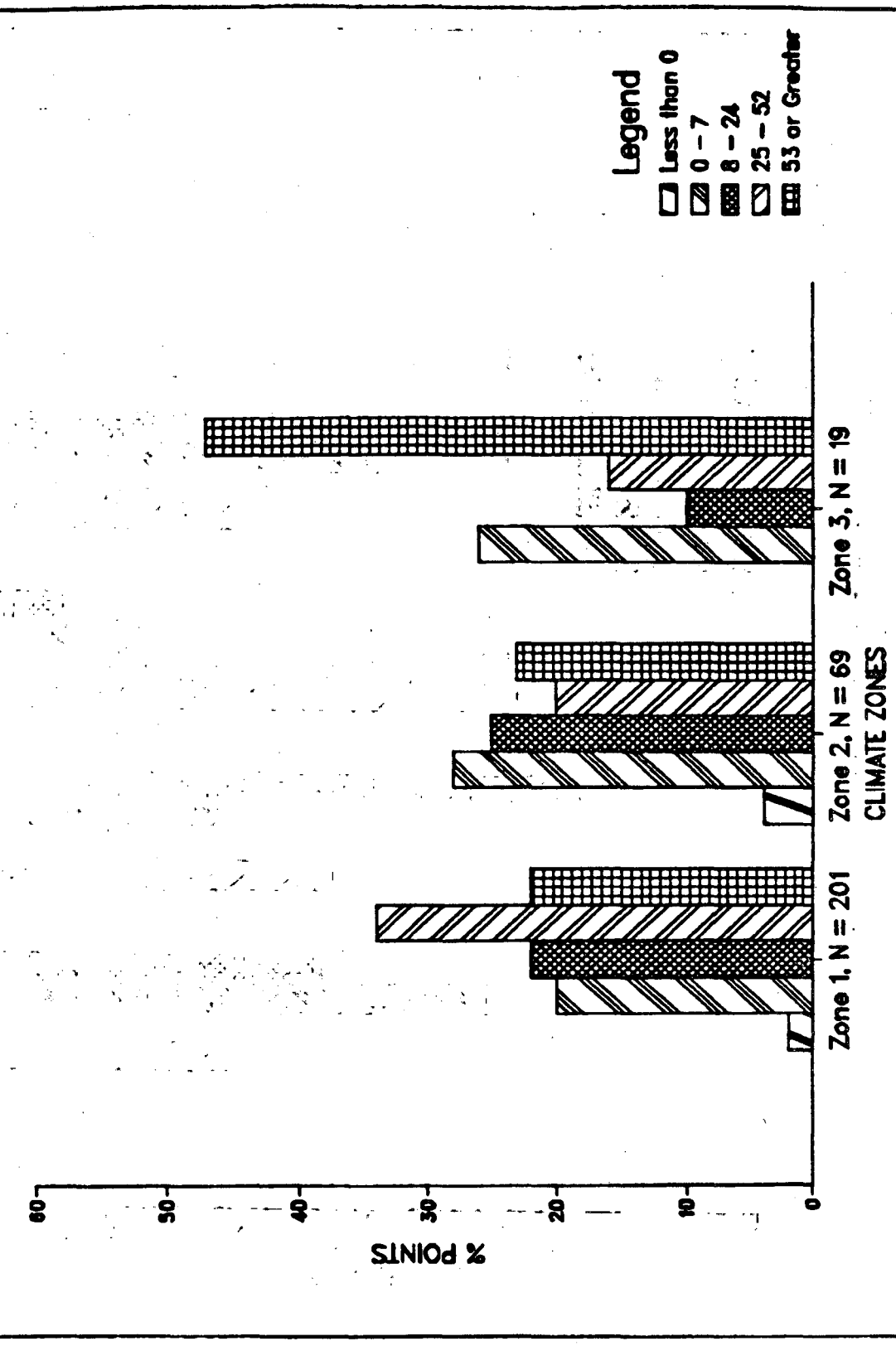


system allows a substitution for the standard MCS approach, trade-offs usually result in more expensive alternatives.

As seen in Table 5, the median number of points in our sample was 28; the mean number of points was 33 with a standard deviation of 34, and the range was -78 to 177 points. Thus, the sample of homes in this study was designed to be more energy efficient, on the average, than the prototypical MCS home.

We combined the homes into five groups based on their energy efficiency (less than 0 points, 0 to 7 points, 8 to 24 points, 25 to 52 points, and 53 or more points). The boundaries between groups do not represent any significant changes in energy use, but were constructed only for graphical display. In Figures 6 and 7, we show the distribution of these groups by states and climate zone, respectively. The greatest percent of the most energy efficient homes were located in Montana and in climate zone 3.

Fig. 7 POINTS BY CLIMATE ZONE



## CHAPTER II

## COMPONENT COST DEFINITIONS AND ABSOLUTE BUILDING COSTS

Prior to analyzing the costs discussed in this chapter and those to follow, we first provide definitions of some of the components that are examined in this report.

### COMPONENT COST DEFINITIONS

**Basement walls:** Some states reported areas in linear feet instead of square feet, and these cases are excluded from analysis.

**Ceiling:** Includes the cost of insulation, but sometimes includes applicable framing (e.g., advanced trusses).

**Design:** Represents the cost of the architect's time to design the MCS home to include energy features.

**Doors:** Assumes door areas remain constant; costs of door jambs are included in wall costs.

**Drywall:** Includes the cost of improved caulking, but does not include Airtight Drywall Approach (ADA) costs which are included in vapor barrier costs.

**Electrical:** These costs may be less in MCS homes, especially, if kitchen and exhaust fans are no longer needed as a result of the installation of an air-to-air heat exchanger.

**Floor:** Usually involves only the cost of added insulation.

**Framing:** Includes floors, walls, and roof trusses.

**Glass:** Includes the frames, but not the structural framing costs which are included in wall costs.

**Heat exchanger (AAHX):** Includes duct costs.

**HVAC:** Heating, ventilation, and air conditioning costs are frequently less in MCS homes due to downsizing furnaces or switching from central to zonal heating.

**Insulation:** Includes only the cost of insulating materials and labor.

**Loan interest:** Represents interest costs due to increased home cost, MCS-related construction delays, or extended time in housing market.

**Passive solar:** Represents the costs of site orientation, thermal mass, insulating materials, and designing or installing extra glazing.

**Point system:** The point system allows modification of the standard component prescriptive packages given in the Component Prescriptive Standards. Specified variations are given points based upon the impact of the change upon the estimated yearly space heating requirements.

**Points:** Under the point system, points are calculated as 100 times the change in kWh/yr-ft$^2$ of heating requirements for the prototype resulting from the modification.

**Sub-floor:** Represents the costs of insulation and vapor barriers associated with slabs-on-grade, basements, and crawl spaces.

**Supervision:** Represents the cost of extra time required on-site to supervise workers' or subcontractors' work in order to assure that MCS standards are met.

**Walls:** Represents the cost of framing, insulation, window jambs, and door jambs.

In this chapter, we also present the absolute building costs for the builders as reported in constructing energy efficient homes. As noted in the Introduction, many of these homes contained more energy conservation measures than needed to achieve the Council's Model Conservation Standards (MCS). Accordingly, these costs may not represent the costs of building a MCS home, but may stand for the costs of building energy efficient homes that achieve **or** go beyond the standards proposed by the Council. All costs are in 1984 dollars and include labor and materials, but exclude builder overhead, fees, and profit.

As shown in Tables 6 and 7, the most expensive components in building energy efficient ("MCS/As-built") homes are, on average (using median costs), walls ($2454), glass (windows) ($2052), ceilings ($1950), and air-to-air heat exchangers (AAHX) ($1326). The next most expensive components are, on average (using median costs), vapor barriers ($813), basement walls ($547), floors ($506), and doors ($326). Mean costs and their standard deviations are reported in Tables 6 and 7 and displayed in Figure 8. The standard deviation and minimum-maximum values indicate the large variation in building component costs. There are a number of possible explanations for the large variance in building costs, and, in the next chapter, we examine one source of variation: building component size.

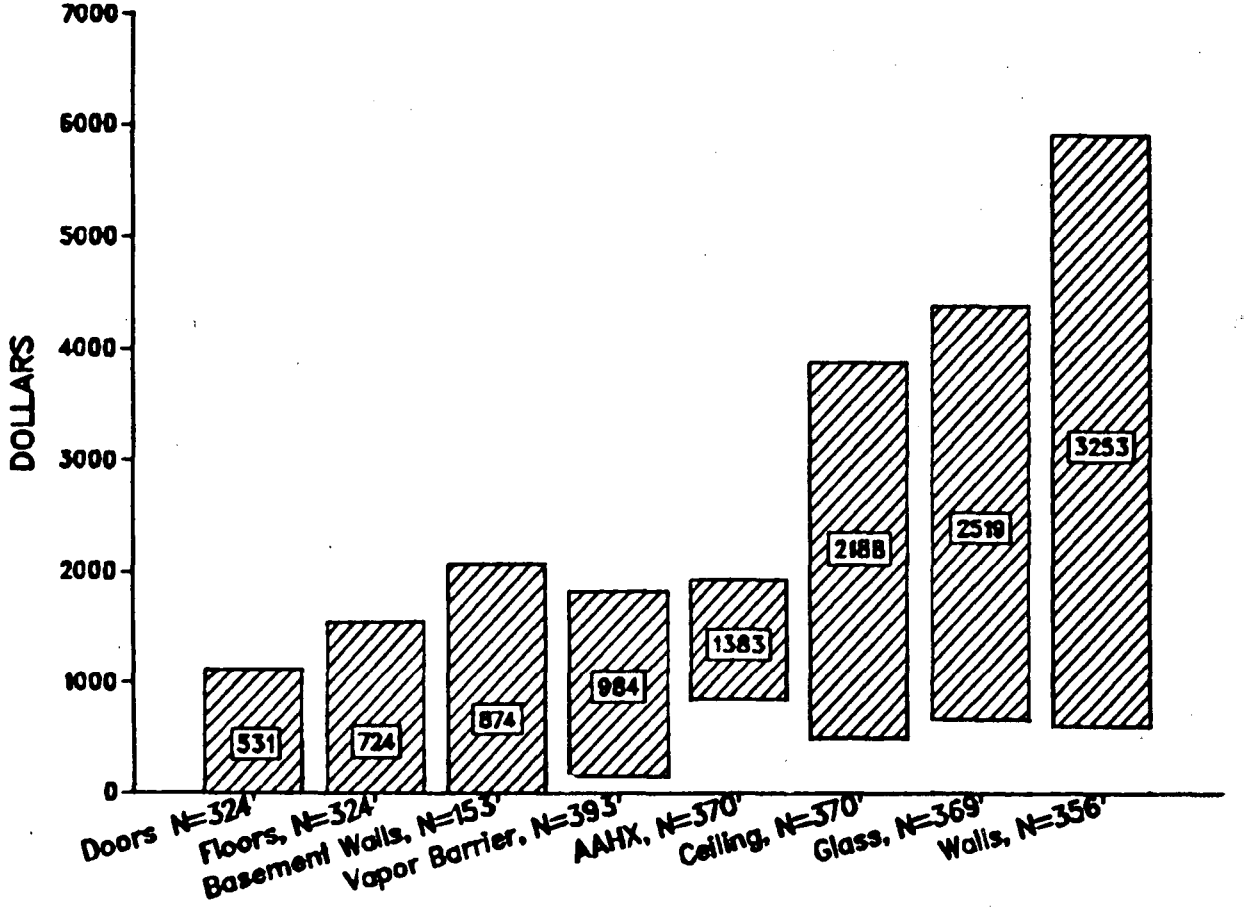
| Table 6. "MCS/As-built" costs - by climate zone | | | | | |
|---|---|---|---|---|---|
| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 2188 | 1689 | 1950 | 92-16895 | 370 |
| Climate zone 1 | 2205 | 1509 | 1938 | 128-9635 | 221 |
| Climate zone 2 | 2305 | 2359 | 2010 | 92-16895 | 82 |
| Climate zone 3 | 1987 | 1204 | 1975 | 159-5692 | 67 |
| **Floor** | | | | | |
| All cases | 724 | 808 | 506 | 10-8150 | 324 |
| Climate zone 1 | 745 | 795 | 537 | 25-8150 | 215 |
| Climate zone 2 | 731 | 1025 | 478 | 10-6424 | 59 |
| Climate zone 3 | 628 | 534 | 430 | 26-2316 | 50 |
| **Walls** | | | | | |
| All cases | 3253 | 2651 | 2454 | 51-22497 | 356 |
| Climate zone 1 | 3174 | 2418 | 2306 | 51-14378 | 218 |
| Climate zone 2 | 3654 | 3438 | 2908 | 337-22497 | 78 |
| Climate zone 3 | 3019 | 2251 | 2565 | 340-11576 | 60 |
| **Basement Walls** | | | | | |
| All cases | 874 | 1175 | 547 | 21-9242 | 153 |
| Climate zone 1 | 723 | 1242 | 409 | 21-8824 | 52 |
| Climate zone 2 | 927 | 900 | 603 | 99-4462 | 55 |
| Climate zone 3 | 981 | 1378 | 557 | 118-9242 | 46 |
| **Heat Exchanger** | | | | | |
| All cases | 1383 | 541 | 1326 | 75-5545 | 370 |
| Climate zone 1 | 1300 | 544 | 1200 | 400-4180 | 223 |
| Climate zone 2 | 1478 | 634 | 1370 | 75-5545 | 71 |
| Climate zone 3 | 1540 | 365 | 1464 | 945-2654 | 76 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Glazing** | | | | | |
| All cases | 2519 | 1858 | 2052 | 63-12820 | 369 |
| Climate zone 1 | 2519 | 1906 | 2020 | 80-12820 | 216 |
| Climate zone 2 | 2238 | 1744 | 1656 | 85-11000 | 80 |
| Climate zone 3 | 2828 | 1809 | 2615 | 63-7830 | 73 |
| **Doors** | | | | | |
| All cases | 531 | 582 | 326 | 7-3869 | 324 |
| Climate zone 1 | 549 | 604 | 358 | 7-3869 | 199 |
| Climate zone 2 | 548 | 608 | 338 | 24-2787 | 58 |
| Climate zone 3 | 463 | 488 | 180 | 20-1857 | 67 |
| **Vapor Barrier/ Caulking** | | | | | |
| All cases | 984 | 834 | 813 | 69-9354 | 393 |
| Climate zone 1 | 994 | 924 | 796 | 69-9354 | 231 |
| Climate zone 2 | 930 | 627 | 760 | 182-4040 | 85 |
| Climate zone 3 | 1014 | 754 | 864 | 103-6107 | 77 |

| Table 7. "MCS/As-built" costs - by state | | | | | |
|---|---|---|---|---|---|
| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 2188 | 1689 | 1950 | 92-16895 | 370 |
| Idaho | 2456 | 2590 | 2240 | 92-16895 | 39 |
| Montana | 1839 | 1204 | 1663 | 159-5692 | 58 |
| Oregon | 2378 | 1916 | 1789 | 195-11092 | 55 |
| Washington | 2184 | 1523 | 1962 | 128-9635 | 218 |
| **Floor** | | | | | |
| All cases | 724 | 808 | 506 | 10-8150 | 324 |
| Idaho | 750 | 715 | 554 | 90-2315 | 23 |
| Montana | 558 | 476 | 406 | 26-2316 | 45 |
| Oregon | 1169 | 1159 | 836 | 151-6424 | 50 |
| Washington | 650 | 738 | 472 | 10-8150 | 206 |
| **Walls** | | | | | |
| All cases | 3253 | 2651 | 2454 | 51-22497 | 356 |
| Idaho | 2582 | 2497 | 1712 | 337-13941 | 33 |
| Montana | 3040 | 2339 | 2358 | 340-11576 | 51 |
| Oregon | 3726 | 2106 | 3300 | 916-10668 | 52 |
| Washington | 3291 | 2841 | 2354 | 51-22497 | 220 |
| **Basement Walls** | | | | | |
| All cases | 874 | 1175 | 547 | 21-9242 | 153 |
| Idaho | 1222 | 1199 | 700 | 99-4462 | 26 |
| Montana | 938 | 1469 | 532 | 118-9242 | 39 |
| Oregon | 890 | 843 | 406 | 100-2778 | 14 |
| Washington | 714 | 1030 | 518 | 21-8824 | 74 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Heat Exchanger** | | | | | |
| All cases | 1383 | 541 | 1326 | 75-5545 | 370 |
| Idaho | 1659 | 418 | 1524 | 1179-2654 | 33 |
| Montana | 1504 | 330 | 1464 | 945-2460 | 67 |
| Oregon | 1167 | 378 | 1137 | 400-2131 | 59 |
| Washington | 1362 | 619 | 1245 | 75-5545 | 211 |
| **Glazing** | | | | | |
| All cases | 2519 | 1858 | 2052 | 63-12820 | 369 |
| Idaho | 2582 | 2034 | 2092 | 665-11000 | 30 |
| Montana | 2857 | 1832 | 2670 | 63-7830 | 64 |
| Oregon | 3078 | 2110 | 2557 | 100-10089 | 59 |
| Washington | 2258 | 1725 | 1799 | 80-12820 | 216 |
| **Doors** | | | | | |
| All cases | 531 | 582 | 326 | 7-3869 | 324 |
| Idaho | 641 | 623 | 466 | 38-2200 | 25 |
| Montana | 425 | 458 | 128 | 20-1857 | 61 |
| Oregon | 600 | 557 | 434 | 24-2787 | 54 |
| Washington | 531 | 618 | 344 | 7-3869 | 184 |
| **Vapor Barrier/ Caulking** | | | | | |
| All cases | 984 | 834 | 813 | 69-9354 | 393 |
| Idaho | 733 | 695 | 609 | 80-4040 | 44 |
| Montana | 1013 | 780 | 872 | 103-6107 | 67 |
| Oregon | 773 | 1241 | 600 | 69-9354 | 58 |
| Washington | 1079 | 723 | 936 | 131-6379 | 224 |

# Fig. 8 MCS/AS-BUILT COSTS




Boxed figure is the mean. Shaded area is the mean +/- standard deviation, unless lower limit becomes less than minimum, in which case minimum is used.

# CHAPTER III

## NORMALIZED ABSOLUTE BUILDING COSTS - BY COMPONENT AREA

In this chapter, we present absolute building component costs normalized (standardized) by **component area** (square footage). As shown in Tables 8 and 9, the most expensive (using median costs) components per square foot in building energy efficient ("MCS/As-built") homes are glass (windows) ($\$9.90/ft^2$), doors ($\$8.75/ft^2$), walls ($\$1.64/ft^2$), and ceilings ($\$1.50/ft^2$). The next most expensive components per square foot are basement walls ($\$0.72/ft^2$), floors ($\$0.54/ft^2$), and vapor barriers ($\$0.16/ft^2$). Mean costs and their standard deviations are reported in Tables 8 and 9 and displayed in Figure 9. The standard deviation and minimum-maximum values again indicate the large variation in building component costs, especially for walls and doors.

| Table 8. "MCS/As-built" costs per component area - by climate zone | | | | | |
|---|---|---|---|---|---|
| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 1.57 | 0.96 | 1.50 | 0.05-6.86 | 370 |
| Climate zone 1 | 1.57 | 0.92 | 1.51 | 0.05-5.80 | 221 |
| Climate zone 2 | 1.57 | 1.13 | 1.31 | 0.09-6.86 | 82 |
| Climate zone 3 | 1.57 | 0.89 | 1.65 | 0.12-3.84 | 67 |
| **Floor** | | | | | |
| All cases | 0.89 | 1.44 | 0.54 | 0.01-19.37 | 324 |
| Climate zone 1 | 0.82 | 0.89 | 0.58 | 0.08-8.66 | 215 |
| Climate zone 2 | 1.24 | 2.65 | 0.63 | 0.01-19.37 | 59 |
| Climate zone 3 | 0.77 | 1.26 | 0.39 | 0.10-6.99 | 50 |
| **Walls** | | | | | |
| All cases | 2.13 | 1.62 | 1.64 | 0.03-12.10 | 356 |
| Climate zone 1 | 2.02 | 1.52 | 1.57 | 0.03-11.70 | 218 |
| Climate zone 2 | 2.45 | 2.09 | 1.90 | 0.33-12.10 | 78 |
| Climate zone 3 | 2.09 | 1.20 | 1.81 | 0.02-6.43 | 60 |
| **Basement Walls*** | | | | | |
| All cases | 1.32 | 1.50 | 0.72 | 0.08-9.27 | 114 |
| Climate zone 1 | 1.08 | 1.15 | 0.68 | 0.08-6.98 | 52 |
| Climate zone 2 | 1.50 | 1.81 | 0.73 | 0.20-9.27 | 55 |
| Climate zone 3 | 1.63 | 1.01 | 1.10 | 0.65-3.12 | 7 |
| **Glass** | | | | | |
| All cases | 10.52 | 5.37 | 9.90 | 0.39-35.66 | 376 |
| Climate zone 1 | 10.01 | 5.01 | 9.46 | 0.39-35.66 | 227 |
| Climate zone 2 | 9.84 | 5.34 | 9.30 | 0.88-27.98 | 83 |
| Climate zone 3 | 13.12 | 5.91 | 13.10 | 1.20-25.98 | 66 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 0.21 | 0.17 | 0.16 | 0.02-1.40 | 375 |
| Climate zone 1 | 0.21 | 0.19 | 0.15 | 0.02-1.40 | 223 |
| Climate zone 2 | 0.20 | 0.18 | 0.15 | 0.03-1.36 | 82 |
| Climate zone 3 | 0.23 | 0.14 | 0.19 | 0.04-0.95 | 70 |
| **Doors** | | | | | |
| All cases | 10.16 | 8.66 | 8.75 | 0.04-52.86 | 289 |
| Climate zone 1 | 9.40 | 8.30 | 8.40 | 0.08-52.86 | 183 |
| Climate zone 2 | 9.98 | 7.32 | 8.82 | 0.04-27.42 | 71 |
| Climate zone 3 | 14.55 | 11.52 | 11.26 | 0.52-45.00 | 35 |

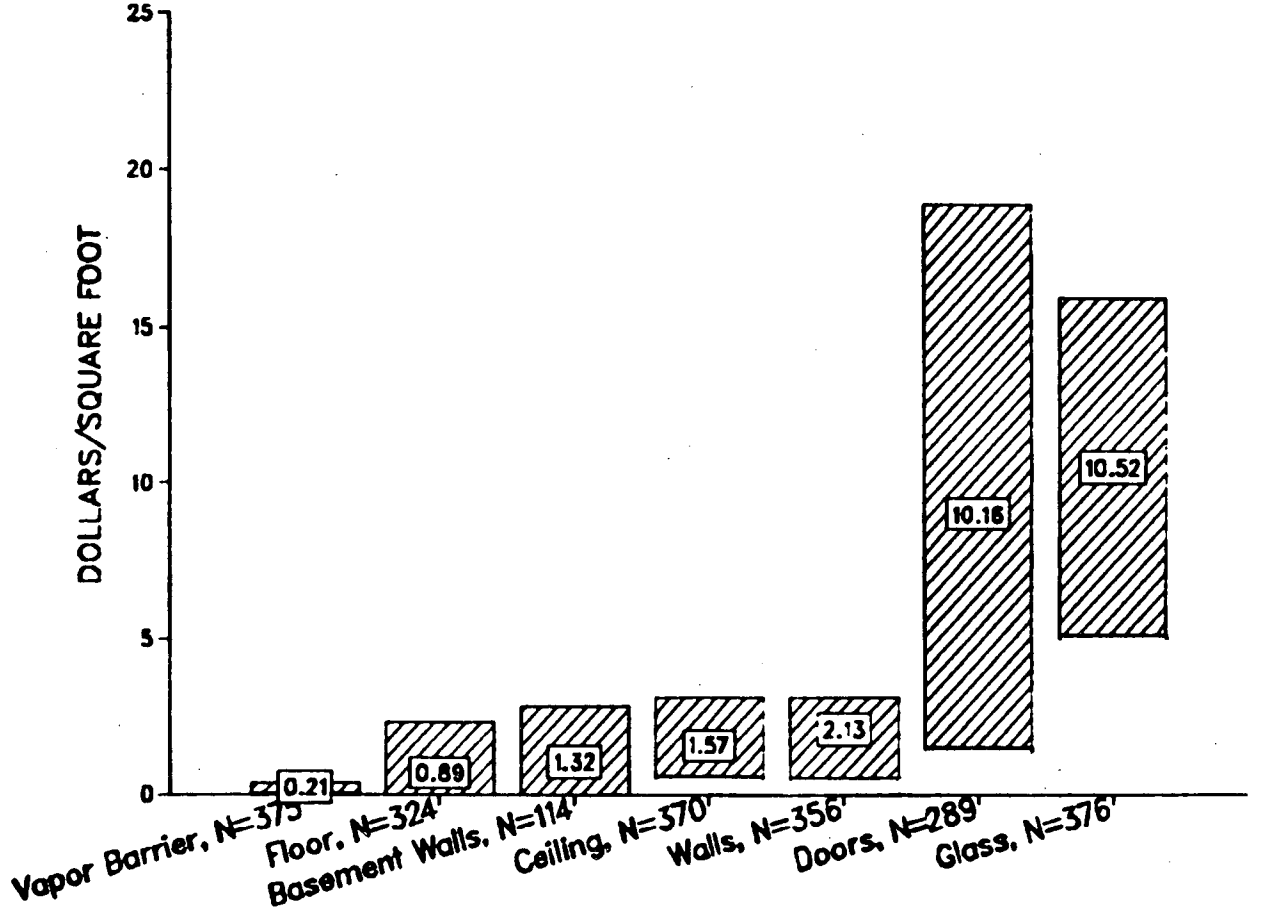
*Montana cases are not included in this analysis because component area was reported in linear feet instead of square feet.

| Table 9. "MCS/As-built" costs per component area - by state | | | | | |
|---|---|---|---|---|---|
| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 1.57 | 0.96 | 1.50 | 0.05-6.86 | 370 |
| Idaho | 1.69 | 1.21 | 1.56 | 0.09-6.86 | 39 |
| Montana | 1.44 | 0.84 | 1.44 | 0.12-3.41 | 58 |
| Oregon | 1.71 | 1.20 | 1.50 | 0.38-6.21 | 55 |
| Washington | 1.55 | 0.88 | 1.50 | 0.05-5.80 | 218 |
| **Floor** | | | | | |
| All cases | 0.89 | 1.44 | 0.54 | 0.01-19.37 | 324 |
| Idaho | 2.04 | 4.16 | 0.61 | 0.21-19.37 | 23 |
| Montana | 0.51 | 0.43 | 0.39 | 0.10-2.18 | 45 |
| Oregon | 0.89 | 0.79 | 0.61 | 0.12-3.60 | 50 |
| Washington | 0.84 | 1.01 | 0.58 | 0.01-8.67 | 206 |
| **Walls** | | | | | |
| All cases | 2.13 | 1.62 | 1.64 | 0.03-12.10 | 356 |
| Idaho | 1.71 | 1.22 | 1.32 | 0.33-5.48 | 33 |
| Montana | 2.15 | 1.25 | 1.83 | 0.02-6.43 | 51 |
| Oregon | 2.28 | 1.30 | 1.89 | 0.58-6.22 | 52 |
| Washington | 2.15 | 1.80 | 1.61 | 0.03-12.10 | 220 |
| **Basement Walls*** | | | | | |
| All cases | 1.32 | 1.50 | 0.72 | 0.08-9.27 | 114 |
| Idaho | 1.90 | 2.34 | 0.80 | 0.20-9.27 | 26 |
| Montana | - | - | - | - | - |
| Oregon | 1.63 | 1.56 | 1.03 | 0.10-5.26 | 14 |
| Washington | 1.06 | 0.99 | 0.68 | 0.08-6.98 | 74 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Glass** | | | | | |
| All cases | 10.52 | 5.37 | 9.90 | 0.39-35.66 | 376 |
| Idaho | 12.71 | 5.77 | 12.47 | 3.11-35.66 | 42 |
| Montana | 13.16 | 6.11 | 13.57 | 1.20-25.98 | 56 |
| Oregon | 10.45 | 5.17 | 10.53 | 0.44-22.84 | 59 |
| Washington | 9.45 | 4.80 | 9.01 | 0.39-32.67 | 219 |
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 0.21 | 0.17 | 0.16 | 0.02-1.40 | 375 |
| Idaho | 0.12 | 0.10 | 0.09 | 0.02-0.49 | 41 |
| Montana | 0.24 | 0.14 | 0.20 | 0.04-0.95 | 60 |
| Oregon | 0.11 | 0.07 | 0.09 | 0.02-0.30 | 55 |
| Washington | 0.24 | 0.20 | 0.20 | 0.02-1.40 | 219 |
| **Doors** | | | | | |
| All cases | 10.16 | 8.66 | 8.75 | 0.04-52.86 | 289 |
| Idaho | 13.26 | 10.83 | 8.38 | 0.71-45.00 | 35 |
| Montana | 12.38 | 8.78 | 10.96 | 0.52-31.63 | 26 |
| Oregon | 9.66 | 7.20 | 9.63 | 0.04-25.47 | 43 |
| Washington | 9.39 | 8.37 | 8.75 | 0.08-52.86 | 185 |

*Montana cases are not included in this analysis because component area was reported in linear feet instead of square feet.

Fig. 9 MCS/AS-BUILT COSTS BY COMPONENT AREA




Boxed figure is the mean. Shaded area is the mean +/- standard deviation, unless lower limit becomes less than minimum, in which case minimum is used.

# CHAPTER IV

## INCREMENTAL BUILDING COSTS

In this chapter, we present "incremental" building costs of selected components. The costs are incremental because they represent the difference between the cost of "MCS/As-built" homes and the cost of homes built to "current practice." Current practice typically refers to existing state or local building standards; however, there are exceptions to this definition (for more discussion, see Chapter X). We include building components (e.g., walls and ceilings) as well as elements of components (e.g., insulation) in our analysis. Because the costs are examined in two different ways, the categories cannot be added to obtain total incremental costs for the whole house. We provide total incremental costs for multi-family homes and single-family homes in Chapters 8 and 9, respectively.

As shown in Tables 10 and 11, the largest median incremental cost for builders of energy efficient homes is the installation of air-to-air heat exchangers ($1268). Because of reduced air infiltration resulting from vapor barriers, the exchangers are required in these homes to provide adequate ventilation; they are not normally found in homes built to current practice. The next most expensive median incremental costs for builders in the RSDP program are walls ($923), insulation ($725), framing ($690), vapor barrier ($658), glass ($592), and ceiling ($417). The remaining median incremental costs are below $300. Mean costs and their standard deviations are reported in Tables 10 and 11, and displayed in Figures 10 and 11. As in the preceding analysis, there is a large variation in incremental building costs, especially for framing and HVAC systems.

| Table 10. Incremental "MCS/As-built" costs - by climate zone | | | | | |
|---|---|---|---|---|---|
| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 566 | 755 | 417 | -671-11795 | 381 |
| Climate zone 1 | 598 | 513 | 471 | 0-3617 | 226 |
| Climate zone 2 | 596 | 1320 | 358 | -547-11795 | 83 |
| Climate zone 3 | 435 | 426 | 360 | -671-2429 | 72 |
| **Floor** | | | | | |
| All cases | 291 | 275 | 224 | -287-1847 | 338 |
| Climate zone 1 | 293 | 268 | 204 | -287-1847 | 219 |
| Climate zone 2 | 260 | 324 | 133 | 0-1800 | 66 |
| Climate zone 3 | 321 | 238 | 307 | 0-996 | 53 |
| **Walls** | | | | | |
| All cases | 1134 | 1063 | 923 | -2562-9998 | 357 |
| Climate zone 1 | 1086 | 915 | 918 | -445-6233 | 219 |
| Climate zone 2 | 1154 | 1043 | 1006 | -2562-4741 | 77 |
| Climate zone 3 | 1285 | 1502 | 843 | 0-9998 | 61 |
| **Basement Walls** | | | | | |
| All cases | 226 | 376 | 0 | -423-3126 | 304 |
| Climate zone 1 | 114 | 339 | 0 | 0-3126 | 187 |
| Climate zone 2 | 379 | 337 | 297 | -34-1235 | 68 |
| Climate zone 3 | 438 | 402 | 444 | -423-1572 | 49 |
| **Glass** | | | | | |
| All cases | 739 | 667 | 592 | -460-4083 | 388 |
| Climate zone 1 | 811 | 710 | 625 | -224-4083 | 231 |
| Climate zone 2 | 763 | 677 | 589 | -460-3000 | 84 |
| Climate zone 3 | 484 | 410 | 389 | -424-1821 | 73 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 797 | 614 | 658 | -683-5442 | 380 |
| Climate zone 1 | 773 | 598 | 642 | -683-5442 | 226 |
| Climate zone 2 | 788 | 616 | 664 | 70-3285 | 83 |
| Climate zone 3 | 886 | 665 | 710 | 142-4893 | 71 |
| **Doors** | | | | | |
| All cases | 109 | 217 | 50 | -736-2624 | 364 |
| Climate zone 1 | 137 | 234 | 72 | -209-2624 | 207 |
| Climate zone 2 | 102 | 225 | 64 | -736-908 | 81 |
| Climate zone 3 | 39 | 125 | 0 | -120-689 | 76 |
| **Heat Exchanger** | | | | | |
| All cases | 1308 | 557 | 1268 | 0-4180 | 366 |
| Climate zone 1 | 1294 | 542 | 1200 | 400-4180 | 222 |
| Climate zone 2 | 1132 | 657 | 1289 | 0-2633 | 76 |
| Climate zone 3 | 1548 | 376 | 1456 | 945-2654 | 68 |

## THE FOLLOWING COMPONENTS MAY CONTAIN COSTS THAT ARE ALSO INCLUDED IN THE COSTS REPORTED ABOVE

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Subfloor** | | | | | |
| All cases | 285 | 439 | 114 | -572-3578 | 360 |
| Climate zone 1 | 186 | 424 | 17 | -199-3578 | 212 |
| Climate zone 2 | 242 | 296 | 122 | -391-1300 | 76 |
| Climate zone 3 | 622 | 448 | 589 | -572-2048 | 72 |
| **Framing** | | | | | |
| All cases | 910 | 1525 | 690 | -2167-24334 | 386 |
| Climate zone 1 | 901 | 1770 | 654 | -2167-24334 | 230 |
| Climate zone 2 | 837 | 1248 | 526 | -350-9277 | 79 |
| Climate zone 3 | 1010 | 856 | 814 | -1500-5180 | 77 |
| **Insulation** | | | | | |
| All cases | 872 | 736 | 725 | -98980-4544 | 387 |
| Climate zone 1 | 876 | 708 | 698 | -980-4114 | 232 |
| Climate zone 2 | 825 | 793 | 791 | -569-3220 | 79 |
| Climate zone 3 | 910 | 767 | 764 | -979-4544 | 76 |
| **Electrical** | | | | | |
| All cases | 13 | 428 | 0 | -1030-5708 | 342 |
| Climate zone 1 | -26 | 182 | 0 | -885-820 | 210 |
| Climate zone 2 | 200 | 839 | 0 | -720-5708 | 70 |
| Climate zone 3 | -66 | 251 | 0 | -1030-350 | 62 |
| **HVAC** | | | | | |
| All cases | -77 | 897 | 0 | -6000-4509 | 303 |
| Climate zone 1 | -178 | 788 | 0 | -6000-4509 | 207 |
| Climate zone 2 | 321 | 845 | 0 | -1340-3311 | 68 |
| Climate zone 3 | -293 | 1401 | -185 | -5450-3045 | 28 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Passive Solar** | | | | | |
| All cases | 115 | 544 | 0 | 0-5343 | 253 |
| Climate zone 1 | 109 | 571 | 0 | 0-5343 | 189 |
| Climate zone 2 | 88 | 411 | 0 | 0-3017 | 59 |
| Climate zone 3 | 656 | 728 | 356 | 0-1885 | 5 |
| **Supervision** | | | | | |
| All cases | 339 | 419 | 250 | 0-3500 | 326 |
| Climate zone 1 | 365 | 481 | 250 | 0-3500 | 209 |
| Climate zone 2 | 322 | 327 | 245 | 0-1800 | 72 |
| Climate zone 3 | 243 | 140 | 220 | 0-560 | 45 |
| **Design** | | | | | |
| All cases | 129 | 187 | 100 | 0-1400 | 329 |
| Climate zone 1 | 120 | 193 | 60 | 0-1330 | 211 |
| Climate zone 2 | 151 | 211 | 122 | 0-1400 | 69 |
| Climate zone 3 | 138 | 114 | 150 | 0-600 | 49 |
| **Loan Interest** | | | | | |
| All cases | 200 | 329 | 137 | -830-3700 | 306 |
| Climate zone 1 | 215 | 369 | 122 | -830-3700 | 205 |
| Climate zone 2 | 189 | 258 | 142 | 0-1438 | 68 |
| Climate zone 3 | 130 | 127 | 100 | -135-402 | 33 |

| Table 11. Incremental "MCS/As-built" costs - by state | | | | | |
|---|---|---|---|---|---|
| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 566 | 755 | 417 | -671-11795 | 381 |
| Idaho | 662 | 1834 | 297 | 0-11795 | 40 |
| Montana | 407 | 433 | 305 | -671-2429 | 63 |
| Oregon | 557 | 487 | 421 | -547-2001 | 55 |
| Washington | 596 | 514 | 482 | 0-3617 | 223 |
| **Floor** | | | | | |
| All cases | 291 | 275 | 224 | -287-1847 | 338 |
| Idaho | 168 | 242 | 129 | -256-996 | 22 |
| Montana | 306 | 227 | 282 | 0-904 | 49 |
| Oregon | 418 | 392 | 307 | 0-1847 | 51 |
| Washington | 270 | 244 | 190 | -287-1800 | 216 |
| **Walls** | | | | | |
| All cases | 1134 | 1063 | 923 | -2562-9998 | 357 |
| Idaho | 690 | 1124 | 491 | -2562-4741 | 33 |
| Montana | 1348 | 1582 | 1001 | 0-9998 | 52 |
| Oregon | 1257 | 1034 | 918 | 141-4444 | 51 |
| Washington | 1122 | 882 | 950 | -4-6233 | 221 |
| **Basement Walls** | | | | | |
| All cases | 226 | 376 | 0 | -423-3126 | 304 |
| Idaho | 385 | 322 | 306 | 0-1232 | 26 |
| Montana | 416 | 389 | 432 | -423-1572 | 42 |
| Oregon | 294 | 359 | 138 | 0-1113 | 15 |
| Washington | 166 | 364 | 0 | -34-3126 | 221 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Glass** | | | | | |
| All cases | 739 | 667 | 592 | -460-4083 | 388 |
| Idaho | 472 | 637 | 309 | -460-3000 | 43 |
| Montana | 442 | 371 | 371 | -424-1779 | 63 |
| Oregon | 1150 | 930 | 886 | -224-4083 | 59 |
| Washington | 766 | 592 | 608 | 0-3770 | 223 |
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 797 | 614 | 658 | -683-5442 | 380 |
| Idaho | 454 | 605 | 275 | 70-3285 | 41 |
| Montana | 920 | 666 | 743 | 142-4893 | 61 |
| Oregon | 537 | 451 | 517 | -683-2673 | 55 |
| Washington | 891 | 598 | 739 | 0-5442 | 223 |
| **Doors** | | | | | |
| All cases | 109 | 217 | 50 | -736-2624 | 364 |
| Idaho | 66 | 166 | 0 | -60-689 | 38 |
| Montana | 20 | 70 | 0 | -120-396 | 67 |
| Oregon | 161 | 280 | 132 | -736-908 | 42 |
| Washington | 134 | 232 | 74 | -104-2624 | 217 |
| **Heat Exchanger** | | | | | |
| All cases | 1308 | 557 | 1268 | 0-4180 | 366 |
| Idaho | 1711 | 466 | 1634 | 1179-2654 | 24 |
| Montana | 1506 | 337 | 1439 | 945-2460 | 60 |
| Oregon | 1144 | 354 | 1132 | 400-1890 | 58 |
| Washington | 1254 | 620 | 1214 | 0-4180 | 224 |

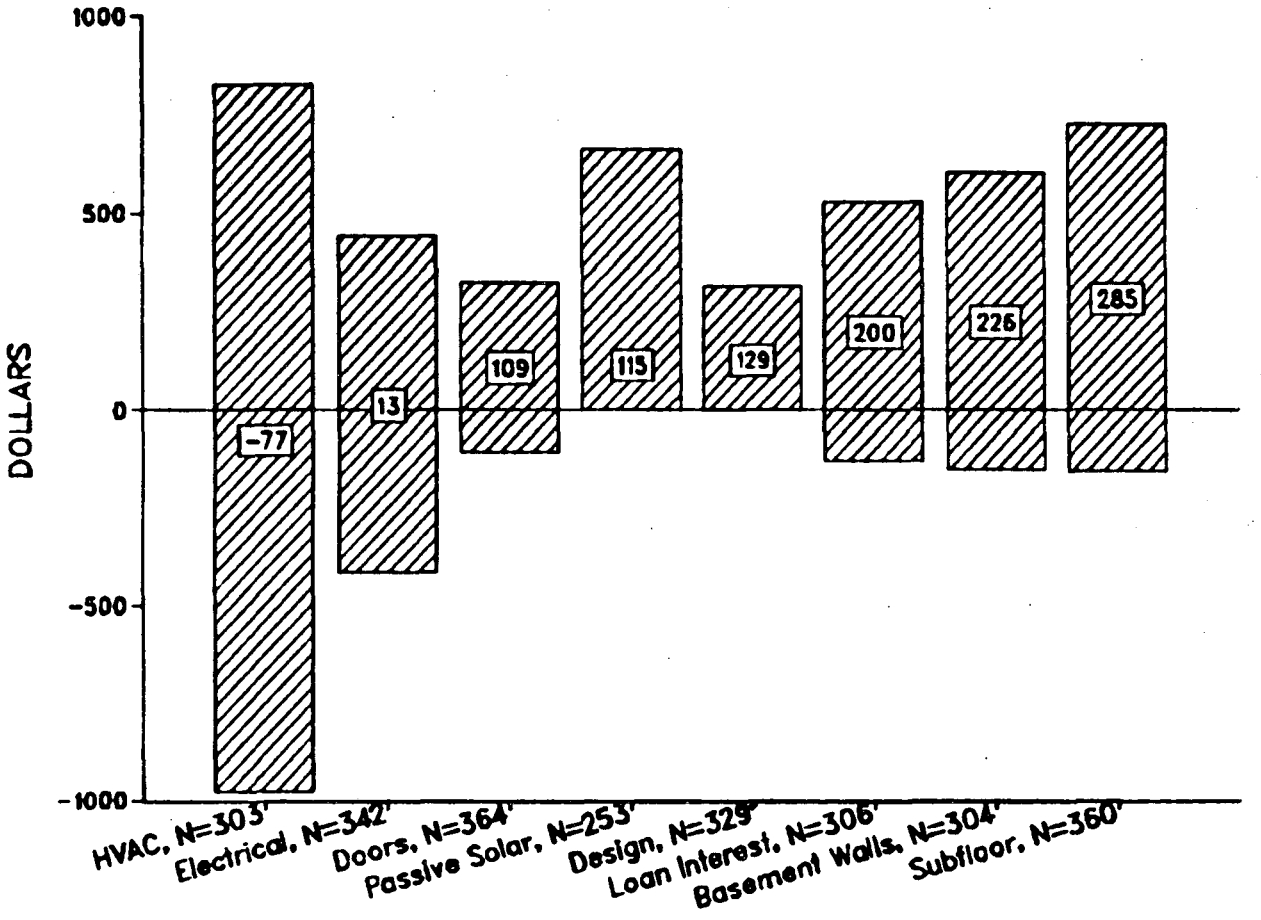
## THE FOLLOWING COMPONENTS MAY CONTAIN COSTS THAT ARE ALSO INCLUDED IN THE COSTS REPORTED ABOVE

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Subfloor** | | | | | |
| All cases | 285 | 439 | 114 | -572-3578 | 360 |
| Idaho | 240 | 333 | 144 | -572-1300 | 38 |
| Montana | 666 | 444 | 612 | -411-2048 | 62 |
| Oregon | 278 | 352 | 177 | -199-1492 | 36 |
| Washington | 188 | 410 | 0 | -142-3578 | 224 |
| **Framing** | | | | | |
| All cases | 910 | 1525 | 690 | -2167-24334 | 386 |
| Idaho | 773 | 1581 | 485 | -1500-9277 | 38 |
| Montana | 1039 | 804 | 814 | 0-5180 | 67 |
| Oregon | 1226 | 1040 | 908 | -2167-3495 | 57 |
| Washington | 814 | 1759 | 577 | -910-24334 | 224 |
| **Insulation** | | | | | |
| All cases | 872 | 736 | 725 | -980-4544 | 387 |
| Idaho | 814 | 927 | 562 | -128-4544 | 38 |
| Montana | 840 | 656 | 735 | -979-3768 | 66 |
| Oregon | 852 | 570 | 791 | -980-2733 | 59 |
| Washington | 897 | 764 | 728 | -569-4114 | 224 |
| **Electrical** | | | | | |
| All cases | 13 | 428 | 0 | -1030-5708 | 342 |
| Idaho | -123 | 288 | -150 | -1030-527 | 31 |
| Montana | -46 | 220 | 0 | -600-350 | 53 |
| Oregon | -41 | 260 | -51 | -452-820 | 34 |
| Washington | 54 | 492 | 0 | -885-5708 | 224 |

| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **HVAC** | | | | | |
| All cases | -77 | 897 | 0 | -6000-4509 | 303 |
| Idaho | -278 | 1149 | 22 | -5450-600 | 28 |
| Montana | 42 | 985 | -190 | -765-3045 | 21 |
| Oregon | -174 | 1183 | -112 | -1100-3311 | 30 |
| Washington | -96 | 803 | 0 | -6000-4509 | 224 |
| **Passive Solar** | | | | | |
| All cases | 115 | 544 | 0 | 0-5343 | 253 |
| Idaho | 1094 | 1548 | 1094 | 0-2189 | 2 |
| Montana | 656 | 728 | 356 | 0-1885 | 5 |
| Oregon | 668 | 1226 | 302 | 0-5343 | 22 |
| Washington | 40 | 349 | 0 | 0-4108 | 224 |
| **Supervision** | | | | | |
| All cases | 339 | 419 | 250 | 0-3500 | 326 |
| Idaho | 195 | 236 | 150 | 0-850 | 20 |
| Montana | 253 | 139 | 240 | 0-560 | 37 |
| Oregon | 525 | 642 | 320 | 0-2500 | 45 |
| Washington | 328 | 396 | 250 | 0-3500 | 224 |
| **Design** | | | | | |
| All cases | 129 | 187 | 100 | 0-1400 | 329 |
| Idaho | 151 | 128 | 152 | 0-422 | 26 |
| Montana | 137 | 112 | 143 | 0-600 | 40 |
| Oregon | 214 | 254 | 150 | 0-1400 | 39 |
| Washington | 110 | 187 | 50 | 0-1330 | 224 |

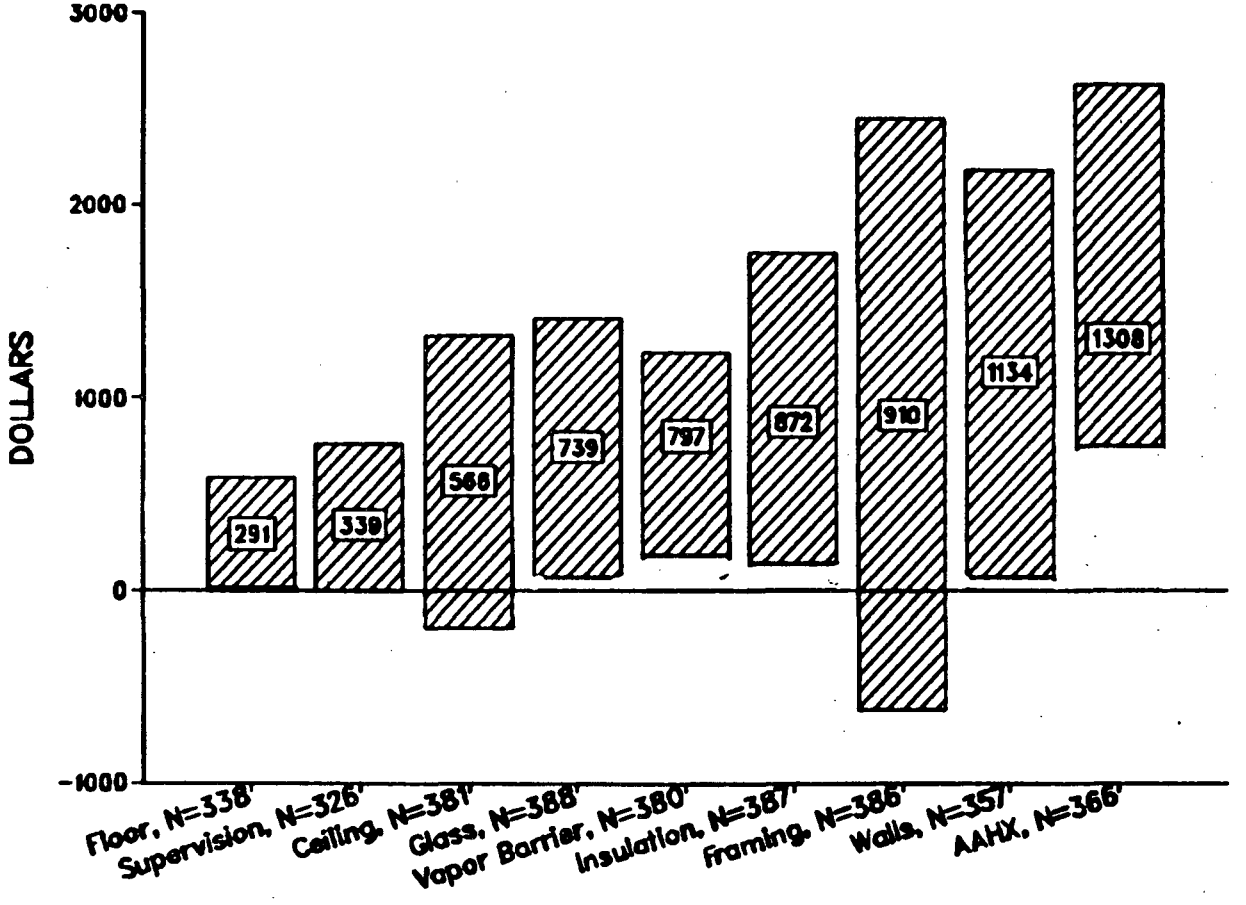
| | Mean ($) | Standard Deviation ($) | Median ($) | Minimum-Maximum ($) | Sample Size |
|---|---|---|---|---|---|
| **Loan Interest** | | | | | |
| All cases | 200 | 329 | 137 | -830-3700 | 306 |
| Idaho | 139 | 118 | 163 | 0-400 | 14 |
| Montana | 132 | 130 | 100 | -135-402 | 29 |
| Oregon | 264 | 462 | 139 | -830-1925 | 39 |
| Washington | 201 | 328 | 132 | 0-3700 | 224 |

Fig. 10 INCREMENTAL MCS/AS-BUILT COSTS




Boxed figure is the mean. Shaded area is the mean +/- 1 standard deviation, unless lower limit becomes less than minimum, in which case minimum value is used.

Fig. 11 INCREMENTAL MCS/AS-BUILT COSTS




Boxed figure is the mean. Shaded area is the mean +/- standard deviation, unless lower limit becomes less than minimum, in which case minimum is used.

## CHAPTER V

## NORMALIZED INCREMENTAL BUILDING COSTS - BY FLOOR AREA

In this chapter, we present incremental building component costs normalized (standardized) by **floor area**. As shown in Table 12, the largest median incremental cost per square foot for builders of energy efficient homes is the installation of air-to-air heat exchangers ($0.69/ft$^2$). The next most expensive median incremental costs per floor area for builders in the RSDP program are walls ($0.47/ft$^2$), insulation ($0.42/ft$^2$), framing ($0.35/ft$^2$), vapor barrier ($0.35/ft$^2$), glass ($0.31/ft$^2$), and ceiling ($0.22/ft$^2$). The remaining median incremental costs are below $0.20/ft$^2$. Mean costs and their standard deviations are also reported in Table12.

**Table 12. Incremental "MCS/As-built" costs per floor area - by climate zone**

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Ceiling** | | | | | |
| All cases | 0.28 | 0.28 | 0.22 | -0.56-2.79 | 381 |
| Climate zone 1 | 0.32 | 0.26 | 0.27 | 0-1.72 | 226 |
| Climate zone 2 | 0.25 | 0.36 | 0.17 | -0.31-2.79 | 83 |
| Climate zone 3 | 0.20 | 0.22 | 0.18 | -0.56-1.35 | 72 |
| **Floor** | | | | | |
| All cases | 0.16 | 0.16 | 0.12 | -0.26-1.22 | 338 |
| Climate zone 1 | 0.16 | 0.15 | 0.13 | -0.26-1.22 | 219 |
| Climate zone 2 | 0.14 | 0.18 | 0.07 | 0-0.85 | 66 |
| Climate zone 3 | 0.18 | 0.16 | 0.14 | 0-0.59 | 53 |
| **Walls** | | | | | |
| All cases | 0.58 | 0.56 | 0.47 | -1.90-4.96 | 357 |
| Climate zone 1 | 0.60 | 0.54 | 0.50 | -0.28-4.44 | 219 |
| Climate zone 2 | 0.52 | 0.51 | 0.46 | -1.90-1.89 | 77 |
| Climate zone 3 | 0.57 | 0.69 | 0.43 | 0-4.96 | 61 |
| **Basement Walls** | | | | | |
| All cases | 0.09 | 0.16 | 0 | -0.35-1.47 | 304 |
| Climate zone 1 | 0.04 | 0.14 | 0 | 0-1.47 | 187 |
| Climate zone 2 | 0.17 | 0.15 | 0.15 | -0.02-0.68 | 68 |
| Climate zone 3 | 0.17 | 0.17 | 0.19 | -0.35-0.52 | 49 |
| **Glass** | | | | | |
| All cases | 0.38 | 0.33 | 0.31 | -0.24-2.12 | 388 |
| Climate zone 1 | 0.43 | 0.35 | 0.36 | -0.24-2.12 | 231 |
| Climate zone 2 | 0.37 | 0.33 | 0.28 | -0.22-1.77 | 84 |
| Climate zone 3 | 0.23 | 0.25 | 0.20 | -0.18-1.43 | 73 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 0.40 | 0.26 | 0.35 | -0.30-1.54 | 380 |
| Climate zone 1 | 0.41 | 0.27 | 0.37 | -0.30-1.54 | 226 |
| Climate zone 2 | 0.36 | 0.24 | 0.29 | 0.06-0.95 | 83 |
| Climate zone 3 | 0.41 | 0.27 | 0.33 | 0.06-1.47 | 71 |
| **Doors** | | | | | |
| All cases | 0.05 | 0.10 | 0.02 | -0.52-0.97 | 364 |
| Climate zone 1 | 0.07 | 0.10 | 0.04 | -0.08-0.97 | 207 |
| Climate zone 2 | 0.04 | 0.12 | 0.03 | -0.52-0.60 | 81 |
| Climate zone 3 | 0.02 | 0.06 | 0 | -0.05-0.33 | 76 |
| **Heat Exchanger** | | | | | |
| All cases | 0.69 | 0.30 | 0.69 | 0-2.08 | 366 |
| Climate zone 1 | 0.72 | 0.26 | 0.69 | 0.17-1.54 | 222 |
| Climate zone 2 | 0.52 | 0.38 | 0.62 | 0-1.50 | 76 |
| Climate zone 3 | 0.75 | 0.29 | 0.72 | 0.41-2.08 | 68 |

## THE FOLLOWING COMPONENTS MAY CONTAIN COSTS THAT ARE ALSO INCLUDED IN THE COSTS REPORTED ABOVE

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Subfloor** | | | | | |
| All cases | 0.13 | 0.19 | 0.06 | -0.34-1.68 | 360 |
| Climate zone 1 | 0.08 | 0.18 | 0.01 | -0.12-1.68 | 212 |
| Climate zone 2 | 0.09 | 0.15 | 0.05 | -0.33-0.65 | 76 |
| Climate zone 3 | 0.27 | 0.19 | 0.26 | -0.34-0.69 | 72 |
| **Framing** | | | | | |
| All cases | 0.46 | 0.68 | 0.35 | -0.89-10.06 | 386 |
| Climate zone 1 | 0.49 | 0.81 | 0.36 | -0.89-10.06 | 230 |
| Climate zone 2 | 0.36 | 0.47 | 0.26 | -0.28-2.20 | 79 |
| Climate zone 3 | 0.46 | 0.35 | 0.39 | -0.60-1.78 | 77 |
| **Insulation** | | | | | |
| All cases | 0.45 | 0.37 | 0.42 | -0.82-3.40 | 387 |
| Climate zone 1 | 0.48 | 0.37 | 0.42 | -0.53-3.40 | 232 |
| Climate zone 2 | 0.40 | 0.37 | 0.41 | -0.18-1.76 | 79 |
| Climate zone 3 | 0.42 | 0.38 | 0.35 | -0.82-2.09 | 76 |
| **Electrical** | | | | | |
| All cases | 0.01 | 0.20 | 0 | -0.54-2.70 | 342 |
| Climate zone 1 | -0.01 | 0.11 | 0 | -0.54-0.75 | 210 |
| Climate zone 2 | 0.12 | 0.38 | 0.02 | -0.30-2.70 | 70 |
| Climate zone 3 | -0.02 | 0.12 | 0 | -0.48-0.22 | 62 |
| **HVAC** | | | | | |
| All cases | -0.06 | 0.40 | 0 | -1.79-1.78 | 303 |
| Climate zone 1 | -0.11 | 0.34 | 0 | -1.79-1.23 | 207 |
| Climate zone 2 | 0.18 | 0.41 | 0 | -0.54-1.78 | 68 |
| Climate zone 3 | -0.14 | 0.58 | -0.08 | -1.46-1.52 | 28 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Passive Solar** | | | | | |
| All cases | 0.06 | 0.28 | 0 | 0-2.81 | 253 |
| Climate zone 1 | 0.06 | 0.29 | 0 | 0-2.81 | 189 |
| Climate zone 2 | 0.06 | 0.27 | 0 | 0-1.98 | 59 |
| Climate zone 3 | 0.23 | 0.21 | 0.18 | 0-0.54 | 5 |
| **Supervision** | | | | | |
| All cases | 0.18 | 0.24 | 0.12 | 0-1.78 | 326 |
| Climate zone 1 | 0.20 | 0.27 | 0.15 | 0-1.78 | 209 |
| Climate zone 2 | 0.17 | 0.20 | 0.12 | 0-1.28 | 72 |
| Climate zone 3 | 0.12 | 0.07 | 0.10 | 0-0.27 | 45 |
| **Design** | | | | | |
| All cases | 0.07 | 0.09 | 0.04 | 0-0.67 | 329 |
| Climate zone 1 | 0.06 | 0.09 | 0.04 | 0-0.67 | 211 |
| Climate zone 2 | 0.08 | 0.10 | 0.06 | 0-0.50 | 69 |
| Climate zone 3 | 0.06 | 0.05 | 0.06 | 0-0.24 | 49 |
| **Loan Interest** | | | | | |
| All cases | 0.10 | 0.16 | 0.07 | -0.51-1.53 | 306 |
| Climate zone 1 | 0.11 | 0.17 | 0.07 | -0.51-1.53 | 205 |
| Climate zone 2 | 0.10 | 0.15 | 0.06 | 0-0.94 | 68 |
| Climate zone 3 | 0.06 | 0.07 | 0.04 | -0.12-0.20 | 33 |

# CHAPTER VI

## NORMALIZED INCREMENTAL BUILDING COSTS - BY COMPONENT AREA

In this chapter, we present incremental building component costs normalized (standardized) by **component area**. As shown in Tables 13 and 14, the largest median incremental cost per square foot of component area for builders of energy efficient homes is glazing ($\$2.64/ft^2$). The next most expensive median incremental costs per component area for builders in the RSDP program are below $\$1.00/ft^2$: doors ($\$0.92/ft^2$), walls ($\$0.60/ft^2$), ceiling ($\$0.34/ft^2$), floor ($\$0.25/ft^2$), air infiltration barriers ($\$0.12/ft^2$), and basement walls ($\$0.00/ft^2$). Mean costs and their standard deviations are reported in Tables 13 and 14, and displayed in Figure 12.

**Table 18. Incremental "MCS/As-built" costs per component area - by climate zone**

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Ceiling** | | | | | |
| All cases | 0.40 | 0.40 | 0.34 | -0.96-4.79 | 381 |
| Climate zone 1 | 0.43 | 0.32 | 0.38 | 0-2.06 | 226 |
| Climate zone 2 | 0.38 | 0.60 | 0.27 | -0.96-4.79 | 83 |
| Climate zone 3 | 0.34 | 0.32 | 0.26 | -0.56-1.87 | 72 |
| **Floor** | | | | | |
| All cases | 0.39 | 1.24 | 0.25 | -8.94-16.33 | 338 |
| Climate zone 1 | 0.28 | 0.86 | 0.25 | -8.94-3.50 | 219 |
| Climate zone 2 | 0.70 | 2.15 | 0.25 | -0.92-16.33 | 66 |
| Climate zone 3 | 0.44 | 0.90 | 0.28 | 0-6.34 | 53 |
| **Walls** | | | | | |
| All cases | 0.37 | 6.54 | 0.60 | -122.10-6.36 | 357 |
| Climate zone 1 | 0.13 | 8.32 | 0.57 | -122.10-4.95 | 219 |
| Climate zone 2 | 0.66 | 0.96 | 0.70 | -5.70-2.28 | 77 |
| Climate zone 3 | 0.90 | 0.95 | 0.68 | 0-6.36 | 61 |
| **Basement Walls*** | | | | | |
| All cases | 0.24 | 0.55 | 0 | -2.79-3.25 | 227 |
| Climate zone 1 | 0.12 | 0.34 | 0 | 0-2.36 | 170 |
| Climate zone 2 | 0.57 | 0.88 | 0.47 | -2.79-3.25 | 50 |
| Climate zone 3 | 0.64 | 0.45 | 0.70 | 0-1.26 | 7 |
| **Glass** | | | | | |
| All cases | 1.72 | 26.09 | 2.64 | -508.45-18.58 | 388 |
| Climate zone 1 | 3.29 | 2.60 | 2.79 | -0.90-18.58 | 231 |
| Climate zone 2 | -3.06 | 55.85 | 2.76 | -508.45-10.97 | 84 |
| Climate zone 3 | 2.25 | 2.54 | 1.94 | -2.96-14.23 | 73 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 0.14 | 0.16 | 0.12 | -1.48-0.67 | 327 |
| Climate zone 1 | 0.15 | 0.13 | 0.13 | -0.18-0.67 | 187 |
| Climate zone 2 | 0.12 | 0.14 | 0.14 | -0.43-0.41 | 70 |
| Climate zone 3 | 0.11 | 0.24 | 0.11 | -1.48-0.65 | 70 |
| **Doors** | | | | | |
| All cases | 1.84 | 3.46 | 0.92 | -18.40-21.87 | 364 |
| Climate zone 1 | 2.43 | 3.28 | 1.63 | -12.50-21.87 | 207 |
| Climate zone 2 | 1.27 | 4.05 | 1.00 | -18.40-9.19 | 81 |
| Climate zone 3 | 0.82 | 2.91 | 0 | -3.16-16.40 | 76 |

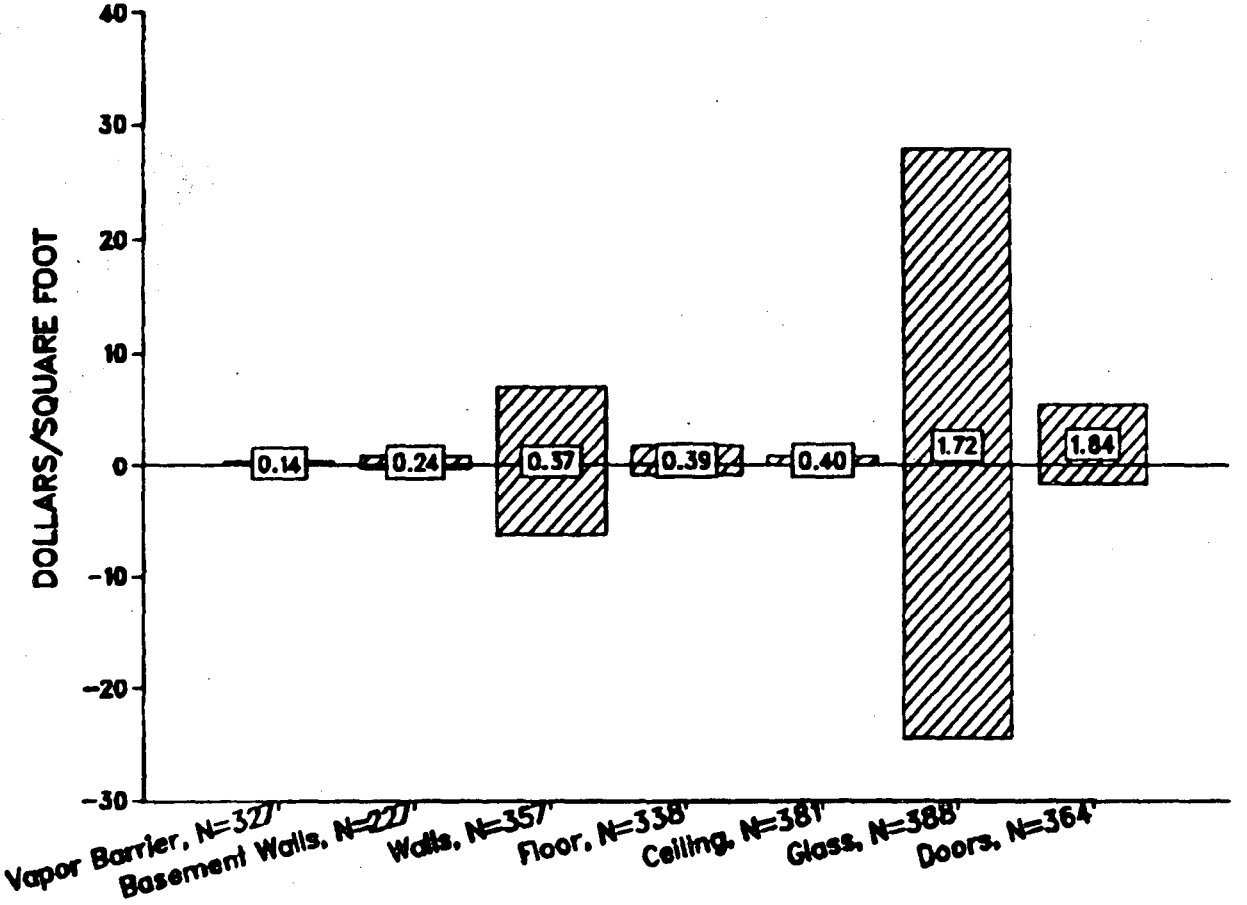
*Montana cases are not included in this analysis because component area was reported in linear feet instead of square feet.

| Table 14. Incremental "MCS/As-built" costs per component area - by state | | | | | |
|---|---|---|---|---|---|
| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
| **Ceiling** | | | | | |
| All cases | 0.40 | 0.40 | 0.34 | -0.96-4.79 | 381 |
| Idaho | 0.38 | 0.78 | 0.24 | -0.96-4.79 | 40 |
| Montana | 0.31 | 0.31 | 0.25 | -0.56-1.87 | 63 |
| Oregon | 0.42 | 0.35 | 0.31 | -0.31-1.87 | 55 |
| Washington | 0.43 | 0.32 | 0.37 | 0-2.06 | 223 |
| **Floor** | | | | | |
| All cases | 0.39 | 1.24 | 0.25 | -8.94-16.33 | 338 |
| Idaho | 1.25 | 3.62 | 0.21 | -0.13-16.33 | 22 |
| Montana | 0.32 | 0.35 | 0.28 | 0-2.18 | 49 |
| Oregon | 0 | 1.41 | 0.21 | -8.94-1.60 | 51 |
| Washington | 0.41 | 0.72 | 0.27 | -2.93-5.99 | 216 |
| **Walls** | | | | | |
| All cases | 0.37 | 6.54 | 0.60 | -122.10-6.36 | 357 |
| Idaho | 0.21 | 1.28 | 0.38 | -5.70-1.86 | 33 |
| Montana | 0.96 | 0.99 | 0.68 | 0-6.36 | 52 |
| Oregon | 0.78 | 0.82 | 0.52 | 0.13-4.95 | 51 |
| Washington | 0.17 | 8.28 | 0.65 | -122.10-4.75 | 221 |
| **Basement Walls*** | | | | | |
| All cases | 0.24 | 0.55 | 0 | -2.79-3.25 | 227 |
| Idaho | 0.39 | 0.74 | 0.47 | -2.79-1.26 | 26 |
| Montana | - | - | - | - | - |
| Oregon | 0.60 | 0.87 | 0.23 | 0-2.91 | 15 |
| Washington | 0.19 | 0.47 | 0 | 0-3.25 | 186 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Glass** | | | | | |
| All cases | 1.72 | 26.09 | 2.64 | -508.45-18.58 | 388 |
| Idaho | 2.58 | 3.65 | 2.18 | -2.41-18.58 | 43 |
| Montana | 1.98 | 2.24 | 1.89 | -2.96-14.23 | 63 |
| Oregon | -4.79 | 66.76 | 3.12 | -508.45-11.25 | 59 |
| Washington | 3.20 | 2.15 | 2.86 | 0-16.72 | 223 |
| **Infiltration/ Vapor Barrier** | | | | | |
| All cases | 0.14 | 0.16 | 0.12 | -1.48-0.67 | 327 |
| Idaho | 0.05 | 0.13 | 0.04 | -0.43-0.46 | 41 |
| Montana | 0.12 | 0.25 | 0.12 | -1.48-0.65 | 60 |
| Oregon | 0.09 | 0.07 | 0.08 | -0.13-0.28 | 51 |
| Washington | 0.18 | 0.13 | 0.15 | -0.18-0.67 | 175 |
| **Doors** | | | | | |
| All cases | 1.84 | 3.46 | 0.92 | -18.40-21.87 | 364 |
| Idaho | 1.33 | 3.80 | 0 | -1.58-16.40 | 38 |
| Montana | 0.35 | 1.40 | 0 | -3.16-8.80 | 67 |
| Oregon | 1.76 | 5.58 | 2.95 | -18.40-9.58 | 42 |
| Washington | 2.40 | 3.18 | 1.60 | -12.50-21.87 | 217 |

*Montana cases are not included in this analysis because component area was reported in linear feet instead of square feet.

Fig. 12 INCREMENTAL MCS/AS-BUILT COSTS BY COMPONENT AREA




Boxed figure is the mean. Shaded area is the mean +/- standard deviation, unless lower limit becomes more negative than minimum, in which case minimum is used.

## NORMALIZED INCREMENTAL BUILDING COSTS - GROUP ANALYSIS

In this chapter, we present a detailed analysis of incremental building component costs normalized (standardized) by **component area** for selected groups of components. The building components are ceiling, floor, walls, basement walls, windows, air infiltration barriers, door, and air-to-air heat exchangers. This chapter contains the "cleanest" data because unusual cases are segregated into an "all other" category.

Before each table, we provide component type codes so that the reader can understand the various groups in that particular table. Because there are many approaches builders take in going from Current Practice to MCS practice, we provide descriptive statistics for several groups of approaches that are of particular interest. For example, Group 1 in Table 15 contains the incremental cost of increased ceiling insulation (from R-19 to R-30) in vaulted ceilings (with batt insulation but with no foam insulation).

If a case does not belong to the first group, one examines it to see if it belongs to the second group; if it does not belong to the second group, then the third group is examined, etc. Those cases not included in a numbered group are analyzed separately as part of the group "all other cases of increments." There is no overlapping of cases in groups: i.e., a case is placed in only one group. It is important to note that it is not possible to add particular groups in order to compare costs with another group: for example, one should expect different costs for going from R-30 to R-45 than from adding the costs of going from R-30 to R-38 and from R-38 to R-45.

As in the previous tables, we provide the median, mean, standard deviation, range, and sample size. If the number of cases is 30 or more for a particular group, then a histogram for this group is provided in Appendix B to illustrate the distribution of incremental costs. Finally, at the end of four tables (ceilings, walls, windows, and air-to-air heat exchangers) in this chapter, we present statistics on "aggregate groups" which represent a series of important and logically consistent aggregations of changes from Current Practice to MCS. It is important to note that these larger groups are inclusive of the previously detailed smaller groups. For those interested in examining individual cases, one should proceed to Appendix C where all the cases are presented in a spreadsheet form and are placed in consecutive order by group number.

## CEILING GROUPS

### Ceiling Insulation Type Code:

A Attic, advanced truss, loosefill insulation

B Attic, advanced truss, batt insulation

C Attic, standard truss, baffle, compressed batt perimeter

D Attic, standard truss, rigid foam perimeter

E Vaulted, batt, no foam

F Vaulted, batt, foam inside

G Vaulted, compressed batt

H Attic, standard truss, loosefill insulation

I Attic, standard truss, loosefill insulation, compressed batt perimeter

X Missing

Z Other

R-38 includes R-38 to R-41; R-45 includes R-42 to R-46; and R-49 includes R-47 to R-51.

**Table 15. Incremental costs per square foot of ceiling by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | R-19 Type E | R-30 Type E | 0.29 | 0.13 | 0.28 | 0.13-0.47 | 6 |
| 2 | R-19 Type E | R-38 Type E,F,G | 0.61 | 0.42 | 0.54 | 0.22-1.27 | 6 |
| 3 | R-30 Type C | R-38 Type A | 0.17 | 0.17 | 0.17 | 0.17-0.17 | 1 |
| 4 | R-30 Type C | R-38 Type B | 0.48 | 0.20 | 0.39 | 0.22-0.88 | 13 |
| 5 | R-30 Type C | R-38 Type C | 0.21 | 0.13 | 0.18 | 0.09-0.56 | 10 |
| 6 | R-30 Type E | R-35 Type F | 0.40 | 0.17 | 0.44 | 0.08-0.55 | 6 |
| 7 | R-30 Type E | R-38 Type E | 0.31 | 0.29 | 0.22 | 0.05-1.26 | 30 |
| 8 | R-30 Type E | R-38 Type F | 0.73 | 0.34 | 0.64 | 0.45-1.48 | 11 |
| 9 | R-30 Type E | R-49 Type E | 1.13 | 1.02 | 0.63 | 0.45-2.30 | 3 |
| 10 | R-30 Type H | R-38 Type A | 0.44 | 0.25 | 0.39 | 0-1.24 | 90 |
| 11 | R-30 Type H | R-38 Type B | 0.40 | 0.16 | 0.41 | 0.23-0.56 | 3 |
| 12 | R-30 Type H | R-38 Type C | 0.19 | 0.26 | 0.19 | 0.01-0.37 | 2 |
| 13 | R-30 Type H | R-38 Type D | 0.41 | 0.06 | 0.41 | 0.37-0.45 | 2 |
| 14 | R-30 Type H | R-38 Type H | 0.11 | 0.08 | 0.09 | 0.03-0.33 | 23 |

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 15 | R-30 Type H | R-45 Type A | 0.32 | 0.21 | 0.23 | 0.09-0.65 | 10 |
| 16 | R-30 Type H | R-49 Type A | 0.55 | 0.47 | 0.47 | 0.20-2.07 | 15 |
| 17 | R-30 Type H | R-49 Type H | 0.23 | 0.10 | 0.16 | 0.16-0.39 | 5 |
| 18 | R-30 Type H | R-60 Type A | 0.60 | 0.19 | 0.58 | 0.30-0.83 | 6 |
| 19 | R-38 Type H | R-38 Type A | 0.24 | 0.26 | 0.16 | 0-1.34 | 36 |
| 20 | R-38 Type H | R-45 Type A | 0.30 | 0.23 | 0.32 | -0.07-0.63 | 8 |
| 21 | R-38 Type H | R-49 Type A | 0.29 | 0.08 | 0.28 | 0.16-0.44 | 12 |
| 22 | R-38 Type H | R-60 Type A | 0.50 | 0.18 | 0.50 | 0.21-0.79 | 15 |
| 23 | R-30 Type E,F,G | R-38 Type E,F,G | 0.47 | 0.11 | 0.47 | 0.39-0.55 | 2 |
| 24 | R-30 Type A,B,C, D,H,I | R-38 Type A,B,C, D,H,I | 0.30 | 0.32 | 0.27 | -0.31-0.99 | 17 |
| 25 | R-30 Type A,B,C, D,H,I | R-49 Type A,B,C, D,H,I | 0.19 | 0.14 | 0.12 | 0.10-0.35 | 3 |
| 26 | R-30 Type A,B,C, D,H,I | R-45 Type A,B,C, D,H,I | 0.42 | 0.42 | 0.42 | 0.42-0.42 | 1 |
| 27 | R-38 Type A,B,C, D,H,I | R-49 Type A,B,C, D,H,I | 0.18 | 0.18 | 0.18 | 0.18-0.18 | 1 |

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 28 | R-38 Type A,B,C, D,H,I | R-60 Type A,B,C, D,H,I | 0.40 | 0.40 | 0.40 | 0.40-0.40 | 1 |
| 29 | R-30 Type E,F,G | R-38 Type A,B,C, D,H,I | 0.56 | 0.35 | 0.56 | 0.31-0.81 | 2 |
| 30 | R-30 Any type | R-38 Any type | 0.71 | 0.58 | 0.71 | 0.08-1.72 | 11 |
| 31 | R-30 Any type | R-49 Any type | 0.82 | 0.32 | 0.94 | 0.21-1.10 | 6 |
| All other cases of increments | | | 0.52 | 1.71 | 0.20 | -0.57-12.40 | 56 |
| **AGGREGATE GROUPS (Attics only)** | | | | | | | |
| A | R-30 Any type | R-38 Std. Frame | 0.16 | 0.13 | 0.10 | 0.01-0.56 | 37 |
| B | R-30 Any type | R-38 Adv. Frame | 0.44 | 0.24 | 0.39 | 0-1.24 | 107 |
| C | R-30 Any type | R-49 Any Type | 0.44 | 0.41 | 0.30 | 0.10-2.07 | 23 |
| D | R-30 Any type | R-60 Any Type | 0.55 | 0.22 | 0.58 | 0.26-0.83 | 7 |
| E | R-38 Any type | R-49 Any Type | 0.28 | 0.08 | 0.27 | 0.16-0.44 | 13 |
| F | R-38 Any type | R-60 Any Type | 0.49 | 0.18 | 0.49 | 0.21-0.79 | 16 |

## FLOOR GROUPS

### Floor Type Code:

A Crawlspace (insulation under floor or overhangs)

B Slab below grade

C Slab on grade

D Heated crawlspace

E Foam insulation under slab

F Combination of floor and perimeter insulation

X Missing

Z Other

R-0 includes R-0 to R-2; R-5 includes R-3 to R-7; R-10 includes R-8 to R-12; R-15 includes R-13 to R-17; R-19 includes R-18 to R-22; R-25 includes R-23 to R-27; and R-30 includes R-28 to R-32.

**Table 16. Incremental costs per square foot of floor by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | R-0 Type A | R-19 Type A | 0.43 | 0.04 | 0.43 | 0.39-0.50 | 5 |
| 2 | R-0 Type B | R-5 Type B | 0.42 | 0.16 | 0.41 | 0.19-0.80 | 11 |
| 3 | R-0 Type B | R-10 Type B | 1.48 | 0.95 | 1.06 | 0.34-3.52 | 13 |
| 4 | R-0 Type B | R-15 Type B | 1.61 | 0.33 | 1.56 | 1.22-2.18 | 6 |
| 5 | R-0 Type B | R-5 Type E | 0.24 | 0.10 | 0.25 | 0.12-0.33 | 4 |
| 6 | R-0 Type B | R-10 Type E | 0.42 | 0.46 | 0.26 | 0.04-1.32 | 6 |
| 7 | R-0 Type B | R-15 Type E | 0.81 | 0.57 | 1.11 | 0.16-1.17 | 3 |
| 8 | R-0 Type E | R-5 Type E | 0.34 | 0.06 | 0.34 | 0.30-0.38 | 2 |
| 9 | R-0 Type E | R-10 Type E | 0.30 | 0.06 | 0.30 | 0.25-0.34 | 2 |
| 10* | R-0 Type C | R-5 Type C | 1.04 | 0.19 | 1.14 | 0.65-1.14 | 7 |
| 11* | R-0 Type C | R-10 Type C | 1.54 | 0.75 | 1.36 | 0.46-3.12 | 18 |
| 12* | R-0 Type C | R-15 Type C | 2.04 | 0.14 | 2.04 | 1.94-2.14 | 2 |
| 13 | R-5 Type B | R-10 Type B | 0.43 | 0.33 | 0.25 | 0.13-0.91 | 5 |
| 14* | R-5 Type C | R-10 Type C | 0.95 | 0.78 | 0.74 | 0.09-3.47 | 25 |
| 15* | R-5 Type C | R-15 Type C | 1.74 | 1.24 | 1.76 | 0.47-3.50 | 7 |
| 16 | R-11 Type A | R-19 Type A | 0.12 | 0.08 | 0.12 | -0.26-0.54 | 72 |
| 17 | R-11 Type A | R-25 Type A | 0.28 | 0.15 | 0.29 | 0-0.62 | 11 |
| 18 | R-11 Type A | R-30 Type A | 0.34 | 0.22 | 0.30 | 0.03-1.60 | 64 |
| 19 | R-11 Type A | R-38 Type A | 0.37 | 0.11 | 0.40 | 0.11-0.47 | 9 |
| 20 | R-11 Type D | R-19 Type A | 0.54 | 0.44 | 0.34 | 0.17-1.22 | 6 |
| 21 | R-19 Type A | R-25 Type A | 0.17 | 0.06 | 0.18 | 0.10-0.24 | 4 |
| 22 | R-19 Type A | R-30 Type A | 0.27 | 0.15 | 0.24 | 0-0.67 | 22 |
| All other cases of increments | | | 0.38 | 0.68 | 0.17 | -0.64-3.78 | 82 |

*Costs are per linear feet.

## WALL GROUPS

### Wall Type Code:

A Strapped wall

B Double wall

C 2 X 6, 24" on center, advanced framing

D 2 X 6, 24" on center, standard framing

E 2 X 6, 16" on center, standard framing

F 2 X 6, 24" on center, foam outside

G 2 X 6, 24" on center, foam inside

H 2 X 4, 24" on center, foam outside

I 2 X 4, 24" on center, foam inside

J Foam blocks

K 2 X 8, 24" on center, advanced framing

L 2 X 8, 16" on center, standard framing

M All weather wood foundation

N Cement, foam outside

O Cement, batt inside

P Cement, foam outside, batt inside

Q 2 X 6, 24" on center, mod. advanced framing

R 2 X 6, 24" on center, mod. advanced framing with foam inside

S 2 X 6, 24" on center, mod. advanced framing with foam outside

T Larsen truss, batt insulation

U 2 X 4, 16" on center, standard framing

V No insulation on foundation

X Missing

Z Other

AA 2 X 4, 24" on center, standard framing

BB Cement, no insulation

R-11 includes R-10 to R-13; R-24 includes R-23 to R-26; R-27 includes R-27 to R-28; R-30 includes R-29 to R-32; R-35 includes R-33 to R-36; and R-38 includes R-37 to R-41.

**Table 17. Incremental costs per square foot of wall by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | R-11 Type U | R-19 Type C,Q | 0.29 | 0.15 | 0.27 | 0-0.65 | 55 |
| 2 | R-11 Type U | R-19 Type D | 0.40 | 0.48 | 0.30 | 0.03-1.71 | 10 |
| 3 | R-11 Type U | R-19 Type E | 0.36 | 0.17 | 0.35 | 0.06-0.65 | 13 |
| 4 | R-11 Type U | R-24 Type G | 0.80 | 0.30 | 0.81 | 0.22-1.54 | 43 |
| 5 | R-11 Type U | R-24 Type K | 0.29 | 0.02 | 0.29 | 0.27-0.31 | 3 |
| 6 | R-11 Type U | R-24 Type L | 0.68 | 0.04 | 0.70 | 0.63-0.74 | 5 |
| 7 | R-11 Type U | R-27 Type A | 0.84 | 0.39 | 0.88 | 0.24-1.57 | 26 |
| 8 | R-11 Type U | R-27 Type B | 1.12 | 0.32 | 1.30 | 0.75-1.32 | 3 |
| 9 | R-11 Type U | R-30 Type B | 1.09 | 0.61 | 0.89 | 0.51-2.32 | 8 |
| 10 | R-11 Type U | R-27 Type F | 0.96 | 0.23 | 0.99 | 0.48-1.21 | 9 |
| 11 | R-11 Type U | R-27 Type G | 0.85 | 0.46 | 0.80 | 0-2.18 | 26 |
| 12 | R-19 Type D | R-27 Type F | 0.73 | 0.44 | 0.71 | 0.22-1.27 | 4 |
| 13 | R-19 Type D | R-38 Type B | 0.77 | 0.40 | 0.68 | 0.28-1.39 | 9 |
| 14 | R-19 Type E | R-24 Type F | 0.18 | 0.29 | 0.30 | -0.15-0.39 | 3 |
| 15 | R-19 Type E | R-35 Type B | 1.18 | 0.74 | 1.36 | 0.13-1.86 | 4 |
| 16 | R-19 Type E | R-38 Type B | 0.91 | 0.51 | 0.88 | 0.20-1.66 | 9 |
| 17 | R-19 Type H | R-27 Type F | 0.49 | 0.49 | 0.49 | 0.49-0.49 | 1 |
| 18 | R-11 Type U | R-38 Type B | 0.84 | 0.84 | 0.84 | 0.84-0.84 | 1 |
| 19 | R-19 Type D | R-35 Type B | 1.47 | 0.67 | 1.24 | 0.68-2.53 | 8 |
| 20 | R-19 Type E | R-27 Type F | 0.47 | 0.34 | 0.60 | 0.09-0.72 | 3 |
| 21 | R-11 Any type | R-19 Any type | 0.40 | 0.22 | 0.32 | 0.13-0.71 | 7 |
| 22 | R-11 Any type | R-24 Any type | 0.99 | 1.18 | 0.70 | 0-4.95 | 32 |
| 23 | R-19 Any type | R-35 Any type | 1.06 | 0.63 | 0.82 | 0.36-2.43 | 9 |
| 24 | R-11 Any type | R-30 Any type | 1.12 | 0.46 | 0.91 | 0.58-2.08 | 13 |
| 25 | R-11 Any type | R-38 Any type | 1.22 | 0.56 | 1.38 | 0.23-1.83 | 6 |
| 26 | R-19 Any type | R-24 Any type | 0.16 | 0.32 | 0.30 | -0.42-0.62 | 13 |
| 27 | R-19 Any type | R-27 Any type | 0.46 | 0.49 | 0.29 | 0.10-1.17 | 4 |
| 28 | R-19 Any type | R-35 Any type | 0.76 | 0.36 | 0.83 | 0.23-1.22 | 9 |

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| All other cases of increments | | | 0.61 | 0.43 | 0.54 | 0-1.74 | 22 |
| **AGGREGATE GROUPS** | | | | | | | |
| A | R-11 Any type | R-19 Any type | 0.32 | 0.22 | 0.28 | 0-1.71 | 85 |
| B | R-11 Any type | R-24 Any type | 0.85 | 0.77 | 0.71 | 0-4.95 | 83 |
| C | R-11 Any type | R-27 Any type | 0.90 | 0.43 | 0.85 | 0-2.43 | 73 |
| D | R-11 Any type | R-30 Any type | 1.11 | 0.51 | 0.90 | 0.51-2.32 | 21 |
| E | R-19 Any type | R-24 Any type | 0.17 | 0.30 | 0.30 | -0.42-0.62 | 16 |
| F | R-19 Any type | R-27 Any type | 0.56 | 0.39 | 0.54 | 0.09-1.27 | 12 |
| G | R-19 Any type | R-30 Any type | 0.57 | 0.32 | 0.57 | 0.10-1.11 | 7 |

## BASEMENT WALL GROUPS

### Basement Wall Type Code:

A Strapped wall

B Double wall

C 2 X 6, 24" on center, advanced framing

D 2 X 6, 24" on center, standard framing

E 2 X 6, 16" on center, standard framing

F 2 X 6, 24" on center, foam outside

G 2 X 6, 24" on center, foam inside

H 2 X 4, 24" on center, foam outside

I 2 X 4, 24" on center, foam inside

J Foam blocks

K 2 X 8, 24" on center, advanced framing

L 2 X 8, 16" on center, standard framing

M All weather wood foundation

N Cement, foam outside

O Cement, batt inside

P Cement, foam outside, batt inside

Q 2 X 6, 24" on center, mod. advanced framing

R 2 X 6, 24" on center, mod. advanced framing with foam inside

S 2 X 6, 24" on center, mod. advanced framing with foam outside

T Larsen truss, batt insulation

U 2 X 4, 16" on center, standard framing

V No insulation on foundation

X Missing

Z Other

AA 2 X 4, 24" on center, standard framing

BB Cement, no insulation

R-0 includes R-0 to R-2; R-5 includes R-4 to R-6; R-11 includes R-10 to R-13; R-15 includes R-14 to R-16; R-19 includes R-17 to R-22; and R-30 includes R-28 to R-32.

**Table 18. Incremental costs per square foot of basement wall by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | R-0 Type BB,V | R-11 Type O | 0.71 | 0.34 | 0.63 | 0.39-1.19 | 4 |
| 2 | R-0 Type BB,V | R-11 Type N | 0.78 | 0.46 | 0.62 | 0.22-1.98 | 28 |
| 3 | R-0 Type BB,V | R-19 Type O | 0.71 | 0.35 | 0.67 | 0.07-1.17 | 19 |
| 4 | R-5 Type N | R-10 Type N | 0.64 | 0.36 | 0.56 | 0.23-1.10 | 5 |
| 5 | R-11 Type M | R-19 Type M | 0.26 | 0.28 | 0.14 | 0.07-0.80 | 6 |
| 6 | R-11 Type O | R-19 Type O | 0.38 | 0.50 | 0.13 | -0.03-1.49 | 15 |
| 7 | R-0 Any type | R-11 Any type | 1.09 | 1.22 | 0.57 | 0.30-3.25 | 5 |
| 8 | R-0 Any type | R-15 Any type | 0.92 | 0.31 | 0.89 | 0.66-1.26 | 4 |
| 9 | R-0 Any type | R-19 Any type | 0.34 | 0.94 | 0.32 | -1.21-1.35 | 6 |
| 10 | R-0 Any type | R-30 Any type | 0.62 | 0.30 | 0.62 | 0.25-0.98 | 4 |
| All other cases of increments | | | 0.50 | 0.77 | 0.33 | -1.35-2.91 | 53 |

## WINDOW GROUPS

### Window Type Code:

A Aluminum slider

B Wood slider

C Aluminum casement

D Wood casement

E Aluminum fixed

F Wood fixed

G Aluminum

H Wood

I Aluminum, thermal break

J Aluminum, heat mirror

K Wood, heat mirror

L Wood, awning

M Aluminum, awning

N Wood, double hung

O Aluminum, double hung

X Missing

Z Other

U-0.34 includes U-0.29 to U-0.36; U-0.38 includes U-0.37 to U-0.40; U-0.48 includes U-0.48 to U-0.50; U-0.70 includes U-0.69 to U-0.71; and U-0.74 includes U-0.74 to U-0.78.

**Table 19. Incremental costs per square foot of window by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | U-0.47<br>Any type | Triple Glaz.<br>Any type | 3.43 | 1.95 | 2.80 | 0.92-7.12 | 9 |
| 2 | U-0.56<br>Type A | Triple Glaz.<br>Type I | 2.29 | 1.90 | 1.53 | 0-4.79 | 5 |
| 3 | U-0.56<br>Type H | Triple Glaz.<br>Type H | 3.61 | 1.83 | 3.06 | 2.24-7.52 | 7 |
| 4 | U-0.56-0.70<br>Type H | Any Glaz.<br>Type K | 5.53 | 2.07 | 5.58 | 2.28-7.79 | 5 |
| 5 | U-0.56<br>Any Type | U-0.34<br>Any Type | 2.84 | 1.00 | 2.76 | 1.70-4.12 | 4 |
| 6 | U-0.56<br>Any Type | U-0.38<br>Any Type | -1.24 | 2.70 | -1.24 | -3.15-0.67 | 2 |
| 7 | U-0.56<br>Any Type | U-.48<br>Any Type | 1.36 | 0.75 | 1.40 | 0.28-2.50 | 6 |
| 8 | U-0.68<br>Type I | U-0.37<br>Type J | 1.36 | 0.00 | 1.36 | 1.36-1.36 | 4 |
| 9 | U-0.70-0.74<br>Type A,C,E,<br>G,M,O | Triple Glaz.<br>Type A,C,E,<br>G,M,O | 3.79 | 1.76 | 4.03 | 0.83-7.30 | 12 |

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 10 | U-0.70-0.74 Type A,C,E, G,M,O | Double Glaz. Type I | 2.76 | 2.24 | 2.34 | 0-10.66 | 23 |
| 11 | U-0.70-0.74 Type A,C,E, G,M,O | Double Glaz. Type J | 5.92 | 4.26 | 8.22 | 1.01-8.53 | 3 |
| 12 | U-0.70-0.74 Type B,D,F, H,L,N | Double Glaz. Type B,D,F, H,L,N | 1.79 | 1.44 | 0.88 | 0.44-4.66 | 9 |
| 13 | U-0.70-0.74 Type G | Double Glaz. Type H | 4.85 | 3.48 | 4.05 | 0-11.25 | 10 |
| 14 | U-0.70-0.74 Type A,C,E, G,M,O | Triple Glaz. Type I | 3.36 | 1.64 | 2.95 | 0.67-7.32 | 47 |
| 15 | U-0.70-0.74 Type A,C,E, G,M,O | Triple Glaz. Type J | 4.23 | 1.46 | 4.58 | 0.98-6.14 | 18 |
| 16 | U-0.70-0.74 Type G | Triple Glaz. Type K | 10.84 | 6.51 | 7.11 | 7.05-18.35 | 3 |
| 17 | U-0.70-0.74 Type G | Triple Glaz. Type H | 7.48 | 2.11 | 7.13 | 5.43-10.25 | 4 |
| 18 | U-0.70-0.74 Any type | Double Glaz. Any type | 4.21 | 2.72 | 3.94 | 0-9.30 | 12 |

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 19 | U-0.70-0.74<br>Any type | Triple Glaz.<br>Any type | 4.55 | 2.42 | 4.20 | 2.28-10.51 | 10 |
| All other cases of increments | | | 1.12 | 2.57 | 0 | -3.44-14.23 | 58 |
| **AGGREGATE GROUPS** | | | | | | | |
| A | > U-0.65<br>Double Glaz.<br>Aluminum | ≤ U-0.41<br>Triple Glaz.*<br>Aluminum | 3.44 | 1.68 | 3.25 | 0.67-8.22 | 82 |
| B | > U-0.65<br>Double Glaz.<br>Aluminum | U-0.56-0.64<br>Double Glaz.<br>Aluminum | 3.29 | 1.77 | 2.79 | 1.52-6.91 | 9 |
| C | U-0.56-0.64<br>Double Glaz.<br>Aluminum | ≤ U-0.41<br>Triple Glaz.*<br>Aluminum | 2.35 | 1.71 | 2.10 | 0-4.79 | 6 |
| D | U-0.45-0.56<br>Double Glaz.<br>Wood | ≤ U-0.41<br>Triple Glaz.*<br>Wood | 4.55 | 2.30 | 3.72 | 0.92-14.23 | 21 |

*This MCS group also includes double-glaze windows with heat mirror.

## AIR INFILTRATION BARRIER GROUPS

### Air Infiltration Barrier Type Code:

A Polyethylene under sheetrock

B Foam

C Paint

D Exterior plywood

E Polyethylene between double wall

F Polyethylene between strapped wall

G Polyethylene under slab floor

H A and B

I D and G

J Polyethylene under subfloor

K Airtight drywall

L Craft or foil-faced insulation

M Building paper on exterior

N L and M

O None

X Missing

Z Other

* Any of the above types

**Table 20. Incremental costs per square foot of air infiltration barrier by types of increments**

| Group No. | Current Practice C/W/F[1] | MCS C/W/F[1] | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | L,L,L | B,B,B | 0.08 | 0.05 | 0.10 | 0.02-0.15 | 5 |
| 2 | B,B,B | B,B,B | 0.06 | 0.03 | 0.05 | 0.02-0.13 | 20 |
| 3 | O,A,G | A,A,G | 0.16 | 0.04 | 0.16 | 0.10-0.20 | 4 |
| 4 | O,A,O | A,A,J | 0.18 | 0.11 | 0.17 | 0.03-0.37 | 7 |
| 5 | O,A,O | A,A,G | 0.17 | 0.09 | 0.14 | 0.07-0.33 | 8 |
| 6 | O,A,O | A,A,D | 0.16 | 0.05 | 0.19 | 0.09-0.19 | 7 |
| 7 | O,L,O | K,K,K | 0.04 | 0.04 | 0.02 | 0.02-0.13 | 8 |
| 8 | O,L,O | A,E,D | 0.18 | 0.26 | 0.05 | 0.02-0.48 | 3 |
| 9 | O,L,O | A,B,D | 0.12 | 0.03 | 0.13 | 0.09-0.14 | 3 |
| 10 | O,L,O | A,A,J | 0.03 | 0.00 | 0.03 | 0.03-0.03 | 4 |
| 11 | O,L,O | A,A,I | 0.26 | 0.25 | 0.20 | 0.05-0.61 | 4 |
| 12 | O,L,O | A,A,G | 0.10 | 0.10 | 0.07 | 0-0.36 | 21 |
| 13 | O,L,O | A,A,D | 0.10 | 0.06 | 0.09 | 0.04-0.22 | 9 |
| 14 | O,O,O | H,B,I | 0.18 | 0.05 | 0.18 | 0.13-0.22 | 4 |
| 15 | O,O,O | A,F,I | 0.11 | 0.12 | 0.09 | 0-0.23 | 3 |
| 16 | O,O,O | A,F,D | 0.21 | 0.12 | 0.16 | 0.08-0.45 | 9 |
| 17 | O,O,O | A,B,I | 0.25 | 0.24 | 0.15 | 0.06-0.86 | 9 |
| 18 | O,O,O | A,B,G | 0.22 | 0.08 | 0.20 | 0.07-0.37 | 16 |
| 19 | O,O,O | A,B,D | 0.21 | 0.10 | 0.18 | 0.08-0.47 | 34 |
| 20 | O,O,O | A,A,I | 0.22 | 0.14 | 0.19 | 0.05-0.55 | 12 |
| 21 | O,O,O | A,A,G | 0.17 | 0.09 | 0.14 | 0.07-0.42 | 29 |
| 22 | O,O,O | A,A,D | 0.16 | 0.10 | 0.13 | 0.02-0.41 | 31 |
| 23 | L,L,* | Any type | 0.10 | 0.06 | 0.09 | -0.01-0.30 | 21 |
| 24 | M,M,* | Any type | 0.13 | 0.07 | 0.12 | 0.03-0.20 | 6 |
| 25 | N,N,* | Any type | 0.10 | 0.11 | 0.08 | 0.01-0.38 | 10 |

[1]C=Ceiling, W=Wall, F=Floor

| Group No. | Current Practice C/W/F[1] | MCS C/W/F[1] | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 26 | O,A,O | Any type | 0.21 | 0.15 | 0.20 | 0.07-0.45 | 5 |
| 27 | O,L,O | Any type | 0.25 | 0.16 | 0.25 | 0.02-0.50 | 10 |
| 28 | O,O,* | Any type | 0.21 | 0.12 | 0.21 | 0.01-0.46 | 37 |
| All other cases of increments | | | 0.16 | 0.16 | 0.15 | -0.13-0.67 | 27 |

[1]C=Ceiling, W=Wall, F=Floor

## DOOR GROUPS

**Door Type Code:**

A Insulated clad foam core
B Wood solid core
C Wood hollow core
D A and B
E A in both MCS and Current Practice
F B in both MCS and Current Practice
X Missing
Z Other

**Table 21. Incremental costs per square foot of door by types of increments**

| Group No. | Current Practice | MCS | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | A,E | A,E | 0.96 | 2.11 | 0.00 | -0.57-16.40 | 179 |
| 2 | B,F | B,F | 1.55 | 2.37 | 0.00 | 0-7.78 | 24 |
| 3 | B | A | 3.33 | 4.35 | 3.18 | -18.40-21.87 | 124 |
| 4 | A | B | 3.16 | 1.38 | 3.16 | 2.18-4.13 | 2 |
| All other cases of increments | | | 2.26 | 3.84 | 0.00 | -0.38-10.93 | 16 |

## AIR-TO-AIR HEAT EXCHANGER GROUPS

### Air-to-Air Heat Exchanger (AAHX) Code:

A The Air Changer Company

B Airxchange (NuTone)

E Conservation Energy Systems (VanEE)

F Des Champs (79m-4)

G Des Champs (79m-6)

H Des Champs (200 series)

I Des Champs (300 series)

J EER Products (Heat-X-changer)

K Ener-Corp (Enerex 250)

M Mountain Energy and Resources

O Star Heat Exchanger 100A

P Star Heat Exchanger 200A

R Enter Matrix

X Missing

Z Other

**Table 22. Incremental costs of air-to-air heat exchangers by increments of floor area**

| Group No. | AAHX Type | Floor Area | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 1 | A | Less than 1500 ft$^2$ | 1.13 | 0.22 | 0.98 | 0.98-1.54 | 7 |
| 2 | B | Less than 1500 ft$^2$ | 0.74 | 0.17 | 0.70 | 0.52-1.14 | 30 |
| 3 | E | Less than 1500 ft$^2$ | 0.99 | 0.19 | 0.99 | 0.78-1.24 | 8 |
| 4 | F | Less than 1500 ft$^2$ | 0.82 | 0.29 | 0.85 | 0-1.10 | 11 |
| 5 | G | Less than 1500 ft$^2$ | 0.96 | 0.05 | 0.96 | 0.93-1.00 | 2 |
| 6 | H | Less than 1500 ft$^2$ | 1.32 | 0.22 | 1.37 | 0.98-1.52 | 6 |
| 7 | I | Less than 1500 ft$^2$ | 1.67 | 0.58 | 1.67 | 1.26-2.08 | 2 |
| 8 | J | Less than 1500 ft$^2$ | 0.98 | 0.02 | 0.98 | 0.97-1.00 | 2 |
| 9 | K | Less than 1500 ft$^2$ | 0.89 | 0.89 | 0.89 | 0.89-0.89 | 1 |
| 10 | M | Less than 1500 ft$^2$ | 1.37 | 1.37 | 1.37 | 1.37-1.37 | 1 |
| 11 | O | Less than 1500 ft$^2$ | 0.89 | 0.34 | 0.94 | 0-1.29 | 14 |
| 12 | P | Less than 1500 ft$^2$ | 1.07 | 0.26 | 1.02 | 0.82-1.42 | 4 |
| 13 | R | Less than 1500 ft$^2$ | 0.98 | 0.23 | 1.00 | 0.70-1.21 | 4 |
| 14 | X | Less than 1500 ft$^2$ | 0.81 | 0.22 | 0.71 | 0.55-1.06 | 5 |
| 15 | Z | Less than 1500 ft$^2$ | 0.99 | 0.40 | 0.89 | 0.64-1.43 | 3 |
| 16 | A | 1500-2500 ft$^2$ | 0.78 | 0.17 | 0.75 | 0.52-1.03 | 13 |
| 17 | B | 1500-2500 ft$^2$ | 0.50 | 0.19 | 0.51 | 0-0.81 | 34 |
| 18 | E | 1500-2500 ft$^2$ | 0.74 | 0.24 | 0.83 | 0-0.99 | 21 |
| 19 | F | 1500-2500 ft$^2$ | 0.78 | 0.18 | 0.74 | 0.61-1.03 | 4 |
| 20 | G | 1500-2500 ft$^2$ | 0.79 | 0.79 | 0.79 | 0.79-0.79 | 1 |
| 21 | H | 1500-2500 ft$^2$ | 0.66 | 0.16 | 0.66 | 0.22-0.94 | 27 |
| 22 | I | 1500-2500 ft$^2$ | 0.79 | 0.25 | 0.79 | 0.29-1.33 | 13 |
| 23 | J | 1500-2500 ft$^2$ | 0.72 | 0.72 | 0.72 | 0.72-0.72 | 1 |
| 24 | K | 1500-2500 ft$^2$ | 1.02 | 0.08 | 1.02 | 0.96-1.07 | 2 |
| 25 | M | 1500-2500 ft$^2$ | 0.65 | 0.34 | 0.69 | 0-1.48 | 26 |
| 26 | O | 1500-2500 ft$^2$ | 0.68 | 0.21 | 0.72 | 0.35-1.15 | 29 |
| 27 | P | 1500-2500 ft$^2$ | 0.62 | 0.11 | 0.58 | 0.50-0.77 | 8 |
| 28 | R | 1500-2500 ft$^2$ | 0.68 | 0.14 | 0.69 | 0.26-0.89 | 15 |

| Group No. | AAHX Type | Floor Area | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Min.-Max. ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|---|---|
| 29 | X | 1500-2500 $ft^2$ | 0.35 | 0.50 | 0.35 | 0-0.70 | 2 |
| 30 | Z | 1500-2500 $ft^2$ | 0.62 | 0.18 | 0.66 | 0.42-0.77 | 3 |
| 31 | A | More than 2500 $ft^2$ | 0.25 | 0.15 | 0.27 | 0-0.45 | 7 |
| 32 | B | More than 2500 $ft^2$ | 0.49 | 0.49 | 0.49 | 0.49-0.49 | 1 |
| 33 | E | More than 2500 $ft^2$ | 0.49 | 0.12 | 0.50 | 0.25-0.64 | 12 |
| 34 | F | More than 2500 $ft^2$ | 0.66 | 0.38 | 0.54 | 0.35-1.09 | 3 |
| 35 | G | More than 2500 $ft^2$ | 0.56 | 0.21 | 0.50 | 0.40-0.87 | 4 |
| 36 | H | More than 2500 $ft^2$ | 0.50 | 0.14 | 0.47 | 0.35-0.72 | 13 |
| 37 | I | More than 2500 $ft^2$ | 0.62 | 0.22 | 0.50 | 0.38-1.00 | 9 |
| 38 | J | More than 2500 $ft^2$ | 0.43 | 0.43 | 0.43 | 0.43-0.43 | 1 |
| 39 | K | More than 2500 $ft^2$ | 0.55 | 0.55 | 0.55 | 0.55-0.55 | 1 |
| 40 | M | More than 2500 $ft^2$ | 0.54 | 0.35 | 0.54 | 0-1.08 | 6 |
| 41 | O | More than 2500 $ft^2$ | 0.50 | 0.36 | 0.49 | 0-1.22 | 14 |
| 42 | P | More than 2500 $ft^2$ | 0.47 | 0.05 | 0.45 | 0.41-0.54 | 6 |
| 43 | R | More than 2500 $ft^2$ | 0.62 | 0.62 | 0.62 | 0.62-0.62 | 1 |
| 44 | X | More than 2500 $ft^2$ | 0.60 | 0.19 | 0.54 | 0.46-0.89 | 4 |
| 45 | Z | More than 2500 $ft^2$ | 0.85 | 0.72 | 0.48 | 0.39-1.68 | 3 |
| | | **AGGREGATE GROUPS** | | | | | |
| A | All types | Less than 1500 $ft^2$ | 0.92 | 0.30 | 0.91 | 0-2.08 | 100 |
| B | All types | 1500-2500 $ft^2$ | 0.66 | 0.24 | 0.69 | 0-1.48 | 199 |
| C | All types | More than 2500 $ft^2$ | 0.52 | 0.26 | 0.48 | 0-1.68 | 85 |

# CHAPTER VIII

## MULTI-FAMILY HOMES

In this chapter, we present total incremental building costs normalized (standardized) by floor area for two multi-family homes (Table 23). We first present "state calculated total costs" which are the total incremental costs per square foot as reported by the states. We also distinguish between "hard" and "soft" building costs for multi-family homes in the following way. "Hard" building costs include air-to-air heat exchanger, subfloor, framing, insulation, glazing, doors, fireplace, plumbing, electrical, HVAC, drywall, painting, vapor barrier and caulking, passive solar, and supervision costs. "Soft" building costs, which are normally part of a builder's overhead, include design, loan, and other costs (including appraisal fees, permit/inspection fees, etc.). It is important to note that the differences, if any, between state calculated total costs and those obtained by adding hard and soft costs are due to recalculations of floor areas by the states to reflect the inclusion of some heated or tempered basements. These revised square footages are not yet in the data base and, therefore, cannot be replicated. However, it can be assumed that these refinements are probably more accurate than previous data.

For the two cases, the median incremental "state calculated total cost" for building energy efficient multi-family homes (that met or exceeded the MCS standard) was $\$3.38/ft^2$; the mean incremental cost was also $\$3.38/ft^2$ with a standard deviation of $\$0.33/ft^2$. For the two cases, the median incremental "hard" cost for building energy efficient multi-family homes (that met or exceeded the MCS standard) was $\$3.50/ft^2$; the mean incremental cost was also $\$3.50/ft^2$ with a standard deviation of $\$0.27/ft^2$. The design, loan, and other costs are relatively minor in comparison to the hard costs.

**Table 23. Multi-family homes - Total incremental "MCS/As-built" costs per floor area**

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **State calculated total costs** | | | | | |
| All cases | 3.38 | 0.33 | 3.38 | 3.15-3.62 | 2 |
| Climate zone 1 | 3.62 | 3.62 | 3.62 | 3.62-3.62 | 1 |
| Climate zone 2 | - | - | - | - | - |
| Climate zone 3 | 3.15 | 3.15 | 3.15 | 3.15-3.15 | 1 |
| Idaho | - | - | - | - | - |
| Montana | 3.15 | 3.15 | 3.15 | 3.15-3.15 | 1 |
| Oregon | - | - | - | - | - |
| Washington | 3.62 | 3.62 | 3.62 | 3.62-3.62 | 1 |
| **Total hard costs** | | | | | |
| All cases | 3.50 | 0.27 | 3.50 | 3.31-3.69 | 2 |
| Climate zone 1 | 3.31 | 3.31 | 3.31 | 3.31-3.31 | 1 |
| Climate zone 2 | - | - | - | - | - |
| Climate zone 3 | 3.69 | 3.69 | 3.69 | 3.69-3.69 | 1 |
| Idaho | - | - | - | - | - |
| Montana | 3.69 | 3.69 | 3.69 | 3.69-3.69 | 1 |
| Oregon | - | - | - | - | - |
| Washington | 3.31 | 3.31 | 3.31 | 3.31-3.31 | 1 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Design costs** | | | | | |
| All cases | 0.04 | 0.05 | 0.04 | 0-0.08 | 2 |
| Climate zone 1 | 0 | 0 | 0 | 0-0 | 1 |
| Climate zone 2 | - | - | - | - | - |
| Climate zone 3 | 0.08 | 0.08 | 0.08 | 0.08-0.08 | 1 |
| Idaho | - | - | - | - | - |
| Montana | 0.08 | 0.08 | 0.08 | 0.08-0.08 | 1 |
| Oregon | - | - | - | - | - |
| Washington | 0 | 0 | 0 | 0-0 | 1 |
| **Loan costs** | | | | | |
| All cases | 0.24 | 0.08 | 0.24 | 0.18-0.30 | 2 |
| Climate zone 1 | 0.18 | 0.18 | 0.18 | 0.18-0.18 | 1 |
| Climate zone 2 | - | - | - | - | - |
| Climate zone 3 | 0.30 | 0.30 | 0.30 | 0.30-0.30 | 1 |
| Idaho | - | - | - | - | - |
| Montana | 0.30 | 0.30 | 0.30 | 0.30-0.30 | 1 |
| Oregon | - | - | - | - | - |
| Washington | 0.18 | 0.18 | 0.18 | 0.18-0.18 | 1 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Other costs** | | | | | |
| All cases | 0.30 | 0.25 | 0.30 | 0.13-0.48 | 2 |
| Climate zone 1 | 0.13 | 0.13 | 0.13 | 0.13-0.13 | 1 |
| Climate zone 2 | - | - | - | - | - |
| Climate zone 3 | 0.48 | 0.48 | 0.48 | 0.48-0.48 | 1 |
| Idaho | - | - | - | - | - |
| Montana | 0.48 | 0.48 | 0.48 | 0.48-0.48 | 1 |
| Oregon | - | - | - | - | - |
| Washington | 0.13 | 0.13 | 0.13 | 0.13-0.13 | 1 |

# CHAPTER IX

## SUMMARY ANALYSIS

In this chapter, we present total incremental building costs normalized (standardized) by floor area for single-family homes (Table 24). We first present "state calculated total costs" which are the total incremental costs per square foot as reported by the states. We also distinguish between "hard" and "soft" building costs for multi-family homes in the following way. "Hard" building costs include air-to-air heat exchanger, subfloor, framing, insulation, glazing, doors, fireplace, plumbing, electrical, HVAC, drywall, painting, vapor barrier and caulking, passive solar, and supervision costs. "Soft" building costs, which are normally part of a builder's overhead, include design, loan, and other costs (including appraisal fees, permit/inspection fees, etc.). It is important to note that the differences, if any, between state calculated total costs and those obtained by adding hard and soft costs are due to recalculations of floor areas by the states to reflect the inclusion of some heated or tempered basements. These revised square footages are not yet in the data base and, therefore, cannot be replicated. However, it can be assumed that these refinements are probably more accurate than previous data.

For all cases (391), the median incremental "state calculated total cost" for building an energy efficient home was $\$2.95/ft^2$; the mean incremental cost was $\$3.07/ft^2$ with a standard deviation of $\$1.36/ft^2$. The median incremental "hard" cost for building an energy efficient home was $\$2.76/ft^2$; the mean incremental cost was $\$2.94/ft^2$ with a standard deviation of $\$1.32/ft^2$. The range was quite large: $\$0.28/ft^2$ to $\$13.68/ft^2$. In general, the design, loan, and other costs are relatively minor in comparison to the hard costs.

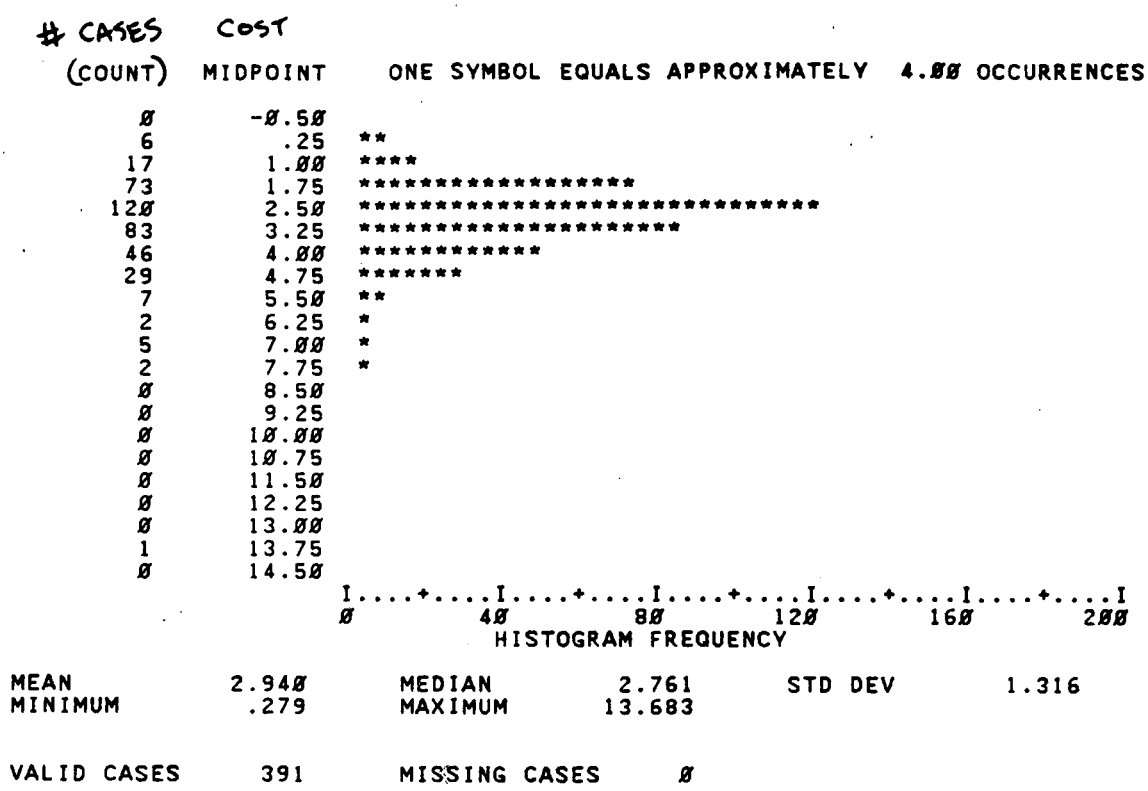
We also graphically display the distribution of incremental building hard costs normalized (standardized) by floor area for single-family homes in histograms for the entire sample, for each climate zone, and for each state (Figures 13 to 20). Appendix D contains the spreadsheet of the cases used in this analysis.

| Table 24. Total incremental "MCS/As-built" costs per floor area | | | | | |
|---|---|---|---|---|---|
| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
| **State calculated total costs** | | | | | |
| All cases | 3.07 | 1.36 | 2.95 | 0.31-15.90 | 391 |
| Climate zone 1 | 3.19 | 1.49 | 3.10 | 0.31-15.90 | 230 |
| Climate zone 2 | 3.07 | 1.28 | 2.98 | 1.00-8.25 | 85 |
| Climate zone 3 | 2.67 | 0.88 | 2.57 | 0.88-6.23 | 76 |
| Idaho | 2.16 | 1.07 | 2.25 | 0.31-4.46 | 44 |
| Montana | 2.70 | 0.84 | 2.57 | 1.40-6.23 | 66 |
| Oregon | 3.58 | 1.54 | 3.59 | 0.32-8.25 | 57 |
| Washington | 3.22 | 1.39 | 3.08 | 0.91-15.90 | 224 |
| **Total hard costs** | | | | | |
| All cases | 2.94 | 1.32 | 2.76 | 0.28-13.68 | 391 |
| Climate zone 1 | 2.96 | 1.33 | 2.84 | 0.28-13.68 | 230 |
| Climate zone 2 | 2.90 | 1.29 | 2.65 | 1.22-7.98 | 85 |
| Climate zone 3 | 2.91 | 1.32 | 2.65 | 0.82-7.34 | 76 |
| Idaho | 2.21 | 1.37 | 2.15 | 0.28-7.98 | 44 |
| Montana | 2.97 | 1.34 | 2.65 | 1.40-7.34 | 66 |
| Oregon | 3.48 | 1.32 | 3.35 | 1.36-7.48 | 57 |
| Washington | 2.94 | 1.24 | 2.79 | 0.86-13.68 | 224 |

| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Design costs** | | | | | |
| All cases | 0.06 | 0.09 | 0.02 | 0-0.67 | 391 |
| Climate zone 1 | 0.06 | 0.09 | 0.02 | 0-0.67 | 230 |
| Climate zone 2 | 0.07 | 0.10 | 0.04 | 0-0.50 | 85 |
| Climate zone 3 | 0.04 | 0.05 | 0.02 | 0-0.24 | 76 |
| Idaho | 0.07 | 0.10 | 0.04 | 0-0.46 | 44 |
| Montana | 0.04 | 0.05 | 0.02 | 0-0.24 | 66 |
| Oregon | 0.08 | 0.12 | 0.04 | 0-0.50 | 57 |
| Washington | 0.06 | 0.09 | 0.02 | 0-0.67 | 224 |
| **Loan costs** | | | | | |
| All cases | 0.08 | 0.14 | 0.04 | 0-1.53 | 391 |
| Climate zone 1 | 0.10 | 0.16 | 0.06 | 0-1.53 | 230 |
| Climate zone 2 | 0.08 | 0.14 | 0.04 | 0-0.94 | 85 |
| Climate zone 3 | 0.03 | 0.05 | 0 | 0-0.20 | 76 |
| Idaho | 0.03 | 0.06 | 0 | 0-0.19 | 44 |
| Montana | 0.03 | 0.05 | 0 | 0-0.20 | 66 |
| Oregon | 0.11 | 0.22 | 0.02 | 0-1.14 | 57 |
| Washington | 0.10 | 0.14 | 0.07 | 0-1.53 | 224 |

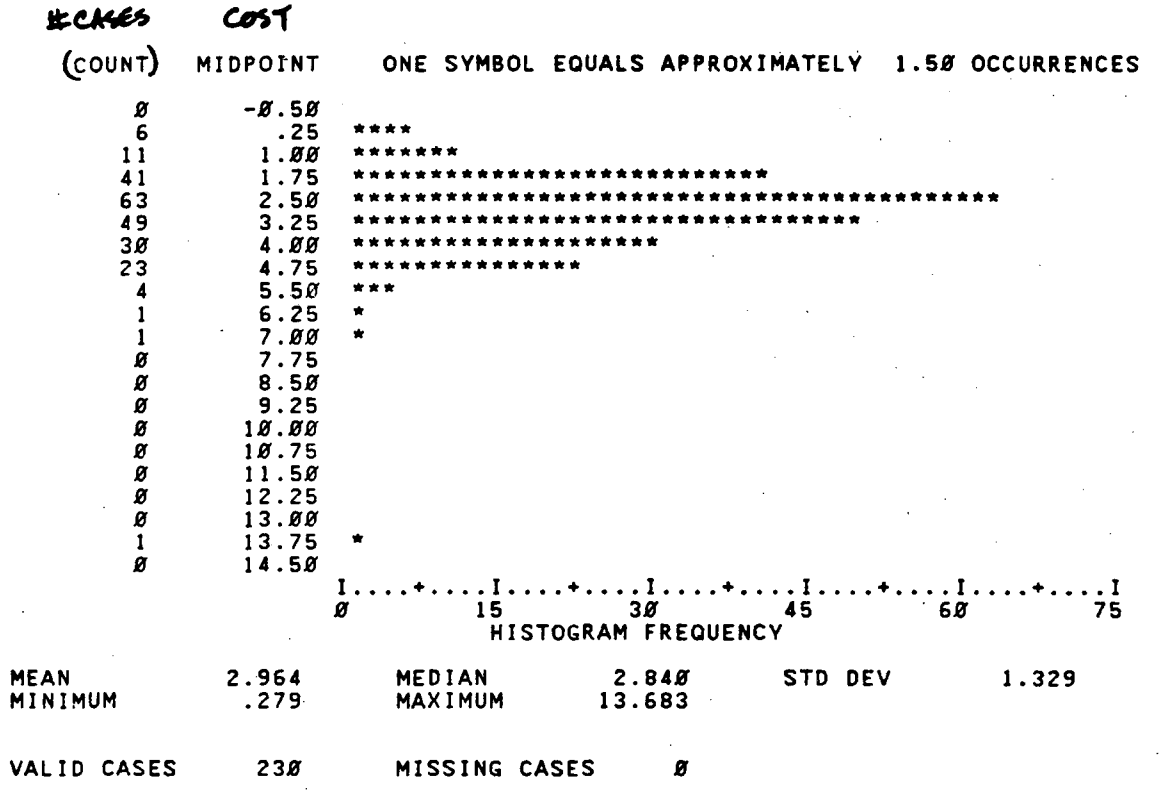
| | Mean ($/ft$^2$) | Standard Deviation ($/ft$^2$) | Median ($/ft$^2$) | Minimum-Maximum ($/ft$^2$) | Sample Size |
|---|---|---|---|---|---|
| **Other costs** | | | | | |
| All cases | 0.10 | 0.15 | 0.01 | 0-0.78 | 391 |
| Climate zone 1 | 0.12 | 0.16 | 0.02 | 0-0.78 | 230 |
| Climate zone 2 | 0.11 | 0.16 | 0.04 | 0-0.75 | 85 |
| Climate zone 3 | 0.03 | 0.08 | 0 | 0-0.40 | 76 |
| Idaho | 0.05 | 0.13 | 0 | 0-0.75 | 44 |
| Montana | 0.04 | 0.09 | 0 | 0-0.40 | 66 |
| Oregon | 0.07 | 0.12 | 0 | 0-0.68 | 57 |
| Washington | 0.13 | 0.16 | 0.04 | 0-0.78 | 224 |

**Fig. 13 Distribution of total incremental costs normalised by floor area - all cases**




| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.940 | MEDIAN | 2.761 | STD DEV | 1.316 |
| MINIMUM | .279 | MAXIMUM | 13.683 | | |
| VALID CASES | 391 | MISSING CASES | 0 | | |

**Fig. 14 Distribution of total incremental costs normalized by floor area - climate zone 1**




| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.964 | MEDIAN | 2.84Ø | STD DEV | 1.329 |
| MINIMUM | .279 | MAXIMUM | 13.683 | | |
| VALID CASES | 23Ø | MISSING CASES | Ø | | |

**Fig. 15 Distribution of total incremental costs normalized by floor area - climate zone 2**

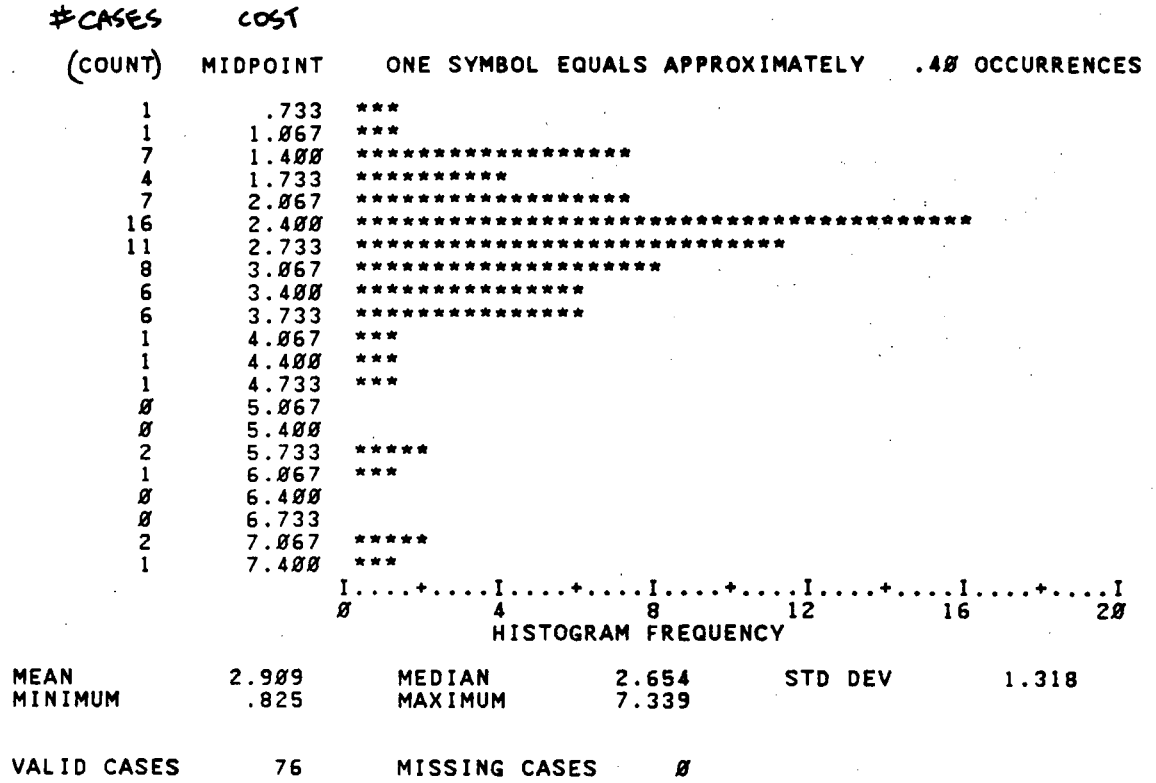
#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .40 OCCURRENCES |
|---|---|---|
| 4 | 1.267 | ********** |
| 11 | 1.600 | ***************************** |
| 6 | 1.933 | *************** |
| 8 | 2.267 | ******************** |
| 19 | 2.600 | ************************************************** |
| 10 | 2.933 | ************************* |
| 6 | 3.267 | *************** |
| 7 | 3.600 | ****************** |
| 1 | 3.933 | *** |
| 6 | 4.267 | *************** |
| 0 | 4.600 | |
| 3 | 4.933 | ******** |
| 0 | 5.267 | |
| 1 | 5.600 | *** |
| 0 | 5.933 | |
| 0 | 6.267 | |
| 0 | 6.600 | |
| 1 | 6.933 | *** |
| 0 | 7.267 | |
| 1 | 7.600 | *** |
| 1 | 7.933 | *** |

I....+....I....+....I....+....I....+....I....+....I
0 4 8 12 16 20
HISTOGRAM FREQUENCY

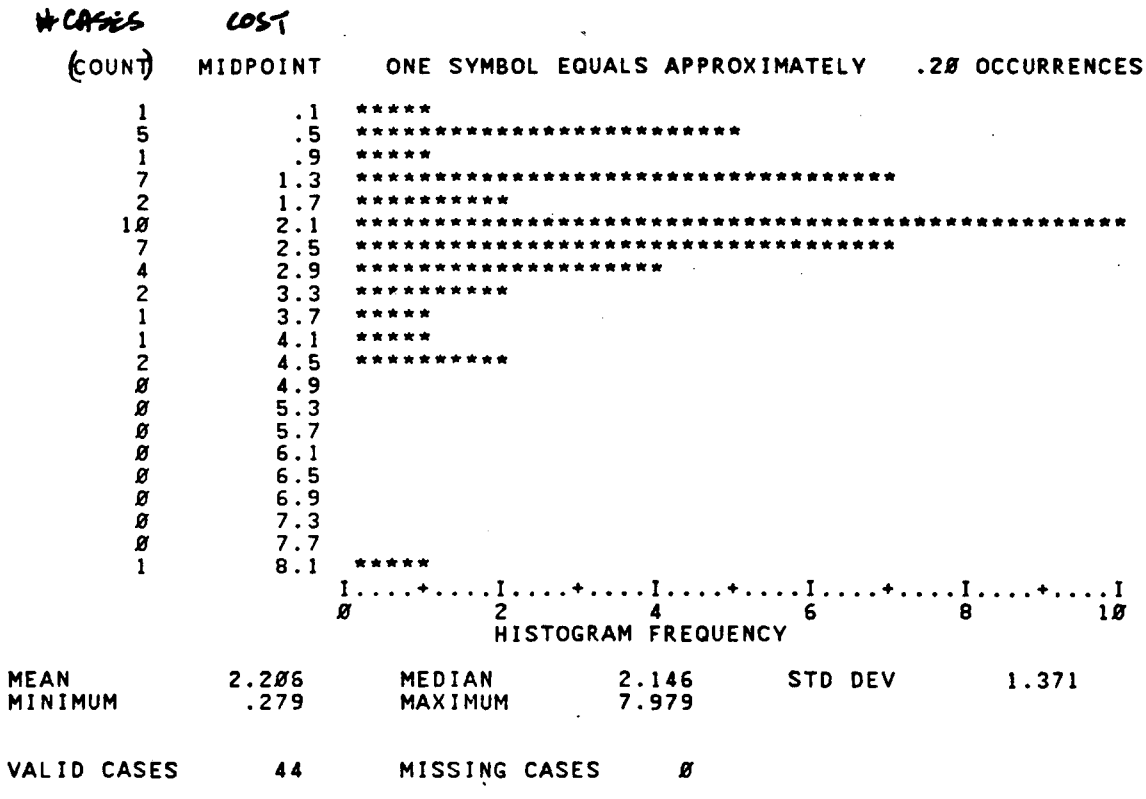
| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.902 | MEDIAN | 2.648 | STD DEV | 1.294 |
| MINIMUM | 1.220 | MAXIMUM | 7.979 | | |
| VALID CASES | 85 | MISSING CASES | 0 | | |

**Fig. 16 Distribution of total incremental costs normalized by floor area - climate zone 3**



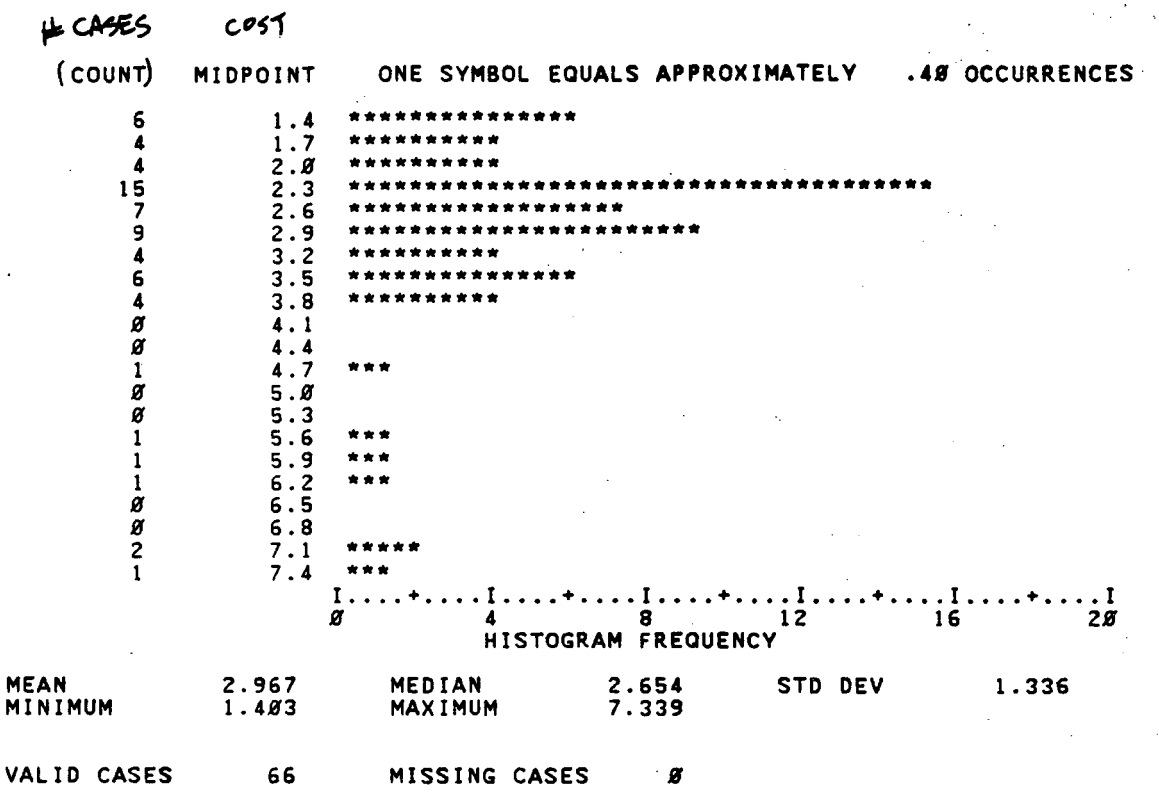

| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.909 | MEDIAN | 2.654 | STD DEV | 1.318 |
| MINIMUM | .825 | MAXIMUM | 7.339 | | |
| VALID CASES | 76 | MISSING CASES | 0 | | |

Fig. 17 Distribution of total incremental costs normalized by floor area - Idaho




| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.2Ø6 | MEDIAN | 2.146 | STD DEV | 1.371 |
| MINIMUM | .279 | MAXIMUM | 7.979 | | |
| VALID CASES | 44 | MISSING CASES | Ø | | |

**Fig. 18 Distribution of total incremental costs normalised by floor area - Montana**




| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.967 | MEDIAN | 2.654 | STD DEV | 1.336 |
| MINIMUM | 1.403 | MAXIMUM | 7.339 | | |
| VALID CASES | 66 | MISSING CASES | 0 | | |

**Fig. 19 Distribution of total incremental costs normalized by floor area - Oregon**

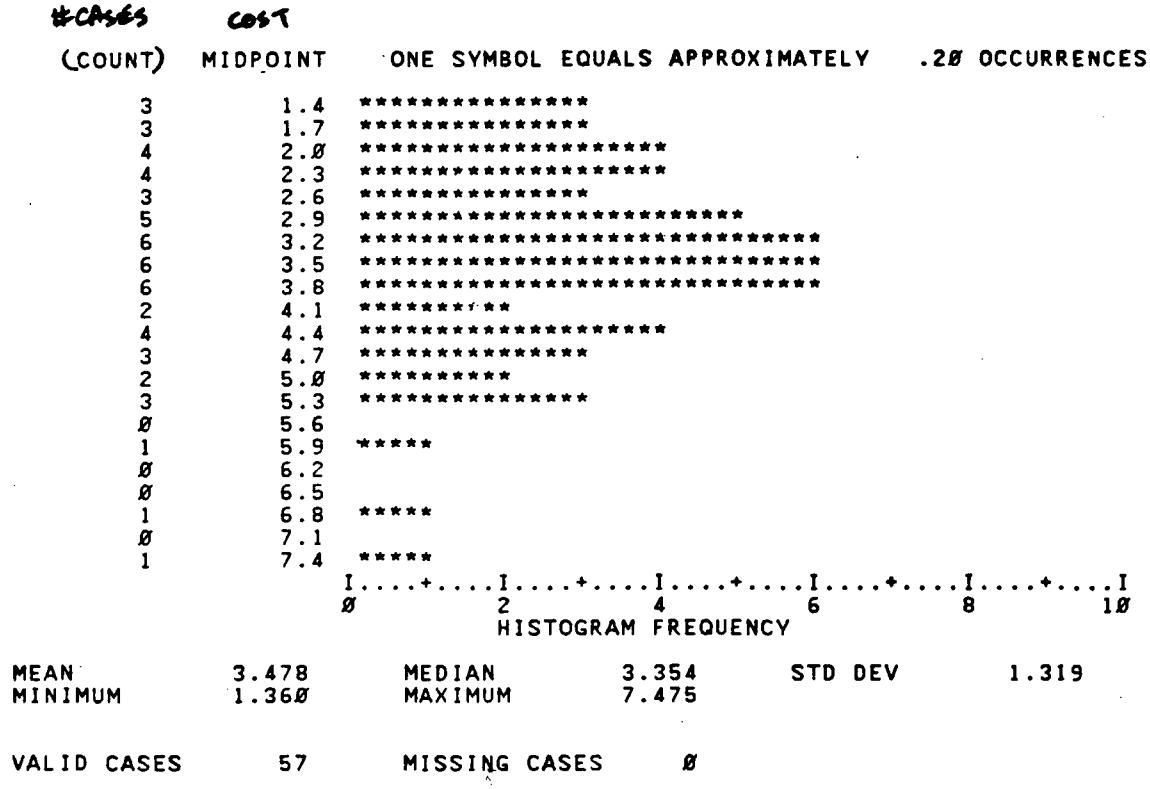
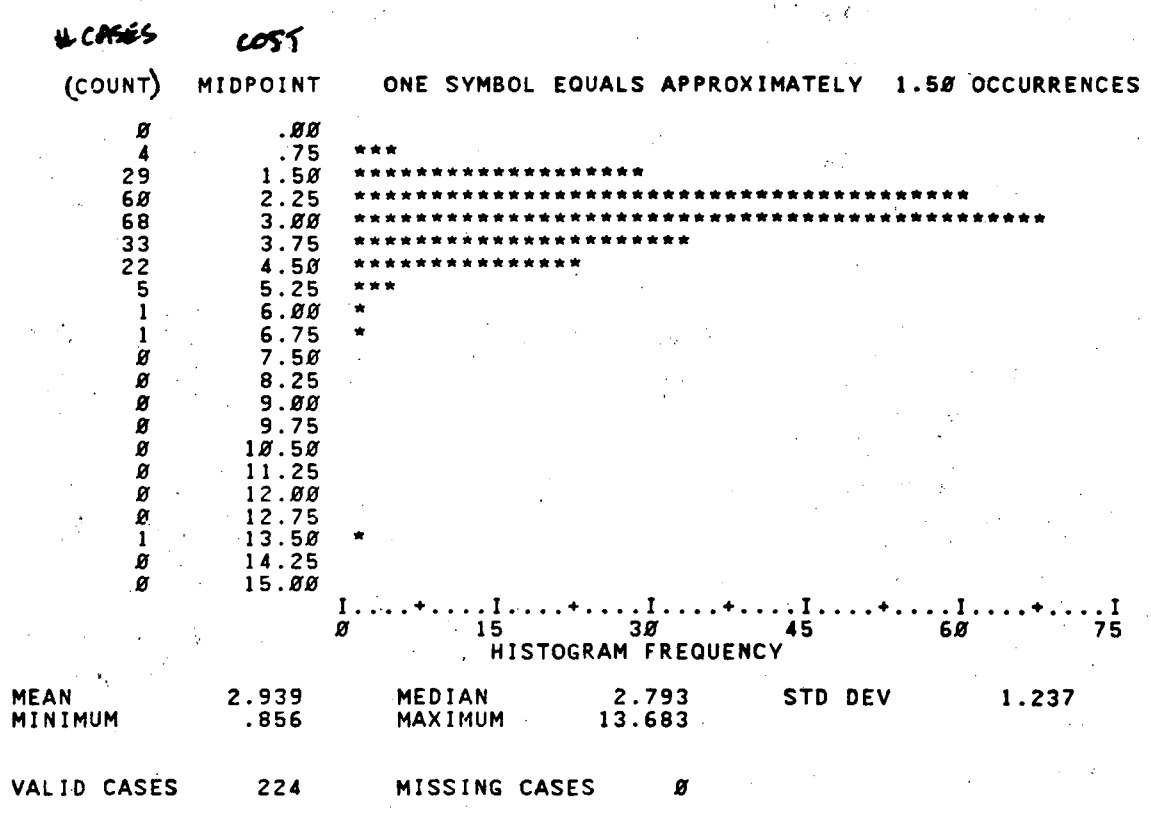


**Fig. 20 Distribution of total incremental costs normalized by floor area - Washington**




| | | | | | |
|---|---|---|---|---|---|
| MEAN | 2.939 | MEDIAN | 2.793 | STD DEV | 1.237 |
| MINIMUM | .856 | MAXIMUM | 13.683 | | |
| VALID CASES | 224 | MISSING CASES | Ø | | |

# CHAPTER X

## DISCUSSION AND CONCLUSIONS

In this report, we examined the costs associated with building energy efficient homes in the Pacific Northwest as part of the Residential Standards Demonstration Program (RSDP). Several levels of analysis were used in examining the cost data: absolute, incremental, and normalized (absolute and incremental) costs (standardized by floor area and/or component area); and component (e.g., ceiling), sub-component (e.g., attic insulation), and total costs. These analyses were conducted on the entire sample (395 homes out of 423 RSDP homes) and for each of three climate zones.

Upon examining total incremental building costs normalized by **floor area**, we found the median cost was $\$2.76/ft^2$. For the average home in the sample with a median floor area of 1883 square feet, the total incremental cost would be $5,197. It is important to note that these costs include labor and materials, but exclude builder overhead, fees, and profit, and, therefore, the actual incremental costs would be somewhat larger. The median costs for the states and climate zones were as follows: Idaho ($\$2.15/ft^2$), Montana ($\$2.65/ft^2$), Oregon ($\$3.35/ft^2$), Washington ($\$2.79/ft^2$), climate zone 1 ($\$2.84/ft^2$), climate zone 2 ($\$2.65/ft^2$), and climate zone 3 ($\$2.65/ft^2$).

Using incremental building component costs normalized by **component area** as a guide, we found that the largest median incremental component cost per square foot was glazing ($\$2.64/ft^2$). All other median incremental component costs per square foot were below $\$1.00/ft^2$: doors ($\$0.92/ft^2$), walls ($\$0.60/ft^2$), ceiling ($\$0.34/ft^2$), floor ($\$0.25/ft^2$), air infiltration barriers ($\$0.12/ft^2$), and basement walls ($\$0.00/ft^2$). There was no clear-cut trend in the level of costs among climate zones or states.

A wide range of costs was encountered in all of our analyses. This finding is not unusual for small businesses spread over a large region with different purchasing habits and varying access to suppliers. In interviews with state energy officials, it was reported that some builders were able to take advantage of one-time-only "bargain buys" with local building suppliers. Accordingly, the mean and median values are more representative of the sample than the costs of individual houses. The findings from this cost analysis should be regarded as only indicative for MCS homes for the following reasons. First, in estimating building costs under "current practice," it was hoped that builders would use their current state code as the model for "current practice." However, while Washington and Oregon have statewide energy codes, Idaho and Montana do not have mandatory statewide codes but have local government options.[1]

[1]The following discussion on state energy codes is based on an article by Susan Skog, "What happens next: Adoption," *Northwest Energy News* 3(2):18-21 (1984).

In 1983 only about 40 percent of Idaho's population was covered by any type of energy efficient building code. While Idaho has produced an energy code, it is considered to be simply a guideline that local governments can enforce, modify, or ignore. Many governments have chosen to ignore it, largely because they lack the funds, staff, or training necessary to enforce it.

Montana's existing energy code is what the building industry calls a "minimum and maximum standard:" cities and counties cannot adopt codes that are either less or more strict than the state code, but they can choose not to enforce the code at all. If a town decides not to enforce a code, the state government is responsible for enforcement. However, the state only has authority over dwellings larger than a four-plex and has very few inspectors to cover an extremely large state. This situation has led to uneven enforcement throughout the state.

Oregon also has a "minimum and maximum standard," and cities and counties can choose whether they want to enforce it or leave the responsibility to the state. In general, smaller, less densely populated areas let the state do the enforcement work.

In contrast to the other states, Washington law allows local jurisdictions to pass codes that are stricter than the state's. In addition, all but three percent of the population live in areas that have some type of energy code.

In summary, due to the different types of building codes and code enforcement in the region, the concept of "current practice" is very loosely defined and variable. Hence, the calculation of incremental costs, in which current practice costs are subtracted from energy efficient home costs, is subject to an unknown bias.

Second, the cost data itself may be incorrect due to confusion and assumptions made by builders participating in the program. According to some state energy personnel, builders had difficulty in understanding the cost data manual and in completing the cost data forms. In particular, it was very difficult for builders to separate out the costs of building components: for example, separating insulation costs to "walls" for above-grade insulation and to "basement walls" for below-grade insulation. The workshops were helpful for most of the builders in determining this type of calculation. However, some builders didn't construct their homes until several months after the workshops were held, and others didn't complete the cost data forms until several months after they built their homes, leading to poor recall. To ensure high quality data, all the state energy agencies had a cost data review process. Typically, the states contacted individual builders an average of two to three times and for up to two hours at a time to resolve inconsistencies in the data. Thus, we believe that the cost data, on the whole, are good, but some discrepancies in the data may remain.

Third, the findings from this demonstration program are not generalizable. Builders participating in the RSDP are probably not representative of the builders in the Pacific Northwest because they were self-selected: they voluntarily participated in the program. Thus, those with experience in building energy efficient homes are probably over-represented in this program. Hence, we would expect the costs of these builders to be lower than those of less-experienced builders.

Fourth, this was the first time that many of the builders ever attempted to build to this level of energy efficiency using innovative building materials and techniques. For example, most builders had little experience with the sizing and installation of air-to-air heat exchangers and experienced several problems in the installation of this equipment. Consequently, we would expect the cost of building energy efficient homes to decrease over time as the building community becomes more informed and experienced in constructing energy efficient homes. As mentioned previously, one of the major purposes of the RSDP was to educate the building community about the construction techniques and materials involved in building MCS-type homes. The builder training workshops, the cost data manual, and the construction of MCS-type homes provided the resources to develop the skills necessary for constructing energy-efficient homes in a cost-effective manner. Thus, we would expect that these experienced builders would now be able to build these energy efficient homes less expensively than before.

Fifth, the incremental costs calculated in this report are, in many cases, for energy efficient homes that are designed to go beyond the Model Conservation Standards (MCS) proposed by the Northwest Power Planning Council. Initially, it was hoped that incremental costs could be calculated for MCS homes. However, because most of the homes built in the RSDP went beyond the MCS and because of the difficulty experienced by builders in separating out those costs that met the MCS from those costs that exceeded the MCS, the initial objective could not be met.

Finally, the builders did not try to take the most cost-effective routes in building their energy efficient homes, as assumed in the development of the MCS by the Council:

> "The MCS were developed by the Council in increments of cost-effective measures, and the costs were based on average costs for the most cost-effective techniques and materials. For aesthetic, marketing, or experimental reasons, the RSDP builders could skip the most cost-effective measures, and take more expensive alternatives to reach a comparable level of energy efficiency. Therefore, the RSDP costs can be expected to exceed the typical MCS costs."[2]

[2] Personal communication, Ken Keating, RSDP Evaluation Group, BPA, September 12, 1985.

Thus, direct comparisons of our findings with the Council's projections should be done cautiously.

In summary, we found that builders are able to build energy efficient homes with minimal changes in building materials and techniques without a substantial increase in costs. Moreover, builders learned during this demonstration program: in some cases, builders have changed their usage of materials and building practices after discovering their higher costs in comparison to alternative materials and techniques.[3] Accordingly, as builders gain more experience in building energy efficient homes, and as manufacturers, wholesalers, retailers, and distributors make energy efficient products more available in greater quantities, the costs of building energy efficient homes should decrease.

We would like to thank the following people for their assistance in this project: Ken Keating, Jane Selby, and Phil Thor of the Bonneville Power Administration; Tom Eckman of the Northwest Power Planning Council; Johnny Douglas, Pat Keegan, and Dan Silver of the Washington State Energy Office; Alan Tabachnikov and Jim Maloney of the Oregon Department of Energy; Paul Cartwright and Brian Green of the Montana Department of Natural Resources; Mike McSorely of the Idaho Department of Water Resources; Carol Wright of EDS; and Barry Barnes, Craig Conner, Steve Gold, Alan Meier, Dan Stein, and Tony Usibelli of the Lawrence Berkeley Laboratory.

[3] Based on interviews with state energy officials.

# APPENDIX A

# COST DATA

# Residential Standards Demonstration Program

HOME I.D. # _____

Builder: _____

Address: _____

Telephone: _____

State Office: _____

Contact: _____

Address: _____

Telephone: _____

Prepared By: NAHB AREA XV, 15555 SW Bangy Road, Lake Oswego, OR 97034 (503) 684-1880 in association with NAHB Research Foundation.

Modified By: Bonneville Power Administration 2/29/84

## General Instructions

The purpose of this manual is to demonstrate the difference in cost between homes built to meet the Model Conservation Standards (MCS) and homes built to current practice or code. It was designed by builders in the Northwest. Two sets of forms are contained in the manual. One set, with the words "Current Practice" in the upper right hand corner of the page, is to be used to enter the costs to the builder if the homes were built to current standards. The other set, marked "MCS", is to be used to enter the costs for the MCS home. The state will provide a description of the current practice home to the builders. Builders will enter their actual costs for the MCS house and their estimates of what those costs would be for the home built to current standards. Builders who are building a matched pair will enter information on these forms based on the homes they actually build to the MCS and current standards.

Information **only** needs to be entered on these forms if it represents an item whose cost is **different** for the MCS and Current Standards home **because** of the MCS. If no difference in costs occurs, simply check the column labeled NA (not applicable).

The builder will be required to calculate cost information for this manual which would not have to be calculated under normal circumstances. The reason this is necessary is to answer questions about the MCS which are very important to the building community of the region. Please make your best effort to enter accurate, complete information.

Monitor your costs, enter the information as construction progresses, follow the instructions below, and feel free to call the state office listed on the cover if you have any questions.

The instructions below will describe how to fill out the forms in this manual. The state office may ask you for some additional information or copies of some of the forms along the way.

## COST FORMS INSTRUCTIONS

### ITEM

"Items" are the materials or labor which could have a different cost for the MCS home and the current practice home. If an item is not listed for which cost differs between the two homes, list the information on an extra line.

### NA

If an item is not required for a particular house, or if the cost is no different for the MCS and current standards homes, check this column. If NA is checked, no further information needs to be entered on the line.

### MATERIALS

Two columns are available for entering costs of materials. Figures entered on these columns should include **all** the materials costs to the builder **and**, if obtainable, the materials cost to the subcontractor. The first column, headed "EST.", is to be used to enter the estimated costs of the materials before construction begins. The builder will be given a materials list of MCS materials taken off by a professional estimator hired by the state. This materials list will show quantities for most of the materials listed in this manual. The builder may use this materials list to obtain cost estimates or he may use a materials list he does himself. These estimated costs should be entered in the "EST." column under "Materials".

The second column, "Actual", is to be used after purchasing the materials to enter the actual costs. If the actual costs were exactly the same as the estimated costs, enter "same" in the "Actual" column.

### BUILDER LABOR

This column is to be used to enter the builder's actual own labor cost. The labor cost could be either the cost of paying the builder's employees, and/or the fair market value of the builder's own labor. The costs of paying the builder's

employees should include gross wages plus benefits, insurance or social security above the gross wages. In other words, the total cost to the builder of the employee for the particular item. The builder's own labor should be figured as the amount the builder would have to pay someone else for the task.

The builder is not expected to break down "Builder Labor" by every line item listed. But costs should be broken down for each major category. If the builder were to do his own framing, for example, a builder labor figure (or an NA) should be entered for "A. Floor/Crawl Space", "B. Basement", "C. Joists", "D. Exterior Walls", etc.

## SUBCONTRACTOR CHARGES

The subcontractor charge information is very important. But it will require some extra communication between the builder and subcontractor. The subcontractor must be persuaded to bid the MCS and current standards homes. If the subcontractor is **unable** to give material costs separately, the total bid, **including materials** should be entered under "BID", and the builder should then write in "L&M" next to the figure, indicating that **both** labor and materials are included. If the subcontractor is **able** to provide material costs separately, they should be entered under "MATERIALS."

The first column, "BID", should represent the subcontractor's bid. The subcontractor should break down the bid into the major categories (A, B, C, etc.) as much as possible. If the subcontractor is unable to do so, categories can be grouped into a single figure.

The second column, "Actual", must be filled in after the subcontractor has completed work. The builder must ask the subcontractor what the bid would have been had he known exactly how much time the job would take. The subcontractor may have little experience with the MCS, and under or overbid the job. This column allows the subcontractor to reflect upon the time and cost of doing the work, and suggest what he feels would be a competitive price in retrospect. Presumably, the subcontractor is familiar with the current standards techniques, so no information needs to be obtained on that form under "Actual".

## RELATED COSTS

Many of the items under "Related Costs" will vary depending on the price of the home. The price of the home will be affected by the MCS, so these items could have different costs for the MCS and current practice homes. Please enter costs for all items which vary in cost for the two homes. The costs that have been incurred by the time of the completion of the home (and, therefore, the due date of this accounting manual) are to be entered, even though additional cost may still be incurred.

## COST SUMMARY SHEET (Optional)

The totals from each component/task page can be used to fill in the Model Conservation Standards (MCS) and Current Practice Home columns.

## ADDITIONAL INFORMATION/QUESTIONS:

Any questions that the builder may have should be directed to the State Office, unless they identify a different source below:

Name: _____

Phone Number: _____

**COMPONENT: SLAB-ON-GRADE, CRAWL SPACE, BASEMENT** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Slab-on grade: | | - | - | - | - | - |
| A.1. vapor barrier | | | | | | |
| a.2. perimeter insul. | | | | | | |
| a.3. Total labor | | - | - | | | |
| | | | | | | |
| B. Crawl Space | | - | - | - | - | - |
| B.1. vapor bar., ground | | see vapor barrier/calking/sealing | | | | |
| B.2. vapor bar., perim. | | | | | | |
| B.3. insulation-perim. | | | | | | |
| B.4. flashing/insul. cover | | | | | | |
| B.5. adhesive/fasteners | | | | | | |
| | | | | | | |
| | | | | | | |
| C. Basement | | | | | | |
| C.1. vapor barrier | | | | | | |
| C.2. Insul.-Perimeter | | | | | | |
| C.3. flashing/cover | | | | | | |
| C.4. Adhesives/fasteners | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: SLAB-ON-GRADE, CRAWL SPACE, BASEMENT** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Slab-on grade: | | - | - | - | - | - |
| A.1. vapor barrier | | | | | | |
| a.2. perimeter insul. | | | | | | |
| a.3. Total labor | | - | - | | | |
| | | | | | | |
| B. Crawl Space | | - | - | - | - | - |
| B.1. vapor bar., ground | | see vapor barrier/calking/sealing | | | | |
| B.2. vapor bar., perim. | | | | | | |
| B.3. insulation-perim. | | | | | | |
| B.4. flashing/insul. cover | | | | | | |
| B.5. adhesive/fasteners | | | | | | |
| | | | | | | |
| | | | | | | |
| C. Basement | | | | | | |
| C.1. vapor barrier | | | | | | |
| C.2. Insul.-Perimeter | | | | | | |
| C.3. flashing/cover | | | | | | |
| C.4. Adhesives/fasteners | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: FRAMING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Floor/Crawl Space | | | | | | |
| | | | | | | |
| B. Basements | | | | | | |
| B.1. Studs | | | | | | |
| B.2. Plates | | | | | | |
| B.3. Flame spread material-see drywall and paneling | | | | | | |
| B.4. Total labor-basement | | | | | | |
| | | | | | | |
| C. Joists | | | | | | |
| C.1. Rim | | | | | | |
| C.2. Support | | | | | | |
| C.3. Total labor-Joists | | | | | | |
| | | | | | | |
| D. Exterior Walls | | | | | | |
| D.1. Studs | | | | | | |
| D.2. Plates | | | | | | |
| D.3. Headers | | | | | | |
| D.4. Sheathing | | | | | | |
| D.5. Bracing | | | | | | |
| D.6. Blocking/backing | | | | | | |
| D.7. Total labor-Walls | | | | | | |
| | | | | | | |
| E. Ceilings | | | | | | |
| E.1. Trusses | | | | | | |
| E.2. Rafters (Vaults) | | | | | | |
| E.3. Soffit Enclosures | | | | | | |
| E.4. Total labor-Ceilings | | | | | | |
| | | | | | | |
| F. Window liners/jambs | | See Windows | | | | |
| G. Doors liners/jambs | | See Doors | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: FRAMING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Floor/Crawl Space | | | | | | |
| | | | | | | |
| B. Basements | | | | | | |
| B.1. Studs | | | | | | |
| B.2. Plates | | | | | | |
| B.3. Flame spread material-see drywall and paneling | | | | | | |
| B.4. Total labor-basement | | | | | | |
| | | | | | | |
| C. Joists | | | | | | |
| C.1. Rim | | | | | | |
| C.2. Support | | | | | | |
| C.3. Total labor-Joists | | | | | | |
| | | | | | | |
| D. Exterior Walls | | | | | | |
| D.1. Studs | | | | | | |
| D.2. Plates | | | | | | |
| D.3. Headers | | | | | | |
| D.4. Sheathing | | | | | | |
| D.5. Bracing | | | | | | |
| D.6. Blocking/backing | | | | | | |
| D.7. Total labor-Walls | | | | | | |
| | | | | | | |
| E. Ceilings | | | | | | |
| E.1. Trusses | | | | | | |
| E.2. Rafters (Vaults) | | | | | | |
| E.3. Soffit Enclosures | | | | | | |
| E.4. Total labor-Ceilings | | | | | | |
| | | | | | | |
| F. Window liners/jambs | | See Windows | | | | |
| G. Doors liners/jambs | | See Doors | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: VAPOR BARRIER, CAULKING, SEALING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Vapor Barrier | | | | | | |
| A.1. Crawl space ground | | | | | | |
| A.2. Floor | | | | | | |
| A.3. Walls | | | | | | |
| A.4. Ceiling | | | | | | |
| A.5. Total V.B. Labor | | | | | | |
| | | | | | | |
| B. Caulking/Sealing | | | | | | |
| B.1. Rim Joists | | | | | | |
| B.2. Sill Plates | | | | | | |
| B.3. Sole Plate | | | | | | |
| B.4. Framing joints | | | | | | |
| B.5. Windows (to frame) | | | | | | |
| B.6. Ex. Doors (to frame) | | | | | | |
| B.7. Utility Holes | | | | | | |
| B.8. All Baseboards | | | | | | |
| B.9. Attic Floor | | | | | | |
| B.10. Envelope openings | | | | | | |
| B.11. Part. Wall Base Mldngs. | | | | | | |
| B.12. Elect. Plate. gaskets | | | | | | |
| B.13. Total Caulking labor | | | | | | |
| | | | | | | |
| | | | | | | |
| C. Air Barrier (tyvek, etc.) | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: VAPOR BARRIER, CAULKING, SEALING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Vapor Barrier | | | | | | |
| A.1. Crawl space ground | | | | | | |
| A.2. Floor | | | | | | |
| A.3. Walls | | | | | | |
| A.4. Ceiling | | | | | | |
| A.5. Total V.B. Labor | | | | | | |
| | | | | | | |
| B. Caulking/Sealing | | | | | | |
| B.1. Rim Joists | | | | | | |
| B.2. Sill Plates | | | | | | |
| B.3. Sole Plate | | | | | | |
| B.4. Framing joints | | | | | | |
| B.5. Windows (to frame) | | | | | | |
| B.6. Ex. Doors (to frame) | | | | | | |
| B.7. Utility Holes | | | | | | |
| B.8. All Baseboards | | | | | | |
| B.9. Attic Floor | | | | | | |
| B.10. Envelope openings | | | | | | |
| B.11. Part. Wall Base Mldngs. | | | | | | |
| B.12. Elect. Plate. gaskets | | | | | | |
| B.13. Total Caulking labor | | | | | | |
| | | | | | | |
| | | | | | | |
| C. Air Barrier (tyvek, etc.) | | | | | | |
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| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: INSULATION** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Perimeter | | See Slab-on-Grade, crawl space, Basements | | | | |
| | | | | | | |
| B. Under Floor | | | | | | |
| | | | | | | |
| C. Exterior Wall | | | | | | |
| C.1. Sheathing | | See Framing | | | | |
| | | | | | | |
| D. Ceiling | | | | | | |
| D.1. Insulation-Ceil. | | | | | | |
| D.2. Vents/Baffle | | | | | | |
| D.3. | | | | | | |
| D.4. Total Ceil. Labor | | | | | | |
| | | | | | | |
| E. Pipe Insulation | | | | | | |
| | | | | | | |
| F. Heating Syst. Ducts | | | | | | |
| F.1. Duct insulation | | | | | | |
| F.2. boot insulation | | | | | | |
| | | | | | | |
| G. Heat Exchanger Ducts-See Heat Exchangers | | | | | | |
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| | | | | | | |
| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: INSULATION** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Perimeter | | See Slab-on-Grade, crawl space, Basements | | | | |
| | | | | | | |
| B. Under Floor | | | | | | |
| | | | | | | |
| C. Exterior Wall | | | | | | |
| C.1. Sheathing | | See Framing | | | | |
| | | | | | | |
| D. Ceiling | | | | | | |
| D.1. Insulation-Ceil. | | | | | | |
| D.2. Vents/Baffle | | | | | | |
| D.3. | | | | | | |
| D.4. Total Ceil. Labor | | | | | | |
| | | | | | | |
| E. Pipe Insulation | | | | | | |
| | | | | | | |
| F. Heating Syst. Ducts | | | | | | |
| F.1. Duct insulation | | | | | | |
| F.2. boot insulation | | | | | | |
| | | | | | | |
| G. Heat Exchanger Ducts-See Heat Exchangers | | | | | | |
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| | | | | | | |
| | | | | | | |
| | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: WINDOWS** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Window Units | | | | | | |
| B. | | | | | | |
| C. | | | | | | |
| D. Liner &/or Ext. Jambs | | | | | | |
| E. | | | | | | |
| F. Insul. Shades/Shutters | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: DOORS** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Door Units | | | | | | |
| B. Liners/Extension Jamb | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: WINDOWS** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Window Units | | | | | | |
| B. | | | | | | |
| C. | | | | | | |
| D. Liner &/or Ext. Jambs | | | | | | |
| E. | | | | | | |
| F. Insul. Shades/Shutters | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: DOORS** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Door Units | | | | | | |
| B. Liners/Extension Jamb | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: Air to Air Heat Exchangers** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Heat Exchanger Unit | | | | | | |
| B. Ducting | | | | | | |
| C. Duct Insulation | | | | | | |
| D. Location | | | | | | |
| E. Wiring | | | | | | |
| F. Controls | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: HVAC** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. HVAC unit | | | | | | |
| B. Ducting | | | | | | |
| C. Duct Insulation | | See Insulation | | | | |
| D. Duct Sealing | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: Air to Air Heat Exchangers** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Heat Exchanger Unit | | | | | | |
| B. Ducting | | | | | | |
| C. Duct Insulation | | | | | | |
| D. Location | | | | | | |
| E. Wiring | | | | | | |
| F. Controls | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: HVAC** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. HVAC unit | | | | | | |
| B. Ducting | | | | | | |
| C. Duct Insulation | | See Insulation | | | | |
| D. Duct Sealing | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: ELECTRICAL** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Heating Unit Wiring | | | | | | |
| B. Bath Fan Wiring | | | | | | |
| C. Outlet Gasketing | | See Caulking and sealing | | | | |
| D. Polyethylene pans | | | | | | |
| E. Heat Exchanger wiring | | See Heat Exchanger | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| I. | | | | | | |
| J. | | | | | | |
| K. | | | | | | |
| L. | | | | | | |
| M. | | | | | | |
| N. | | | | | | |
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| P. | | | | | | |
| Q. | | | | | | |
| R. | | | | | | |
| S. | | | | | | |
| T. | | | | | | |
| U. | | | | | | |
| V. | | | | | | |
| W. | | | | | | |
| X. | | | | | | |
| Y. | | | | | | |
| Z. | | | | | | |
| AA. | | | | | | |
| BB. | | | | | | |
| CC. | | | | | | |
| DD. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: ELECTRICAL** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Heating Unit Wiring | | | | | | |
| B. Bath Fan Wiring | | | | | | |
| C. Outlet Gasketing | | See Caulking and sealing | | | | |
| D. Polyethylene pans | | | | | | |
| E. Heat Exchanger wiring | | See Heat Exchanger | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| I. | | | | | | |
| J. | | | | | | |
| K. | | | | | | |
| L. | | | | | | |
| M. | | | | | | |
| N. | | | | | | |
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| R. | | | | | | |
| S. | | | | | | |
| T. | | | | | | |
| U. | | | | | | |
| V. | | | | | | |
| W. | | | | | | |
| X. | | | | | | |
| Y. | | | | | | |
| Z. | | | | | | |
| AA. | | | | | | |
| BB. | | | | | | |
| CC. | | | | | | |
| DD. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: FIREPLACE** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Combustion Air | | | | | | |
| B. Door | | | | | | |
| C. Damper | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PLUMBING** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Pipe Insulation | | see insulation | | | | |
| B. | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: FIREPLACE** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | CHARGES EXCLUDING MATERIAL | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Combustion Air | | | | | | |
| B. Door | | | | | | |
| C. Damper | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PLUMBING** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Pipe Insulation | | see insulation | | | | |
| B. | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: DRYWALL & PANELING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Walls | | | | | | |
| B. Ceilings | | | | | | |
| C. Clips | | | | | | |
| D. Fasteners | | | | | | |
| E. Flame spread material | | | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PAINTING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Jambs | | | | | | |
| B. Drywall returns | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: DRYWALL & PANELING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Walls | | | | | | |
| B. Ceilings | | | | | | |
| C. Clips | | | | | | |
| D. Fasteners | | | | | | |
| E. Flame spread material | | | | | | |
| F. | | | | | | |
| G. | | | | | | |
| H. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PAINTING** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Jambs | | | | | | |
| B. Drywall returns | | | | | | |
| C. | | | | | | |
| D. | | | | | | |
| E. | | | | | | |
| F. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PASSIVE SOLAR** **Home I.D.#** _____

| ITEM | NA | MATERIALS EST. | MATERIALS ACTUAL | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES BID (EST) | SUBCONTRACTOR CHARGES ACTUAL |
|---|---|---|---|---|---|---|
| A. Thermal Mass | | | | | | |
| B. mass support | | | | | | |
| C. shading devices | | | | | | |
| D. venting | | | | | | |
| E. drapes/night insul. | | See Windows | | | | |
| F. Glazing | | See Windows | | | | |
| G. Ducting | | | | | | |
| H. Equip. & Controls | | | | | | |
| I. | | | | | | |
| J. | | | | | | |
| K. | | | | | | |
| L. | | | | | | |
| M. | | | | | | |
| N. | | | | | | |
| O. | | | | | | |
| P. | | | | | | |
| Q. | | | | | | |
| R. | | | | | | |
| S. | | | | | | |
| T. | | | | | | |
| U. | | | | | | |
| V. | | | | | | |
| W. | | | | | | |
| X. | | | | | | |
| Y. | | | | | | |
| Z. | | | | | | |
| AA. | | | | | | |
| BB. | | | | | | |
| CC. | | | | | | |
| DD. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**COMPONENT: PASSIVE SOLAR** **Home I.D.#** _____

| ITEM | NA | MATERIALS | | BUILDER ACTUAL LABOR | SUBCONTRACTOR CHARGES | |
|---|---|---|---|---|---|---|
| | | EST. | ACTUAL | | BID (EST) | ACTUAL |
| A. Thermal Mass | | | | | | |
| B. mass support | | | | | | |
| C. shading devices | | | | | | |
| D. venting | | | | | | |
| E. drapes/night insul. | | See Windows | | | | |
| F. Glazing | | See Windows | | | | |
| G. Ducting | | | | | | |
| H. Equip. & Controls | | | | | | |
| I. | | | | | | |
| J. | | | | | | |
| K. | | | | | | |
| L. | | | | | | |
| M. | | | | | | |
| N. | | | | | | |
| O. | | | | | | |
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| Q. | | | | | | |
| R. | | | | | | |
| S. | | | | | | |
| T. | | | | | | |
| U. | | | | | | |
| V. | | | | | | |
| W. | | | | | | |
| X. | | | | | | |
| Y. | | | | | | |
| Z. | | | | | | |
| AA. | | | | | | |
| BB. | | | | | | |
| CC. | | | | | | |
| DD. | | | | | | |
| TOTALS | | $ | $ | $ | $ | $ |

**House Identification NO:** _____

**Component:** RELATED COST*

| Item | n/a | Cost |
|---|---|---|
| | | |
| a. Supervision | | |
| b. Design | | |
| c. Permit/inspection fees | | |
| d. Hazard insurance | | |
| e. Appraisal fee | | |
| f. H.O.W. | | |
| g. Construction loan interest** | | |
| h. Commission | | |
| i. Discount points | | |
| j. Take-Out title insurance | | |
| k. Transfer tax and/or sales tax | | |
| l. Closing cost | | |
| m. Escrow fee | | |
| n. Estimated monthly, construction interest | | |
| o. | | |

Total: _____ _____

* Identify all related costs incurred at completion of home and include on this sheet.

** Identify construction loan interest incurred to point of completion.

**House Identification NO:** _____

**Component:** RELATED COST*

| Item | n/a | Cost |
|---|---|---|
| | | |
| a. Supervision | | |
| b. Design | | |
| c. Permit/inspection fees | | |
| d. Hazard insurance | | |
| e. Appraisal fee | | |
| f. H.O.W. | | |
| g. Construction loan interest** | | |
| h. Commission | | |
| i. Discount points | | |
| j. Take-Out title insurance | | |
| k. Transfer tax and/or sales tax | | |
| l. Closing cost | | |
| m. Escrow fee | | |
| n. Estimated monthly, construction interest | | |
| o. | | |

Total: _____ _____

* Identify all related costs incurred at completion of home and include on this sheet.

** Identify construction loan interest incurred to point of completion.

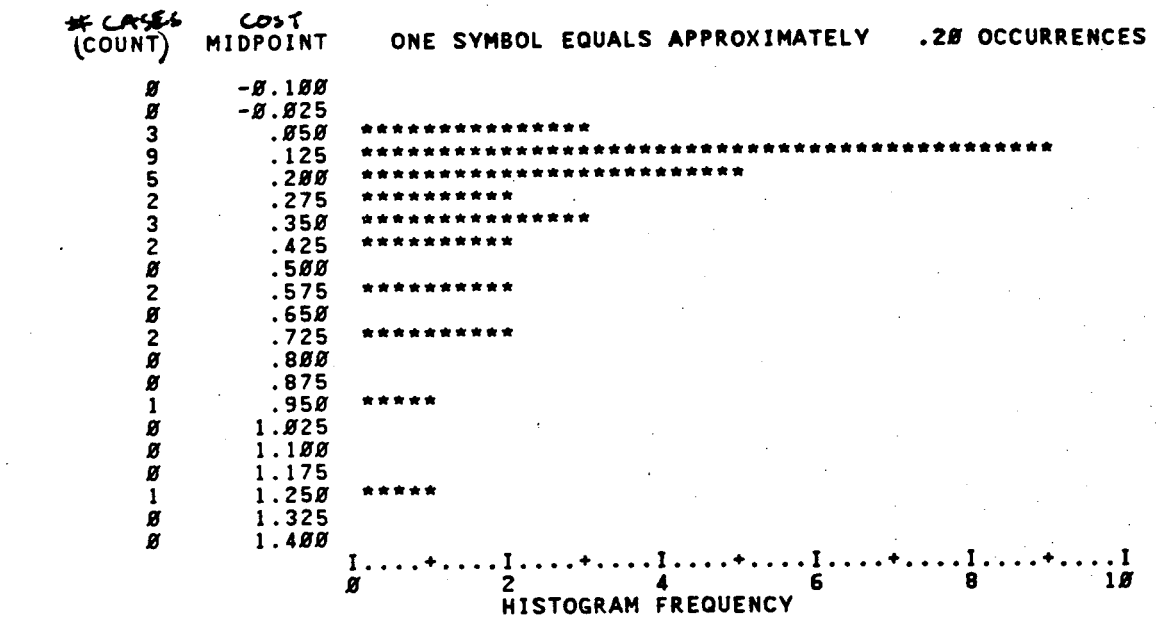
## COST SUMMARY

| CURRENT PRACTICE | MODEL CONSERVATION STANDARDS (MCS) |
|---|---|
| | |
| | |
| Air to Air Heat Exchanger | |
| Slab, Crawl Space, Basement | |
| Framing | |
| Insulation | |
| Glazing | |
| Doors | |
| Fireplace | |
| Plumbing | |
| Electrical | |
| HVAC | |
| Drywall | |
| Painting | |
| Vapor Barriers, Caulking & Sealing | |
| Passive Solar | |
| Related Costs | |
| | |
| TOTAL | |

# Fig. B-1 Distribution of ceiling incremental costs - Group 7

**Current Practice:** Vaulted ceiling with batt insulation and no foam insulation; R-30

**MCS:** Vaulted ceiling with batt insulation and no foam insulation; R-38




| | | | | | |
|---|---|---|---|---|---|
| MEAN | .312 | MEDIAN | .22Ø | STD DEV | .287 |
| MINIMUM | .Ø5Ø | MAXIMUM | 1.26Ø | | |
| VALID CASES | 3Ø | MISSING CASES | Ø | | |

# Fig. B-2 Distribution of ceiling incremental costs - Group 10

**Current Practice:** Attic, standard truss, loosefill insulation; R-30

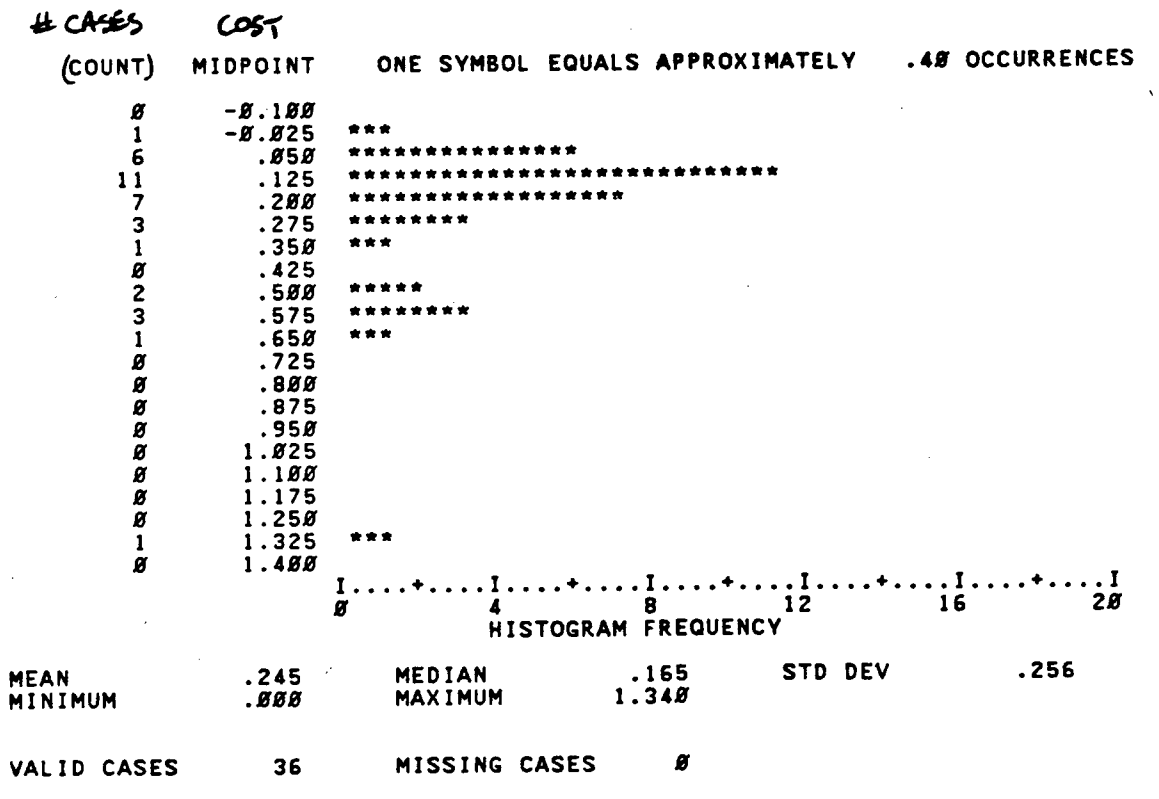
**MCS:** Attic, advanced truss, loosefill insulation; R-38

```
#CASES   COST
(COUNT)  MIDPOINT    ONE SYMBOL EQUALS APPROXIMATELY   .40 OCCURRENCES

    0     -0.150
    0     -0.075
    1      .000   ***
    4      .075   **********
    7      .150   ******************
   15      .225   ****************************************
    6      .300   ***************
   16      .375   ****************************************
    8      .450   ********************
    9      .525   ************************
    3      .600   ********
    9      .675   ************************
    4      .750   **********
    6      .825   ***************
    0      .900
    0      .975
    0     1.050
    0     1.125
    0     1.200
    2     1.275   *****
    0     1.350
                 I....+....I....+....I....+....I....+....I....+....I....+....I
                 0         4         8        12        16        20
                          HISTOGRAM FREQUENCY

MEAN          .436      MEDIAN         .390      STD DEV        .246
MINIMUM       .000      MAXIMUM       1.240

VALID CASES    90       MISSING CASES    0
```

# Fig. B-3 Distribution of ceiling incremental costs - Group 19

**Current Practice:** Attic, standard truss, loosefill insulation; R-38

**MCS:** Attic, advanced truss, loosefill insulation; R-38



# Fig. B-4 Distribution of floor incremental costs - Group 16

**Current Practice:** Crawlspace (insulation under floor or overhangs); R-11

**MCS:** Crawlspace (insulation under floor or overhangs); R-19

#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .6Ø OCCURRENCES |
|---|---|---|
| 1 | -Ø.26 | ** |
| Ø | -Ø.22 | |
| Ø | -Ø.18 | |
| Ø | -Ø.14 | |
| Ø | -Ø.1Ø | |
| Ø | -Ø.Ø6 | |
| Ø | -Ø.Ø2 | |
| 1 | .Ø2 | ** |
| 11 | .Ø6 | ****************** |
| 29 | .1Ø | ********************************************** |
| 2Ø | .14 | ********************************** |
| 5 | .18 | ******** |
| 1 | .22 | ** |
| 1 | .26 | ** |
| 2 | .3Ø | *** |
| Ø | .34 | |
| Ø | .38 | |
| Ø | .42 | |
| Ø | .46 | |
| Ø | .5Ø | |
| 1 | .54 | ** |

I....+....I....+....I....+....I....+....I....+....I....+....I
Ø 6 12 18 24 3Ø
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | .123 | MEDIAN | .115 | STD DEV | .Ø84 |
| MINIMUM | -Ø.26Ø | MAXIMUM | .54Ø | | |
| VALID CASES | 72 | MISSING CASES | Ø | | |

# Fig. B-5 Distribution of floor incremental costs - Group 18

**Current Practice:** Crawlspace (insulation under floor or overhangs); R-11

**MCS:** Crawlspace (insulation under floor or overhangs); R-30

#Cases COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .5Ø OCCURRENCES |
|---|---|---|
| Ø | -Ø.2 | |
| Ø | -Ø.1 | |
| 1 | .Ø | ** |
| 3 | .1 | ****** |
| 13 | .2 | ********** |
| 23 | .3 | ********** |
| 15 | .4 | ********** |
| 3 | .5 | ****** |
| 1 | .6 | ** |
| 3 | .7 | ****** |
| 1 | .8 | ** |
| Ø | .9 | |
| Ø | 1.Ø | |
| Ø | 1.1 | |
| Ø | 1.2 | |
| Ø | 1.3 | |
| Ø | 1.4 | |
| Ø | 1.5 | |
| 1 | 1.6 | ** |
| Ø | 1.7 | |
| Ø | 1.8 | |

I....+....I....+....I....+....I....+....I....+....I....+....I
Ø 5 1Ø 15 2Ø 25
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | .343 | MEDIAN | .3ØØ | STD DEV | .216 |
| MINIMUM | .Ø3Ø | MAXIMUM | 1.6ØØ | | |
| VALID CASES | 64 | MISSING CASES | Ø | | |

## Fig. B-6 Distribution of wall incremental costs - Group 1

**Current Practice:** 2 X 4, 16" on center, standard framing; R-11

**MCS:** 2 X 6, 24" on center, (mod.) advanced framing; R-19

#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .2Ø OCCURRENCES |
|---|---|---|
| 1 | -Ø.Ø1ØØ | ***** |
| Ø | .Ø233 | |
| Ø | .Ø567 | |
| 4 | .ØØØØ | ********** |
| 6 | .1233 | ********** |
| 4 | .1567 | ********** |
| 5 | .1ØØØ | ********** |
| 2 | .2233 | ********** |
| 8 | .2567 | ********** |
| 4 | .2ØØØ | ********** |
| Ø | .3233 | |
| 5 | .3567 | ********** |
| Ø | .3ØØØ | |
| 7 | .4233 | ********** |
| 2 | .4567 | ********** |
| 1 | .4ØØØ | ***** |
| 3 | .5233 | ********** |
| Ø | .5567 | |
| 2 | .5ØØØ | ********** |
| Ø | .6233 | |
| 1 | .6567 | ***** |

I....+....I....+....I....+....I....+....I....+....I
Ø 2 4 6 8 1Ø

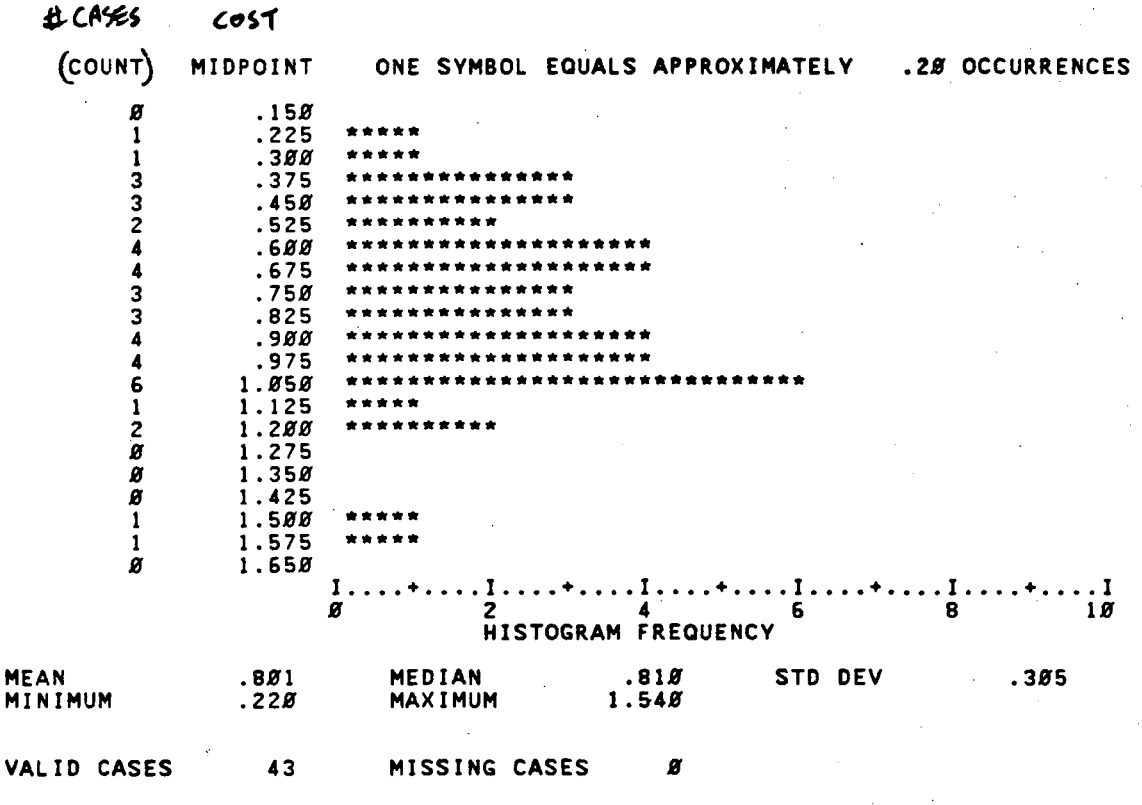
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | .287 | MEDIAN | .27Ø | STD DEV | .152 |
| MINIMUM | .ØØØ | MAXIMUM | .65Ø | | |
| VALID CASES | 55 | MISSING CASES | Ø | | |

# Fig. B-7 Distribution of wall incremental costs - Group 4

**Current Practice:** 2 X 4, 16" on center, standard framing; R-11

**MCS:** 2 X 6, 24" on center, foam inside; R-24




| | | | | | |
|---|---|---|---|---|---|
| MEAN | .8Ø1 | MEDIAN | .81Ø | STD DEV | .3Ø5 |
| MINIMUM | .22Ø | MAXIMUM | 1.54Ø | | |
| VALID CASES | 43 | MISSING CASES | Ø | | |

# Fig. B-8 Distribution of wall incremental costs - Group 22

**Current Practice:** Any type; R-11

**MCS:** Any type; R-24

#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .2Ø OCCURRENCES |
|---|---|---|
| 1 | -Ø.Ø5 | ***** |
| 6 | .2Ø | ****************************** |
| 7 | .45 | *********************************** |
| 5 | .7Ø | ************************* |
| 6 | .95 | ****************************** |
| 1 | 1.2Ø | ***** |
| 1 | 1.45 | ***** |
| 1 | 1.7Ø | ***** |
| Ø | 1.95 | |
| Ø | 2.2Ø | |
| 2 | 2.45 | ********** |
| Ø | 2.7Ø | |
| Ø | 2.95 | |
| Ø | 3.2Ø | |
| Ø | 3.45 | |
| Ø | 3.7Ø | |
| Ø | 3.95 | |
| Ø | 4.2Ø | |
| Ø | 4.45 | |
| 1 | 4.7Ø | ***** |
| 1 | 4.95 | ***** |

I....+....I....+....I....+....I....+....I....+....I
Ø 2 4 6 8 1Ø
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | .991 | MEDIAN | .7ØØ | STD DEV | 1.179 |
| MINIMUM | .ØØØ | MAXIMUM | 4.95Ø | | |
| VALID CASES | 32 | MISSING CASES | Ø | | |

## Fig. B-9 Distribution of window incremental costs - Group 14

**Current Practice:** Aluminum slider, aluminum casement, aluminum fixed, aluminum, aluminum with awning, or double hung aluminum windows; U-0.70-0.74

**MCS:** Aluminum windows with thermal break; triple glazing.

#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .2Ø OCCURRENCES |
|---|---|---|
| 1 | .667 | ***** |
| 1 | 1.ØØØ | ***** |
| 2 | 1.333 | ********** |
| 4 | 1.667 | ******************** |
| 6 | 2.ØØØ | ****************************** |
| 4 | 2.333 | ******************** |
| 4 | 2.667 | ******************** |
| 4 | 3.ØØØ | ******************** |
| 3 | 3.333 | *************** |
| 1 | 3.667 | ***** |
| 3 | 4.ØØØ | *************** |
| 1 | 4.333 | ***** |
| 1 | 4.667 | ***** |
| 2 | 5.ØØØ | ********** |
| 6 | 5.333 | ****************************** |
| 1 | 5.667 | ***** |
| 1 | 6.ØØØ | ***** |
| Ø | 6.333 | |
| Ø | 6.667 | |
| 1 | 7.ØØØ | ***** |
| 1 | 7.333 | ***** |

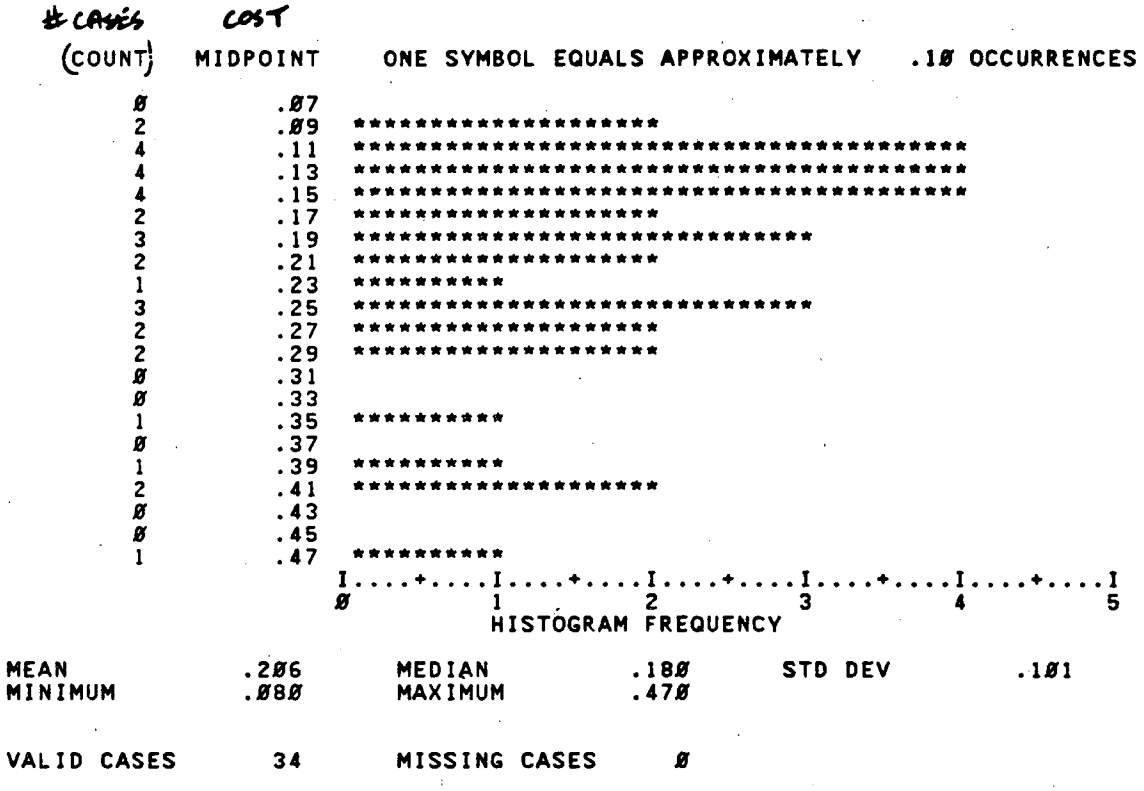
I....+....I....+....I....+....I....+....I....+....I....+....I
Ø 2 4 6 8 1Ø
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | 3.36Ø | MEDIAN | 2.95Ø | STD DEV | 1.635 |
| MINIMUM | .67Ø | MAXIMUM | 7.32Ø | | |
| VALID CASES | 47 | MISSING CASES | Ø | | |

# Fig. B-10 Distribution of air infiltration barrier incremental costs - Group 19

**Current Practice:** No barriers for ceiling, wall, and floor

**MCS:** Polyvinyl under sheetrock for ceiling, foam for wall, and exterior plywood for floor

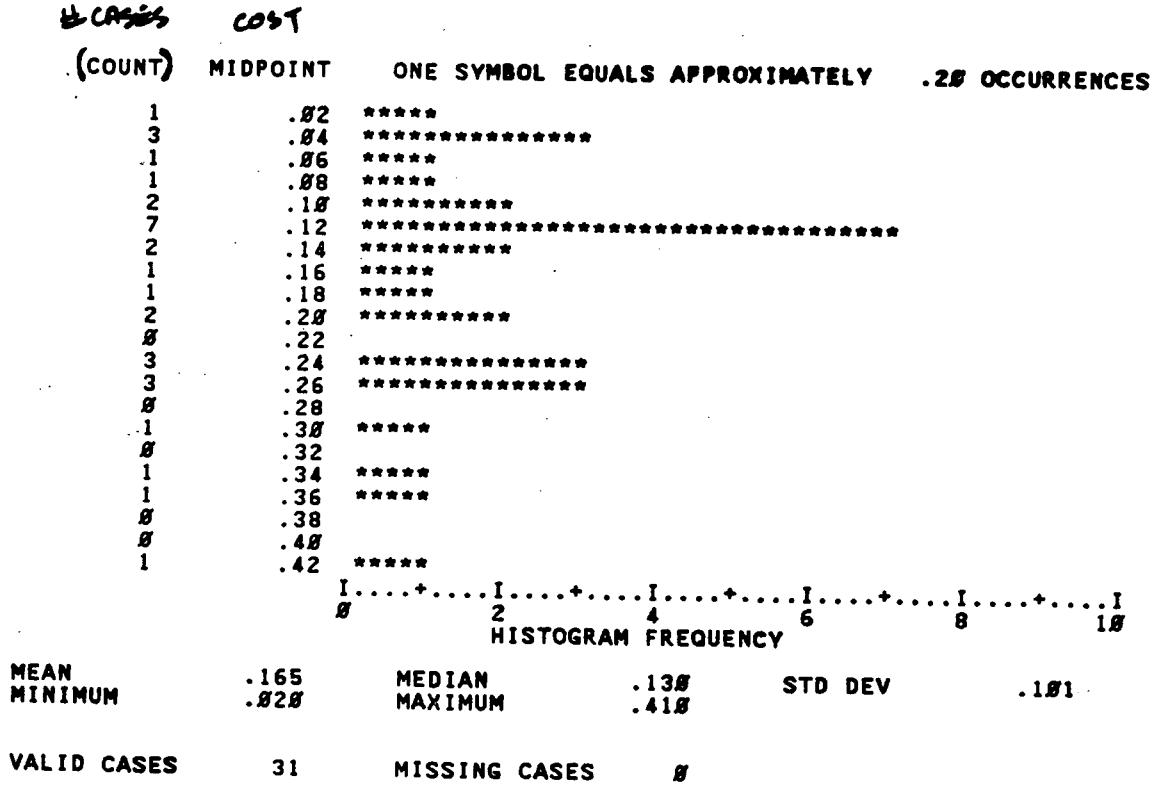



| | | | | | |
|---|---|---|---|---|---|
| MEAN | .2Ø6 | MEDIAN | .18Ø | STD DEV | .1Ø1 |
| MINIMUM | .Ø8Ø | MAXIMUM | .47Ø | | |
| VALID CASES | 34 | MISSING CASES | Ø | | |

# Fig. B-11 Distribution of air infiltration barrier incremental costs - Group 22

**Current Practice:** No barriers for ceiling, wall, and floor

**MCS:** Polyvinyl under sheetrock for ceiling and for wall, and exterior plywood for floor

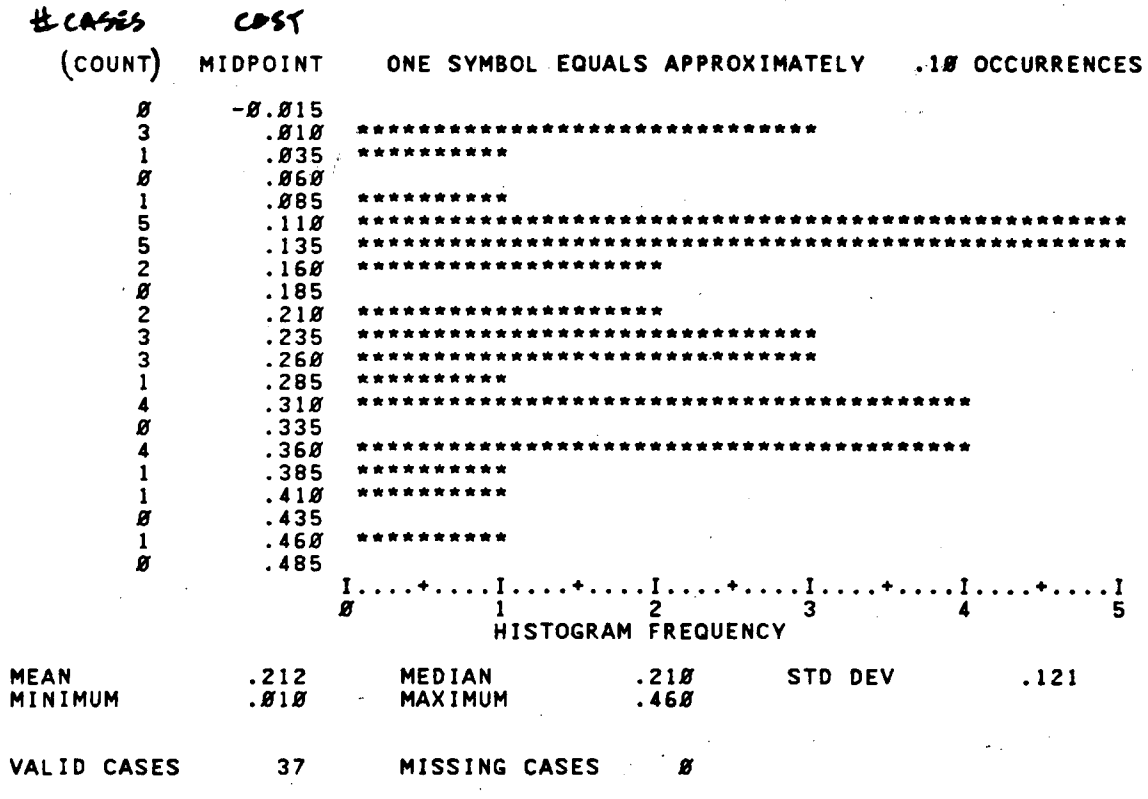



| | | | | | |
|---|---|---|---|---|---|
| MEAN | .165 | MEDIAN | .13Ø | STD DEV | .1Ø1 |
| MINIMUM | .Ø2Ø | MAXIMUM | .41Ø | | |
| VALID CASES | 31 | MISSING CASES | Ø | | |

## Fig. B-12 Distribution of air infiltration barrier incremental costs - Group 28

**Current Practice:** No barriers for ceiling and wall, and any type of floor barrier

**MCS:** Any type of barrier for ceiling, wall, and floor



## Fig. B-13 Distribution of door incremental costs - Group 1

**Current Practice:** Insulated clad foam core

**MCS:** Insulated clad foam core

# CASES COST

```
  (COUNT)   MIDPOINT     ONE SYMBOL EQUALS APPROXIMATELY  4.ØØ OCCURRENCES

       Ø         -2
       2         -1   *
     1Ø6          Ø   ****************************
      32          1   ********
      19          2   *****
       8          3   **
       5          4   *
       3          5   *
       Ø          6
       1          7
       Ø          8
       1          9
       Ø         1Ø
       Ø         11
       Ø         12
       Ø         13
       Ø         14
       Ø         15
       2         16   *
       Ø         17
       Ø         18
                      I....+....I....+....I....+....I....+....I....+....I....+....I
                      Ø         4Ø        8Ø        12Ø       16Ø       2ØØ
                                HISTOGRAM FREQUENCY

MEAN            .962      MEDIAN          .ØØØ      STD DEV       2.1Ø7
MINIMUM       -Ø.57Ø      MAXIMUM       16.4ØØ

VALID CASES     179       MISSING CASES     Ø
```

# Fig. B-14 Distribution of door incremental costs - Group 3

**Current Practice:** Wood solid core

**MCS:** Insulated clad foam core

#CASES COST

| (COUNT) | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .8Ø OCCURRENCES |
|---|---|---|
| 1 | -18 | * |
| Ø | -16 | |
| Ø | -14 | |
| Ø | -12 | |
| 1 | -1Ø | * |
| 1 | -8 | * |
| Ø | -6 | |
| 2 | -4 | *** |
| 4 | -2 | ***** |
| 16 | Ø | ********** |
| 31 | 2 | ********** |
| 4Ø | 4 | ********** |
| 1Ø | 6 | ********** |
| 7 | 8 | ********* |
| 7 | 1Ø | ********* |
| 2 | 12 | *** |
| 1 | 14 | * |
| Ø | 16 | |
| Ø | 18 | |
| Ø | 2Ø | |
| 1 | 22 | * |

I....+....I....+....I....+....I....+....I....+....I....+....I
Ø 8 16 24 32 4Ø
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | 3.334 | MEDIAN | 3.18Ø | STD DEV | 4.353 |
| MINIMUM | -18.4ØØ | MAXIMUM | 21.87Ø | | |
| VALID CASES | 124 | MISSING CASES | Ø | | |

# Fig. B-15 Distribution of air-to-air heat exchanger incremental costs - Group 2

MCS: Airchange (NuTone) heat exchanger, in homes with less than 1500 $ft^2$

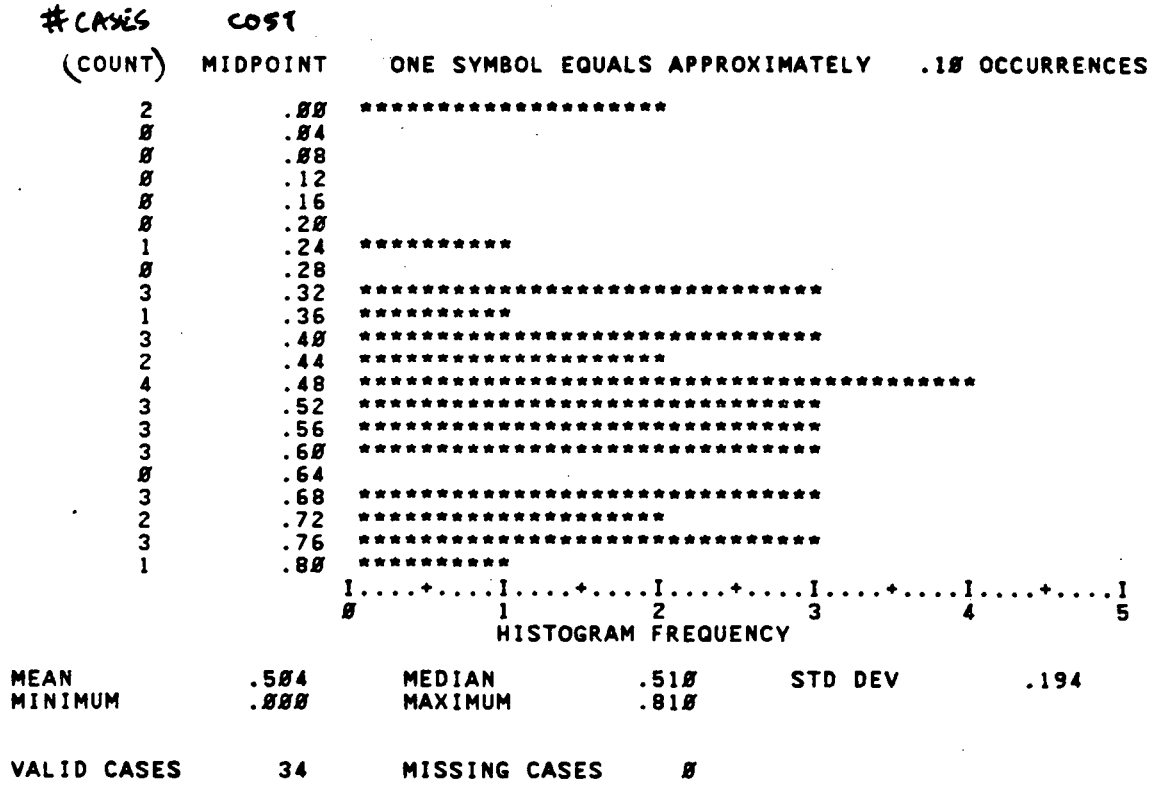
| # CASES (COUNT) | COST MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .2Ø OCCURRENCES |
|---|---|---|
| 3 | .53 | ********** |
| Ø | .56 | |
| 1 | .59 | ***** |
| 6 | .62 | ********** |
| 3 | .65 | ********** |
| 1 | .68 | ***** |
| 4 | .71 | ********** |
| 3 | .74 | ********** |
| 2 | .77 | ********** |
| Ø | .8Ø | |
| Ø | .83 | |
| Ø | .86 | |
| Ø | .89 | |
| 1 | .92 | ***** |
| Ø | .95 | |
| Ø | .98 | |
| 5 | 1.Ø1 | ********** |
| Ø | 1.Ø4 | |
| Ø | 1.Ø7 | |
| Ø | 1.1Ø | |
| 1 | 1.13 | ***** |

I....+....I....+....I....+....I....+....I....+....I....+....I
Ø 2 4 6 8 1Ø
HISTOGRAM FREQUENCY

| | | | | | |
|---|---|---|---|---|---|
| MEAN | .743 | MEDIAN | .7ØØ | STD DEV | .169 |
| MINIMUM | .52Ø | MAXIMUM | 1.14Ø | | |
| VALID CASES | 3Ø | MISSING CASES | Ø | | |

## Fig. B-16 Distribution of air-to-air heat exchanger incremental costs - Group 17

MCS: Airchange (NuTone) heat exchanger, in homes with 1500-2500 $ft^2$




| | | | | | |
|---|---|---|---|---|---|
| MEAN | .5Ø4 | MEDIAN | .51Ø | STD DEV | .194 |
| MINIMUM | .ØØØ | MAXIMUM | .81Ø | | |
| VALID CASES | 34 | MISSING CASES | Ø | | |

This appendix contains a listing of homes (spreadsheets) used in the determination of groups of components analyzed in Chapter 7. The following information is provided for each home: identification number, area of component, type of component, R-value (or U-value) of component, cost of component, incremental cost per square foot, and group number (identifying which group the home was placed).[1] The spreadsheets are presented in the same order as in Chapter 7: ceiling, floor, wall, basement wall, window, air infiltration barrier, door, and air-to-air heat exchanger. Column headings are explained in the glossary below.

## GLOSSARY

| | |
|---|---|
| SITEID[2] | Identification of house/builder. |
| AREA | Area of component. |
| CPTYPE | Component type - current practice. |
| MCSTYPE | Component type - MCS. |
| CPRVAL | Component R-value - current practice. |
| MCSRVAL | Component R-value - MCS. |
| CPUVAL | Component U-value - current practice. |
| MCSUVAL | Component U-value - MCS. |
| CP$ | Component cost - current practice. |
| MCS$ | Component cost - MCS. |
| INCOST$ | Incremental cost/$ft^2$ = ((MCS$-CP$)/AREA) |
| GRP | Group number |

[1] We have used group number 99 to indicate "all other cases of increments."

[2] SITEID is an eight digit number: the first digit indicates state location (1 = Idaho, 2 = Montana, 3 = Oregon, 4 = Washington); the second digit indicates climate zone location (1 = Zone 1, 2 = Zone 2, 3 = Zone 3); the third digit indicates a "matched pair" home (1 = matched, 2 = unmatched, 3 = unmatched and ELCAP, 4 = control home); the fourth digit indicates a MCS home (1 = MCS, 2 = current practice); the fifth digit indicates type of home (1 = single-family, 2 = multi-family-1, 3 = multi-family-2); and the last three digits indicate the house number (same number if it is a matched pair home).

## CEILING SPREADSHEET

**Ceiling Insulation Type Code:**

A Attic, advanced truss, loosefill insulation

B Attic, advanced truss, batt insulation

C Attic, standard truss, baffle, compressed batt perimeter

D Attic, standard truss, rigid foam perimeter

E Vaulted, batt, no foam

F Vaulted, batt, foam inside

G Vaulted, compressed batt

H Attic, standard truss, loosefill insulation

I Attic, standard truss, loosefill insulation, compressed batt perimeter

X Missing

Z Other

24-APR-86 ceiling spreadsheet
11:33:47 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31211106 | 1879 | E | E | 19 | 30 | 560 | 880 | .17 | 1 |
| 31211133 | 950 | E | E | 19 | 30 | 470 | 767 | .31 | 1 |
| 31211145 | 512 | E | E | 19 | 30 | 128 | 195 | .13 | 1 |
| 31211200 | 1003 | E | E | 19 | 30 | 1403 | 1789 | .38 | 1 |
| 31211292 | 2535 | E | E | 19 | 30 | 1136 | 2321 | .47 | 1 |
| 31211410 | 408 | E | E | 19 | 30 | 180 | 286 | .26 | 1 |
| 31211253 | 680 | E | E | 19 | 38 | 218 | 369 | .22 | 2 |
| 31211270 | 270 | E | E | 19 | 38 | 950 | 1292 | 1.27 | 2 |
| 31211271 | 514 | E | E | 19 | 38 | 498 | 911 | .80 | 2 |
| 32211162 | 360 | E | E | 19 | 38 | 419 | 524 | .29 | 2 |
| 32211423 | 538 | E | G | 19 | 38 | 221 | 371 | .28 | 2 |
| 32211232 | 1722 | E | F | 19 | 40 | 3755 | 5140 | .80 | 2 |
| 31211250 | 943 | C | A | 30 | 40 | 752 | 912 | .17 | 3 |
| 31111112 | 1193 | C | B | 30 | 38 | 3790 | 4840 | .88 | 4 |
| 31211346 | 1230 | C | B | 30 | 38 | 2424 | 3297 | .71 | 4 |
| 32211299 | 1260 | C | B | 30 | 38 | 1777 | 2052 | .22 | 4 |
| 41111045 | 1035 | C | B | 30 | 38 | 3078 | 3718 | .62 | 4 |
| 41211006 | 1521 | C | B | 30 | 38 | 2224 | 3034 | .53 | 4 |
| 41211074 | 980 | C | B | 30 | 38 | 1054 | 1373 | .33 | 4 |
| 41211075 | 980 | C | B | 30 | 38 | 1054 | 1373 | .33 | 4 |
| 41211076 | 980 | C | B | 30 | 38 | 1054 | 1373 | .33 | 4 |
| 41211077 | 980 | C | B | 30 | 38 | 1054 | 1373 | .33 | 4 |
| 41211107 | 1413 | C | B | 30 | 38 | 2584 | 3281 | .49 | 4 |
| 41211220 | 1204 | C | B | 30 | 38 | 2202 | 3081 | .73 | 4 |
| 41211053 | 405 | C | B | 30 | 38 | 881 | 1040 | .39 | 4 |
| 42211219 | 1408 | C | B | 30 | 38 | 3180 | 3720 | .38 | 4 |
| 31211122 | 1404 | C | C | 30 | 38 | 468 | 627 | .11 | 5 |
| 31211270 | 792 | C | C | 30 | 38 | 284 | 487 | .26 | 5 |
| 32211289 | 1632 | C | C | 30 | 38 | 593 | 820 | .14 | 5 |
| 41111151 | 1422 | C | C | 30 | 38 | 418 | 684 | .19 | 5 |
| 41211002 | 1495 | C | C | 30 | 38 | 564 | 706 | .09 | 5 |
| 41211025 | 1190 | C | C | 30 | 38 | 1977 | 2642 | .56 | 5 |
| 41211123 | 738 | C | C | 30 | 38 | 480 | 663 | .25 | 5 |
| 41211187 | 1263 | C | C | 30 | 38 | 520 | 744 | .18 | 5 |
| 42211044 | 1406 | C | C | 30 | 38 | 450 | 657 | .15 | 5 |
| 32211423 | 606 | C | C | 30 | 38 | 315 | 418 | .17 | 5 |
| 41211053 | 1175 | E | F | 30 | 35 | 324 | 945 | .53 | 6 |
| 41211119 | 416 | E | F | 30 | 35 | 0 | 229 | .55 | 6 |
| 41211149 | 1350 | E | F | 30 | 35 | 0 | 556 | .41 | 6 |
| 41211181 | 930 | E | F | 30 | 35 | 0 | 77 | .08 | 6 |
| 41211118 | 814 | E | F | 30 | 35 | 0 | 292 | .36 | 6 |
| 41211274 | 539 | E | F | 30 | 35 | 609 | 857 | .46 | 6 |
| 41111209 | 732 | E | E | 30 | 38 | 430 | 500 | .10 | 7 |
| 41111211 | 732 | E | E | 30 | 38 | 430 | 500 | .10 | 7 |
| 41111213 | 732 | E | E | 30 | 38 | 430 | 500 | .10 | 7 |
| 41111215 | 732 | E | E | 30 | 38 | 430 | 500 | .10 | 7 |
| 41111217 | 732 | E | E | 30 | 38 | 430 | 500 | .10 | 7 |
| 41211059 | 566 | E | E | 30 | 38 | 253 | 414 | .28 | 7 |
| 41211081 | 1458 | E | E | 30 | 38 | 1853 | 3238 | .95 | 7 |
| 41211164 | 1302 | E | E | 30 | 38 | 589 | 758 | .13 | 7 |
| 42211115 | 224 | E | E | 30 | 38 | 186 | 212 | .12 | 7 |

26-MAR-86 ceiling spreadsheet
11:44:43 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 42211219 | 720 | E | E | 30 | 38 | 1645 | 1924 | .39 | 7 |
| 41111045 | 236 | E | E | 30 | 38 | 60 | 204 | .61 | 7 |
| 41211026 | 132 | E | E | 30 | 38 | 152 | 204 | .39 | 7 |
| 41211047 | 406 | E | E | 30 | 38 | 290 | 384 | .23 | 7 |
| 41211052 | 330 | E | E | 30 | 38 | 71 | 192 | .37 | 7 |
| 41211094 | 191 | E | E | 30 | 38 | 0 | 105 | .55 | 7 |
| 41211095 | 315 | E | E | 30 | 38 | 599 | 712 | .36 | 7 |
| 41211123 | 320 | E | E | 30 | 38 | 383 | 496 | .35 | 7 |
| 41211156 | 719 | E | E | 30 | 38 | 352 | 503 | .21 | 7 |
| 41211157 | 768 | E | E | 30 | 38 | 454 | 612 | .21 | 7 |
| 41211163 | 375 | E | E | 30 | 38 | 343 | 438 | .25 | 7 |
| 41211187 | 217 | E | E | 30 | 38 | 90 | 128 | .18 | 7 |
| 42111021 | 64 | E | E | 30 | 38 | 32 | 35 | .05 | 7 |
| 42211003 | 588 | E | E | 30 | 38 | 401 | 535 | .23 | 7 |
| 42211004 | 64 | E | E | 30 | 38 | 32 | 35 | .05 | 7 |
| 42211011 | 128 | E | E | 30 | 38 | 64 | 70 | .05 | 7 |
| 42211264 | 544 | E | E | 30 | 38 | 320 | 403 | .15 | 7 |
| 42211282 | 270 | E | E | 30 | 38 | 97 | 121 | .09 | 7 |
| 42211285 | 416 | E | E | 30 | 38 | 333 | 623 | .70 | 7 |
| 41211058 | 1178 | E | F | 30 | 38 | 953 | 1771 | .69 | 7 |
| 42211148 | 764 | E | E | 30 | 41 | 2158 | 3118 | 1.26 | 7 |
| 41211124 | 608 | E | F | 30 | 38 | 49 | 682 | 1.04 | 8 |
| 41211171 | 695 | E | F | 30 | 38 | 0 | 1026 | 1.48 | 8 |
| 41211060 | 528 | E | F | 30 | 38 | 303 | 839 | 1.02 | 8 |
| 41211072 | 438 | E | F | 30 | 38 | 415 | 713 | .68 | 8 |
| 41211074 | 196 | E | F | 30 | 38 | 131 | 220 | .45 | 8 |
| 41211075 | 196 | E | F | 30 | 38 | 131 | 220 | .45 | 8 |
| 41211076 | 196 | E | F | 30 | 38 | 131 | 220 | .45 | 8 |
| 41211077 | 196 | E | F | 30 | 38 | 131 | 220 | .45 | 8 |
| 41211087 | 285 | E | F | 30 | 38 | 43 | 225 | .64 | 8 |
| 41211132 | 772 | E | F | 30 | 38 | 0 | 640 | .83 | 8 |
| 41211266 | 434 | E | F | 30 | 38 | 0 | 223 | .51 | 8 |
| 41211036 | 330 | E | E | 30 | 49 | 287 | 495 | .63 | 9 |
| 41211234 | 1202 | E | E | 30 | 49 | 3473 | 6241 | 2.30 | 9 |
| 42211035 | 364 | E | E | 30 | 50 | 777 | 942 | .45 | 9 |
| 31211166 | 1268 | H | A | 30 | 38 | 1940 | 2572 | .50 | 10 |
| 31211338 | 819 | H | A | 30 | 38 | 2446 | 2867 | .51 | 10 |
| 31211341 | 1600 | H | A | 30 | 38 | 4253 | 5473 | .76 | 10 |
| 31211397 | 1587 | H | A | 30 | 38 | 1841 | 2211 | .23 | 10 |
| 41111028 | 1052 | H | A | 30 | 38 | 1087 | 1538 | .43 | 10 |
| 41111174 | 1435 | H | A | 30 | 38 | 3044 | 3791 | .52 | 10 |
| 41111176 | 1299 | H | A | 30 | 38 | 2787 | 3683 | .69 | 10 |
| 41211001 | 1152 | H | A | 30 | 38 | 620 | 1083 | .40 | 10 |
| 41211005 | 1230 | H | A | 30 | 38 | 1766 | 2240 | .39 | 10 |
| 41211008 | 1280 | H | A | 30 | 38 | 1270 | 1379 | .09 | 10 |
| 41211009 | 1222 | H | A | 30 | 38 | 1617 | 2469 | .70 | 10 |
| 41211013 | 1248 | H | A | 30 | 38 | 1845 | 2511 | .53 | 10 |
| 41211014 | 1649 | H | A | 30 | 38 | 3207 | 4557 | .82 | 10 |
| 41211018 | 1103 | H | A | 30 | 38 | 1622 | 1976 | .32 | 10 |
| 41211023 | 1327 | H | A | 30 | 38 | 1275 | 1726 | .34 | 10 |
| 41211024 | 1327 | H | A | 30 | 38 | 1275 | 1726 | .34 | 10 |

26-MAR-86 ceiling spreadsheet
11:44:50 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211026 | 955 | H | A | 30 | 38 | 1975 | 2293 | .33 | 10 |
| 41211027 | 1452 | H | A | 30 | 38 | 2513 | 3069 | .38 | 10 |
| 41211031 | 1620 | H | A | 30 | 38 | 414 | 1057 | .40 | 10 |
| 41211032 | 927 | H | A | 30 | 38 | 0 | 469 | .51 | 10 |
| 41211038 | 1430 | H | A | 30 | 38 | 1670 | 2156 | .34 | 10 |
| 41211039 | 893 | H | A | 30 | 38 | 1630 | 1886 | .29 | 10 |
| 41211047 | 1034 | H | A | 30 | 38 | 3012 | 3262 | .24 | 10 |
| 41211055 | 1140 | H | A | 30 | 38 | 876 | 1138 | .23 | 10 |
| 41211067 | 1406 | H | A | 30 | 38 | 1779 | 2464 | .49 | 10 |
| 41211068 | 1284 | H | A | 30 | 38 | 1935 | 2160 | .18 | 10 |
| 41211069 | 1682 | H | A | 30 | 38 | 2897 | 4318 | .84 | 10 |
| 41211070 | 1326 | H | A | 30 | 38 | 2418 | 3495 | .81 | 10 |
| 41211071 | 1326 | H | A | 30 | 38 | 2418 | 3495 | .81 | 10 |
| 41211078 | 1440 | H | A | 30 | 38 | 1698 | 2239 | .38 | 10 |
| 41211082 | 1124 | H | A | 30 | 38 | 1536 | 1829 | .26 | 10 |
| 41211092 | 1104 | H | A | 30 | 38 | 379 | 862 | .44 | 10 |
| 41211094 | 700 | H | A | 30 | 38 | 0 | 527 | .75 | 10 |
| 41211095 | 805 | H | A | 30 | 38 | 1726 | 2115 | .48 | 10 |
| 41211097 | 1611 | H | A | 30 | 38 | 2582 | 2990 | .25 | 10 |
| 41211106 | 1139 | H | A | 30 | 38 | 1610 | 2220 | .54 | 10 |
| 41211125 | 1108 | H | A | 30 | 38 | 1946 | 2433 | .44 | 10 |
| 41211131 | 806 | H | A | 30 | 38 | 0 | 169 | .21 | 10 |
| 41211156 | 1092 | H | A | 30 | 38 | 2982 | 3368 | .35 | 10 |
| 41211157 | 624 | H | A | 30 | 38 | 1918 | 2123 | .33 | 10 |
| 41211168 | 1538 | H | A | 30 | 38 | 0 | 0 | .00 | 10 |
| 41211170 | 1718 | H | A | 30 | 38 | 2937 | 4277 | .78 | 10 |
| 41211180 | 1750 | H | A | 30 | 38 | 2566 | 4008 | .82 | 10 |
| 41211183 | 1558 | H | A | 30 | 38 | 2054 | 2287 | .15 | 10 |
| 41211184 | 1062 | H | A | 30 | 38 | 1248 | 1358 | .10 | 10 |
| 41211193 | 1246 | H | A | 30 | 38 | 2104 | 3074 | .78 | 10 |
| 41211195 | 1011 | H | A | 30 | 38 | 1727 | 2587 | .85 | 10 |
| 41211201 | 1936 | H | A | 30 | 38 | 2360 | 3027 | .34 | 10 |
| 41211202 | 1326 | H | A | 30 | 38 | 1039 | 1918 | .66 | 10 |
| 41211203 | 1216 | H | A | 30 | 38 | 1399 | 2217 | .67 | 10 |
| 41211204 | 1120 | H | A | 30 | 38 | 1666 | 2396 | .65 | 10 |
| 41211246 | 1300 | H | A | 30 | 38 | 402 | 968 | .44 | 10 |
| 41211251 | 1487 | H | A | 30 | 38 | 440 | 2291 | 1.24 | 10 |
| 41211252 | 1487 | H | A | 30 | 38 | 440 | 2291 | 1.24 | 10 |
| 41211254 | 1770 | H | A | 30 | 38 | 1086 | 1324 | .13 | 10 |
| 41211255 | 1457 | H | A | 30 | 38 | 1738 | 2391 | .45 | 10 |
| 41211267 | 1461 | H | A | 30 | 38 | 1555 | 1831 | .19 | 10 |
| 41211268 | 1686 | H | A | 30 | 38 | 1947 | 2343 | .23 | 10 |
| 41211271 | 1541 | H | A | 30 | 38 | 592 | 814 | .14 | 10 |
| 41211275 | 1390 | H | A | 30 | 38 | 1985 | 2847 | .62 | 10 |
| 41211276 | 1630 | H | A | 30 | 38 | 2392 | 3339 | .58 | 10 |
| 41211277 | 1445 | H | A | 30 | 38 | 2497 | 3415 | .64 | 10 |
| 41211289 | 1278 | H | A | 30 | 38 | 559 | 805 | .19 | 10 |
| 41311186 | 1408 | H | A | 30 | 38 | 675 | 1231 | .39 | 10 |
| 41311189 | 1714 | H | A | 30 | 38 | 1917 | 2457 | .32 | 10 |
| 42111021 | 913 | H | A | 30 | 38 | 809 | 1094 | .31 | 10 |
| 42211004 | 926 | H | A | 30 | 38 | 931 | 1143 | .23 | 10 |

26-MAR-86 ceiling spreadsheet
11:44:56 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 42211011 | 944 | H | A | 30 | 38 | 892 | 1258 | .39 | 10 |
| 42211037 | 1029 | H | A | 30 | 38 | 938 | 1155 | .21 | 10 |
| 42211121 | 1009 | H | A | 30 | 38 | 1950 | 2475 | .52 | 10 |
| 42211141 | 1120 | H | A | 30 | 38 | 940 | 1350 | .37 | 10 |
| 42211147 | 1047 | H | A | 30 | 38 | 472 | 555 | .08 | 10 |
| 42211241 | 952 | H | A | 30 | 38 | 904 | 1133 | .24 | 10 |
| 42211264 | 2352 | H | A | 30 | 38 | 799 | 1709 | .39 | 10 |
| 42211281 | 1562 | H | A | 30 | 38 | 1664 | 2068 | .26 | 10 |
| 42211282 | 978 | H | A | 30 | 38 | 1751 | 2150 | .41 | 10 |
| 42211283 | 1101 | H | A | 30 | 38 | 1630 | 2092 | .42 | 10 |
| 42211284 | 1101 | H | A | 30 | 38 | 1630 | 2092 | .42 | 10 |
| 42211285 | 605 | H | A | 30 | 38 | 485 | 906 | .70 | 10 |
| 42311224 | 2104 | H | A | 30 | 38 | 2215 | 2573 | .17 | 10 |
| 42311242 | 696 | H | A | 30 | 38 | 924 | 1069 | .21 | 10 |
| 41211059 | 644 | H | A | 30 | 38 | 228 | 372 | .22 | 10 |
| 41211124 | 1377 | H | A | 30 | 38 | 0 | 876 | .64 | 10 |
| 41211171 | 1242 | H | A | 30 | 38 | 497 | 929 | .35 | 10 |
| 31211135 | 683 | H | A | 30 | 40 | 594 | 1074 | .70 | 10 |
| 31211257 | 2484 | H | A | 30 | 40 | 1108 | 1484 | .15 | 10 |
| 32211186 | 1331 | H | A | 30 | 40 | 1407 | 2213 | .61 | 10 |
| 41211120 | 1023 | H | A | 30 | 40 | 1232 | 1792 | .55 | 10 |
| 41211163 | 330 | H | A | 30 | 40 | 643 | 690 | .14 | 10 |
| 41211164 | 1026 | H | A | 30 | 40 | 297 | 356 | .06 | 10 |
| 31211408 | 1423 | H | B | 30 | 38 | 3164 | 3746 | .41 | 11 |
| 31211409 | 1917 | H | B | 30 | 38 | 2434 | 2871 | .23 | 11 |
| 41211146 | 1288 | H | B | 30 | 38 | 1586 | 2304 | .56 | 11 |
| 41211052 | 1480 | H | C | 30 | 38 | 319 | 860 | .37 | 12 |
| 41211108 | 1290 | H | C | 30 | 38 | 234 | 247 | .01 | 12 |
| 42211116 | 1408 | H | D | 30 | 38 | 876 | 1504 | .45 | 13 |
| 42211115 | 1328 | H | D | 30 | 38 | 687 | 1173 | .37 | 13 |
| 31211271 | 720 | H | H | 30 | 38 | 780 | 840 | .08 | 14 |
| 32211426 | 2020 | H | H | 30 | 38 | 867 | 1071 | .10 | 14 |
| 41211056 | 2440 | H | H | 30 | 38 | 0 | 128 | .05 | 14 |
| 41211063 | 548 | H | H | 30 | 38 | 201 | 242 | .07 | 14 |
| 41211072 | 768 | H | H | 30 | 38 | 250 | 455 | .27 | 14 |
| 41211087 | 630 | H | H | 30 | 38 | 351 | 518 | .27 | 14 |
| 41211091 | 817 | H | H | 30 | 38 | 315 | 341 | .03 | 14 |
| 41211159 | 1764 | H | H | 30 | 38 | 645 | 814 | .10 | 14 |
| 41211266 | 1036 | H | H | 30 | 38 | 412 | 578 | .16 | 14 |
| 41211274 | 1768 | H | H | 30 | 38 | 4067 | 4651 | .33 | 14 |
| 42211134 | 1768 | H | H | 30 | 38 | 600 | 700 | .06 | 14 |
| 42211135 | 1768 | H | H | 30 | 38 | 600 | 700 | .06 | 14 |
| 42211136 | 1768 | H | H | 30 | 38 | 600 | 700 | .06 | 14 |
| 42211137 | 1768 | H | H | 30 | 38 | 600 | 700 | .06 | 14 |
| 42211138 | 1768 | H | H | 30 | 38 | 600 | 700 | .06 | 14 |
| 42211206 | 1912 | H | H | 30 | 38 | 822 | 1013 | .10 | 14 |
| 41211062 | 508 | H | H | 30 | 38 | 186 | 225 | .08 | 14 |
| 41211065 | 624 | H | H | 30 | 38 | 229 | 276 | .08 | 14 |
| 41211169 | 1356 | H | H | 30 | 38 | 570 | 732 | .12 | 14 |
| 41211181 | 1078 | H | H | 30 | 38 | 0 | 184 | .17 | 14 |
| 31211248 | 1380 | H | H | 30 | 40 | 400 | 524 | .09 | 14 |

26-MAR-86 ceiling spreadsheet
11:44:58 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31211399 | 1Ø89 | H | H | 3Ø | 4Ø | 324 | 432 | .1Ø | 14 |
| 41211132 | 33Ø | H | H | 3Ø | 4Ø | Ø | 3Ø | .ØØ | 14 |
| 41211Ø12 | 1491 | H | A | 3Ø | 42 | 2Ø26 | 2222 | .13 | 15 |
| 41211Ø48 | 728 | H | A | 3Ø | 42 | 617 | 787 | .23 | 15 |
| 41211Ø5Ø | 75Ø | H | A | 3Ø | 42 | 761 | 825 | .ØØ | 15 |
| 41211244 | 13ØØ | H | A | 3Ø | 42 | 1323 | 1593 | .21 | 15 |
| 41211118 | 952 | H | A | 3Ø | 44 | 252 | 474 | .23 | 15 |
| 41211272 | 174Ø | H | A | 3Ø | 44 | 626 | 979 | .2Ø | 15 |
| 42211129 | 961 | H | A | 3Ø | 44 | 1Ø99 | 1727 | .65 | 15 |
| 4231127Ø | 1729 | H | A | 3Ø | 44 | 2Ø42 | 2519 | .28 | 15 |
| 41211Ø93 | 2468 | H | A | 3Ø | 45 | 3117 | 4536 | .57 | 15 |
| 41211Ø54 | 597 | H | A | 3Ø | 46 | 31Ø | 686 | .63 | 15 |
| 41211Ø36 | 1Ø58 | H | A | 3Ø | 49 | 23ØØ | 3Ø27 | .69 | 16 |
| 41211Ø51 | 1776 | H | A | 3Ø | 49 | 3336 | 4173 | .47 | 16 |
| 41211188 | 1352 | H | A | 3Ø | 49 | 1372 | 2168 | .59 | 16 |
| 4221Ø3Ø | 1755 | H | A | 3Ø | 49 | 3Ø56 | 3412 | .2Ø | 16 |
| 42211142 | 975 | H | A | 3Ø | 49 | 87Ø | 1113 | .25 | 16 |
| 42211262 | 1755 | H | A | 3Ø | 49 | 3Ø56 | 3412 | .2Ø | 16 |
| 42211263 | 1755 | H | A | 3Ø | 49 | 3Ø56 | 3412 | .2Ø | 16 |
| 41211153 | 1Ø32 | H | A | 3Ø | 5Ø | 4ØØ | 665 | .26 | 16 |
| 41211173 | 1478 | H | A | 3Ø | 5Ø | 4829 | 7883 | 2.Ø7 | 16 |
| 41211234 | 992 | H | A | 3Ø | 5Ø | 2545 | 3394 | .86 | 16 |
| 41211257 | 16Ø5 | H | A | 3Ø | 5Ø | 1648 | 2716 | .67 | 16 |
| 41211259 | 18Ø2 | H | A | 3Ø | 5Ø | 2225 | 3Ø37 | .45 | 16 |
| 41211261 | 1418 | H | A | 3Ø | 5Ø | 2437 | 2861 | .3Ø | 16 |
| 41311258 | 1845 | H | A | 3Ø | 5Ø | 1741 | 2667 | .5Ø | 16 |
| 4121126Ø | 2264 | H | A | 3Ø | 51 | 5594 | 6936 | .59 | 16 |
| 31211182 | 1686 | H | H | 3Ø | 49 | 72Ø | 1164 | .26 | 17 |
| 42111144 | 975 | H | H | 3Ø | 49 | 329 | 487 | .16 | 17 |
| 42211143 | 975 | H | H | 3Ø | 49 | 8Ø7 | 1187 | .39 | 17 |
| 42211145 | 975 | H | H | 3Ø | 49 | 329 | 486 | .16 | 17 |
| 4221Ø3Ø4 | 975 | H | H | 3Ø | 49 | 329 | 486 | .16 | 17 |
| 41211Ø49 | 1325 | H | A | 3Ø | 6Ø | 21Ø9 | 2815 | .53 | 18 |
| 41211245 | 1672 | H | A | 3Ø | 6Ø | 262Ø | 3114 | .3Ø | 18 |
| 42211Ø41 | 1Ø88 | H | A | 3Ø | 6Ø | 1462 | 2Ø96 | .58 | 18 |
| 42211Ø42 | 1Ø88 | H | A | 3Ø | 6Ø | 1462 | 2Ø96 | .58 | 18 |
| 4221111Ø | 182Ø | H | A | 3Ø | 6Ø | 295Ø | 4467 | .83 | 18 |
| 42211148 | 396 | H | A | 3Ø | 6Ø | 134 | 444 | .78 | 18 |
| 1111114Ø | 17ØØ | H | A | 38 | 38 | 921 | 1Ø62 | .ØØ | 19 |
| 11111142 | 1697 | H | A | 38 | 38 | 9Ø4 | 1Ø62 | .ØØ | 19 |
| 11111143 | 1196 | H | A | 38 | 38 | 943 | 1Ø67 | .1Ø | 19 |
| 11111145 | 1491 | H | A | 38 | 38 | 1221 | 1349 | .ØØ | 19 |
| 11111153 | 1348 | H | A | 38 | 38 | 111Ø | 1342 | .17 | 19 |
| 11211139 | 1888 | H | A | 38 | 38 | 11ØØ | 1216 | .Ø6 | 19 |
| 11211141 | 189Ø | H | A | 38 | 38 | 22ØØ | 2298 | .Ø5 | 19 |
| 11211144 | 898 | H | A | 38 | 38 | 9ØØ | 1ØØ3 | .11 | 19 |
| 12211Ø2 | 1ØØ3 | H | A | 38 | 38 | Ø | 92 | .ØØ | 19 |
| 12211Ø3 | 1692 | H | A | 38 | 38 | 3569 | 5829 | 1.34 | 19 |
| 12211121 | 135Ø | H | A | 38 | 38 | 27Ø3 | 2777 | .Ø5 | 19 |
| 1221113Ø | 95Ø | H | A | 38 | 38 | 2Ø43 | 2228 | .19 | 19 |
| 12211131 | 1352 | H | A | 38 | 38 | 822 | 1157 | .25 | 19 |

26-MAR-86 ceiling spreadsheet
11:45:Ø4 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 12211133 | 1396 | H | A | 38 | 38 | 1661 | 1799 | .1Ø | 19 |
| 12211146 | 1442 | H | A | 38 | 38 | Ø | Ø | .ØØ | 19 |
| 12211148 | 875 | H | A | 38 | 38 | Ø | 511 | .58 | 19 |
| 13211123 | 1277 | H | A | 38 | 38 | 2324 | 258Ø | .2Ø | 19 |
| 23111521 | 96Ø | H | A | 38 | 38 | 746 | 966 | .23 | 19 |
| 23111573 | 96Ø | H | A | 38 | 38 | 746 | 966 | .23 | 19 |
| 2321150Ø1 | 1Ø11 | H | A | 38 | 38 | 469 | 544 | .Ø7 | 19 |
| 23211507 | 1164 | H | A | 38 | 38 | 1391 | 1691 | .26 | 19 |
| 23211516 | 1272 | H | A | 38 | 38 | 83Ø | 1Ø18 | .15 | 19 |
| 2321153Ø | 1248 | H | A | 38 | 38 | 219Ø | 2316 | .1Ø | 19 |
| 23211537 | 1344 | H | A | 38 | 38 | Ø | 159 | .12 | 19 |
| 23211544 | 1232 | H | A | 38 | 38 | 1125 | 136Ø | .19 | 19 |
| 23211551 | 936 | H | A | 38 | 38 | 74Ø | 81Ø | .Ø7 | 19 |
| 23211554 | 1496 | H | A | 38 | 38 | 1447 | 1633 | .12 | 19 |
| 23211561 | 896 | H | A | 38 | 38 | 97Ø | 119Ø | .25 | 19 |
| 2331151Ø | 148Ø | H | A | 38 | 38 | 85Ø | 1154 | .21 | 19 |
| 41111235 | 679 | H | A | 38 | 38 | 1442 | 1846 | .59 | 19 |
| 41111237 | 1323 | H | A | 38 | 38 | 239Ø | 3Ø18 | .47 | 19 |
| 41211133 | 131Ø | H | A | 38 | 38 | 199Ø | 22Ø5 | .16 | 19 |
| 41211273 | 1456 | H | A | 38 | 38 | 3436 | 4156 | .49 | 19 |
| 11211136 | 1996 | H | A | 38 | 4Ø | 2866 | 4187 | .66 | 19 |
| 13211119 | 11Ø4 | H | A | 38 | 4Ø | 28Ø5 | 3396 | .54 | 19 |
| 1221111Ø | 1224 | H | A | 4Ø | 4Ø | 2475 | 2925 | .37 | 19 |
| 12111117 | 1ØØ2 | H | A | 38 | 42 | 2289 | 27Ø2 | .41 | 2Ø |
| 12211114 | 4823 | H | A | 38 | 42 | 3Ø47 | 3437 | .ØØ | 2Ø |
| 23111574 | 1236 | H | A | 38 | 43 | 1774 | 2268 | .4Ø | 2Ø |
| 23211545 | 1ØØ8 | H | A | 38 | 43 | 1144 | 1774 | .63 | 2Ø |
| 23211572 | 147Ø | H | A | 38 | 43 | 1562 | 18Ø9 | .17 | 2Ø |
| 12111152 | 1142 | H | A | 38 | 44 | 28Ø5 | 3371 | .5Ø | 2Ø |
| 12211151 | 14Ø8 | H | A | 38 | 44 | 2495 | 2397 | -Ø.Ø7 | 2Ø |
| 23211581 | 1227 | H | A | 38 | 45 | Ø | 31Ø | .25 | 2Ø |
| 1221110Ø4 | 92Ø | H | A | 38 | 49 | 395 | 665 | .29 | 21 |
| 1321150Ø | 1294 | H | A | 38 | 49 | 26Ø5 | 2899 | .23 | 21 |
| 23211556 | 132Ø | H | A | 38 | 49 | Ø | 388 | .29 | 21 |
| 12211108 | 1Ø42 | H | A | 38 | 5Ø | 1965 | 224Ø | .26 | 21 |
| 12211147 | 1493 | H | A | 38 | 5Ø | 616 | 1Ø18 | .27 | 21 |
| 13211113 | 1248 | H | A | 38 | 5Ø | 1715 | 2264 | .44 | 21 |
| 2321150Ø5 | 1235 | H | A | 38 | 5Ø | 1672 | 2189 | .42 | 21 |
| 23211519 | 1356 | H | A | 38 | 5Ø | 1662 | 2149 | .36 | 21 |
| 2321152Ø | 1266 | H | A | 38 | 5Ø | 1871 | 2221 | .28 | 21 |
| 23211557 | 1579 | H | A | 38 | 5Ø | 845 | 11Ø5 | .16 | 21 |
| 23211578 | 11ØØ | H | A | 38 | 5Ø | 1866 | 2127 | .24 | 21 |
| 23211513 | 1493 | H | A | 38 | 51 | Ø | 4Ø4 | .27 | 21 |
| 12211107 | 1684 | H | A | 38 | 6Ø | 528 | 156Ø | .61 | 22 |
| 12211132 | 1344 | H | A | 38 | 6Ø | 2174 | 2769 | .44 | 22 |
| 1321110Ø1 | 12ØØ | H | A | 38 | 6Ø | 2813 | 3758 | .79 | 22 |
| 13211115 | 1Ø68 | H | A | 38 | 6Ø | 33Ø3 | 4106 | .75 | 22 |
| 13211118 | 17ØØ | H | A | 38 | 6Ø | 2374 | 28ØØ | .25 | 22 |
| 23211511 | 15Ø4 | H | A | 38 | 6Ø | 159Ø | 24Ø4 | .54 | 22 |
| 23211515 | 112Ø | H | A | 38 | 6Ø | 1Ø21 | 1393 | .33 | 22 |
| 23211517 | 1669 | H | A | 38 | 6Ø | 4542 | 5692 | .69 | 22 |

26-MAR-86 ceiling spreadsheet
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| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211526 | 877 | H | A | 38 | 60 | 872 | 1056 | .21 | 22 |
| 23211536 | 1516 | H | A | 38 | 60 | 0 | 756 | .50 | 22 |
| 23211543 | 1166 | H | A | 38 | 60 | 1633 | 2142 | .44 | 22 |
| 23211550 | 1018 | H | A | 38 | 60 | 2796 | 3444 | .64 | 22 |
| 23211553 | 1652 | H | A | 38 | 60 | 1693 | 2490 | .48 | 22 |
| 23211571 | 1304 | H | A | 38 | 60 | 1918 | 2576 | .50 | 22 |
| 23211525 | 640 | H | A | 38 | 60 | 290 | 460 | .27 | 22 |
| 41211169 | 232 | E | G | 30 | 38 | 0 | 91 | .39 | 23 |
| 31211137 | 1700 | G | G | 30 | 38 | 2782 | 3717 | .55 | 23 |
| 31211221 | 936 | A | A | 30 | 38 | 327 | 756 | .46 | 24 |
| 41211182 | 1484 | A | A | 30 | 38 | 1986 | 2274 | .19 | 24 |
| 31211253 | 1328 | A | A | 30 | 40 | 518 | 687 | .13 | 24 |
| 31211146 | 832 | B | A | 30 | 38 | 316 | 543 | .27 | 24 |
| 41211119 | 680 | B | B | 30 | 41 | 827 | 1503 | .99 | 24 |
| 31111218 | 1038 | C | A | 30 | 38 | 2957 | 3763 | .78 | 24 |
| 31211134 | 1388 | C | A | 30 | 38 | 973 | 2153 | .85 | 24 |
| 31211153 | 1326 | C | A | 30 | 38 | 2037 | 2460 | .32 | 24 |
| 31211201 | 1204 | C | A | 30 | 38 | 1785 | 2197 | .34 | 24 |
| 31211297 | 768 | C | A | 30 | 38 | 1264 | 1339 | .10 | 24 |
| 32211162 | 1602 | C | A | 30 | 38 | 1785 | 2235 | .28 | 24 |
| 32211310 | 1776 | C | A | 30 | 38 | 3142 | 2595 | -0.31 | 24 |
| 42211003 | 588 | C | A | 30 | 38 | 1600 | 1778 | .30 | 24 |
| 31211216 | 1844 | C | H | 30 | 38 | 1300 | 1705 | .22 | 24 |
| 41211160 | 1535 | D | D | 30 | 38 | 585 | 688 | .07 | 24 |
| 41211060 | 801 | H | I | 30 | 38 | 448 | 554 | .13 | 24 |
| 41211256 | 1021 | I | I | 30 | 38 | 559 | 610 | .05 | 24 |
| 42211035 | 956 | A | A | 30 | 50 | 2217 | 2332 | .12 | 25 |
| 42211043 | 1499 | C | B | 30 | 49 | 1664 | 2188 | .35 | 25 |
| 42211088 | 1314 | H | C | 30 | 50 | 723 | 858 | .10 | 25 |
| 42311306 | 1568 | H | D | 30 | 42 | 967 | 1618 | .42 | 26 |
| 23211577 | 992 | C | A | 38 | 50 | 1709 | 1892 | .18 | 27 |
| 13211125 | 1260 | H | B | 38 | 60 | 1928 | 2436 | .40 | 28 |
| 41211227 | 1852 | E | A | 30 | 38 | 3714 | 5223 | .81 | 29 |
| 31211265 | 800 | E | B | 30 | 38 | 1399 | 1649 | .31 | 29 |
| 31211424 | 1998 | C | G | 30 | 38 | 1180 | 1640 | .23 | 30 |
| 41211065 | 520 | E | Z | 30 | 38 | 479 | 849 | .71 | 30 |
| 42211085 | 1008 | E | Z | 30 | 40 | 2261 | 3862 | 1.59 | 30 |
| 31211177 | 388 | H | X | 30 | 38 | 233 | 265 | .08 | 30 |
| 41211020 | 1021 | H | Z | 30 | 38 | 559 | 661 | .10 | 30 |
| 41211062 | 500 | H | Z | 30 | 38 | 423 | 802 | .76 | 30 |
| 41211083 | 1692 | H | Z | 30 | 38 | 3226 | 5082 | 1.10 | 30 |
| 41211063 | 460 | H | Z | 30 | 38 | 377 | 767 | .85 | 30 |
| 41211084 | 1425 | Z | A | 30 | 38 | 5815 | 8266 | 1.72 | 30 |
| 41211019 | 1244 | Z | Z | 30 | 38 | 538 | 654 | .09 | 30 |
| 41211040 | 840 | Z | Z | 30 | 38 | 1029 | 1535 | .60 | 30 |
| 41311167 | 728 | C | Z | 30 | 49 | 1490 | 2197 | .97 | 31 |
| 41311167 | 940 | E | Z | 30 | 49 | 885 | 1919 | 1.10 | 31 |
| 42211099 | 1247 | H | Z | 30 | 49 | 1700 | 1968 | .21 | 31 |
| 41211140 | 1439 | Z | Z | 30 | 49 | 1026 | 2434 | .98 | 31 |
| 41311205 | 1145 | Z | Z | 30 | 49 | 2479 | 3532 | .92 | 31 |
| 42211015 | 1154 | Z | Z | 30 | 49 | 299 | 1179 | .76 | 31 |

26-MAR-86 ceiling spreadsheet
11:45:18 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211535 | 768 | Z | Z | 0 | 19 | 0 | 440 | .57 | 99 |
| 42211111 | 3838 | H | A | 11 | 60 | 6845 | 9219 | .62 | 99 |
| 31211155 | 1271 | E | B | 19 | 38 | 1366 | 1712 | .27 | 99 |
| 31211177 | 688 | E | H | 19 | 38 | 227 | 495 | .39 | 99 |
| 32211110 | 1050 | E | A | 19 | 60 | 1058 | 3017 | 1.87 | 99 |
| 31211395 | 1440 | C | B | 30 | 30 | 1203 | 1400 | .14 | 99 |
| 31211308 | 1741 | C | A | 30 | 56 | 4955 | 5926 | .56 | 99 |
| 41111112 | 1097 | E | E | 30 | 30 | 536 | 559 | .02 | 99 |
| 41211196 | 1534 | E | E | 30 | 30 | 0 | 0 | .00 | 99 |
| 41311676 | 777 | E | E | 30 | 30 | 0 | 0 | .00 | 99 |
| 41211048 | 466 | E | E | 30 | 30 | 210 | 210 | .00 | 99 |
| 41211051 | 99 | E | E | 30 | 30 | 0 | 0 | .00 | 99 |
| 41211133 | 144 | E | E | 30 | 30 | 50 | 60 | .07 | 99 |
| 41211165 | 784 | E | E | 30 | 30 | 0 | 0 | .00 | 99 |
| 41211675 | 358 | E | E | 30 | 30 | 0 | 0 | .00 | 99 |
| 42211116 | 224 | E | E | 30 | 30 | 246 | 309 | .28 | 99 |
| 42311306 | 240 | E | E | 30 | 42 | 214 | 296 | .34 | 99 |
| 41211054 | 752 | E | Z | 30 | 46 | 1236 | 1964 | .97 | 99 |
| 41211303 | 1776 | F | F | 30 | 43 | 2342 | 4210 | 1.05 | 99 |
| 41211126 | 1456 | H | A | 30 | 30 | 915 | 1592 | .46 | 99 |
| 41211165 | 736 | H | A | 30 | 30 | 0 | 0 | .00 | 99 |
| 41211265 | 2078 | H | A | 30 | 30 | 2710 | 3285 | .28 | 99 |
| 41211675 | 830 | H | H | 30 | 30 | 0 | 0 | .00 | 99 |
| 31211410 | 192 | H | H | 30 | 30 | 135 | 135 | .00 | 99 |
| 41311676 | 629 | H | H | 30 | 30 | 0 | 0 | .00 | 99 |
| 41211073 | 2980 | H | H | 30 | 60 | 1026 | 1815 | .26 | 99 |
| 42211017 | 912 | Z | Z | 30 | 44 | 299 | 996 | .76 | 99 |
| 41211161 | 1296 | Z | Z | 30 | 60 | 492 | 975 | .37 | 99 |
| 11111106 | 1628 | H | A | 33 | 38 | 2009 | 2435 | .26 | 99 |
| 11211122 | 1426 | H | A | 33 | 38 | 1920 | 2220 | .21 | 99 |
| 23111523 | 1392 | A | A | 38 | 38 | 0 | 0 | .00 | 99 |
| 41211192 | 1246 | A | A | 38 | 38 | 2178 | 2716 | .43 | 99 |
| 23211563 | 749 | A | A | 38 | 38 | 0 | 0 | .00 | 99 |
| 41111239 | 866 | C | B | 38 | 38 | 1646 | 1979 | .38 | 99 |
| 23211518 | 1422 | E | E | 38 | 38 | 0 | 281 | .20 | 99 |
| 23211535 | 960 | E | E | 38 | 38 | 0 | 0 | .00 | 99 |
| 23211539 | 1771 | E | E | 38 | 38 | 0 | 0 | .00 | 99 |
| 23211552 | 890 | E | E | 38 | 38 | 1248 | 1857 | .68 | 99 |
| 23211563 | 729 | E | E | 38 | 38 | 0 | 0 | .00 | 99 |
| 23211565 | 1197 | E | E | 38 | 38 | 0 | 0 | .00 | 99 |
| 23211570 | 1560 | E | E | 38 | 38 | 0 | 0 | .00 | 99 |
| 12211103 | 769 | E | E | 38 | 38 | 1531 | 11066 | 12.40 | 99 |
| 42311242 | 256 | E | E | 38 | 38 | 112 | 149 | .14 | 99 |
| 23211525 | 657 | E | F | 38 | 60 | 851 | 3110 | 3.44 | 99 |
| 12211149 | 1246 | H | H | 38 | 38 | 1220 | 1220 | .00 | 99 |
| 23211565 | 760 | H | H | 38 | 38 | 0 | 0 | .00 | 99 |
| 12211100 | 1288 | H | C | 38 | 40 | 2873 | 2873 | .00 | 99 |
| 23211541 | 1443 | H | Z | 38 | 50 | 2680 | 3140 | .32 | 99 |
| 23211506 | 1046 | H | A | 38 | 69 | 1500 | 2127 | .60 | 99 |
| 23211566 | 1046 | H | A | 38 | 69 | 1500 | 1975 | .45 | 99 |
| 23211548 | 925 | Z | Z | 38 | 38 | 823 | 1031 | .22 | 99 |

26-MAR-86 ceiling spreadsheet
11:45:24 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23111514 | 1184 | Z | A | 38 | 5Ø | 3756 | 3Ø85 | -Ø.57 | 99 |
| 23211567 | 1269 | Z | Z | 38 | 56 | 2124 | 266Ø | .42 | 99 |
| 232115Ø2 | 1676 | Z | Z | 38 | 6Ø | 1157 | 126Ø | .Ø6 | 99 |
| 42211129 | 58 | C | B | 44 | 44 | Ø | 17 | .29 | 99 |
| 23211538 | 1ØØ8 | H | A | 5Ø | 5Ø | Ø | 19Ø | .19 | 99 |

NUMBER OF CASES READ = 413 NUMBER OF CASES LISTED = 413

## FLOOR SPREADSHEET

**Floor Type Code:**

A Crawlspace (insulation under floor or overhangs)

B Slab below grade

C Slab on grade

D Heated crawlspace

E Foam insulation under slab

F Combination of floor and perimeter insulation

X Missing

Z Other

26-MAR-86 floor spreadsheet
12:00:17 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23111514 | 1195 | A | A | 0 | 19 | 1674 | 2203 | .44 | 1 |
| 23111521 | 960 | A | A | 0 | 19 | 0 | 376 | .39 | 1 |
| 23111573 | 960 | A | A | 0 | 19 | 0 | 376 | .39 | 1 |
| 23211562 | 435 | A | A | 0 | 19 | 0 | 188 | .43 | 1 |
| 41211127 | 1449 | A | A | 0 | 19 | 0 | 726 | .50 | 1 |
| 23211513 | 728 | B | B | 0 | 3 | 0 | 137 | .19 | 2 |
| 23211550 | 988 | B | B | 0 | 5 | 0 | 482 | .49 | 2 |
| 41211254 | 106 | B | B | 0 | 5 | 0 | 50 | .47 | 2 |
| 41211255 | 142 | B | B | 0 | 5 | 0 | 113 | .80 | 2 |
| 41211267 | 170 | B | B | 0 | 5 | 0 | 63 | .37 | 2 |
| 23211506 | 988 | B | B | 0 | 6 | 0 | 397 | .40 | 2 |
| 23211536 | 1344 | B | B | 0 | 6 | 0 | 319 | .24 | 2 |
| 23211566 | 988 | B | B | 0 | 6 | 0 | 494 | .50 | 2 |
| 23211530 | 576 | B | B | 0 | 6 | 0 | 237 | .41 | 2 |
| 23211549 | 1146 | B | B | 0 | 6 | 1536 | 2055 | .45 | 2 |
| 23211524 | 646 | B | B | 0 | 7 | 0 | 232 | .36 | 2 |
| 23211553 | 918 | B | B | 0 | 10 | 0 | 641 | .70 | 3 |
| 23211563 | 296 | B | B | 0 | 10 | 0 | 315 | 1.06 | 3 |
| 41111178 | 74 | B | B | 0 | 10 | 0 | 102 | 1.38 | 3 |
| 41211192 | 136 | B | B | 0 | 10 | 0 | 95 | .70 | 3 |
| 41211193 | 136 | B | B | 0 | 10 | 0 | 104 | .76 | 3 |
| 41211197 | 163 | B | B | 0 | 10 | 0 | 154 | .94 | 3 |
| 41211203 | 140 | B | B | 0 | 10 | 0 | 262 | 1.87 | 3 |
| 42211121 | 128 | B | B | 0 | 10 | 0 | 450 | 3.52 | 3 |
| 42211147 | 144 | B | B | 0 | 10 | 0 | 268 | 1.86 | 3 |
| 41211166 | 76 | B | B | 0 | 10 | 0 | 70 | .92 | 3 |
| 41211202 | 72 | B | B | 0 | 10 | 0 | 199 | 2.76 | 3 |
| 42211017 | 912 | B | B | 0 | 12 | 14 | 321 | .34 | 3 |
| 42211264 | 82 | B | B | 0 | 12 | 0 | 202 | 2.46 | 3 |
| 23111574 | 256 | B | B | 0 | 15 | 0 | 410 | 1.60 | 4 |
| 23211516 | 152 | B | B | 0 | 15 | 0 | 331 | 2.18 | 4 |
| 23211518 | 268 | B | B | 0 | 15 | 0 | 465 | 1.74 | 4 |
| 23211551 | 308 | B | B | 0 | 15 | 0 | 375 | 1.22 | 4 |
| 23211572 | 192 | B | B | 0 | 15 | 0 | 291 | 1.52 | 4 |
| 23211564 | 256 | B | B | 0 | 15 | 0 | 355 | 1.39 | 4 |
| 13211118 | 928 | B | E | 0 | 5 | 0 | 308 | .33 | 5 |
| 23211577 | 887 | B | E | 0 | 5 | 42 | 304 | .30 | 5 |
| 23211580 | 1218 | B | E | 0 | 5 | 0 | 148 | .12 | 5 |
| 23211543 | 1073 | B | E | 0 | 7 | 0 | 210 | .20 | 5 |
| 23211505 | 1235 | B | E | 0 | 8 | 0 | 346 | .28 | 6 |
| 12211103 | 2147 | B | E | 0 | 10 | 570 | 660 | .04 | 6 |
| 23211560 | 1134 | B | E | 0 | 10 | 0 | 488 | .43 | 6 |
| 23211567 | 1232 | B | E | 0 | 10 | 269 | 544 | .22 | 6 |
| 13211113 | 1248 | B | E | 1 | 10 | 0 | 307 | .25 | 6 |
| 13211125 | 660 | B | E | 1 | 10 | 86 | 958 | 1.32 | 6 |
| 23211502 | 1676 | B | E | 0 | 15 | 0 | 272 | .16 | 7 |
| 23211544 | 188 | B | E | 0 | 15 | 0 | 220 | 1.17 | 7 |
| 23211556 | 200 | B | E | 0 | 17 | 0 | 221 | 1.11 | 7 |
| 42211148 | 1144 | E | E | 0 | 5 | 0 | 438 | .38 | 8 |
| 41211260 | 1600 | E | E | 0 | 5 | 0 | 483 | .30 | 8 |
| 41211106 | 1139 | E | E | 0 | 10 | 0 | 383 | .34 | 9 |

26-MAR-86 floor spreadsheet
12:00:18 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211058 | 1445 | E | E | 0 | 10 | 0 | 361 | .25 | 9 |
| 41111209 | 110 | C | C | 0 | 6 | 0 | 125 | 1.14 | 10 |
| 41111211 | 110 | C | C | 0 | 6 | 0 | 125 | 1.14 | 10 |
| 41111213 | 110 | C | C | 0 | 6 | 0 | 125 | 1.14 | 10 |
| 41111215 | 110 | C | C | 0 | 6 | 0 | 125 | 1.14 | 10 |
| 41111217 | 110 | C | C | 0 | 6 | 0 | 125 | 1.14 | 10 |
| 23211525 | 622 | C | C | 0 | 7 | 0 | 404 | .65 | 10 |
| 41211048 | 65 | C | C | 2 | 5 | 49 | 108 | .91 | 10 |
| 41211132 | 37 | C | C | 0 | 8 | 0 | 67 | 1.81 | 11 |
| 41211049 | 34 | C | C | 0 | 10 | 0 | 25 | .74 | 11 |
| 41211069 | 170 | C | C | 0 | 10 | 0 | 79 | .46 | 11 |
| 41211196 | 223 | C | C | 0 | 10 | 0 | 522 | 2.34 | 11 |
| 42211096 | 106 | C | C | 0 | 10 | 0 | 105 | .99 | 11 |
| 42211148 | 44 | C | C | 0 | 10 | 0 | 46 | 1.05 | 11 |
| 42211283 | 12 | C | C | 0 | 10 | 0 | 17 | 1.42 | 11 |
| 42211284 | 12 | C | C | 0 | 10 | 0 | 17 | 1.42 | 11 |
| 41211060 | 68 | C | C | 0 | 10 | 0 | 68 | 1.00 | 11 |
| 41211124 | 140 | C | C | 0 | 10 | 0 | 365 | 2.61 | 11 |
| 41211220 | 140 | C | C | 0 | 10 | 0 | 133 | .95 | 11 |
| 41211246 | 110 | C | C | 0 | 10 | 0 | 267 | 2.43 | 11 |
| 42211206 | 128 | C | C | 0 | 10 | 0 | 132 | 1.03 | 11 |
| 41211158 | 187 | C | C | 0 | 12 | 0 | 242 | 1.29 | 11 |
| 42211285 | 12 | C | C | 0 | 12 | 0 | 17 | 1.42 | 11 |
| 41211156 | 79 | C | C | 0 | 12 | 0 | 92 | 1.16 | 11 |
| 42311224 | 40 | C | C | 0 | 12 | 0 | 100 | 2.50 | 11 |
| 42311270 | 58 | C | C | 0 | 12 | 0 | 181 | 3.12 | 11 |
| 42211085 | 136 | C | C | 0 | 15 | 0 | 291 | 2.14 | 12 |
| 41311205 | 32 | C | C | 0 | 16 | 0 | 62 | 1.94 | 12 |
| 41211086 | 174 | B | B | 5 | 10 | 105 | 214 | .63 | 13 |
| 41211055 | 116 | B | B | 5 | 10 | 35 | 61 | .22 | 13 |
| 23211571 | 264 | B | B | 5 | 12 | 84 | 150 | .25 | 13 |
| 32211299 | 870 | B | B | 6 | 12 | 59 | 168 | .13 | 13 |
| 41211164 | 75 | B | B | 6 | 12 | 68 | 136 | .91 | 13 |
| 41211081 | 169 | C | C | 4 | 8 | 356 | 942 | 3.47 | 14 |
| 41211050 | 84 | C | C | 4 | 8 | 15 | 40 | .30 | 14 |
| 31211145 | 1688 | C | C | 4 | 10 | 0 | 577 | .34 | 14 |
| 41211133 | 188 | C | C | 4 | 10 | 1160 | 1629 | 2.49 | 14 |
| 31211183 | 58 | C | C | 4 | 10 | 0 | 60 | 1.03 | 14 |
| 41211058 | 51 | C | C | 5 | 10 | 55 | 90 | .69 | 14 |
| 41211119 | 108 | C | C | 5 | 10 | 80 | 160 | .74 | 14 |
| 41211182 | 192 | C | C | 5 | 10 | 163 | 301 | .72 | 14 |
| 41211260 | 272 | C | C | 5 | 10 | 164 | 373 | .77 | 14 |
| 42211035 | 44 | C | C | 5 | 10 | 32 | 48 | .36 | 14 |
| 41211149 | 80 | C | C | 5 | 10 | 120 | 209 | 1.11 | 14 |
| 41311189 | 35 | C | C | 5 | 10 | 48 | 79 | .89 | 14 |
| 42211044 | 150 | C | C | 5 | 12 | 47 | 106 | .39 | 14 |
| 31211133 | 624 | C | C | 6 | 10 | 100 | 157 | .09 | 14 |
| 32211232 | 1804 | C | C | 6 | 10 | 173 | 506 | .18 | 14 |
| 41111239 | 94 | C | C | 6 | 10 | 0 | 222 | 2.36 | 14 |
| 41211032 | 135 | C | C | 6 | 10 | 110 | 252 | 1.05 | 14 |
| 41211072 | 173 | C | C | 6 | 10 | 101 | 291 | 1.10 | 14 |

26-MAR-86 floor spreadsheet
12:ØØ:18 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31211128 | 215 | C | C | 6 | 1Ø | 332 | 415 | .39 | 14 |
| 32211314 | 162 | C | C | 6 | 1Ø | 57 | 246 | 1.17 | 14 |
| 41111Ø28 | 128 | C | C | 6 | 1Ø | 81 | 263 | 1.42 | 14 |
| 41211Ø25 | 73 | C | C | 6 | 1Ø | 52 | 1Ø4 | .71 | 14 |
| 41211Ø47 | 148 | C | C | 6 | 12 | 24Ø | 386 | .99 | 14 |
| 41211157 | 116 | C | C | 6 | 12 | 178 | 242 | .55 | 14 |
| 41211163 | 112 | C | C | 6 | 12 | 56 | 112 | .5Ø | 14 |
| 41111151 | 148 | C | C | 5 | 15 | 84 | 436 | 2.38 | 15 |
| 41211Ø73 | 13Ø | C | C | 5 | 15 | 94 | 472 | 2.91 | 15 |
| 41211108 | 146 | C | C | 5 | 15 | 14Ø | 651 | 3.5Ø | 15 |
| 42211134 | 71 | C | C | 5 | 15 | 178 | 3Ø3 | 1.76 | 15 |
| 31211248 | 138Ø | C | C | 6 | 16 | 16Ø | 91Ø | .54 | 15 |
| 31211399 | 1Ø89 | C | C | 6 | 16 | 13Ø | 775 | .59 | 15 |
| 41211162 | 137 | C | C | 7 | 15 | 65 | 13Ø | .47 | 15 |
| 41111Ø45 | 1271 | A | A | 11 | 19 | 278 | 459 | .14 | 16 |
| 41111174 | 1435 | A | A | 11 | 19 | Ø | 125 | .Ø9 | 16 |
| 41111176 | 1299 | A | A | 11 | 19 | Ø | 1Ø4 | .Ø8 | 16 |
| 41211ØØ5 | 123Ø | A | A | 11 | 19 | 277 | 447 | .14 | 16 |
| 41211ØØ8 | 128Ø | A | A | 11 | 19 | 299 | 416 | .Ø9 | 16 |
| 41211Ø13 | 1248 | A | A | 11 | 19 | 1176 | 1312 | .11 | 16 |
| 41211Ø14 | 1649 | A | A | 11 | 19 | 454 | 648 | .12 | 16 |
| 41211Ø16 | 771 | A | A | 11 | 19 | 261 | 456 | .25 | 16 |
| 41211Ø18 | 824 | A | A | 11 | 19 | 242 | 415 | .21 | 16 |
| 41211Ø23 | 1327 | A | A | 11 | 19 | 248 | 388 | .11 | 16 |
| 41211Ø24 | 1327 | A | A | 11 | 19 | 248 | 388 | .11 | 16 |
| 41211Ø25 | 56Ø | A | A | 11 | 19 | 191 | 291 | .18 | 16 |
| 41211Ø26 | 989 | A | A | 11 | 19 | 18Ø | 239 | .Ø6 | 16 |
| 41211Ø31 | 1628 | A | A | 11 | 19 | 344 | 49Ø | .Ø9 | 16 |
| 41211Ø38 | 143Ø | A | A | 11 | 19 | 366 | 5Ø6 | .1Ø | 16 |
| 41211Ø4Ø | 84Ø | A | A | 11 | 19 | 827 | 96Ø | .16 | 16 |
| 41211Ø55 | 696 | A | A | 11 | 19 | 834 | 972 | .2Ø | 16 |
| 41211Ø59 | 121Ø | A | A | 11 | 19 | 165 | 3Ø7 | .12 | 16 |
| 41211Ø6Ø | 7Ø4 | A | A | 11 | 19 | 171 | 241 | .1Ø | 16 |
| 41211Ø62 | 1ØØ8 | A | A | 11 | 19 | 272 | 435 | .16 | 16 |
| 41211Ø63 | 1ØØ8 | A | A | 11 | 19 | 272 | 435 | .16 | 16 |
| 41211Ø65 | 1144 | A | A | 11 | 19 | 3Ø8 | 493 | .16 | 16 |
| 41211Ø67 | 14Ø6 | A | A | 11 | 19 | 343 | 537 | .14 | 16 |
| 41211Ø68 | 1284 | A | A | 11 | 19 | 3Ø6 | 414 | .Ø8 | 16 |
| 41211Ø74 | 1176 | A | A | 11 | 19 | 179 | 338 | .14 | 16 |
| 41211Ø75 | 1176 | A | A | 11 | 19 | 179 | 338 | .14 | 16 |
| 41211Ø76 | 1176 | A | A | 11 | 19 | 179 | 338 | .14 | 16 |
| 41211Ø77 | 1176 | A | A | 11 | 19 | 179 | 338 | .14 | 16 |
| 41211Ø82 | 1124 | A | A | 11 | 19 | 1543 | 1256 | -Ø.26 | 16 |
| 41211Ø9Ø | 1462 | A | A | 11 | 19 | 323 | 5Ø6 | .13 | 16 |
| 41211128 | 1Ø23 | A | A | 11 | 19 | 3Ø8 | 357 | .Ø5 | 16 |
| 41211123 | 1Ø58 | A | A | 11 | 19 | 264 | 36Ø | .Ø9 | 16 |
| 41211146 | 1288 | A | A | 11 | 19 | 25Ø | 4Ø6 | .12 | 16 |
| 41211165 | 36Ø | A | A | 11 | 19 | 74 | 1Ø6 | .Ø9 | 16 |
| 41211166 | 26Ø | A | A | 11 | 19 | 1Ø6 | 129 | .Ø9 | 16 |
| 41211184 | 175Ø | A | A | 11 | 19 | 499 | 734 | .13 | 16 |
| 41211183 | 1558 | A | A | 11 | 19 | 378 | 4Ø5 | .Ø2 | 16 |

26-MAR-86 floor spreadsheet
12:00:18 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211184 | 1062 | A | A | 11 | 19 | 254 | 369 | .11 | 16 |
| 41211195 | 1011 | A | A | 11 | 19 | 176 | 477 | .30 | 16 |
| 41211201 | 1936 | A | A | 11 | 19 | 265 | 411 | .08 | 16 |
| 41211202 | 665 | A | A | 11 | 19 | 157 | 225 | .10 | 16 |
| 41211204 | 1120 | A | A | 11 | 19 | 265 | 381 | .10 | 16 |
| 41211246 | 572 | A | A | 11 | 19 | 100 | 175 | .13 | 16 |
| 41211257 | 1605 | A | A | 11 | 19 | 573 | 720 | .09 | 16 |
| 41211259 | 1376 | A | A | 11 | 19 | 620 | 740 | .09 | 16 |
| 41211265 | 2078 | A | A | 11 | 19 | 457 | 789 | .16 | 16 |
| 41211271 | 1541 | A | A | 11 | 19 | 444 | 592 | .10 | 16 |
| 41211275 | 1390 | A | A | 11 | 19 | 441 | 684 | .17 | 16 |
| 41211276 | 1630 | A | A | 11 | 19 | 510 | 791 | .17 | 16 |
| 41211277 | 1445 | A | A | 11 | 19 | 422 | 654 | .16 | 16 |
| 41211675 | 1188 | A | A | 11 | 19 | 260 | 367 | .09 | 16 |
| 41211677 | 1913 | A | A | 11 | 19 | 360 | 580 | .12 | 16 |
| 41311189 | 1118 | A | A | 11 | 19 | 2886 | 3029 | .13 | 16 |
| 41311258 | 1395 | A | A | 11 | 19 | 576 | 649 | .05 | 16 |
| 41311676 | 1406 | A | A | 11 | 19 | 312 | 440 | .09 | 16 |
| 42111021 | 130 | A | A | 11 | 19 | 32 | 41 | .07 | 16 |
| 42211004 | 130 | A | A | 11 | 19 | 32 | 41 | .07 | 16 |
| 42211037 | 108 | A | A | 11 | 19 | 27 | 34 | .06 | 16 |
| 42211041 | 288 | A | A | 11 | 19 | 58 | 93 | .12 | 16 |
| 42211042 | 288 | A | A | 11 | 19 | 58 | 93 | .12 | 16 |
| 42211141 | 612 | A | A | 11 | 19 | 113 | 175 | .10 | 16 |
| 42211241 | 208 | A | A | 11 | 19 | 50 | 67 | .08 | 16 |
| 42311224 | 341 | A | A | 11 | 19 | 85 | 109 | .07 | 16 |
| 41111178 | 553 | A | A | 11 | 19 | 0 | 169 | .31 | 16 |
| 41111239 | 85 | A | A | 11 | 19 | 16 | 27 | .13 | 16 |
| 41211047 | 193 | A | A | 11 | 19 | 65 | 85 | .10 | 16 |
| 41211081 | 396 | A | A | 11 | 19 | 97 | 141 | .11 | 16 |
| 41211086 | 35 | A | A | 11 | 19 | 16 | 35 | .54 | 16 |
| 41211203 | 555 | A | A | 11 | 19 | 132 | 209 | .14 | 16 |
| 41211254 | 651 | A | A | 11 | 19 | 100 | 168 | .10 | 16 |
| 41211255 | 392 | A | A | 11 | 19 | 93 | 150 | .15 | 16 |
| 42211011 | 64 | A | A | 11 | 22 | 25 | 36 | .17 | 16 |
| 41211171 | 1937 | A | A | 11 | 24 | 710 | 1334 | .32 | 17 |
| 41111235 | 660 | A | A | 11 | 25 | 163 | 570 | .62 | 17 |
| 41111237 | 1314 | A | A | 11 | 25 | 289 | 732 | .34 | 17 |
| 41211020 | 1021 | A | A | 11 | 25 | 312 | 657 | .34 | 17 |
| 41211084 | 1425 | A | A | 11 | 25 | 1781 | 1787 | .00 | 17 |
| 41211097 | 1611 | A | A | 11 | 25 | 526 | 841 | .20 | 17 |
| 41211225 | 2535 | A | A | 11 | 25 | 532 | 1329 | .31 | 17 |
| 41211256 | 1021 | A | A | 11 | 25 | 312 | 609 | .29 | 17 |
| 41211261 | 1418 | A | A | 11 | 25 | 650 | 889 | .17 | 17 |
| 42211206 | 952 | A | A | 11 | 25 | 209 | 446 | .25 | 17 |
| 41211095 | 1110 | A | A | 11 | 26 | 300 | 571 | .24 | 17 |
| 41211220 | 20 | A | A | 11 | 28 | 25 | 40 | .75 | 18 |
| 32211423 | 495 | A | A | 11 | 30 | 826 | 1616 | 1.60 | 18 |
| 41211001 | 1152 | A | A | 11 | 30 | 591 | 879 | .25 | 18 |
| 41211002 | 1495 | A | A | 11 | 30 | 791 | 1374 | .39 | 18 |
| 41211006 | 1521 | A | A | 11 | 30 | 983 | 1416 | .28 | 18 |

26-MAR-86 floor spreadsheet
12:00:19 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211009 | 1222 | A | A | 11 | 30 | 851 | 1077 | .18 | 18 |
| 41211012 | 1491 | A | A | 11 | 30 | 365 | 716 | .24 | 18 |
| 41211027 | 1452 | A | A | 11 | 30 | 781 | 1345 | .39 | 18 |
| 41211033 | 734 | A | A | 11 | 30 | 776 | 957 | .25 | 18 |
| 41211036 | 1388 | A | A | 11 | 30 | 1001 | 1519 | .37 | 18 |
| 41211039 | 893 | A | A | 11 | 30 | 290 | 651 | .40 | 18 |
| 41211050 | 325 | A | A | 11 | 30 | 78 | 211 | .41 | 18 |
| 41211051 | 1875 | A | A | 11 | 30 | 389 | 756 | .20 | 18 |
| 41211053 | 1580 | A | A | 11 | 30 | 544 | 998 | .29 | 18 |
| 41211070 | 1326 | A | A | 11 | 30 | 320 | 910 | .44 | 18 |
| 41211071 | 1326 | A | A | 11 | 30 | 320 | 910 | .44 | 18 |
| 41211078 | 1440 | A | A | 11 | 30 | 400 | 920 | .36 | 18 |
| 41211079 | 1310 | A | A | 11 | 30 | 903 | 1244 | .26 | 18 |
| 41211087 | 915 | A | A | 11 | 30 | 210 | 347 | .15 | 18 |
| 41211091 | 796 | A | A | 11 | 30 | 1426 | 1760 | .42 | 18 |
| 41211092 | 1104 | A | A | 11 | 30 | 298 | 618 | .29 | 18 |
| 41211093 | 1234 | A | A | 11 | 30 | 371 | 512 | .11 | 18 |
| 41211094 | 850 | A | A | 11 | 30 | 0 | 351 | .41 | 18 |
| 41211107 | 1413 | A | A | 11 | 30 | 333 | 760 | .30 | 18 |
| 41211118 | 1764 | A | A | 11 | 30 | 324 | 808 | .27 | 18 |
| 41211122 | 1494 | A | A | 11 | 30 | 379 | 695 | .21 | 18 |
| 41211124 | 1157 | A | A | 11 | 30 | 197 | 486 | .25 | 18 |
| 41211125 | 1335 | A | A | 11 | 30 | 7248 | 8150 | .68 | 18 |
| 41211131 | 817 | A | A | 11 | 30 | 0 | 204 | .25 | 18 |
| 41211132 | 326 | A | A | 11 | 30 | 0 | 56 | .17 | 18 |
| 41211140 | 1439 | A | A | 11 | 30 | 576 | 857 | .20 | 18 |
| 41211149 | 565 | A | A | 11 | 30 | 141 | 243 | .18 | 18 |
| 41211153 | 1032 | A | A | 11 | 30 | 300 | 675 | .36 | 18 |
| 41211156 | 1229 | A | A | 11 | 30 | 1062 | 1459 | .32 | 18 |
| 41211159 | 1764 | A | A | 11 | 30 | 1223 | 1889 | .38 | 18 |
| 41211160 | 1535 | A | A | 11 | 30 | 659 | 1311 | .42 | 18 |
| 41211161 | 1296 | A | A | 11 | 30 | 258 | 750 | .38 | 18 |
| 41211164 | 1808 | A | A | 11 | 30 | 443 | 1103 | .37 | 18 |
| 41211168 | 1538 | A | A | 11 | 30 | 431 | 923 | .32 | 18 |
| 41211169 | 996 | A | A | 11 | 30 | 269 | 598 | .33 | 18 |
| 41211170 | 336 | A | A | 11 | 30 | 78 | 195 | .35 | 18 |
| 41211173 | 1905 | A | A | 11 | 30 | 628 | 1100 | .25 | 18 |
| 41211187 | 1480 | A | A | 11 | 30 | 234 | 610 | .25 | 18 |
| 41211188 | 1585 | A | A | 11 | 30 | 294 | 758 | .29 | 18 |
| 41211227 | 1852 | A | A | 11 | 30 | 389 | 1287 | .48 | 18 |
| 41211244 | 280 | A | A | 11 | 30 | 63 | 148 | .30 | 18 |
| 41211268 | 756 | A | A | 11 | 30 | 267 | 464 | .26 | 18 |
| 41211272 | 1740 | A | A | 11 | 30 | 487 | 828 | .20 | 18 |
| 41211273 | 1420 | A | A | 11 | 30 | 1585 | 1676 | .06 | 18 |
| 41211274 | 2308 | A | A | 11 | 30 | 1321 | 1768 | .19 | 18 |
| 41211289 | 1278 | A | A | 11 | 30 | 297 | 667 | .29 | 18 |
| 41211303 | 1776 | A | A | 11 | 30 | 550 | 957 | .23 | 18 |
| 41311205 | 32 | A | A | 11 | 30 | 14 | 15 | .03 | 18 |
| 42211088 | 1314 | A | A | 11 | 30 | 378 | 538 | .12 | 18 |
| 42211099 | 1247 | A | A | 11 | 30 | 181 | 455 | .22 | 18 |
| 42211282 | 247 | A | A | 11 | 30 | 0 | 142 | .57 | 18 |

26-MAR-86 floor spreadsheet
12:00:19 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211048 | 259 | A | A | 11 | 30 | 82 | 145 | .24 | 18 |
| 41211119 | 300 | A | A | 11 | 30 | 675 | 822 | .49 | 18 |
| 41211157 | 579 | A | A | 11 | 30 | 1024 | 1435 | .71 | 18 |
| 41211158 | 152 | A | A | 11 | 30 | 39 | 90 | .34 | 18 |
| 41211192 | 186 | A | A | 11 | 30 | 35 | 95 | .32 | 18 |
| 41211193 | 186 | A | A | 11 | 30 | 35 | 95 | .32 | 18 |
| 41211260 | 72 | A | A | 11 | 30 | 962 | 1013 | .71 | 18 |
| 42211085 | 260 | A | A | 11 | 30 | 62 | 187 | .48 | 18 |
| 41311167 | 1914 | A | A | 11 | 38 | 518 | 1416 | .47 | 19 |
| 42211110 | 1820 | A | A | 11 | 38 | 450 | 1250 | .44 | 19 |
| 42211111 | 3838 | A | A | 11 | 38 | 1056 | 1475 | .11 | 19 |
| 42211134 | 1768 | A | A | 11 | 38 | 400 | 1110 | .40 | 19 |
| 42211135 | 1768 | A | A | 11 | 38 | 400 | 1110 | .40 | 19 |
| 42211136 | 1768 | A | A | 11 | 38 | 400 | 1110 | .40 | 19 |
| 42211137 | 1768 | A | A | 11 | 38 | 400 | 1110 | .40 | 19 |
| 42211138 | 1768 | A | A | 11 | 38 | 400 | 1110 | .40 | 19 |
| 42211096 | 22 | A | A | 11 | 38 | 36 | 43 | .32 | 19 |
| 31211177 | 1742 | D | A | 11 | 19 | 128 | 617 | .28 | 20 |
| 31211260 | 1688 | D | A | 11 | 19 | 1795 | 2126 | .20 | 20 |
| 31211408 | 1423 | D | A | 11 | 19 | 1897 | 3626 | 1.22 | 20 |
| 31211409 | 1917 | D | A | 11 | 19 | 1779 | 3626 | .96 | 20 |
| 32211310 | 1614 | D | A | 11 | 19 | 130 | 786 | .41 | 20 |
| 41111112 | 1097 | D | A | 11 | 19 | 142 | 331 | .17 | 20 |
| 31211346 | 1230 | A | A | 19 | 24 | 492 | 618 | .10 | 21 |
| 31211221 | 824 | A | A | 19 | 25 | 421 | 620 | .24 | 21 |
| 31211297 | 768 | A | A | 19 | 25 | 193 | 300 | .14 | 21 |
| 31211338 | 845 | A | A | 19 | 25 | 1500 | 1680 | .21 | 21 |
| 12211104 | 256 | A | A | 19 | 30 | 54 | 90 | .14 | 22 |
| 12211147 | 1493 | A | A | 19 | 30 | 378 | 630 | .17 | 22 |
| 23211525 | 538 | A | A | 19 | 30 | 0 | 230 | .43 | 22 |
| 31111218 | 1024 | A | A | 19 | 30 | 1357 | 1591 | .23 | 22 |
| 31211106 | 1203 | A | A | 19 | 30 | 638 | 972 | .28 | 22 |
| 31211128 | 1653 | A | A | 19 | 30 | 720 | 964 | .15 | 22 |
| 31211135 | 672 | A | A | 19 | 30 | 242 | 355 | .17 | 22 |
| 31211137 | 1700 | A | A | 19 | 30 | 475 | 1008 | .31 | 22 |
| 31211155 | 1199 | A | A | 19 | 30 | 427 | 724 | .25 | 22 |
| 31211201 | 1104 | A | A | 19 | 30 | 531 | 766 | .21 | 22 |
| 31211216 | 1844 | A | A | 19 | 30 | 2542 | 3190 | .35 | 22 |
| 31211253 | 1892 | A | A | 19 | 30 | 613 | 910 | .16 | 22 |
| 31211271 | 901 | A | A | 19 | 30 | 750 | 1351 | .67 | 22 |
| 31211424 | 1790 | A | A | 19 | 30 | 900 | 1170 | .15 | 22 |
| 32211110 | 896 | A | A | 19 | 30 | 397 | 820 | .47 | 22 |
| 32211162 | 1077 | A | A | 19 | 30 | 670 | 906 | .22 | 22 |
| 32211186 | 1232 | A | A | 19 | 30 | 426 | 898 | .38 | 22 |
| 32211289 | 768 | A | A | 19 | 30 | 650 | 1010 | .47 | 22 |
| 32211427 | 768 | A | A | 19 | 30 | 1314 | 1563 | .32 | 22 |
| 12211151 | 721 | A | A | 19 | 32 | 877 | 1077 | .28 | 22 |
| 12211108 | 1042 | A | A | 20 | 30 | 1565 | 1565 | .00 | 22 |
| 12211114 | 352 | A | A | 20 | 30 | 76 | 92 | .05 | 22 |
| 23111512 | 1144 | A | A | 0 | 3 | 0 | 674 | .59 | 99 |
| 23111523 | 1392 | A | A | 0 | 3 | 0 | 722 | .52 | 99 |

26-MAR-86 floor spreadsheet
12:00:19 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211578 | 528 | A | A | 0 | 11 | 0 | 127 | .24 | 99 |
| 23211537 | 152 | B | B | 0 | 0 | 0 | 26 | .17 | 99 |
| 23211552 | 611 | B | B | 0 | 0 | 0 | 0 | .00 | 99 |
| 23211561 | 672 | B | B | 0 | 0 | 0 | 0 | .00 | 99 |
| 23211562 | 400 | B | B | 0 | 0 | 0 | 0 | .00 | 99 |
| 23211541 | 1443 | B | Z | 0 | 19 | 0 | 595 | .41 | 99 |
| 23211541 | 1147 | C | C | 0 | 0 | 0 | 0 | .00 | 99 |
| 41211019 | 34 | C | B | 0 | 10 | 0 | 77 | 2.26 | 99 |
| 23211564 | 20 | C | C | 0 | 22 | 0 | 40 | 2.00 | 99 |
| 41211033 | 330 | C | C | 0 | 32 | 0 | 119 | .36 | 99 |
| 23211535 | 768 | D | D | 0 | 3 | 0 | 474 | .62 | 99 |
| 41211054 | 1013 | E | E | 0 | 14 | 0 | 777 | .77 | 99 |
| 41211266 | 875 | E | E | 0 | 30 | 0 | 404 | .46 | 99 |
| 23211535 | 1088 | Z | Z | 0 | 1 | 0 | 430 | .40 | 99 |
| 23211527 | 1144 | Z | Z | 0 | 2 | 0 | 603 | .53 | 99 |
| 23211509 | 1169 | Z | Z | 0 | 8 | 0 | 580 | .50 | 99 |
| 23211562 | 170 | B | B | 3 | 3 | 0 | 0 | .00 | 99 |
| 41211165 | 160 | B | B | 4 | 13 | 266 | 870 | 3.78 | 99 |
| 41211054 | 184 | C | C | 4 | 22 | 220 | 378 | .86 | 99 |
| 42211130 | 953 | C | E | 5 | 5 | 220 | 401 | .19 | 99 |
| 31211250 | 943 | C | E | 5 | 15 | 75 | 190 | .12 | 99 |
| 41211269 | 1792 | D | A | 5 | 19 | 82 | 828 | .42 | 99 |
| 32211162 | 268 | E | E | 5 | 15 | 87 | 143 | .21 | 99 |
| 31211395 | 768 | B | B | 6 | 6 | 90 | 151 | .08 | 99 |
| 31211166 | 1268 | B | B | 6 | 15 | 166 | 778 | .48 | 99 |
| 31211270 | 506 | E | E | 6 | 15 | 117 | 204 | .17 | 99 |
| 23211565 | 342 | B | B | 8 | 15 | 200 | 551 | 1.03 | 99 |
| 42211043 | 1499 | D | A | 8 | 30 | 200 | 960 | .51 | 99 |
| 41211245 | 174 | B | B | 10 | 10 | 0 | 0 | .00 | 99 |
| 41211083 | 200 | C | C | 10 | 10 | 0 | 0 | .00 | 99 |
| 41211234 | 1780 | C | E | 10 | 10 | 324 | 900 | .32 | 99 |
| 23211538 | 240 | E | E | 10 | 10 | 0 | 0 | .00 | 99 |
| 23211539 | 280 | E | E | 10 | 15 | 225 | 321 | .34 | 99 |
| 12211149 | 94 | A | D | 11 | 19 | 1662 | 1821 | 1.69 | 99 |
| 13211150 | 164 | A | D | 11 | 31 | 840 | 1146 | 1.87 | 99 |
| 42211219 | 542 | A | Z | 11 | 38 | 1941 | 3741 | 3.32 | 99 |
| 42211130 | 80 | A | A | 11 | 44 | 69 | 112 | .54 | 99 |
| 31211134 | 1280 | B | B | 11 | 15 | 68 | 290 | .17 | 99 |
| 31211183 | 1889 | B | B | 11 | 19 | 120 | 404 | .15 | 99 |
| 41211127 | 518 | D | D | 11 | 11 | 250 | 283 | .06 | 99 |
| 31211270 | 311 | D | A | 11 | 30 | 132 | 308 | .57 | 99 |
| 13211125 | 400 | Z | Z | 11 | 33 | 758 | 882 | .31 | 99 |
| 23211580 | 157 | E | E | 15 | 15 | 0 | 0 | .00 | 99 |
| 11211136 | 1996 | A | D | 19 | 13 | 810 | 554 | -0.13 | 99 |
| 31211101 | 1560 | A | A | 19 | 18 | 3600 | 3600 | .00 | 99 |
| 23211511 | 648 | A | A | 19 | 19 | 0 | 0 | .00 | 99 |
| 23211519 | 1356 | A | A | 19 | 19 | 439 | 439 | .00 | 99 |
| 23211520 | 1200 | A | A | 19 | 19 | 421 | 421 | .00 | 99 |
| 23211524 | 783 | A | A | 19 | 19 | 336 | 336 | .00 | 99 |
| 23211530 | 576 | A | A | 19 | 19 | 169 | 169 | .00 | 99 |
| 23211531 | 1478 | A | A | 19 | 19 | 0 | 0 | .00 | 99 |

26-MAR-86 floor spreadsheet
12:00:20 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211549 | 612 | A | A | 19 | 19 | 251 | 261 | .02 | 99 |
| 23211557 | 444 | A | A | 19 | 19 | 150 | 155 | .01 | 99 |
| 31111112 | 1193 | A | A | 19 | 19 | 546 | 546 | .00 | 99 |
| 31211122 | 1404 | A | A | 19 | 19 | 0 | 173 | .12 | 99 |
| 31211146 | 832 | A | A | 19 | 19 | 0 | 0 | .00 | 99 |
| 31211153 | 1334 | A | A | 19 | 19 | 437 | 437 | .00 | 99 |
| 31211292 | 2480 | A | A | 19 | 19 | 660 | 852 | .08 | 99 |
| 12211133 | 1396 | A | D | 19 | 19 | 856 | 856 | .00 | 99 |
| 11111145 | 190 | A | D | 19 | 20 | 76 | 93 | .09 | 99 |
| 42311270 | 158 | A | A | 19 | 38 | 38 | 50 | .08 | 99 |
| 31211257 | 2304 | B | X | 19 | 20 | 0 | 1120 | .49 | 99 |
| 31211265 | 972 | B | B | 19 | 30 | 375 | 525 | .15 | 99 |
| 31111218 | 176 | C | C | 19 | 19 | 80 | 170 | .51 | 99 |
| 23211544 | 608 | Z | Z | 19 | 30 | 218 | 280 | .10 | 99 |
| 13211118 | 772 | Z | Z | 19 | 30 | 614 | 724 | .14 | 99 |
| 23211560 | 421 | Z | Z | 19 | 30 | 158 | 244 | .20 | 99 |
| 31211308 | 1085 | Z | Z | 19 | 30 | 384 | 575 | .18 | 99 |
| 23211525 | 48 | Z | Z | 19 | 30 | 0 | 0 | .00 | 99 |
| 23211572 | 780 | Z | Z | 19 | 30 | 285 | 468 | .23 | 99 |
| 23211565 | 648 | Z | Z | 19 | 38 | 310 | 532 | .34 | 99 |
| 12211110 | 1224 | A | A | 20 | 19 | 2201 | 2315 | .09 | 99 |
| 11111106 | 598 | A | A | 20 | 20 | 123 | 123 | .00 | 99 |
| 11111140 | 352 | A | D | 20 | 20 | 86 | 294 | .59 | 99 |
| 11111142 | 382 | D | D | 20 | 20 | 89 | 95 | .02 | 99 |
| 11111143 | 288 | D | D | 20 | 20 | 62 | 294 | .81 | 99 |
| 11111153 | 304 | D | D | 20 | 20 | 65 | 209 | .47 | 99 |
| 11211139 | 191 | D | D | 20 | 20 | 75 | 91 | .08 | 99 |
| 11211141 | 207 | D | D | 20 | 20 | 208 | 75 | -0.64 | 99 |
| 11211144 | 134 | D | D | 20 | 20 | 70 | 104 | .25 | 99 |

NUMBER OF CASES READ = 386 NUMBER OF CASES LISTED = 386

## WALL SPREADSHEET

**Wall Type Code:**

A Strapped wall

B Double wall

C 2 X 6, 24" on center, advanced framing

D 2 X 6, 24" on center, standard framing

E 2 X 6, 16" on center, standard framing

F 2 X 6, 24" on center, foam outside

G 2 X 6, 24" on center, foam inside

H 2 X 4, 24" on center, foam outside

I 2 X 4, 24" on center, foam inside

J Foam blocks

K 2 X 8, 24" on center, advanced framing

L 2 X 8, 16" on center, standard framing

M All weather wood foundation

N Cement, foam outside

O Cement, batt inside

P Cement, foam outside, batt inside

Q 2 X 6, 24" on center, mod. advanced framing

R 2 X 6, 24" on center, mod. advanced framing with foam inside

S 2 X 6, 24" on center, mod. advanced framing with foam outside

T Larsen truss, batt insulation

U 2 X 4, 16" on center, standard framing

V No insulation on foundation

X Missing

Z Other

AA 2 X 4, 24" on center, standard framing

BB Cement, no insulation

28-MAR-86 wall spreadsheet
16:31:30 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31111112 | 1168 | U | C | 11 | 19 | 4063 | 4745 | .58 | 1 |
| 31211128 | 1492 | U | C | 11 | 19 | 1932 | 2439 | .34 | 1 |
| 31211260 | 1400 | U | C | 11 | 19 | 4546 | 5180 | .45 | 1 |
| 31211297 | 1876 | U | C | 11 | 19 | 807 | 1090 | .15 | 1 |
| 31211338 | 1712 | U | C | 11 | 19 | 4707 | 5570 | .50 | 1 |
| 31211346 | 1101 | U | C | 11 | 19 | 1431 | 1572 | .13 | 1 |
| 31211410 | 1000 | U | C | 11 | 19 | 1383 | 1610 | .23 | 1 |
| 41111028 | 1589 | U | C | 11 | 19 | 4774 | 4976 | .13 | 1 |
| 41111112 | 868 | U | C | 11 | 19 | 390 | 527 | .16 | 1 |
| 41111209 | 1126 | U | C | 11 | 19 | 1362 | 1834 | .42 | 1 |
| 41111211 | 1126 | U | C | 11 | 19 | 1362 | 1834 | .42 | 1 |
| 41111213 | 1126 | U | C | 11 | 19 | 1362 | 1834 | .42 | 1 |
| 41111215 | 1126 | U | C | 11 | 19 | 1362 | 1834 | .42 | 1 |
| 41111217 | 1126 | U | C | 11 | 19 | 1362 | 1834 | .42 | 1 |
| 41211001 | 1871 | U | C | 11 | 19 | 568 | 1106 | .29 | 1 |
| 41211005 | 1120 | U | C | 11 | 19 | 595 | 716 | .11 | 1 |
| 41211023 | 1337 | U | C | 11 | 19 | 964 | 1069 | .08 | 1 |
| 41211024 | 1337 | U | C | 11 | 19 | 964 | 1069 | .08 | 1 |
| 41211025 | 1546 | U | C | 11 | 19 | 2245 | 2396 | .10 | 1 |
| 41211069 | 1800 | U | C | 11 | 19 | 1210 | 1461 | .14 | 1 |
| 41211089 | 1215 | U | C | 11 | 19 | 1170 | 1505 | .28 | 1 |
| 41211095 | 1728 | U | C | 11 | 19 | 3628 | 4757 | .65 | 1 |
| 41211106 | 2874 | U | C | 11 | 19 | 1378 | 2149 | .27 | 1 |
| 41211108 | 1049 | U | C | 11 | 19 | 842 | 1053 | .20 | 1 |
| 41211146 | 954 | U | C | 11 | 19 | 2170 | 2166 | .00 | 1 |
| 41211162 | 1830 | U | C | 11 | 19 | 1986 | 2358 | .20 | 1 |
| 41211163 | 1225 | U | C | 11 | 19 | 412 | 642 | .19 | 1 |
| 41211170 | 2104 | U | C | 11 | 19 | 1050 | 1263 | .10 | 1 |
| 41211187 | 1185 | U | C | 11 | 19 | 1636 | 2241 | .51 | 1 |
| 41211192 | 1818 | U | C | 11 | 19 | 716 | 1635 | .51 | 1 |
| 41211193 | 1818 | U | C | 11 | 19 | 716 | 1635 | .51 | 1 |
| 41211196 | 1507 | U | C | 11 | 19 | 1144 | 1499 | .24 | 1 |
| 41211225 | 2087 | U | C | 11 | 19 | 1983 | 2616 | .30 | 1 |
| 41211227 | 1712 | U | C | 11 | 19 | 967 | 1442 | .28 | 1 |
| 41211251 | 1874 | U | C | 11 | 19 | 337 | 559 | .12 | 1 |
| 41211252 | 1874 | U | C | 11 | 19 | 337 | 559 | .12 | 1 |
| 41211266 | 2052 | U | C | 11 | 19 | 1009 | 1397 | .19 | 1 |
| 41211267 | 1466 | U | C | 11 | 19 | 562 | 964 | .27 | 1 |
| 41211268 | 1299 | U | C | 11 | 19 | 535 | 1001 | .36 | 1 |
| 41211275 | 1266 | U | C | 11 | 19 | 777 | 1245 | .37 | 1 |
| 41211276 | 1299 | U | C | 11 | 19 | 1136 | 1688 | .42 | 1 |
| 41211277 | 1324 | U | C | 11 | 19 | 774 | 1334 | .42 | 1 |
| 41211675 | 2007 | U | C | 11 | 19 | 1140 | 1386 | .12 | 1 |
| 41311186 | 1922 | U | C | 11 | 19 | 766 | 1164 | .21 | 1 |
| 41311676 | 1835 | U | C | 11 | 19 | 945 | 1274 | .18 | 1 |
| 42211015 | 1860 | U | C | 11 | 19 | 21827 | 22497 | .36 | 1 |
| 42211017 | 1314 | U | C | 11 | 19 | 12574 | 13035 | .35 | 1 |
| 42211241 | 1346 | U | C | 11 | 19 | 753 | 1103 | .26 | 1 |
| 42311224 | 1615 | U | C | 11 | 19 | 591 | 1007 | .26 | 1 |
| 42311242 | 1321 | U | C | 11 | 19 | 742 | 1083 | .26 | 1 |
| 41211259 | 607 | U | C | 11 | 19 | 84 | 359 | .45 | 1 |

28-MAR-86 wall spreadsheet
16:31:30 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31111218 | 1108 | U | Q | 11 | 19 | 3843 | 4007 | .15 | 1 |
| 31211145 | 1491 | U | Q | 11 | 19 | 511 | 916 | .27 | 1 |
| 31211216 | 1346 | U | Q | 11 | 19 | 1200 | 1996 | .59 | 1 |
| 31211292 | 2088 | U | Q | 11 | 19 | 1153 | 1684 | .25 | 1 |
| 31211134 | 2118 | U | D | 11 | 19 | 1004 | 1655 | .31 | 2 |
| 31211135 | 1585 | U | D | 11 | 19 | 1606 | 2073 | .29 | 2 |
| 31211253 | 2150 | U | D | 11 | 19 | 1338 | 2288 | .44 | 2 |
| 31211270 | 2255 | U | D | 11 | 19 | 2620 | 3294 | .30 | 2 |
| 31211395 | 1464 | U | D | 11 | 19 | 669 | 1099 | .29 | 2 |
| 41211020 | 2180 | U | D | 11 | 19 | 931 | 989 | .03 | 2 |
| 41211032 | 1882 | U | D | 11 | 19 | 0 | 51 | .03 | 2 |
| 41211159 | 1406 | U | D | 11 | 19 | 2698 | 3336 | .45 | 2 |
| 41211073 | 1136 | U | D | 11 | 19 | 421 | 597 | .15 | 2 |
| 41211156 | 233 | U | D | 11 | 19 | 1200 | 1599 | 1.71 | 2 |
| 31211101 | 2371 | U | E | 11 | 19 | 5737 | 6585 | .36 | 3 |
| 31211133 | 1520 | U | E | 11 | 19 | 2270 | 2805 | .35 | 3 |
| 31211200 | 1540 | U | E | 11 | 19 | 1587 | 2505 | .60 | 3 |
| 31211271 | 2105 | U | E | 11 | 19 | 2565 | 3306 | .35 | 3 |
| 31211424 | 1181 | U | E | 11 | 19 | 1378 | 1594 | .18 | 3 |
| 32211426 | 1766 | U | E | 11 | 19 | 3600 | 4152 | .31 | 3 |
| 41211002 | 1319 | U | E | 11 | 19 | 687 | 1019 | .25 | 3 |
| 41211087 | 1724 | U | E | 11 | 19 | 3455 | 4497 | .60 | 3 |
| 41211165 | 3034 | U | E | 11 | 19 | 843 | 1977 | .37 | 3 |
| 41211171 | 2718 | U | E | 11 | 19 | 1415 | 2157 | .27 | 3 |
| 41211197 | 1544 | U | E | 11 | 19 | 2455 | 3451 | .65 | 3 |
| 41211256 | 2180 | U | E | 11 | 19 | 932 | 1052 | .06 | 3 |
| 31211257 | 1565 | U | E | 11 | 20 | 981 | 1424 | .28 | 3 |
| 41211012 | 1228 | U | G | 11 | 24 | 1240 | 1723 | .39 | 4 |
| 41211016 | 1867 | U | G | 11 | 24 | 915 | 2241 | .71 | 4 |
| 41211027 | 1186 | U | G | 11 | 24 | 3129 | 4120 | .84 | 4 |
| 41211031 | 2326 | U | G | 11 | 24 | 5898 | 8112 | .95 | 4 |
| 41211038 | 1126 | U | G | 11 | 24 | 527 | 1035 | .45 | 4 |
| 41211048 | 2381 | U | G | 11 | 24 | 1254 | 2466 | .51 | 4 |
| 41211049 | 1247 | U | G | 11 | 24 | 858 | 1682 | .66 | 4 |
| 41211050 | 1333 | U | G | 11 | 24 | 702 | 1547 | .63 | 4 |
| 41211051 | 1448 | U | G | 11 | 24 | 740 | 1908 | .81 | 4 |
| 41211060 | 1820 | U | G | 11 | 24 | 1150 | 3016 | 1.03 | 4 |
| 41211068 | 979 | U | G | 11 | 24 | 1323 | 1540 | .22 | 4 |
| 41211070 | 1455 | U | G | 11 | 24 | 3184 | 4719 | 1.05 | 4 |
| 41211071 | 1455 | U | G | 11 | 24 | 3184 | 4719 | 1.05 | 4 |
| 41211092 | 952 | U | G | 11 | 24 | 4312 | 5256 | .99 | 4 |
| 41211118 | 2237 | U | G | 11 | 24 | 951 | 1570 | .28 | 4 |
| 41211120 | 1445 | U | G | 11 | 24 | 2132 | 2665 | .37 | 4 |
| 41211122 | 1060 | U | G | 11 | 24 | 3971 | 4701 | .69 | 4 |
| 41211125 | 2568 | U | G | 11 | 24 | 7341 | 8548 | .47 | 4 |
| 41211126 | 1821 | U | G | 11 | 24 | 305 | 1359 | .58 | 4 |
| 41211127 | 1290 | U | G | 11 | 24 | 1447 | 2839 | 1.08 | 4 |
| 41211132 | 948 | U | G | 11 | 24 | 0 | 1028 | 1.08 | 4 |
| 41211180 | 1256 | U | G | 11 | 24 | 486 | 1268 | .62 | 4 |
| 41211182 | 1262 | U | G | 11 | 24 | 498 | 1356 | .68 | 4 |
| 41211183 | 1195 | U | G | 11 | 24 | 618 | 1704 | .91 | 4 |

28-MAR-86 wall spreadsheet
16:31:30 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211184 | 1970 | U | G | 11 | 24 | 920 | 2394 | .75 | 4 |
| 41211201 | 2068 | U | G | 11 | 24 | 5226 | 6716 | .72 | 4 |
| 41211202 | 1587 | U | G | 11 | 24 | 3970 | 5398 | .90 | 4 |
| 41211203 | 1925 | U | G | 11 | 24 | 3805 | 5604 | .93 | 4 |
| 41211204 | 2160 | U | G | 11 | 24 | 4401 | 6540 | .99 | 4 |
| 41211234 | 2411 | U | G | 11 | 24 | 2599 | 3553 | .40 | 4 |
| 41211254 | 1414 | U | G | 11 | 24 | 2408 | 3732 | .94 | 4 |
| 41211255 | 1070 | U | G | 11 | 24 | 522 | 1427 | .85 | 4 |
| 41211265 | 1445 | U | G | 11 | 24 | 6043 | 7667 | 1.12 | 4 |
| 41211271 | 2707 | U | G | 11 | 24 | 1093 | 2516 | .53 | 4 |
| 41211273 | 2284 | U | G | 11 | 24 | 5371 | 6780 | .62 | 4 |
| 41211274 | 1488 | U | G | 11 | 24 | 2450 | 3148 | .47 | 4 |
| 42211129 | 1330 | U | G | 11 | 24 | 1159 | 2571 | 1.06 | 4 |
| 41211119 | 142 | U | G | 11 | 24 | 106 | 213 | .75 | 4 |
| 31211106 | 1933 | U | G | 11 | 25 | 4898 | 7270 | 1.23 | 4 |
| 41111174 | 1255 | U | G | 11 | 25 | 2700 | 3790 | .87 | 4 |
| 41111176 | 1295 | U | G | 11 | 25 | 2439 | 4003 | 1.21 | 4 |
| 41111178 | 1356 | U | G | 11 | 25 | 2747 | 4806 | 1.52 | 4 |
| 41211086 | 1651 | U | G | 11 | 25 | 8343 | 10881 | 1.54 | 4 |
| 31211155 | 2172 | U | K | 11 | 25 | 1321 | 1998 | .31 | 5 |
| 42211043 | 1296 | U | K | 11 | 25 | 1330 | 1704 | .29 | 5 |
| 42211096 | 1360 | U | K | 11 | 25 | 1498 | 1860 | .27 | 5 |
| 42211141 | 1748 | U | L | 11 | 26 | 671 | 1769 | .63 | 6 |
| 42211142 | 1320 | U | L | 11 | 26 | 662 | 1635 | .74 | 6 |
| 42211143 | 1320 | U | L | 11 | 26 | 689 | 1544 | .65 | 6 |
| 42211145 | 1320 | U | L | 11 | 26 | 621 | 1540 | .70 | 6 |
| 42211304 | 1320 | U | L | 11 | 26 | 621 | 1540 | .70 | 6 |
| 41211013 | 981 | U | A | 11 | 27 | 3073 | 3648 | .59 | 7 |
| 41211014 | 1440 | U | A | 11 | 27 | 337 | 1470 | .79 | 7 |
| 41211039 | 1841 | U | A | 11 | 27 | 1086 | 2178 | .59 | 7 |
| 41211062 | 872 | U | A | 11 | 27 | 961 | 1835 | 1.00 | 7 |
| 41211063 | 887 | U | A | 11 | 27 | 1021 | 1885 | .97 | 7 |
| 41211065 | 1156 | U | A | 11 | 27 | 1237 | 2168 | .81 | 7 |
| 41211074 | 904 | U | A | 11 | 27 | 318 | 1295 | 1.08 | 7 |
| 41211075 | 904 | U | A | 11 | 27 | 318 | 1295 | 1.08 | 7 |
| 41211076 | 904 | U | A | 11 | 27 | 318 | 1295 | 1.08 | 7 |
| 41211077 | 904 | U | A | 11 | 27 | 318 | 1295 | 1.08 | 7 |
| 41211081 | 2437 | U | A | 11 | 27 | 5488 | 8544 | 1.25 | 7 |
| 41211082 | 1055 | U | A | 11 | 27 | 3037 | 3690 | .62 | 7 |
| 41211084 | 1030 | U | A | 11 | 27 | 2758 | 3062 | .30 | 7 |
| 41211107 | 1192 | U | A | 11 | 27 | 1576 | 1876 | .25 | 7 |
| 41211153 | 1864 | U | A | 11 | 27 | 6008 | 8781 | 1.49 | 7 |
| 41211156 | 1382 | U | A | 11 | 27 | 2041 | 4128 | 1.51 | 7 |
| 41211158 | 1562 | U | A | 11 | 27 | 1426 | 2088 | .42 | 7 |
| 41211259 | 790 | U | A | 11 | 27 | 135 | 1379 | 1.57 | 7 |
| 41211289 | 1075 | U | A | 11 | 27 | 582 | 1554 | .90 | 7 |
| 41311189 | 1922 | U | A | 11 | 27 | 1260 | 1728 | .24 | 7 |
| 41311205 | 1238 | U | A | 11 | 27 | 6175 | 7244 | .86 | 7 |
| 42211206 | 1568 | U | A | 11 | 27 | 565 | 1167 | .38 | 7 |
| 41211086 | 640 | U | A | 11 | 27 | 1138 | 1561 | .66 | 7 |
| 41211090 | 1564 | U | A | 11 | 28 | 492 | 1899 | .90 | 7 |

28-MAR-86 wall spreadsheet
16:31:30 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211245 | 1588 | U | A | 11 | 28 | 5679 | 6273 | .37 | 7 |
| 41211269 | 1222 | U | A | 11 | 28 | 244 | 1618 | 1.12 | 7 |
| 41211047 | 1994 | U | B | 11 | 27 | 2693 | 4193 | .75 | 8 |
| 41211072 | 1857 | U | B | 11 | 27 | 1765 | 4188 | 1.30 | 8 |
| 41211157 | 1464 | U | B | 11 | 27 | 4330 | 6263 | 1.32 | 8 |
| 31211308 | 1850 | U | B | 11 | 29 | 7911 | 10668 | 1.49 | 9 |
| 32211186 | 1933 | U | B | 11 | 30 | 3769 | 6415 | 1.37 | 9 |
| 41111045 | 1361 | U | B | 11 | 30 | 1077 | 1929 | .63 | 9 |
| 41211036 | 1005 | U | B | 11 | 30 | 2948 | 3855 | .90 | 9 |
| 41211260 | 1469 | U | B | 11 | 30 | 2040 | 2906 | .59 | 9 |
| 41211261 | 1088 | U | B | 11 | 30 | 1170 | 1726 | .51 | 9 |
| 41211246 | 652 | U | B | 11 | 30 | 112 | 1623 | 2.32 | 9 |
| 41211067 | 1283 | U | B | 11 | 32 | 776 | 1902 | .88 | 9 |
| 31211408 | 1310 | U | F | 11 | 27 | 3282 | 4582 | .99 | 10 |
| 31211409 | 1242 | U | F | 11 | 27 | 3351 | 4429 | .87 | 10 |
| 41211019 | 1146 | U | F | 11 | 27 | 1532 | 2085 | .48 | 10 |
| 41211078 | 1428 | U | F | 11 | 27 | 5542 | 6992 | 1.02 | 10 |
| 41211123 | 1392 | U | F | 11 | 27 | 943 | 2547 | 1.15 | 10 |
| 42211264 | 2062 | U | F | 11 | 27 | 1365 | 3217 | .90 | 10 |
| 42211283 | 864 | U | F | 11 | 27 | 5562 | 6604 | 1.21 | 10 |
| 42211284 | 864 | U | F | 11 | 27 | 5562 | 6604 | 1.21 | 10 |
| 42211285 | 1544 | U | F | 11 | 27 | 5972 | 7267 | .84 | 10 |
| 31211397 | 1492 | U | G | 11 | 27 | 812 | 2021 | .81 | 11 |
| 41211006 | 1246 | U | G | 11 | 27 | 680 | 1691 | .81 | 11 |
| 41211008 | 1060 | U | G | 11 | 27 | 423 | 1483 | 1.00 | 11 |
| 41211026 | 2412 | U | G | 11 | 27 | 3485 | 5295 | .75 | 11 |
| 41211033 | 1428 | U | G | 11 | 27 | 708 | 1658 | .67 | 11 |
| 41211040 | 1129 | U | G | 11 | 27 | 1019 | 2587 | 1.39 | 11 |
| 41211056 | 1958 | U | G | 11 | 27 | 35 | 3390 | 1.71 | 11 |
| 41211058 | 1201 | U | G | 11 | 27 | 12307 | 14056 | 1.46 | 11 |
| 41211124 | 2397 | U | G | 11 | 27 | 3264 | 5090 | .76 | 11 |
| 41211131 | 1608 | U | G | 11 | 27 | 0 | 1429 | .89 | 11 |
| 41211133 | 2734 | U | G | 11 | 27 | 8225 | 10379 | .79 | 11 |
| 41211168 | 1211 | U | G | 11 | 27 | 0 | 0 | .00 | 11 |
| 41211169 | 1529 | U | G | 11 | 27 | 652 | 1418 | .50 | 11 |
| 41211181 | 1474 | U | G | 11 | 27 | 1509 | 2323 | .55 | 11 |
| 41211188 | 2704 | U | G | 11 | 27 | 5856 | 8149 | .85 | 11 |
| 41211246 | 1576 | U | G | 11 | 27 | 3813 | 5884 | 1.31 | 11 |
| 41211272 | 1519 | U | G | 11 | 27 | 3102 | 3573 | .31 | 11 |
| 41211677 | 1382 | U | G | 11 | 27 | 4369 | 5685 | .95 | 11 |
| 42111021 | 1515 | U | G | 11 | 27 | 1761 | 2505 | .49 | 11 |
| 42211004 | 1692 | U | G | 11 | 27 | 1817 | 3156 | .79 | 11 |
| 42211037 | 1692 | U | G | 11 | 27 | 1348 | 2791 | .85 | 11 |
| 42211088 | 1280 | U | G | 11 | 27 | 319 | 883 | .44 | 11 |
| 42211115 | 1221 | U | G | 11 | 27 | 2569 | 5231 | 2.18 | 11 |
| 42211282 | 1563 | U | G | 11 | 27 | 6058 | 6787 | .47 | 11 |
| 42211011 | 1344 | U | G | 13 | 27 | 2090 | 3322 | .92 | 11 |
| 42211281 | 1897 | U | G | 13 | 27 | 6376 | 7351 | .51 | 11 |
| 12211146 | 1344 | D | F | 19 | 27 | 0 | 816 | .61 | 12 |
| 12211148 | 1420 | D | F | 19 | 27 | 0 | 1152 | .81 | 12 |
| 23211526 | 1159 | D | F | 19 | 27 | 1101 | 2571 | 1.27 | 12 |

28-MAR-86 wall spreadsheet
16:31:30 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211578 | 1127 | D | F | 19 | 27 | 490 | 741 | .22 | 12 |
| 23211505 | 1040 | D | B | 19 | 37 | 1156 | 1866 | .68 | 13 |
| 23211529 | 1456 | D | B | 19 | 38 | 700 | 1507 | .55 | 13 |
| 23211519 | 1141 | D | B | 19 | 40 | 1359 | 2623 | 1.11 | 13 |
| 23211520 | 1437 | D | B | 19 | 40 | 1687 | 3028 | .93 | 13 |
| 23211517 | 1158 | D | B | 19 | 41 | 1795 | 2123 | .28 | 13 |
| 23211522 | 954 | D | B | 19 | 41 | 940 | 2117 | 1.23 | 13 |
| 23211560 | 919 | D | B | 19 | 41 | 735 | 1115 | .41 | 13 |
| 23211563 | 2028 | D | B | 19 | 41 | 0 | 2823 | 1.39 | 13 |
| 13211115 | 2153 | D | B | 20 | 40 | 2246 | 3058 | .38 | 13 |
| 11111145 | 796 | E | F | 19 | 25 | 546 | 424 | -0.15 | 14 |
| 13211123 | 1104 | E | F | 19 | 25 | 255 | 690 | .39 | 14 |
| 13211150 | 1104 | E | F | 19 | 25 | 425 | 760 | .30 | 14 |
| 12211103 | 2546 | E | B | 19 | 33 | 9200 | 13941 | 1.86 | 15 |
| 13211113 | 1262 | E | B | 19 | 33 | 1377 | 1542 | .13 | 15 |
| 23211527 | 1051 | E | B | 19 | 33 | 3131 | 4610 | 1.41 | 15 |
| 23211572 | 1296 | E | B | 19 | 33 | 597 | 2307 | 1.32 | 15 |
| 23211543 | 935 | E | B | 19 | 37 | 1058 | 1525 | .50 | 16 |
| 23211571 | 1127 | E | B | 19 | 37 | 1173 | 1747 | .51 | 16 |
| 13211101 | 1161 | E | B | 19 | 38 | 1084 | 3011 | 1.66 | 16 |
| 13211125 | 1449 | E | B | 19 | 38 | 3588 | 3882 | .20 | 16 |
| 12211107 | 1073 | E | B | 19 | 39 | 815 | 1389 | .53 | 16 |
| 13211118 | 1202 | E | B | 19 | 40 | 1117 | 2640 | 1.27 | 16 |
| 23211531 | 1227 | E | A | 19 | 41 | 2406 | 4246 | 1.50 | 16 |
| 23211516 | 1062 | E | B | 19 | 41 | 3359 | 4566 | 1.14 | 16 |
| 23211553 | 1243 | E | B | 19 | 41 | 912 | 2012 | .88 | 16 |
| 23111573 | 872 | H | F | 19 | 27 | 1024 | 1447 | .49 | 17 |
| 42211035 | 1216 | U | B | 11 | 38 | 2095 | 3122 | .84 | 18 |
| 23211525 | 1701 | D | B | 19 | 33 | 6635 | 10940 | 2.53 | 19 |
| 23211554 | 1205 | D | B | 19 | 33 | 1549 | 2874 | 1.10 | 19 |
| 23211558 | 1170 | D | B | 19 | 33 | 2110 | 3598 | 1.27 | 19 |
| 23211570 | 1236 | D | B | 19 | 33 | 2889 | 5953 | 2.48 | 19 |
| 23211577 | 966 | D | B | 19 | 33 | 1470 | 2126 | .68 | 19 |
| 23211528 | 1221 | D | B | 19 | 34 | 2206 | 3585 | 1.13 | 19 |
| 23211541 | 1092 | D | B | 19 | 34 | 2298 | 3634 | 1.22 | 19 |
| 23211581 | 1090 | D | B | 19 | 36 | 0 | 1501 | 1.38 | 19 |
| 11211136 | 1570 | E | F | 19 | 27 | 336 | 474 | .09 | 20 |
| 12211132 | 700 | E | F | 19 | 27 | 686 | 1107 | .60 | 20 |
| 12211104 | 1818 | E | F | 19 | 28 | 1911 | 3215 | .72 | 20 |
| 41211164 | 1941 | C | C | 11 | 19 | 752 | 1204 | .23 | 21 |
| 31211183 | 2225 | E | E | 11 | 19 | 2755 | 4003 | .56 | 21 |
| 41211055 | 528 | O | O | 11 | 19 | 194 | 328 | .25 | 21 |
| 41211195 | 1535 | U | I | 11 | 19 | 659 | 1582 | .60 | 21 |
| 41111151 | 1209 | U | Z | 11 | 19 | 422 | 805 | .32 | 21 |
| 32211232 | 1419 | U | J | 11 | 21 | 2957 | 3963 | .71 | 21 |
| 41211055 | 1814 | U | F | 11 | 22 | 1336 | 1573 | .13 | 21 |
| 41211091 | 1647 | U | Z | 11 | 23 | 2442 | 3326 | .54 | 22 |
| 31211146 | 1596 | U | C | 11 | 24 | 2438 | 2977 | .34 | 22 |
| 31211221 | 1728 | U | F | 11 | 24 | 937 | 1511 | .33 | 22 |
| 41211166 | 1694 | U | F | 11 | 24 | 1640 | 2568 | .55 | 22 |
| 41211244 | 1667 | U | F | 11 | 24 | 2652 | 3144 | .30 | 22 |

28-MAR-86 wall spreadsheet
16:31:31 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 31211399 | 1034 | U | N | 11 | 24 | 1355 | 3940 | 2.50 | 22 |
| 41211018 | 1810 | U | Z | 11 | 24 | 910 | 2443 | .85 | 22 |
| 41211053 | 2930 | U | Z | 11 | 24 | 3202 | 5625 | .83 | 22 |
| 41211132 | 398 | U | Z | 11 | 24 | 0 | 426 | 1.07 | 22 |
| 32211427 | 1500 | U | E | 11 | 25 | 1066 | 2826 | 1.17 | 22 |
| 31211137 | 1320 | U | F | 11 | 25 | 1525 | 3816 | 1.74 | 22 |
| 31211166 | 1636 | U | F | 11 | 25 | 2793 | 4220 | .87 | 22 |
| 32211423 | 1424 | U | F | 11 | 25 | 1101 | 2046 | .66 | 22 |
| 42211130 | 2317 | U | F | 11 | 25 | 4981 | 8068 | 1.33 | 22 |
| 31211248 | 1328 | U | N | 11 | 25 | 1730 | 4965 | 2.44 | 22 |
| 31211250 | 846 | U | N | 11 | 25 | 1075 | 5266 | 4.95 | 22 |
| 31211153 | 1248 | U | S | 11 | 25 | 1304 | 2398 | .88 | 22 |
| 32211162 | 1856 | U | S | 11 | 25 | 4947 | 4947 | .00 | 22 |
| 32211310 | 1592 | U | S | 11 | 25 | 1521 | 2745 | .77 | 22 |
| 42211003 | 910 | U | Z | 11 | 25 | 1683 | 2099 | .46 | 22 |
| 42211134 | 1135 | U | Z | 11 | 25 | 575 | 680 | .09 | 22 |
| 42211135 | 1135 | U | Z | 11 | 25 | 575 | 680 | .09 | 22 |
| 42211136 | 1135 | U | Z | 11 | 25 | 575 | 680 | .09 | 22 |
| 42211137 | 1135 | U | Z | 11 | 25 | 575 | 680 | .09 | 22 |
| 42211138 | 1135 | U | Z | 11 | 25 | 575 | 680 | .09 | 22 |
| 32211110 | 1639 | U | S | 11 | 26 | 763 | 2311 | .94 | 22 |
| 41211083 | 1312 | U | Z | 11 | 26 | 8145 | 14378 | 4.75 | 22 |
| 41111235 | 1523 | U | G | 13 | 24 | 3652 | 4214 | .37 | 22 |
| 41111237 | 1085 | U | G | 13 | 24 | 2782 | 3567 | .72 | 22 |
| 41111239 | 1656 | U | G | 13 | 24 | 2880 | 3684 | .49 | 22 |
| 42311270 | 1870 | U | Z | 13 | 24 | 1239 | 2539 | .70 | 22 |
| 42111144 | 1320 | U | L | 13 | 26 | 621 | 1540 | .70 | 22 |
| 41211079 | 1088 | U | C | 11 | 27 | 2499 | 3390 | .82 | 23 |
| 41211160 | 1056 | U | D | 11 | 27 | 594 | 2142 | 1.47 | 23 |
| 31211177 | 2787 | U | E | 11 | 27 | 4593 | 6073 | .53 | 23 |
| 41211009 | 1203 | U | I | 11 | 27 | 636 | 1573 | .78 | 23 |
| 31211341 | 1762 | U | R | 11 | 27 | 4006 | 4639 | .36 | 23 |
| 41211052 | 1650 | U | Z | 11 | 27 | 539 | 2855 | 1.40 | 23 |
| 41211094 | 1832 | U | Z | 11 | 27 | 0 | 1287 | .70 | 23 |
| 41211097 | 1438 | U | Z | 11 | 27 | 959 | 2471 | 1.05 | 23 |
| 41211173 | 2541 | U | Z | 11 | 27 | 4876 | 11059 | 2.43 | 23 |
| 42211099 | 1012 | U | A | 11 | 30 | 2960 | 4712 | 1.73 | 24 |
| 42211148 | 1189 | U | A | 11 | 30 | 4262 | 5635 | 1.15 | 24 |
| 41211303 | 1654 | U | G | 11 | 30 | 1986 | 3350 | .82 | 24 |
| 41211073 | 1888 | U | Z | 11 | 30 | 751 | 2207 | .77 | 24 |
| 32211289 | 558 | U | CC | 11 | 31 | 1485 | 2643 | 2.08 | 24 |
| 42211147 | 2603 | U | G | 11 | 31 | 492 | 1997 | .58 | 24 |
| 41211093 | 2733 | U | K | 11 | 31 | 5263 | 7760 | .91 | 24 |
| 32211289 | 1512 | U | Z | 11 | 31 | 3940 | 5965 | 1.34 | 24 |
| 42211030 | 1296 | U | Z | 11 | 31 | 2222 | 3161 | .72 | 24 |
| 42211262 | 1296 | U | Z | 11 | 31 | 2334 | 3364 | .79 | 24 |
| 42211263 | 1296 | U | Z | 11 | 31 | 2334 | 3364 | .79 | 24 |
| 42211041 | 1528 | U | Z | 11 | 32 | 2630 | 4839 | 1.45 | 24 |
| 42211042 | 1528 | U | Z | 11 | 32 | 2630 | 4839 | 1.45 | 24 |
| 42211219 | 1576 | U | J | 11 | 38 | 2945 | 5388 | 1.55 | 25 |
| 41211119 | 1492 | U | Z | 11 | 38 | 1114 | 3290 | 1.46 | 25 |

28-MAR-86 wall spreadsheet
16:31:31 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 42211110 | 1224 | U | B | 11 | 39 | 818 | 3064 | 1.83 | 25 |
| 42211111 | 1854 | U | B | 11 | 39 | 1229 | 3626 | 1.29 | 25 |
| 41211161 | 1754 | U | B | 11 | 41 | 650 | 2350 | .97 | 25 |
| 42211044 | 1000 | E | Z | 13 | 27 | 360 | 594 | .23 | 25 |
| 12211110 | 1237 | D | B | 19 | 25 | 2165 | 2932 | .62 | 26 |
| 23311510 | 1119 | D | B | 19 | 25 | 2925 | 3302 | .34 | 26 |
| 12211130 | 1390 | D | G | 19 | 25 | 2805 | 3265 | .33 | 26 |
| 23211561 | 1182 | D | C | 19 | 26 | 1084 | 1453 | .31 | 26 |
| 12211131 | 1034 | E | G | 19 | 23 | 2899 | 3370 | .46 | 26 |
| 11211139 | 1218 | E | S | 19 | 25 | 1150 | 1225 | .06 | 26 |
| 11111142 | 1098 | E | S | 19 | 26 | 800 | 1022 | .20 | 26 |
| 11111140 | 1098 | H | F | 19 | 26 | 1192 | 1526 | .30 | 26 |
| 11111143 | 978 | H | F | 19 | 26 | 918 | 651 | -0.27 | 26 |
| 11111153 | 1577 | H | F | 19 | 26 | 1476 | 1175 | -0.19 | 26 |
| 31211201 | 2880 | U | Z | 19 | 25 | 1706 | 3079 | .48 | 26 |
| 11111106 | 1052 | D | F | 20 | 25 | 2312 | 1867 | -0.42 | 26 |
| 11211122 | 2959 | D | F | 20 | 26 | 1935 | 1712 | -0.08 | 26 |
| 12211149 | 1296 | E | E | 19 | 27 | 2393 | 2884 | .38 | 27 |
| 23211513 | 1012 | E | G | 19 | 27 | 0 | 1189 | 1.17 | 27 |
| 11211141 | 1420 | E | S | 19 | 27 | 975 | 1115 | .10 | 27 |
| 11211144 | 1791 | E | S | 19 | 27 | 978 | 1333 | .20 | 27 |
| 12111117 | 1539 | D | F | 19 | 33 | 3412 | 4272 | .56 | 28 |
| 23211536 | 1162 | D | G | 19 | 33 | 0 | 1423 | 1.22 | 28 |
| 23211507 | 1522 | D | T | 19 | 33 | 1165 | 2819 | 1.09 | 28 |
| 23211509 | 1070 | D | F | 19 | 34 | 767 | 1166 | .37 | 28 |
| 12211121 | 1132 | E | F | 19 | 33 | 3558 | 4747 | 1.05 | 28 |
| 23211550 | 793 | E | F | 19 | 33 | 1888 | 2288 | .50 | 28 |
| 13211119 | 1566 | E | S | 19 | 33 | 3910 | 4275 | .23 | 28 |
| 12211151 | 988 | E | A | 19 | 34 | 3314 | 4320 | 1.02 | 28 |
| 12111152 | 1540 | E | B | 19 | 34 | 3315 | 4594 | .83 | 28 |
| 12211148 | 423 | BB | M | 0 | 19 | 0 | 492 | 1.16 | 99 |
| 42211085 | 1876 | U | Z | 11 | 35 | 4500 | 7763 | 1.74 | 99 |
| 42211121 | 1323 | U | Z | 11 | 35 | 1947 | 3097 | .87 | 99 |
| 41211054 | 2445 | U | B | 11 | 36 | 2703 | 5345 | 1.08 | 99 |
| 41311167 | 2299 | U | T | 11 | 49 | 408 | 2723 | 1.01 | 99 |
| 12211100 | 1039 | E | F | 15 | 26 | 1325 | 1373 | .05 | 99 |
| 23111521 | 886 | H | F | 17 | 27 | 1024 | 1461 | .49 | 99 |
| 23211538 | 895 | U | F | 17 | 26 | 0 | 340 | .38 | 99 |
| 31211265 | 2590 | C | C | 19 | 19 | 2314 | 2649 | .13 | 99 |
| 23211537 | 1462 | D | Z | 19 | 29 | 587 | 730 | .10 | 99 |
| 23211524 | 1415 | D | F | 19 | 30 | 3050 | 3542 | .35 | 99 |
| 23211549 | 2267 | D | F | 19 | 31 | 2782 | 5288 | 1.11 | 99 |
| 23211552 | 1962 | D | Z | 19 | 32 | 724 | 2087 | .69 | 99 |
| 23211551 | 1417 | D | F | 19 | 38 | 1547 | 2065 | .37 | 99 |
| 23211518 | 1411 | E | E | 19 | 19 | 0 | 0 | .00 | 99 |
| 13211124 | 3760 | E | B | 19 | 31 | 3615 | 6208 | .69 | 99 |
| 23211539 | 1944 | E | Z | 19 | 31 | 1250 | 2358 | .57 | 99 |
| 23211545 | 1451 | E | Z | 19 | 32 | 552 | 1257 | .49 | 99 |
| 12211147 | 1354 | E | B | 19 | 43 | 738 | 1899 | .86 | 99 |
| 12211114 | 1143 | D | C | 20 | 31 | 1342 | 1511 | .15 | 99 |
| 23211515 | 961 | G | B | 23 | 37 | 817 | 1332 | .54 | 99 |

28-MAR-86 wall spreadsheet
16:31:31 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23111574 | 1656 | Z | Z | 25 | 32 | 690 | 1592 | .54 | 99 |

NUMBER OF CASES READ = 358 NUMBER OF CASES LISTED = 358

## BASEMENT WALL SPREADSHEET

**Basement Wall Type Code:**

A Strapped wall

B Double wall

C 2 X 6, 24" on center, advanced framing

D 2 X 6, 24" on center, standard framing

E 2 X 6, 16" on center, standard framing

F 2 X 6, 24" on center, foam outside

G 2 X 6, 24" on center, foam inside

H 2 X 4, 24" on center, foam outside

I 2 X 4, 24" on center, foam inside

J Foam blocks

K 2 X 8, 24" on center, advanced framing

L 2 X 8, 16" on center, standard framing

M All weather wood foundation

N Cement, foam outside

O Cement, batt inside

P Cement, foam outside, batt inside

Q 2 X 6, 24" on center, mod. advanced framing

R 2 X 6, 24" on center, mod. advanced framing with foam inside

S 2 X 6, 24" on center, mod. advanced framing with foam outside

T Larsen truss, batt insulation

U 2 X 4, 16" on center, standard framing

V No insulation on foundation

X Missing

Z Other

AA 2 X 4, 24" on center, standard framing

BB Cement, no insulation

26-MAR-86 basement wall spreadsheet
13:52:26 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 12211133 | 172 | BB | | O | 0 | 11 | 0 | 99 | .58 | 1 |
| 12111117 | 476 | BB | | O | 0 | 12 | 1297 | 1865 | 1.19 | 1 |
| 12211151 | 735 | BB | | O | 0 | 12 | 747 | 1032 | .39 | 1 |
| 12111152 | 646 | BB | | O | 0 | 13 | 443 | 883 | .68 | 1 |
| 13211124 | 1656 | BB | | N | 0 | 11 | 0 | 1232 | .74 | 2 |
| 12211104 | 1024 | BB | | N | 0 | 12 | 0 | 603 | .59 | 2 |
| 41211019 | 688 | V | | N | 0 | 10 | 0 | 1365 | 1.98 | 2 |
| 41211052 | 1200 | V | | N | 0 | 10 | 0 | 1800 | 1.50 | 2 |
| 41211069 | 580 | V | | N | 0 | 10 | 0 | 794 | 1.37 | 2 |
| 41211123 | 422 | V | | N | 0 | 10 | 0 | 198 | .47 | 2 |
| 41211124 | 864 | V | | N | 0 | 10 | 0 | 547 | .63 | 2 |
| 41211181 | 1325 | V | | N | 0 | 10 | 0 | 1239 | .94 | 2 |
| 42211004 | 333 | V | | N | 0 | 10 | 0 | 521 | 1.56 | 2 |
| 42211011 | 608 | V | | N | 0 | 10 | 0 | 823 | 1.35 | 2 |
| 42211037 | 333 | V | | N | 0 | 10 | 0 | 495 | 1.49 | 2 |
| 41211170 | 616 | V | | N | 0 | 11 | 0 | 312 | .51 | 2 |
| 23211519 | 481 | V | | O | 0 | 11 | 0 | 421 | .88 | 2 |
| 23211520 | 481 | V | | O | 0 | 11 | 0 | 390 | .81 | 2 |
| 41211254 | 424 | V | | O | 0 | 11 | 0 | 180 | .42 | 2 |
| 41211255 | 1152 | V | | O | 0 | 11 | 0 | 417 | .36 | 2 |
| 41211266 | 856 | V | | O | 0 | 11 | 0 | 192 | .22 | 2 |
| 41211267 | 1212 | V | | O | 0 | 11 | 90 | 489 | .33 | 2 |
| 23211557 | 320 | V | | O | 0 | 11 | 0 | 291 | .91 | 2 |
| 23211577 | 1056 | V | | O | 0 | 13 | 182 | 815 | .60 | 2 |
| 41211158 | 1028 | V | | O | 0 | 13 | 0 | 604 | .59 | 2 |
| 42211147 | 1016 | V | | O | 0 | 13 | 0 | 722 | .71 | 2 |
| 42211264 | 1820 | V | | O | 0 | 13 | 624 | 1188 | .31 | 2 |
| 42211281 | 1136 | V | | O | 0 | 13 | 0 | 681 | .60 | 2 |
| 42211282 | 770 | V | | O | 0 | 13 | 0 | 511 | .66 | 2 |
| 42211283 | 1135 | V | | O | 0 | 13 | 0 | 561 | .49 | 2 |
| 42211284 | 1135 | V | | O | 0 | 13 | 0 | 561 | .49 | 2 |
| 42211285 | 1078 | V | | O | 0 | 13 | 0 | 294 | .27 | 2 |
| 12211146 | 292 | BB | | O | 0 | 18 | 0 | 120 | .41 | 3 |
| 12211114 | 947 | BB | | O | 0 | 19 | 444 | 693 | .26 | 3 |
| 23111574 | 453 | BB | | O | 0 | 19 | 0 | 451 | 1.00 | 3 |
| 23211524 | 399 | BB | | O | 0 | 19 | 0 | 219 | .55 | 3 |
| 23211563 | 1175 | BB | | O | 0 | 19 | 0 | 1129 | .96 | 3 |
| 23211545 | 433 | BB | | O | 0 | 19 | 0 | 457 | 1.06 | 3 |
| 11211122 | 772 | BB | | O | 0 | 20 | 427 | 484 | .07 | 3 |
| 23211531 | 595 | V | | O | 0 | 19 | 123 | 523 | .67 | 3 |
| 42111144 | 506 | V | | O | 0 | 19 | 0 | 511 | 1.01 | 3 |
| 42211030 | 1532 | V | | O | 0 | 19 | 52 | 971 | .60 | 3 |
| 42211141 | 264 | V | | O | 0 | 19 | 0 | 273 | 1.03 | 3 |
| 42211142 | 506 | V | | O | 0 | 19 | 0 | 514 | 1.02 | 3 |
| 42211143 | 506 | V | | O | 0 | 19 | 0 | 591 | 1.17 | 3 |
| 42211145 | 506 | V | | O | 0 | 19 | 0 | 512 | 1.01 | 3 |
| 42211262 | 1532 | V | | O | 0 | 19 | 52 | 971 | .60 | 3 |
| 42211263 | 1532 | V | | O | 0 | 19 | 52 | 971 | .60 | 3 |
| 42211304 | 506 | V | | O | 0 | 19 | 0 | 512 | 1.01 | 3 |
| 42311224 | 617 | V | | O | 0 | 19 | 137 | 384 | .40 | 3 |
| 13211125 | 485 | BB | | O | 1 | 20 | 258 | 316 | .12 | 3 |

26-MAR-86 basement wall spreadsheet
13:52:27 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211133 | 668 | N | N | 4 | 10 | 512 | 1131 | .93 | 4 |
| 41211058 | 841 | N | N | 5 | 10 | 393 | 724 | .39 | 4 |
| 41211086 | 496 | N | N | 5 | 10 | 280 | 559 | .56 | 4 |
| 41211106 | 540 | N | N | 5 | 10 | 562 | 1158 | 1.10 | 4 |
| 41311189 | 141 | N | N | 5 | 10 | 369 | 401 | .23 | 4 |
| 12211110 | 1185 | M | M | 10 | 19 | 405 | 523 | .10 | 5 |
| 41211089 | 218 | M | M | 11 | 19 | 152 | 187 | .16 | 5 |
| 42211015 | 936 | M | M | 11 | 19 | 0 | 300 | .32 | 5 |
| 42211017 | 496 | M | M | 11 | 19 | 98 | 131 | .07 | 5 |
| 42211035 | 812 | M | M | 11 | 19 | 242 | 347 | .13 | 5 |
| 41211220 | 288 | M | M | 11 | 22 | 75 | 306 | .80 | 5 |
| 23211509 | 470 | O | O | 11 | 19 | 162 | 292 | .28 | 6 |
| 23211515 | 1078 | O | O | 11 | 19 | 454 | 558 | .10 | 6 |
| 23211551 | 466 | O | O | 11 | 19 | 263 | 378 | .25 | 6 |
| 23211570 | 1062 | O | O | 11 | 19 | 1148 | 1893 | .70 | 6 |
| 31211134 | 724 | O | O | 11 | 19 | 205 | 369 | .23 | 6 |
| 41211197 | 652 | O | O | 11 | 19 | 145 | 215 | .11 | 6 |
| 41211245 | 704 | O | O | 11 | 19 | 380 | 418 | .05 | 6 |
| 41211260 | 1264 | O | O | 11 | 19 | 2107 | 2941 | .66 | 6 |
| 42211003 | 1120 | O | O | 11 | 19 | 350 | 316 | -0.03 | 6 |
| 42211096 | 840 | O | O | 11 | 19 | 353 | 380 | .03 | 6 |
| 42211148 | 784 | O | O | 11 | 19 | 162 | 224 | .08 | 6 |
| 42211206 | 1024 | O | O | 11 | 19 | 225 | 358 | .13 | 6 |
| 42211241 | 496 | O | O | 11 | 19 | 328 | 1066 | 1.49 | 6 |
| 42311242 | 496 | O | O | 11 | 19 | 328 | 1068 | 1.49 | 6 |
| 23211578 | 170 | O | O | 11 | 19 | 41 | 55 | .08 | 6 |
| 11211136 | 382 | BB | Z | 0 | 10 | 0 | 327 | .86 | 7 |
| 41211268 | 1040 | U | O | 0 | 11 | 0 | 308 | .30 | 7 |
| 41211073 | 1040 | V | U | 0 | 11 | 0 | 595 | .57 | 7 |
| 12211121 | 1400 | X | X | 0 | 12 | 695 | 1373 | .48 | 7 |
| 42111021 | 380 | Z | N | 0 | 10 | 0 | 1235 | 3.25 | 7 |
| 13211119 | 620 | BB | O | 0 | 15 | 1153 | 1932 | 1.26 | 8 |
| 41211048 | 570 | V | Z | 0 | 16 | 0 | 635 | 1.11 | 8 |
| 41211049 | 908 | V | Z | 0 | 16 | 0 | 612 | .67 | 8 |
| 41211244 | 471 | V | Z | 0 | 16 | 645 | 957 | .66 | 8 |
| 23211537 | 624 | BB | U | 0 | 17 | 0 | 845 | 1.35 | 9 |
| 12211149 | 228 | BB | M | 0 | 19 | 1828 | 2113 | 1.25 | 9 |
| 11111106 | 322 | BB | M | 0 | 20 | 72 | 123 | .16 | 9 |
| 23211502 | 1288 | BB | Z | 0 | 22 | 0 | 602 | .47 | 9 |
| 23211529 | 736 | V | Z | 0 | 22 | 0 | 0 | .00 | 9 |
| 13211113 | 888 | V | M | 2 | 19 | 3420 | 2347 | -1.21 | 9 |
| 13211118 | 933 | BB | Z | 0 | 28 | 103 | 1022 | .98 | 10 |
| 12211103 | 1361 | BB | M | 0 | 30 | 3550 | 3897 | .25 | 10 |
| 12211107 | 1298 | BB | O | 0 | 30 | 0 | 706 | .54 | 10 |
| 13211115 | 262 | BB | O | 0 | 30 | 406 | 586 | .69 | 10 |
| 13211101 | 1168 | BB | A | . | 19 | 280 | 1093 | .70 | 99 |
| 23111512 | 420 | O | B | . | 0 | 103 | 0 | -0.25 | 99 |
| 41211203 | 191 | V | N | 0 | 5 | 0 | 110 | .58 | 99 |
| 41211202 | 95 | V | Z | 0 | 5 | 0 | 66 | .69 | 99 |
| 42311270 | 1128 | V | P | 0 | 23 | 0 | 1141 | 1.01 | 99 |
| 42211129 | 496 | V | Z | 0 | 24 | 0 | 1226 | 2.47 | 99 |

26-MAR-86 basement wall spreadsheet
13:52:27 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPRVAL | MCSRVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211516 | 553 | V | B | 0 | 38 | 429 | 1059 | 1.14 | 99 |
| 31211341 | 914 | N | O | 6 | 11 | 124 | 1040 | 1.00 | 99 |
| 42211130 | 800 | N | N | 8 | 15 | 673 | 1141 | .59 | 99 |
| 12211100 | 1406 | M | M | 10 | 26 | 152 | 278 | .09 | 99 |
| 41211126 | 200 | N | N | 10 | 10 | 0 | 0 | .00 | 99 |
| 23211539 | 870 | N | N | 10 | 15 | 890 | 1340 | .52 | 99 |
| 23211544 | 470 | N | N | 10 | 15 | 379 | 467 | .19 | 99 |
| 23211535 | 396 | N | N | 10 | 18 | 0 | 530 | 1.34 | 99 |
| 23211518 | 1075 | N | O | 10 | 19 | 184 | 647 | .43 | 99 |
| 23211517 | 1436 | O | O | 10 | 30 | 364 | 1313 | .66 | 99 |
| 23211553 | 837 | O | O | 10 | 30 | 0 | 393 | .47 | 99 |
| 23211525 | 395 | Z | Z | 10 | 22 | 317 | 448 | .33 | 99 |
| 42211115 | 816 | M | M | 11 | 13 | 86 | 286 | .25 | 99 |
| 31211270 | 172 | N | N | 11 | 10 | 161 | 222 | .35 | 99 |
| 31211257 | 648 | N | N | 11 | 11 | 0 | 100 | .15 | 99 |
| 41211195 | 516 | N | N | 11 | 11 | 0 | 0 | .00 | 99 |
| 32211289 | 288 | N | Z | 11 | 12 | 675 | 1514 | 2.91 | 99 |
| 23211530 | 252 | O | O | 11 | 11 | 118 | 118 | .00 | 99 |
| 31211166 | 1170 | O | O | 11 | 11 | 1952 | 2114 | .14 | 99 |
| 41211192 | 605 | O | O | 11 | 11 | 0 | 0 | .00 | 99 |
| 41211193 | 605 | O | O | 11 | 11 | 0 | 0 | .00 | 99 |
| 41211047 | 560 | O | O | 11 | 13 | 310 | 355 | .08 | 99 |
| 41211056 | 1088 | O | O | 11 | 13 | 0 | 100 | .09 | 99 |
| 41211156 | 440 | O | O | 11 | 13 | 106 | 133 | .06 | 99 |
| 41211157 | 144 | O | O | 11 | 13 | 40 | 53 | .09 | 99 |
| 31211145 | 1490 | O | N | 11 | 15 | 103 | 141 | .03 | 99 |
| 23211558 | 390 | O | P | 11 | 16 | 0 | 444 | 1.14 | 99 |
| 23211550 | 919 | O | P | 11 | 17 | 0 | 644 | .70 | 99 |
| 42211041 | 396 | O | Z | 11 | 18 | 388 | 682 | .74 | 99 |
| 42211042 | 396 | O | Z | 11 | 18 | 388 | 682 | .74 | 99 |
| 31211200 | 617 | O | N | 11 | 19 | 299 | 437 | .22 | 99 |
| 41211166 | 568 | O | N | 11 | 20 | 431 | 1200 | 1.35 | 99 |
| 41211132 | 432 | O | Z | 11 | 24 | 0 | 308 | .71 | 99 |
| 42211121 | 512 | O | Z | 11 | 26 | 505 | 1210 | 1.38 | 99 |
| 41311205 | 1264 | O | J | 11 | 29 | 5698 | 8824 | 2.47 | 99 |
| 31211308 | 408 | O | O | 11 | 29 | 100 | 374 | .67 | 99 |
| 32211299 | 872 | O | M | 11 | 31 | 2723 | 2778 | .06 | 99 |
| 31111218 | 352 | U | Q | 11 | 19 | 1006 | 1093 | .25 | 99 |
| 23111514 | 449 | Z | Z | 12 | 10 | 955 | 532 | -0.94 | 99 |
| 41111178 | 256 | O | Z | 13 | 18 | 0 | 21 | .08 | 99 |
| 23111523 | 468 | Z | V | 15 | 0 | 403 | 0 | -0.86 | 99 |
| 23211541 | 460 | D | D | 19 | 19 | 0 | 0 | .00 | 99 |
| 23211516 | 608 | E | N | 19 | 16 | 1819 | 1001 | -1.35 | 99 |
| 12211131 | 468 | M | M | 19 | 30 | 3496 | 3571 | .16 | 99 |
| 23211526 | 538 | O | Z | 19 | 17 | 284 | 1182 | 1.67 | 99 |
| 23211565 | 906 | O | Z | 19 | 20 | 1957 | 2825 | .96 | 99 |
| 23211528 | 629 | Z | Z | 22 | 33 | 187 | 334 | .23 | 99 |

NUMBER OF CASES READ = 149 NUMBER OF CASES LISTED = 149

## WINDOW SPREADSHEET

**Window Type Code:**

A Aluminum slider
B Wood slider
C Aluminum casement
D Wood casement
E Aluminum fixed
F Wood fixed
G Aluminum
H Wood
I Aluminum, thermal break
J Aluminum, heat mirror
K Wood, heat mirror
L Wood, awning
M Aluminum, awning
N Wood, double hung
O Aluminum, double hung
X Missing
Z Other

26-MAR-86 window spreadsheet
14:26:ØØ Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | PANES | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 12211ØØ8 | 1Ø6 | A | I | .47Ø | .37Ø | 3 | 851 | 1175 | 3.Ø6 | 1 |
| 12211121 | 262 | B | K | .47Ø | .3ØØ | 3 | 3439 | 4Ø34 | 2.27 | 1 |
| 23211516 | 171 | B | B | .47Ø | .368 | 3 | 1441 | 1775 | 1.95 | 1 |
| 23211548 | 223 | D | D | .47Ø | .35Ø | 3 | 3995 | 4619 | 2.8Ø | 1 |
| 23211513 | 259 | D | D | .47Ø | .37Ø | 3 | Ø | 237 | .92 | 1 |
| 23211577 | 85 | D | D | .47Ø | .37Ø | 3 | 126Ø | 1624 | 4.28 | 1 |
| 13211Ø1 | 139 | H | D | .47Ø | .31Ø | 3 | 66Ø | 1649 | 7.12 | 1 |
| 12211149 | 156 | I | I | .47Ø | .35Ø | 3 | 715 | 1142 | 2.74 | 1 |
| 12211Ø3 | 527 | K | K | .47Ø | .25Ø | 3 | 8ØØØ | 11ØØØ | 5.69 | 1 |
| 12211133 | 18Ø | A | I | .56Ø | .29Ø | 3 | 1372 | 2234 | 4.79 | 2 |
| 12111152 | 192 | A | I | .56Ø | .37Ø | 3 | 266Ø | 2946 | 1.49 | 2 |
| 12211147 | 136 | A | I | .56Ø | .37Ø | 3 | 778 | 1272 | 3.63 | 2 |
| 13211150 | 194 | A | I | .56Ø | .37Ø | 3 | 952 | 1249 | 1.53 | 2 |
| 12211146 | 22Ø | A | I | .56Ø | .39Ø | 3 | Ø | Ø | .ØØ | 2 |
| 41211Ø72 | 197 | H | H | .56Ø | .34Ø | 3 | 2Ø35 | 2488 | 2.3Ø | 3 |
| 41211Ø19 | 366 | H | H | .56Ø | .38Ø | 3 | 4Ø43 | 54Ø4 | 3.72 | 3 |
| 41211Ø36 | 278 | H | H | .56Ø | .38Ø | 3 | 3745 | 4596 | 3.Ø6 | 3 |
| 41211123 | 29Ø | H | H | .56Ø | .38Ø | 3 | Ø | 774 | 2.67 | 3 |
| 41211133 | 494 | H | H | .56Ø | .38Ø | 3 | 51ØØ | 695Ø | 3.74 | 3 |
| 41211234 | 321 | H | H | .56Ø | .38Ø | 3 | 8Ø75 | 1Ø488 | 7.52 | 3 |
| 41211274 | 168 | H | H | .56Ø | .38Ø | 3 | 23Ø8 | 2684 | 2.24 | 3 |
| 41211149 | 478 | H | K | .56Ø | .34Ø | 3 | 6662 | 9198 | 5.31 | 4 |
| 41211260 | 393 | H | K | .56Ø | .34Ø | 3 | 6168 | 88Ø6 | 6.71 | 4 |
| 41211303 | 484 | H | K | .56Ø | .34Ø | 3 | 9ØØØ | 1277Ø | 7.79 | 4 |
| 42211Ø43 | 16Ø | H | K | .56Ø | .38Ø | 3 | 1215 | 158Ø | 2.28 | 4 |
| 41211ØØ8 | 161 | H | K | .56Ø | .48Ø | 3 | 1111 | 2ØØ9 | 5.58 | 4 |
| 12211ØØ8 | 116 | A | A | .Ø56 | .35Ø | 3 | 598 | 9Ø7 | 2.66 | 5 |
| 41211140 | 223 | H | Z | .56Ø | .34Ø | 2 | 34Ø7 | 3785 | 1.7Ø | 5 |
| 41211171 | 433 | H | Z | .56Ø | .34Ø | 2 | Ø | 124Ø | 2.86 | 5 |
| 41311205 | 318 | H | J | .56Ø | .36Ø | 3 | 2546 | 3856 | 4.12 | 5 |
| 12111117 | 189 | A | F | .56Ø | .37Ø | 3 | 1334 | 146Ø | .67 | 6 |
| 12211151 | 146 | B | I | .56Ø | .38Ø | 3 | 296Ø | 25ØØ | -3.15 | 6 |
| 42211Ø35 | 268 | D | D | .56Ø | .48Ø | 2 | 1241 | 1316 | .28 | 7 |
| 41211Ø53 | 5ØØ | H | H | .56Ø | .48Ø | 2 | 6581 | 7199 | 1.24 | 7 |
| 41211163 | 167 | H | H | .56Ø | .48Ø | 2 | 1383 | 1538 | .93 | 7 |
| 42211115 | 267 | H | H | .56Ø | .48Ø | 2 | 3Ø6 | 726 | 1.57 | 7 |
| 42211116 | 224 | H | H | .56Ø | .48Ø | 2 | 16Ø1 | 2161 | 2.5Ø | 7 |
| 41211127 | 198 | I | I | .56Ø | .48Ø | 3 | 1743 | 2Ø72 | 1.66 | 7 |
| 42211134 | 22Ø | I | J | .68Ø | .37Ø | 3 | 14ØØ | 17ØØ | 1.36 | 8 |
| 42211136 | 22Ø | I | J | .68Ø | .37Ø | 3 | 14ØØ | 17ØØ | 1.36 | 8 |
| 42211137 | 22Ø | I | J | .68Ø | .37Ø | 3 | 14ØØ | 17ØØ | 1.36 | 8 |
| 42211138 | 22Ø | I | J | .68Ø | .37Ø | 3 | 14ØØ | 17ØØ | 1.36 | 8 |
| 31211271 | 242 | A | A | .7ØØ | .37Ø | 3 | 925 | 2ØØ6 | 4.47 | 9 |
| 31211338 | 162 | A | A | .7ØØ | .39Ø | 3 | 1196 | 196Ø | 4.72 | 9 |
| 32211426 | 171 | A | A | .7ØØ | .44Ø | 3 | 15Ø9 | 2393 | 5.17 | 9 |
| 31211338 | 8Ø | O | O | .7ØØ | .39Ø | 3 | 589 | 964 | 4.69 | 9 |
| 41211ØØ5 | 122 | A | A | .74Ø | .35Ø | 3 | 1213 | 137Ø | 1.29 | 9 |
| 41111237 | 189 | A | A | .74Ø | .41Ø | 3 | 874 | 1553 | 3.59 | 9 |
| 41211Ø47 | 4Ø2 | A | A | .74Ø | .41Ø | 3 | 2882 | 394Ø | 2.63 | 9 |
| 41211160 | 16Ø | A | A | .74Ø | .41Ø | 3 | 596 | 1311 | 4.47 | 9 |
| 41211183 | 143 | A | A | .74Ø | .41Ø | 3 | 698 | 1169 | 3.29 | 9 |

24-APR-86 window spreadsheet
12:09:57 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | PANES | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 42211141 | 96 | A | A | .740 | .410 | 3 | 497 | 786 | 3.01 | 9 |
| 42211141 | 33 | A | A | .740 | .410 | 3 | 178 | 419 | 7.30 | 9 |
| 42211141 | 75 | E | E | .740 | .310 | 3 | 160 | 222 | .83 | 9 |
| 31211403 | 448 | A | I | .700 | .470 | 2 | 3245 | 4316 | 2.39 | 10 |
| 31211260 | 197 | A | I | .700 | .500 | 2 | 856 | 1178 | 1.63 | 10 |
| 31211270 | 232 | G | I | .700 | .370 | 2 | 0 | 2474 | 10.66 | 10 |
| 31211397 | 181 | G | I | .700 | .380 | 2 | 1092 | 1798 | 3.90 | 10 |
| 31211253 | 397 | G | I | .700 | .470 | 2 | 0 | 240 | .60 | 10 |
| 41211039 | 259 | G | I | .740 | .540 | 2 | 1656 | 2532 | 3.38 | 10 |
| 41211122 | 201 | G | I | .740 | .540 | 2 | 1184 | 1576 | 1.95 | 10 |
| 41211124 | 382 | G | I | .740 | .540 | 2 | 2400 | 2659 | .68 | 10 |
| 41211201 | 248 | G | I | .740 | .540 | 2 | 1733 | 2240 | 2.04 | 10 |
| 41211251 | 188 | G | I | .740 | .540 | 2 | 850 | 1400 | 2.93 | 10 |
| 41211252 | 188 | G | I | .740 | .540 | 2 | 850 | 1400 | 2.93 | 10 |
| 41211254 | 194 | G | I | .740 | .540 | 2 | 1024 | 1395 | 1.91 | 10 |
| 41211006 | 217 | G | I | .740 | .550 | 2 | 1759 | 1925 | .76 | 10 |
| 41211013 | 167 | G | I | .740 | .550 | 2 | 810 | 1374 | 3.38 | 10 |
| 41211048 | 193 | G | I | .740 | .560 | 2 | 990 | 1283 | 1.52 | 10 |
| 41211084 | 130 | G | I | .740 | .560 | 2 | 750 | 1648 | 6.91 | 10 |
| 41211132 | 268 | G | I | .740 | .560 | 2 | 0 | 590 | 2.20 | 10 |
| 41211203 | 287 | G | I | .740 | .560 | 2 | 1813 | 2614 | 2.79 | 10 |
| 41211204 | 246 | G | I | .740 | .560 | 2 | 1696 | 2271 | 2.34 | 10 |
| 41211225 | 287 | G | I | .740 | .560 | 2 | 1686 | 2792 | 3.85 | 10 |
| 41211227 | 251 | G | I | .740 | .560 | 2 | 1349 | 2128 | 3.10 | 10 |
| 41311205 | 35 | G | I | .740 | .560 | 2 | 510 | 570 | 1.71 | 10 |
| 41211128 | 283 | G | I | .740 | .740 | 2 | 0 | 0 | .00 | 10 |
| 31211408 | 175 | A | J | .700 | .370 | 2 | 1118 | 2557 | 8.22 | 11 |
| 31211409 | 223 | A | I | .700 | .380 | 2 | 1181 | 3084 | 8.53 | 11 |
| 31211257 | 573 | G | J | .700 | .470 | 2 | 1251 | 1829 | 1.01 | 11 |
| 31211182 | 226 | D | D | .700 | .440 | 2 | 0 | 100 | .44 | 12 |
| 31211341 | 555 | H | H | .700 | .330 | 2 | 7505 | 10089 | 4.66 | 12 |
| 31211106 | 266 | H | H | .700 | .350 | 2 | 2109 | 2864 | 2.84 | 12 |
| 31211135 | 252 | H | H | .700 | .450 | 2 | 0 | 180 | .71 | 12 |
| 32211423 | 363 | H | H | .700 | .470 | 2 | 0 | 320 | .88 | 12 |
| 31211106 | 159 | H | H | .700 | .470 | 2 | 1261 | 1377 | .73 | 12 |
| 32211299 | 276 | H | H | .700 | .490 | 2 | 0 | 700 | 2.54 | 12 |
| 31211395 | 288 | H | H | .700 | .500 | 2 | 2400 | 3156 | 2.62 | 12 |
| 31211106 | 268 | H | H | .700 | .550 | 2 | 2130 | 2324 | .72 | 12 |
| 31211248 | 241 | G | H | .700 | .450 | 2 | 1200 | 1800 | 2.49 | 13 |
| 31211399 | 159 | G | H | .700 | .450 | 2 | 1100 | 1590 | 3.08 | 13 |
| 31211101 | 363 | G | H | .700 | .470 | 2 | 1850 | 5933 | 11.25 | 13 |
| 31211145 | 535 | G | H | .700 | .470 | 2 | 1360 | 1360 | .00 | 13 |
| 31211166 | 366 | G | H | .700 | .490 | 2 | 1356 | 2695 | 3.66 | 13 |
| 41211056 | 338 | G | H | .740 | .480 | 2 | 0 | 1500 | 4.44 | 13 |
| 41211081 | 364 | G | H | .740 | .480 | 2 | 4625 | 7666 | 8.35 | 13 |
| 41211677 | 180 | G | H | .740 | .480 | 2 | 2175 | 2448 | 1.52 | 13 |
| 41211023 | 185 | G | H | .740 | .490 | 2 | 958 | 2432 | 7.97 | 13 |
| 41211086 | 435 | G | H | .740 | .560 | 2 | 3402 | 5902 | 5.75 | 13 |
| 31211155 | 365 | A | I | .700 | .430 | 3 | 1855 | 3654 | 4.93 | 14 |
| 31211145 | 49 | A | I | .700 | .470 | 3 | 167 | 370 | 4.14 | 14 |
| 32211110 | 191 | G | I | .700 | .370 | 3 | 1687 | 2283 | 3.12 | 14 |

26-MAR-86 window spreadsheet
14:26:ø5 Lawrence Berkeley Laboratory DEC VAX-86øø VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | PANES | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 31211ø8 | 2ø4 | G | I | .7øø | .49ø | 3 | 1853 | 3346 | 7.32 | 14 |
| 12211132 | 258 | A | I | .74ø | .39ø | 3 | 17ø8 | 2426 | 2.78 | 14 |
| 42211219 | 192 | G | I | .74ø | .34ø | 3 | 18ø3 | 197ø | .87 | 14 |
| 41211ø87 | 238 | G | I | .74ø | .39ø | 3 | 1277 | 1784 | 2.13 | 14 |
| 41211261 | 16ø | G | I | .74ø | .4øø | 3 | 982 | 132ø | 2.11 | 14 |
| 42211ø44 | 215 | G | I | .74ø | .4øø | 3 | 8ø3 | 1451 | 3.ø1 | 14 |
| 41111213 | 111 | G | I | .74ø | .41ø | 3 | 7ø2 | 1299 | 5.38 | 14 |
| 41211øø2 | 183 | G | I | .74ø | .41ø | 3 | 1ø48 | 1572 | 2.86 | 14 |
| 41211ø16 | 2ø2 | G | I | .74ø | .41ø | 3 | 1186 | 155ø | 1.8ø | 14 |
| 41211ø18 | 155 | G | I | .74ø | .41ø | 3 | 977 | 1488 | 3.3ø | 14 |
| 41211ø2ø | 212 | G | I | .74ø | .41ø | 3 | 781 | 1263 | 2.27 | 14 |
| 41211ø4ø | 175 | G | I | .74ø | .41ø | 3 | 975 | 1213 | 1.36 | 14 |
| 41211ø59 | 164 | G | I | .74ø | .41ø | 3 | 852 | 1767 | 5.58 | 14 |
| 41211119 | 1ø8 | G | I | .74ø | .41ø | 3 | 6øø | 1ø76 | 4.41 | 14 |
| 41211126 | 318 | G | I | .74ø | .41ø | 3 | 1816 | 2492 | 2.13 | 14 |
| 41211256 | 212 | G | I | .74ø | .41ø | 3 | 781 | 1263 | 2.27 | 14 |
| 42211ø15 | 168 | G | I | .74ø | .41ø | 3 | 1øø8 | 1273 | 1.58 | 14 |
| 42211ø17 | 154 | G | I | .74ø | .41ø | 3 | 1øø8 | 1273 | 1.72 | 14 |
| 42211241 | 186 | G | I | .74ø | .41ø | 3 | 93ø | 1336 | 2.18 | 14 |
| 42311224 | 4ø4 | G | I | .74ø | .41ø | 3 | 199ø | 27ø6 | 1.77 | 14 |
| 42311242 | 211 | G | I | .74ø | .41ø | 3 | 958 | 1394 | 2.ø7 | 14 |
| 41211ø8ø | 218 | G | I | .74ø | .42ø | 3 | 12ø3 | 2ø74 | 4.øø | 14 |
| 41111ø9 | 111 | G | I | .74ø | .48ø | 3 | 7ø2 | 1299 | 5.38 | 14 |
| 41111211 | 111 | G | I | .74ø | .48ø | 3 | 7ø2 | 1299 | 5.38 | 14 |
| 41111215 | 111 | G | I | .74ø | .48ø | 3 | 7ø2 | 1299 | 5.38 | 14 |
| 41111217 | 111 | G | I | .74ø | .48ø | 3 | 7ø2 | 1299 | 5.38 | 14 |
| 41211øø1 | 237 | G | I | .74ø | .48ø | 3 | ø | 1229 | 5.19 | 14 |
| 41211ø55 | 314 | G | I | .74ø | .48ø | 3 | 1896 | 2823 | 2.95 | 14 |
| 41211ø95 | 224 | G | I | .74ø | .48ø | 3 | 12øø | 15ø6 | 1.37 | 14 |
| 41211ø06 | 266 | G | I | .74ø | .48ø | 3 | 13ø6 | 3144 | 6.91 | 14 |
| 41211118 | 275 | G | I | .74ø | .48ø | 3 | 15ø8 | 2838 | 4.84 | 14 |
| 41211166 | 4øø | G | I | .74ø | .48ø | 3 | 3323 | 4122 | 2.øø | 14 |
| 41211188 | 267 | G | I | .74ø | .48ø | 3 | 18ø8 | 3ø28 | 4.57 | 14 |
| 41211259 | 381 | G | I | .74ø | .48ø | 3 | 165ø | 19ø6 | .67 | 14 |
| 41311186 | 376 | G | I | .74ø | .48ø | 3 | 2213 | 2951 | 1.96 | 14 |
| 42211ø06 | 279 | G | I | .74ø | .48ø | 2 | 2231 | 3289 | 3.79 | 14 |
| 4231127ø | 3ø5 | G | I | .74ø | .48ø | 3 | 141ø | 2399 | 3.24 | 14 |
| 41211ø24 | 185 | G | I | .74ø | .49ø | 3 | 958 | 1471 | 2.77 | 14 |
| 41211ø92 | 128 | G | I | .74ø | .49ø | 3 | 468 | 793 | 2.54 | 14 |
| 32211289 | 313 | A | I | .75ø | .37ø | 3 | 2295 | 4221 | 6.15 | 14 |
| 31211146 | 2ø4 | A | I | .78ø | .37ø | 3 | 931 | 1745 | 3.99 | 14 |
| 31211221 | 162 | A | I | .78ø | .37ø | 3 | 796 | 1191 | 2.44 | 14 |
| 31211267 | 13ø | A | I | .78ø | .37ø | 3 | 649 | 1ø66 | 3.21 | 14 |
| 31211268 | 145 | A | I | .78ø | .37ø | 3 | 699 | 1ø91 | 2.7ø | 14 |
| 41211195 | 293 | G | J | .71ø | .36ø | 3 | 1651 | 2711 | 3.62 | 15 |
| 41111151 | 165 | G | J | .74ø | .36ø | 3 | 687 | 1475 | 4.78 | 15 |
| 41211ø14 | 25ø | G | J | .74ø | .36ø | 3 | 737 | 21ø5 | 5.47 | 15 |
| 41211ø63 | 132 | G | J | .74ø | .36ø | 3 | 7ø9 | 1249 | 4.ø9 | 15 |
| 41211ø65 | 166 | G | J | .74ø | .36ø | 3 | 8ø3 | 1529 | 4.37 | 15 |
| 41211ø83 | 23ø | G | J | .74ø | .36ø | 3 | 12ø2 | 2533 | 5.79 | 15 |
| 41211ø8 | 191 | G | J | .74ø | .36ø | 3 | 1ø51 | 211ø | 5.54 | 15 |

26-MAR-86 window spreadsheet
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| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | PANES | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 41211192 | 4Ø1 | G | J | .74Ø | .36Ø | 3 | 2198 | 3592 | 3.48 | 15 |
| 41211193 | 4Ø1 | G | J | .74Ø | .36Ø | 3 | 2198 | 3592 | 3.48 | 15 |
| 41211246 | 253 | G | J | .74Ø | .36Ø | 3 | 2215 | 2464 | .98 | 15 |
| 41211275 | 168 | G | J | .74Ø | .36Ø | 3 | 935 | 1967 | 6.14 | 15 |
| 41211276 | 229 | G | J | .74Ø | .36Ø | 3 | 1352 | 2477 | 4.91 | 15 |
| 41211277 | 143 | G | J | .74Ø | .36Ø | 3 | 816 | 1547 | 5.11 | 15 |
| 42111Ø21 | 171 | G | J | .74Ø | .36Ø | 3 | 1Ø34 | 159Ø | 3.25 | 15 |
| 42211Ø37 | 171 | G | J | .74Ø | .36Ø | 3 | 1114 | 1711 | 3.49 | 15 |
| 42211121 | 174 | G | J | .74Ø | .36Ø | 3 | 925 | 1825 | 5.17 | 15 |
| 42211129 | 252 | G | J | .74Ø | .36Ø | 3 | 1Ø25 | 2364 | 5.31 | 15 |
| 41211Ø62 | 144 | G | J | .74Ø | .39Ø | 3 | 392 | 55Ø | 1.1Ø | 15 |
| 41211187 | 138 | G | K | .74Ø | .31Ø | 3 | 1Ø72 | 36Ø4 | 18.35 | 16 |
| 42211110 | 26Ø | G | K | .74Ø | .34Ø | 3 | 3Ø75 | 4924 | 7.11 | 16 |
| 42211111 | 354 | G | K | .74Ø | .34Ø | 3 | 4935 | 743Ø | 7.Ø5 | 16 |
| 41211Ø27 | 17Ø | G | H | .74Ø | .38Ø | 3 | 93Ø | 1853 | 5.43 | 17 |
| 41211Ø52 | 312 | G | H | .74Ø | .38Ø | 3 | 4215 | 6683 | 7.91 | 17 |
| 42211Ø85 | 22Ø | G | H | .74Ø | .38Ø | 3 | 2262 | 4517 | 1Ø.25 | 17 |
| 41211273 | 284 | G | H | .74Ø | .48Ø | 3 | 1783 | 3586 | 6.35 | 17 |
| 31211Ø2Ø1 | 392 | C | D | .7ØØ | .47Ø | 2 | 26ØØ | 4911 | 5.9Ø | 18 |
| 32211426 | 12 | E | E | .7ØØ | .57Ø | 2 | 1Ø6 | 168 | 5.17 | 18 |
| 31211134 | 435 | G | K | .7ØØ | .39Ø | 2 | 2624 | 526Ø | 6.Ø6 | 18 |
| 32211186 | 223 | H | K | .7ØØ | .37Ø | 2 | 1438 | 3511 | 9.3Ø | 18 |
| 41211Ø48 | 82 | A | D | .74Ø | .48Ø | 2 | 48Ø | 11ØØ | 7.56 | 18 |
| 41211Ø7Ø | 184 | A | A | .74Ø | .54Ø | 2 | 11Ø5 | 183Ø | 3.94 | 18 |
| 41211Ø71 | 184 | A | A | .74Ø | .54Ø | 2 | 11Ø5 | 183Ø | 3.94 | 18 |
| 41211269 | 148 | A | A | .74Ø | .54Ø | 2 | 11Ø7 | 1378 | 1.83 | 18 |
| 41211ØØ9 | 158 | A | A | .74Ø | .55Ø | 2 | 8Ø2 | 984 | 1.15 | 18 |
| 31211122 | 37Ø | A | B | .74Ø | .56Ø | 2 | 2998 | 3895 | 2.42 | 18 |
| 31211137 | 27Ø | A | B | .74Ø | .56Ø | 2 | 1845 | 2711 | 3.21 | 18 |
| 41211261 | 34 | A | A | .74Ø | .74Ø | 2 | Ø | Ø | .ØØ | 18 |
| 31111112 | 148 | A | B | .7ØØ | .32Ø | 3 | 78Ø | 2335 | 1Ø.51 | 19 |
| 31211177 | 299 | A | Z | .7ØØ | .37Ø | 3 | 1629 | 3425 | 6.Ø1 | 19 |
| 3121128Ø | 36Ø | C | D | .7ØØ | .46Ø | 3 | 5135 | 5957 | 2.28 | 19 |
| 3221131Ø | 314 | D | D | .7ØØ | .37Ø | 3 | 3657 | 4389 | 2.33 | 19 |
| 31211265 | 261 | H | H | .7ØØ | .34Ø | 3 | 476Ø | 596Ø | 4.6Ø | 19 |
| 32211427 | 288 | H | H | .7ØØ | .37Ø | 3 | 463Ø | 5836 | 4.19 | 19 |
| 32211426 | 48 | Z | Z | .7ØØ | .44Ø | 3 | 424 | 672 | 5.17 | 19 |
| 41211168 | 173 | G | Z | .74Ø | .41Ø | 3 | Ø | 728 | 4.21 | 19 |
| 41211169 | 185 | G | Z | .74Ø | .41Ø | 3 | Ø | 541 | 2.92 | 19 |
| 42211Ø11 | 171 | I | J | .74Ø | .36Ø | 3 | 1Ø34 | 159Ø | 3.25 | 19 |
| 3121141Ø | 161 | D | D | .17Ø | .47Ø | 2 | Ø | 216 | 1.34 | 99 |
| 12211107 | 182 | I | I | .37Ø | .37Ø | 3 | 2322 | 2281 | -Ø.23 | 99 |
| 13211124 | 538 | D | D | .41Ø | .41Ø | 2 | 7532 | 7532 | .ØØ | 99 |
| 13211118 | 217 | I | I | .44Ø | .44Ø | 3 | 2189 | 2854 | 3.Ø6 | 99 |
| 11111145 | 139 | D | D | .45Ø | .45Ø | 2 | 2375 | 2375 | .ØØ | 99 |
| 11111153 | 169 | D | D | .45Ø | .45Ø | 2 | 1521 | 1521 | .ØØ | 99 |
| 11211138 | 81 | D | D | .45Ø | .45Ø | 2 | 1377 | 1377 | .ØØ | 99 |
| 11211139 | 192 | D | D | .45Ø | .45Ø | 2 | 3264 | 3264 | .ØØ | 99 |
| 11211141 | 149 | D | D | .45Ø | .45Ø | 2 | 2533 | 2533 | .ØØ | 99 |
| 11211144 | 156 | D | D | .45Ø | .45Ø | 2 | 2652 | 2652 | .ØØ | 99 |
| 23211501 | 156 | D | D | .45Ø | .45Ø | 2 | Ø | Ø | .ØØ | 99 |

26-MAR-86 window spreadsheet
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| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | PANES | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|
| 12211114 | 173 | A | I | .47Ø | .35Ø | 2 | 1231 | 167Ø | 2.54 | 99 |
| 23211545 | 42 | B | B | .47Ø | .33Ø | 2 | 645 | 771 | 3.ØØ | 99 |
| 23211502 | 245 | D | D | .47Ø | .31Ø | 2 | 4463 | 4925 | 1.89 | 99 |
| 13211115 | 346 | D | D | .47Ø | .43Ø | 2 | 61Ø5 | 61Ø5 | .ØØ | 99 |
| 11111140 | 192 | D | D | .47Ø | .45Ø | 2 | 1728 | 1728 | .ØØ | 99 |
| 11111143 | 1Ø4 | D | D | .47Ø | .45Ø | 2 | 936 | 936 | .ØØ | 99 |
| 11211122 | 115 | D | D | .47Ø | .47Ø | 2 | 2Ø24 | 2Ø24 | .ØØ | 99 |
| 23211519 | 13Ø | D | D | .47Ø | .47Ø | 2 | Ø | Ø | .ØØ | 99 |
| 23211520 | 13Ø | D | D | .47Ø | .47Ø | 2 | Ø | Ø | .ØØ | 99 |
| 23211561 | 151 | D | D | .47Ø | .47Ø | 2 | Ø | Ø | .ØØ | 99 |
| 11111106 | 198 | O | D | .47Ø | .47Ø | 2 | 2593 | 2593 | .ØØ | 99 |
| 41211131 | 111 | B | B | .48Ø | .48Ø | 2 | Ø | Ø | .ØØ | 99 |
| 41211131 | 5Ø | F | F | .48Ø | .48Ø | 2 | Ø | Ø | .ØØ | 99 |
| 41211181 | 326 | H | H | .48Ø | .48Ø | 2 | Ø | Ø | .ØØ | 99 |
| 41211267 | 248 | H | H | .48Ø | .48Ø | 2 | Ø | 13Ø | .52 | 99 |
| 11211136 | 29Ø | D | D | .49Ø | .49Ø | 2 | 45Ø2 | 45Ø2 | .ØØ | 99 |
| 41211031 | 26Ø | H | H | .49Ø | .49Ø | 2 | 8Ø | 475 | 1.52 | 99 |
| 41211073 | 415 | H | H | .49Ø | .49Ø | 2 | Ø | 725 | 1.75 | 99 |
| 11111140 | 8Ø | A | A | .53Ø | .53Ø | 2 | 22Ø | 22Ø | .ØØ | 99 |
| 11111143 | 4Ø | A | A | .53Ø | .53Ø | 2 | 291 | 291 | .ØØ | 99 |
| 11111153 | 4Ø | A | A | .53Ø | .53Ø | 2 | 262 | 262 | .ØØ | 99 |
| 11211141 | 4Ø | A | A | .53Ø | .53Ø | 2 | 491 | 491 | .ØØ | 99 |
| 11211144 | 8Ø | A | A | .53Ø | .53Ø | 2 | 495 | 495 | .ØØ | 99 |
| 11211139 | 8Ø | A | I | .53Ø | .53Ø | 2 | 485 | 485 | .ØØ | 99 |
| 11111145 | 4Ø | E | E | .53Ø | .53Ø | 2 | 474 | 474 | .ØØ | 99 |
| 11211138 | 4Ø | I | I | .53Ø | .53Ø | 2 | 281 | 281 | .ØØ | 99 |
| 11111145 | 2Ø | L | L | .53Ø | .53Ø | 2 | 25Ø | 25Ø | .ØØ | 99 |
| 42211088 | 16Ø | H | H | .54Ø | .36Ø | 3 | 1677 | 2215 | 3.36 | 99 |
| 31211195 | 372 | H | H | .54Ø | .54Ø | 2 | 49ØØ | 5175 | .74 | 99 |
| 41211187 | 4Ø | H | H | .54Ø | .54Ø | 2 | 286 | 73Ø | 11.1Ø | 99 |
| 23111523 | 125 | B | K | .55Ø | .35Ø | 2 | 1244 | 3Ø23 | 14.23 | 99 |
| 12211102 | 328 | A | J | .56Ø | .29Ø | 2 | Ø | 1Ø2Ø | 3.11 | 99 |
| 11111142 | 92 | A | D | .56Ø | .45Ø | 2 | 3281 | 3281 | .ØØ | 99 |
| 42211147 | 169 | B | B | .56Ø | .56Ø | 2 | Ø | 622 | 3.68 | 99 |
| 41211082 | 129 | H | H | .56Ø | .56Ø | 2 | 15 | 5Ø | .27 | 99 |
| 41211182 | 2Ø6 | H | H | .56Ø | .56Ø | 2 | Ø | Ø | .ØØ | 99 |
| 41211265 | 248 | H | H | .56Ø | .56Ø | 2 | 4675 | 56Ø6 | 3.75 | 99 |
| 41211266 | 33Ø | H | H | .56Ø | .56Ø | 2 | Ø | 286 | .87 | 99 |
| 41211268 | 233 | H | H | .56Ø | .56Ø | 2 | Ø | 162 | .7Ø | 99 |
| 41211271 | 427 | H | H | .56Ø | .56Ø | 2 | Ø | 24Ø | .56 | 99 |
| 42311306 | 353 | H | H | .56Ø | .56Ø | 2 | 172Ø | 2312 | 1.68 | 99 |
| 41211201 | 34 | Z | Z | .56Ø | .56Ø | 2 | 796 | 679 | -3.44 | 99 |
| 41211078 | 179 | H | H | .57Ø | .49Ø | 2 | 23ØØ | 278Ø | 2.68 | 99 |
| 12211151 | 45 | A | A | .64Ø | .64Ø | 2 | 771 | 771 | .ØØ | 99 |
| 31211250 | 89 | D | D | .65Ø | .47Ø | 2 | 74Ø | 885 | 1.63 | 99 |
| 42211004 | 171 | I | J | .68Ø | .36Ø | 3 | 1Ø34 | 159Ø | 3.25 | 99 |
| 42211135 | 22Ø | I | J | .68Ø | .36Ø | 3 | 14ØØ | 17ØØ | 1.36 | 99 |

NUMBER OF CASES READ = 251 NUMBER OF CASES LISTED = 251

## AIR INFILTRATION BARRIER SPREADSHEET

**Air Infiltration Barrier Type Code:**

A Polyethylene under sheetrock
B Foam
C Paint
D Exterior plywood
E Polyethylene between double wall
F Polyethylene between strapped wall
G Polyethylene under slab floor
H A and B
I D and G
J Polyethylene under subfloor
K Airtight drywall
L Craft or foil-faced insulation
M Building paper on exterior
N L and M
O None
X Missing
Z Other

CCPTYPE Ceiling component type - current practice
CMCSTYPE Ceiling component type - MCS
WCPTYPE Window component type - current practice
WMCSTYPE Window component type - MCS
FCPTYPE Floor component type - current practice
FMCSTYPE Floor component type - MCS

26-MAR-86 Infiltration barrier spreadsheet
14:45:28 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31111218 | 2858 | L | L | L | B | B | B | 278 | 413 | .05 | 1 |
| 31211122 | 6086 | L | L | L | B | B | B | 188 | 784 | .10 | 1 |
| 31211137 | 4720 | L | L | L | B | B | B | 178 | 891 | .15 | 1 |
| 31211216 | 5084 | L | L | L | B | B | B | 0 | 80 | .02 | 1 |
| 31211221 | 3488 | L | L | L | B | B | B | 9 | 364 | .10 | 1 |
| 31211146 | 3260 | B | B | B | B | B | B | 9 | 180 | .05 | 2 |
| 31211166 | 5766 | B | B | B | B | B | B | 20 | 385 | .06 | 2 |
| 31211257 | 7612 | B | B | B | B | B | B | 47 | 207 | .02 | 2 |
| 31211395 | 4449 | B | B | B | B | B | B | 20 | 615 | .13 | 2 |
| 31111112 | 3554 | B | B | B | B | B | B | 75 | 430 | .10 | 2 |
| 31211106 | 6088 | B | B | B | B | B | B | 12 | 479 | .08 | 2 |
| 31211135 | 3083 | B | B | B | B | B | B | 0 | 77 | .02 | 2 |
| 31211177 | 6330 | B | B | B | B | B | B | 0 | 173 | .03 | 2 |
| 31211182 | 4876 | B | B | B | B | B | B | 48 | 205 | .03 | 2 |
| 31211292 | 7103 | B | B | B | B | B | B | 175 | 474 | .04 | 2 |
| 31211297 | 3412 | B | B | B | B | B | B | 30 | 177 | .04 | 2 |
| 31211308 | 6027 | B | B | B | B | B | B | 70 | 208 | .02 | 2 |
| 31211346 | 3764 | B | B | B | B | B | B | 98 | 289 | .05 | 2 |
| 31211408 | 4331 | B | B | B | B | B | B | 0 | 204 | .05 | 2 |
| 31211409 | 5299 | B | B | B | B | B | B | 0 | 211 | .04 | 2 |
| 32211110 | 3834 | B | B | B | B | B | B | 0 | 252 | .07 | 2 |
| 32211186 | 5220 | B | B | B | B | B | B | 26 | 605 | .11 | 2 |
| 32211299 | 6234 | B | B | B | B | B | B | 401 | 725 | .05 | 2 |
| 32211310 | 5145 | B | B | B | B | B | B | 70 | 451 | .07 | 2 |
| 32211423 | 3063 | B | B | B | B | B | B | 0 | 210 | .07 | 2 |
| 23211536 | 5104 | O | A | G | A | A | G | 72 | 586 | .10 | 3 |
| 23211543 | 3168 | O | A | G | A | A | G | 63 | 563 | .16 | 3 |
| 23211552 | 4145 | O | A | G | A | A | G | 97 | 763 | .16 | 3 |
| 23211570 | 5271 | O | A | G | A | A | G | 487 | 1563 | .20 | 3 |
| 23111521 | 3350 | O | A | O | A | A | J | 54 | 423 | .11 | 4 |
| 23211511 | 5110 | O | A | O | A | A | J | 104 | 926 | .16 | 4 |
| 23211519 | 4334 | O | A | O | A | A | J | 242 | 1190 | .22 | 4 |
| 23211520 | 4384 | O | A | O | A | A | J | 257 | 1863 | .37 | 4 |
| 23211557 | 4688 | O | A | O | A | A | J | 429 | 1507 | .23 | 4 |
| 23211560 | 3335 | O | A | O | A | A | J | 555 | 949 | .12 | 4 |
| 42211135 | 4671 | O | A | O | A | A | J | 240 | 365 | .03 | 4 |
| 23111574 | 4524 | O | A | O | A | A | G | 107 | 660 | .12 | 5 |
| 23211515 | 4279 | O | A | O | A | A | G | 165 | 645 | .11 | 5 |
| 23211516 | 4767 | O | A | O | A | A | G | 371 | 853 | .10 | 5 |
| 23211518 | 5084 | O | A | O | A | A | G | 64 | 1751 | .33 | 5 |
| 23211522 | 4148 | O | A | O | A | A | G | 282 | 1260 | .24 | 5 |
| 23211537 | 4774 | O | A | O | A | A | G | 0 | 355 | .07 | 5 |
| 23211545 | 3858 | O | A | O | A | A | G | 105 | 1029 | .24 | 5 |
| 41211073 | 9609 | O | A | O | A | A | G | 148 | 1638 | .16 | 5 |
| 41111112 | 3062 | O | A | O | A | A | D | 43 | 585 | .18 | 6 |
| 41211074 | 3256 | O | A | O | A | A | D | 55 | 672 | .19 | 6 |
| 41211075 | 3256 | O | A | O | A | A | D | 55 | 672 | .19 | 6 |
| 41211076 | 3256 | O | A | O | A | A | D | 55 | 672 | .19 | 6 |
| 41211077 | 3256 | O | A | O | A | A | D | 55 | 672 | .19 | 6 |
| 42211110 | 4864 | O | A | O | A | A | D | 82 | 543 | .09 | 6 |
| 42211111 | 9530 | O | A | O | A | A | D | 165 | 1030 | .09 | 6 |

26-MAR-86 infiltration barrier spreadsheet
14:45:29 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1111114Ø | 4498 | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11111143 | 337Ø | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11111153 | 3495 | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11211138 | 3249 | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11211139 | 365Ø | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11211141 | 52ØØ | O | L | O | K | K | K | Ø | 8Ø | .Ø2 | 7 |
| 11211144 | 3652 | O | L | O | K | K | K | Ø | 13Ø | .Ø4 | 7 |
| 12211133 | 4ØØ6 | O | L | O | K | K | K | Ø | 523 | .13 | 7 |
| 12211Ø8 | 3Ø76 | O | L | O | A | E | D | 534 | 6Ø4 | .Ø2 | 8 |
| 13211115 | 48Ø6 | O | L | O | A | E | D | 78 | 237Ø | .48 | 8 |
| 13211118 | 46Ø7 | O | L | O | A | E | D | 313 | 563 | .Ø5 | 8 |
| 12211131 | 3738 | O | L | O | A | B | D | Ø | 327 | .Ø9 | 9 |
| 41211Ø21 | 594Ø | O | L | O | A | B | D | 8Ø | 94Ø | .14 | 9 |
| 41211Ø24 | 44ØØ | O | L | O | A | B | D | 32 | 616 | .13 | 9 |
| 42211134 | 4671 | O | L | O | A | A | J | 24Ø | 365 | .Ø3 | 1Ø |
| 42211136 | 4671 | O | L | O | A | A | J | 24Ø | 365 | .Ø3 | 1Ø |
| 42211137 | 4671 | O | L | O | A | A | J | 24Ø | 365 | .Ø3 | 1Ø |
| 42211138 | 4671 | O | L | O | A | A | J | 24Ø | 365 | .Ø3 | 1Ø |
| 12211151 | 45Ø3 | O | L | O | A | A | I | 169 | 395 | .Ø5 | 11 |
| 41211Ø55 | 5ØØØ | O | L | O | A | A | I | 72 | 698 | .13 | 11 |
| 41211166 | 4334 | O | L | O | A | A | I | Ø | 2649 | .61 | 11 |
| 41311186 | 4258 | O | L | O | A | A | I | Ø | 1149 | .27 | 11 |
| 12111117 | 4Ø19 | O | L | O | A | A | G | 86 | 451 | .Ø9 | 12 |
| 12111152 | 447Ø | O | L | O | A | A | G | 12Ø | 395 | .Ø6 | 12 |
| 12211Ø2 | 3981 | O | L | O | A | A | G | Ø | 28Ø | .Ø7 | 12 |
| 12211Ø4 | 4214 | O | L | O | A | A | G | Ø | 72Ø | .17 | 12 |
| 12211Ø7 | 4441 | O | L | O | A | A | G | 56 | 271 | .Ø5 | 12 |
| 12211121 | 5232 | O | L | O | A | A | G | 175 | 687 | .1Ø | 12 |
| 12211146 | 452Ø | O | L | O | A | A | G | Ø | Ø | .ØØ | 12 |
| 12211148 | 3593 | O | L | O | A | A | G | Ø | 112 | .Ø3 | 12 |
| 13211119 | 4394 | O | L | O | A | A | G | Ø | 482 | .11 | 12 |
| 13211128 | 58Ø4 | O | L | O | A | A | G | 231 | 395 | .Ø3 | 12 |
| 42311242 | 2769 | O | L | O | A | A | G | 2ØØ | 119Ø | .36 | 12 |
| 1111Ø6 | 4514 | O | L | O | A | A | D | 15Ø | 553 | .Ø9 | 13 |
| 11211122 | 7Ø75 | O | L | O | A | A | D | 135 | 425 | .Ø4 | 13 |
| 12211ØØ | 2787 | O | L | O | A | A | D | 92 | 353 | .Ø9 | 13 |
| 1221111Ø | 3715 | O | L | O | A | A | D | 95 | 921 | .22 | 13 |
| 12211114 | 4495 | O | L | O | A | A | D | 3Ø | 949 | .2Ø | 13 |
| 12211147 | 434Ø | O | L | O | A | A | D | 6Ø | 31Ø | .Ø6 | 13 |
| 12211149 | 3Ø88 | O | L | O | A | A | D | 94 | 254 | .Ø5 | 13 |
| 13211123 | 3658 | O | L | O | A | A | D | 76 | 3Ø4 | .Ø6 | 13 |
| 1321115Ø | 3692 | O | L | O | A | A | D | 56 | 396 | .Ø9 | 13 |
| 41211Ø48 | 5459 | O | O | O | H | B | I | Ø | 7Ø3 | .13 | 14 |
| 41211Ø53 | 6Ø9Ø | O | O | O | H | B | I | 7Ø | 14ØØ | .22 | 14 |
| 41211132 | 3982 | O | O | O | H | B | I | Ø | 866 | .22 | 14 |
| 41211169 | 4288 | O | O | O | H | B | I | Ø | 596 | .14 | 14 |
| 41211Ø81 | 5Ø87 | O | O | O | A | F | I | 2879 | 4Ø59 | .23 | 15 |
| 41211158 | 4618 | O | O | O | A | F | I | Ø | Ø | .ØØ | 15 |
| 41311258 | 4686 | O | O | O | A | F | I | 98 | 51Ø | .Ø9 | 15 |
| 41211Ø14 | 4738 | O | O | O | A | F | D | 62 | 815 | .16 | 16 |
| 41211Ø39 | 3866 | O | O | O | A | F | D | Ø | 1759 | .45 | 16 |

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| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 41211082 | 3303 | 0 | 0 | 0 | A | F | D | 1940 | 2483 | .16 | 16 |
| 41211084 | 3880 | 0 | 0 | 0 | A | F | D | 129 | 1548 | .37 | 16 |
| 41211090 | 4488 | 0 | 0 | 0 | A | F | D | 65 | 1036 | .22 | 16 |
| 41211107 | 4018 | 0 | 0 | 0 | A | F | D | 20 | 466 | .11 | 16 |
| 41211153 | 3928 | 0 | 0 | 0 | A | F | D | 230 | 799 | .14 | 16 |
| 41211257 | 4686 | 0 | 0 | 0 | A | F | D | 98 | 485 | .08 | 16 |
| 41211269 | 4806 | 0 | 0 | 0 | A | F | D | 3 | 808 | .17 | 16 |
| 41211050 | 3731 | 0 | 0 | 0 | A | B | I | 0 | 398 | .11 | 17 |
| 41211056 | 7926 | 0 | 0 | 0 | A | B | I | 60 | 1926 | .24 | 17 |
| 41211060 | 4675 | 0 | 0 | 0 | A | B | I | 2821 | 4379 | .33 | 17 |
| 41211126 | 4996 | 0 | 0 | 0 | A | B | I | 0 | 463 | .09 | 17 |
| 41211133 | 6310 | 0 | 0 | 0 | A | B | I | 276 | 5718 | .86 | 17 |
| 41211254 | 5378 | 0 | 0 | 0 | A | B | I | 0 | 642 | .12 | 17 |
| 42211041 | 3874 | 0 | 0 | 0 | A | B | I | 186 | 757 | .15 | 17 |
| 42211042 | 3886 | 0 | 0 | 0 | A | B | I | 186 | 757 | .15 | 17 |
| 42211115 | 5147 | 0 | 0 | 0 | A | B | I | 84 | 1901 | .35 | 17 |
| 42211281 | 5877 | 0 | 0 | 0 | A | B | I | 153 | 495 | .06 | 17 |
| 41111239 | 3314 | 0 | 0 | 0 | A | B | G | 0 | 940 | .28 | 18 |
| 41211181 | 4807 | 0 | 0 | 0 | A | B | G | 0 | 1289 | .27 | 18 |
| 41211182 | 4230 | 0 | 0 | 0 | A | B | G | 0 | 986 | .23 | 18 |
| 41211192 | 3805 | 0 | 0 | 0 | A | B | G | 0 | 705 | .19 | 18 |
| 41211193 | 3805 | 0 | 0 | 0 | A | B | G | 0 | 738 | .19 | 18 |
| 41211195 | 3210 | 0 | 0 | 0 | A | B | G | 0 | 651 | .20 | 18 |
| 41211220 | 4082 | 0 | 0 | 0 | A | B | G | 0 | 858 | .21 | 18 |
| 41211234 | 6086 | 0 | 0 | 0 | A | B | G | 110 | 1828 | .28 | 18 |
| 42111021 | 3849 | 0 | 0 | 0 | A | B | G | 43 | 761 | .19 | 18 |
| 42211004 | 3913 | 0 | 0 | 0 | A | B | G | 0 | 655 | .17 | 18 |
| 42211011 | 4149 | 0 | 0 | 0 | A | B | G | 55 | 1100 | .25 | 18 |
| 42211037 | 4083 | 0 | 0 | 0 | A | B | G | 43 | 584 | .13 | 18 |
| 42211044 | 3812 | 0 | 0 | 0 | A | B | G | 0 | 284 | .07 | 18 |
| 42211121 | 3832 | 0 | 0 | 0 | A | B | G | 0 | 1425 | .37 | 18 |
| 42211129 | 3864 | 0 | 0 | 0 | A | B | G | 537 | 1973 | .37 | 18 |
| 42311270 | 6033 | 0 | 0 | 0 | A | B | G | 0 | 711 | .12 | 18 |
| 41111174 | 4125 | 0 | 0 | 0 | A | B | D | 0 | 574 | .14 | 19 |
| 41111176 | 3893 | 0 | 0 | 0 | A | B | D | 0 | 573 | .15 | 19 |
| 41111235 | 2767 | 0 | 0 | 0 | A | B | D | 0 | 1111 | .40 | 19 |
| 41111237 | 3722 | 0 | 0 | 0 | A | B | D | 0 | 1760 | .47 | 19 |
| 41211006 | 4288 | 0 | 0 | 0 | A | B | D | 110 | 683 | .13 | 19 |
| 41211008 | 3620 | 0 | 0 | 0 | A | B | D | 0 | 318 | .09 | 19 |
| 41211009 | 3647 | 0 | 0 | 0 | A | B | D | 20 | 458 | .12 | 19 |
| 41211012 | 4210 | 0 | 0 | 0 | A | B | D | 773 | 1390 | .15 | 19 |
| 41211016 | 3687 | 0 | 0 | 0 | A | B | D | 0 | 676 | .18 | 19 |
| 41211018 | 3737 | 0 | 0 | 0 | A | B | D | 0 | 361 | .10 | 19 |
| 41211026 | 4488 | 0 | 0 | 0 | A | B | D | 117 | 965 | .19 | 19 |
| 41211027 | 4648 | 0 | 0 | 0 | A | B | D | 99 | 1100 | .22 | 19 |
| 41211031 | 5818 | 0 | 0 | 0 | A | B | D | 420 | 2070 | .28 | 19 |
| 41211033 | 1556 | 0 | 0 | 0 | A | B | D | 35 | 633 | .38 | 19 |
| 41211038 | 4215 | 0 | 0 | 0 | A | B | D | 0 | 648 | .15 | 19 |
| 41211040 | 2809 | 0 | 0 | 0 | A | B | D | 27 | 613 | .21 | 19 |
| 41211051 | 5198 | 0 | 0 | 0 | A | B | D | 0 | 622 | .12 | 19 |
| 41211068 | 3547 | 0 | 0 | 0 | A | B | D | 40 | 901 | .24 | 19 |

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| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 41211070 | 4107 | 0 | 0 | 0 | A | B | D | 50 | 1062 | .25 | 19 |
| 41211071 | 4107 | 0 | 0 | 0 | A | B | D | 50 | 1062 | .25 | 19 |
| 41211079 | 3712 | 0 | 0 | 0 | A | B | D | 90 | 461 | .10 | 19 |
| 41211093 | 5201 | 0 | 0 | 0 | A | B | D | 79 | 988 | .17 | 19 |
| 41211120 | 3874 | 0 | 0 | 0 | A | B | D | 186 | 1543 | .35 | 19 |
| 41211125 | 4784 | 0 | 0 | 0 | A | B | D | 508 | 2399 | .40 | 19 |
| 41211131 | 3222 | 0 | 0 | 0 | A | B | D | 0 | 406 | .13 | 19 |
| 41211160 | 4126 | 0 | 0 | 0 | A | B | D | 31 | 861 | .20 | 19 |
| 41211173 | 5923 | 0 | 0 | 0 | A | B | D | 0 | 1585 | .27 | 19 |
| 41211183 | 4394 | 0 | 0 | 0 | A | B | D | 0 | 445 | .10 | 19 |
| 41211184 | 4460 | 0 | 0 | 0 | A | B | D | 0 | 454 | .10 | 19 |
| 41211265 | 5292 | 0 | 0 | 0 | A | B | D | 50 | 1554 | .28 | 19 |
| 41211271 | 5699 | 0 | 0 | 0 | A | B | D | 0 | 956 | .17 | 19 |
| 41211272 | 4920 | 0 | 0 | 0 | A | B | D | 0 | 410 | .00 | 19 |
| 41211273 | 5196 | 0 | 0 | 0 | A | B | D | 25 | 954 | .18 | 19 |
| 41211677 | 5168 | 0 | 0 | 0 | A | B | D | 80 | 1495 | .27 | 19 |
| 41111028 | 3976 | 0 | 0 | 0 | A | A | I | 84 | 823 | .19 | 20 |
| 41211025 | 4378 | 0 | 0 | 0 | A | A | I | 55 | 1199 | .26 | 20 |
| 41211078 | 4308 | 0 | 0 | 0 | A | A | I | 122 | 936 | .19 | 20 |
| 41211156 | 5655 | 0 | 0 | 0 | A | A | I | 0 | 1232 | .22 | 20 |
| 41211165 | 6563 | 0 | 0 | 0 | A | A | I | 8310 | 9173 | .13 | 20 |
| 41211259 | 4964 | 0 | 0 | 0 | A | A | I | 112 | 633 | .10 | 20 |
| 41211266 | 5253 | 0 | 0 | 0 | A | A | I | 0 | 1446 | .28 | 20 |
| 42211116 | 6108 | 0 | 0 | 0 | A | A | I | 84 | 2341 | .37 | 20 |
| 42211141 | 4252 | 0 | 0 | 0 | A | A | I | 20 | 607 | .14 | 20 |
| 42211206 | 6416 | 0 | 0 | 0 | A | A | I | 0 | 1049 | .16 | 20 |
| 42211282 | 4731 | 0 | 0 | 0 | A | A | I | 128 | 357 | .05 | 20 |
| 42311306 | 3619 | 0 | 0 | 0 | A | A | I | 91 | 2066 | .55 | 20 |
| 41111151 | 4053 | 0 | 0 | 0 | A | A | G | 2890 | 3636 | .18 | 21 |
| 41111209 | 2590 | 0 | 0 | 0 | A | A | G | 0 | 215 | .00 | 21 |
| 41111211 | 2590 | 0 | 0 | 0 | A | A | G | 0 | 215 | .00 | 21 |
| 41111213 | 2590 | 0 | 0 | 0 | A | A | G | 0 | 215 | .00 | 21 |
| 41111215 | 2590 | 0 | 0 | 0 | A | A | G | 0 | 215 | .00 | 21 |
| 41111217 | 2590 | 0 | 0 | 0 | A | A | G | 0 | 215 | .00 | 21 |
| 41211032 | 3736 | 0 | 0 | 0 | A | A | G | 0 | 1050 | .28 | 21 |
| 41211069 | 5442 | 0 | 0 | 0 | A | A | G | 0 | 810 | .15 | 21 |
| 41211106 | 5692 | 0 | 0 | 0 | A | A | G | 202 | 1126 | .16 | 21 |
| 41211108 | 3748 | 0 | 0 | 0 | A | A | G | 0 | 349 | .09 | 21 |
| 41211162 | 4600 | 0 | 0 | 0 | A | A | G | 0 | 901 | .20 | 21 |
| 41211163 | 2635 | 0 | 0 | 0 | A | A | G | 0 | 670 | .25 | 21 |
| 41211164 | 6597 | 0 | 0 | 0 | A | A | G | 0 | 951 | .14 | 21 |
| 41211196 | 4575 | 0 | 0 | 0 | A | A | G | 0 | 652 | .14 | 21 |
| 41211267 | 4139 | 0 | 0 | 0 | A | A | G | 50 | 1156 | .27 | 21 |
| 41311205 | 4792 | 0 | 0 | 0 | A | A | G | 0 | 2036 | .42 | 21 |
| 42211015 | 4862 | 0 | 0 | 0 | A | A | G | 0 | 1363 | .28 | 21 |
| 42211017 | 3634 | 0 | 0 | 0 | A | A | G | 0 | 1502 | .41 | 21 |
| 42211030 | 4669 | 0 | 0 | 0 | A | A | G | 26 | 690 | .14 | 21 |
| 42211035 | 5008 | 0 | 0 | 0 | A | A | G | 19 | 743 | .14 | 21 |
| 42211142 | 3776 | 0 | 0 | 0 | A | A | G | 22 | 717 | .18 | 21 |
| 42211143 | 3730 | 0 | 0 | 0 | A | A | G | 20 | 759 | .20 | 21 |
| 42211145 | 3776 | 0 | 0 | 0 | A | A | G | 22 | 680 | .17 | 21 |

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| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 42211262 | 4669 | O | O | O | A | A | G | 26 | 690 | .14 | 21 |
| 42211263 | 4669 | O | O | O | A | A | G | 26 | 690 | .14 | 21 |
| 42211283 | 4083 | O | O | O | A | A | G | 150 | 465 | .08 | 21 |
| 42211284 | 4083 | O | O | O | A | A | G | 150 | 465 | .08 | 21 |
| 42211285 | 4937 | O | O | O | A | A | G | 129 | 473 | .07 | 21 |
| 42311224 | 6440 | O | O | O | A | A | G | 0 | 1209 | .19 | 21 |
| 11211136 | 5562 | O | O | O | A | A | D | 0 | 192 | .03 | 22 |
| 41211001 | 4175 | O | O | O | A | A | D | 108 | 1051 | .23 | 22 |
| 41211002 | 4273 | O | O | O | A | A | D | 0 | 495 | .12 | 22 |
| 41211005 | 3580 | O | O | O | A | A | D | 26 | 449 | .12 | 22 |
| 41211013 | 3649 | O | O | O | A | A | D | 12 | 477 | .13 | 22 |
| 41211020 | 4212 | O | O | O | A | A | D | 60 | 253 | .05 | 22 |
| 41211023 | 4718 | O | O | O | A | A | D | 26 | 581 | .12 | 22 |
| 41211024 | 4718 | O | O | O | A | A | D | 26 | 581 | .12 | 22 |
| 41211062 | 2888 | O | O | O | A | A | D | 0 | 68 | .02 | 22 |
| 41211063 | 2918 | O | O | O | A | A | D | 0 | 79 | .03 | 22 |
| 41211065 | 3474 | O | O | O | A | A | D | 0 | 113 | .03 | 22 |
| 41211089 | 2704 | O | O | O | A | A | D | 0 | 554 | .20 | 22 |
| 41211092 | 3160 | O | O | O | A | A | D | 118 | 474 | .11 | 22 |
| 41211097 | 4660 | O | O | O | A | A | D | 124 | 1748 | .35 | 22 |
| 41211123 | 4369 | O | O | O | A | A | D | 0 | 1134 | .26 | 22 |
| 41211146 | 3530 | O | O | O | A | A | D | 60 | 395 | .09 | 22 |
| 41211161 | 4346 | O | O | O | A | A | D | 0 | 545 | .13 | 22 |
| 41211168 | 4287 | O | O | O | A | A | D | 0 | 534 | .12 | 22 |
| 41211180 | 4756 | O | O | O | A | A | D | 20 | 503 | .10 | 22 |
| 41211187 | 3850 | O | O | O | A | A | D | 119 | 1417 | .34 | 22 |
| 41211225 | 7157 | O | O | O | A | A | D | 210 | 1672 | .20 | 22 |
| 41211227 | 5416 | O | O | O | A | A | D | 191 | 1451 | .23 | 22 |
| 41211252 | 4389 | O | O | O | A | A | D | 0 | 1815 | .41 | 22 |
| 41211256 | 4212 | O | O | O | A | A | D | 60 | 393 | .08 | 22 |
| 41211275 | 4046 | O | O | O | A | A | D | 0 | 1023 | .25 | 22 |
| 41211276 | 4467 | O | O | O | A | A | D | 0 | 1024 | .23 | 22 |
| 41211277 | 4214 | O | O | O | A | A | D | 0 | 758 | .18 | 22 |
| 41211289 | 3631 | O | O | O | A | A | D | 0 | 1063 | .29 | 22 |
| 41211675 | 4383 | O | O | O | A | A | D | 0 | 547 | .12 | 22 |
| 41311676 | 4647 | O | O | O | A | A | D | 0 | 705 | .15 | 22 |
| 42211043 | 4294 | O | O | O | A | A | D | 0 | 1124 | .26 | 22 |
| 32211423 | 3063 | L | L | B | A | A | B | 0 | 397 | .13 | 23 |
| 31211270 | 4575 | L | L | D | L | A | D | 0 | 180 | .04 | 23 |
| 31211145 | 6641 | L | L | D | A | A | B | 0 | 407 | .06 | 23 |
| 31211410 | 2301 | L | L | G | K | K | G | 10 | 332 | .14 | 23 |
| 31211133 | 3094 | L | L | G | A | A | G | 0 | 431 | .14 | 23 |
| 31211200 | 4088 | L | L | J | L | L | J | 110 | 493 | .09 | 23 |
| 31211183 | 6635 | L | L | J | L | L | G | 210 | 493 | .04 | 23 |
| 31211135 | 3083 | L | L | L | N | N | L | 132 | 442 | .10 | 23 |
| 31211271 | 4240 | L | L | L | L | L | L | 0 | 364 | .09 | 23 |
| 31211408 | 4331 | L | L | L | L | L | D | 37 | 0 | -0.01 | 23 |
| 31211403 | 5974 | L | L | L | K | K | Z | 21 | 433 | .07 | 23 |
| 31211297 | 3412 | L | L | L | K | K | L | 0 | 510 | .15 | 23 |
| 31211409 | 5299 | L | L | L | K | K | D | 49 | 490 | .08 | 23 |
| 32211310 | 5145 | L | L | L | A | A | L | 25 | 540 | .10 | 23 |

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| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CPS | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31211397 | 4666 | L | L | L | A | A | J | Ø | 4Ø2 | .Ø9 | 23 |
| 41311167 | 58Ø1 | L | L | L | A | A | D | 75 | 694 | .11 | 23 |
| 31111112 | 3554 | L | L | O | L | L | L | 115 | 278 | .Ø5 | 23 |
| 31211253 | 6583 | L | L | O | K | K | K | Ø | 626 | .1Ø | 23 |
| 41211124 | 7Ø65 | L | L | O | H | B | I | Ø | 1Ø51 | .15 | 23 |
| 41211268 | 5744 | L | L | O | A | A | I | 354 | 21ØØ | .3Ø | 23 |
| 41211261 | 3924 | L | L | O | A | A | D | 122 | 422 | .Ø8 | 23 |
| 31211177 | 633Ø | M | M | D | N | N | D | Ø | 572 | .Ø9 | 24 |
| 31211153 | 39Ø8 | M | M | D | H | H | L | 181 | 683 | .13 | 24 |
| 31211341 | 6471 | M | M | G | M | M | G | 12Ø | 332 | .Ø3 | 24 |
| 32211186 | 522Ø | M | M | J | K | K | K | Ø | 629 | .12 | 24 |
| 32211111 | 4428 | M | M | J | A | A | J | 251 | 1158 | .2Ø | 24 |
| 322111 1Ø | 3834 | M | M | J | A | A | H | Ø | 755 | .2Ø | 24 |
| 31211134 | 6ØØØ | N | N | B | K | K | G | 2Ø2 | 1416 | .2Ø | 25 |
| 31211248 | 4Ø88 | N | N | B | B | B | B | 45 | 7Ø | .Ø1 | 25 |
| 31211399 | 3212 | N | N | B | B | B | B | 45 | 7Ø | .Ø1 | 25 |
| 32211299 | 6234 | N | N | G | A | A | G | 2Ø8 | 2557 | .38 | 25 |
| 31211292 | 71Ø3 | N | N | J | N | N | J | 155 | 227 | .Ø1 | 25 |
| 31211128 | 5Ø68 | N | N | L | N | N | A | 128 | 47Ø | .Ø7 | 25 |
| 31211Ø8 | 6Ø27 | N | N | L | A | A | J | Ø | 658 | .11 | 25 |
| 31211Ø6 | 6Ø88 | N | N | L | A | A | B | 12Ø | 635 | .Ø8 | 25 |
| 32211427 | 3362 | N | N | N | A | A | J | 31Ø | 722 | .12 | 25 |
| 312112Ø1 | 5188 | N | N | Z | A | A | C | Ø | 29Ø | .Ø6 | 25 |
| 23211517 | 5992 | O | A | O | A | E | G | 728 | 1311 | .1Ø | 26 |
| 42211Ø88 | 39Ø8 | O | A | O | A | B | D | 68 | 856 | .2Ø | 26 |
| 23111514 | 3816 | O | A | O | A | A | Z | 434 | 13Ø4 | .23 | 26 |
| 23211 5Ø9 | 2744 | O | A | O | A | A | Z | Ø | 1236 | .45 | 26 |
| 13211 1Ø1 | 4729 | O | A | O | A | A | B | 26Ø | 61Ø | .Ø7 | 26 |
| 41211Ø87 | 3882 | O | L | O | H | A | D | 8Ø | 1481 | .36 | 27 |
| 13211124 | 6271 | O | L | O | B | A | G | Ø | 1278 | .2Ø | 27 |
| 12211 13Ø | 334Ø | O | L | O | A | O | D | Ø | 212 | .Ø6 | 27 |
| 41211 17Ø | 6156 | O | L | O | A | L | I | 1Ø | 131 | .Ø2 | 27 |
| 41211Ø86 | 5742 | O | L | O | A | H | I | 8Ø7 | 2532 | .3Ø | 27 |
| 41211 2Ø2 | 3745 | O | L | O | A | B | I | 22 | 19ØØ | .5Ø | 27 |
| 13211125 | 4254 | O | L | O | A | A | Z | 121 | 784 | .16 | 27 |
| 42211241 | 3ØØ2 | O | L | O | A | A | H | 2ØØ | 1257 | .35 | 27 |
| 12211 1Ø3 | 7782 | O | L | O | A | A | B | 3Ø5 | 3594 | .42 | 27 |
| 12211132 | 4781 | O | L | O | A | A | B | 51 | 482 | .Ø9 | 27 |
| 41211Ø72 | 4269 | O | O | G | H | F | G | 2Ø5 | 1526 | .31 | 28 |
| 41211Ø83 | 4696 | O | O | G | A | Z | G | 189 | 829 | .14 | 28 |
| 41211255 | 2919 | O | O | G | A | H | I | 25 | 892 | .3Ø | 28 |
| 41311189 | 5Ø63 | O | O | G | A | F | I | 73 | 713 | .13 | 28 |
| 41211Ø52 | 6585 | O | O | G | A | A | I | 268 | 991 | .11 | 28 |
| 42211264 | 9674 | O | O | G | A | A | I | 134 | 1186 | .11 | 28 |
| 41211Ø19 | 43Ø1 | O | O | G | A | A | G | 188 | 521 | .Ø8 | 28 |
| 41211197 | 5712 | O | O | G | A | A | G | 64 | 8Ø7 | .13 | 28 |
| 42211Ø85 | 3892 | O | O | I | B | B | I | 83 | 853 | .2Ø | 28 |
| 42211148 | 4531 | O | O | O | Z | F | G | 1Ø3 | 1851 | .39 | 28 |
| 11111142 | 4492 | O | O | O | K | K | K | Ø | 8Ø | .Ø2 | 28 |
| 11111145 | 3778 | O | O | O | K | K | K | Ø | 8Ø | .Ø2 | 28 |
| 32211162 | 5168 | O | O | O | H | H | H | Ø | 1216 | .24 | 28 |

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| SITEID | AREA | CCPTYPE | WCPTYPE | FCPTYPE | CMCSTYPE | WMCSTYPE | FMCSTYPE | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 42211003 | 4456 | O | O | O | H | F | G | 0 | 1363 | .31 | 28 |
| 41211118 | 5765 | O | O | O | H | B | D | 0 | 606 | .11 | 28 |
| 41211149 | 4607 | O | O | O | B | B | I | 485 | 547 | .01 | 28 |
| 41211058 | 4640 | O | O | O | B | B | G | 0 | 2117 | .46 | 28 |
| 41211303 | 5206 | O | O | O | B | B | D | 0 | 1375 | .26 | 28 |
| 41211059 | 3805 | O | O | O | A | Z | D | 29 | 811 | .21 | 28 |
| 41211140 | 4893 | O | O | O | A | Z | D | 0 | 217 | .04 | 28 |
| 41211159 | 4934 | O | O | O | A | L | D | 258 | 899 | .13 | 28 |
| 41211171 | 6592 | O | O | O | A | L | D | 0 | 689 | .10 | 28 |
| 41211246 | 4156 | O | O | O | A | H | I | 40 | 1553 | .36 | 28 |
| 41211047 | 5398 | O | O | O | A | E | I | 0 | 1640 | .30 | 28 |
| 41211157 | 4685 | O | O | O | A | E | I | 0 | 1104 | .24 | 28 |
| 41211054 | 5506 | O | O | O | A | E | G | 906 | 3091 | .40 | 28 |
| 41211067 | 4095 | O | O | O | A | E | D | 0 | 559 | .14 | 28 |
| 41211036 | 3886 | O | O | O | A | E | A | 0 | 1048 | .27 | 28 |
| 41211203 | 4027 | O | O | O | A | B | H | 0 | 1478 | .37 | 28 |
| 41211049 | 4805 | O | O | O | A | B | B | 0 | 490 | .10 | 28 |
| 42211219 | 4246 | O | O | O | A | B | B | 290 | 1474 | .28 | 28 |
| 42111144 | 2801 | O | O | O | A | A | O | 22 | 681 | .24 | 28 |
| 42211147 | 4698 | O | O | O | A | A | O | 0 | 1735 | .37 | 28 |
| 42211304 | 3776 | O | O | O | A | A | O | 22 | 680 | .17 | 28 |
| 41111045 | 3903 | O | O | O | A | A | J | 80 | 715 | .16 | 28 |
| 41211091 | 3660 | O | O | O | A | A | A | 30 | 1293 | .35 | 28 |
| 41211094 | 3564 | O | O | O | A | A | A | 0 | 960 | .27 | 28 |
| 41211245 | 5664 | A | A | G | A | F | G | 0 | 1680 | .30 | 99 |
| 42211130 | 5667 | A | A | G | A | A | G | 5473 | 7698 | .39 | 99 |
| 32211426 | 5770 | A | A | L | A | A | L | 334 | 462 | .02 | 99 |
| 42211099 | 3506 | A | A | O | A | A | D | 99 | 350 | .07 | 99 |
| 41211119 | 3330 | A | L | O | H | B | I | 1000 | 1845 | .25 | 99 |
| 41211244 | 1300 | A | O | O | A | B | I | 576 | 1444 | .67 | 99 |
| 31211341 | 6471 | B | B | B | K | K | G | 0 | 312 | .05 | 99 |
| 31211250 | 1886 | B | B | B | C | Z | J | 40 | 80 | .02 | 99 |
| 31211338 | 3376 | B | B | J | K | K | J | 200 | 647 | .13 | 99 |
| 31211270 | 4575 | B | N | B | B | B | B | 25 | 413 | .08 | 99 |
| 31211424 | 1998 | C | O | O | C | O | O | 59 | 609 | .28 | 99 |
| 32211289 | 5622 | L | N | L | A | Z | O | 60 | 760 | .12 | 99 |
| 31211155 | 5257 | M | L | L | L | C | L | 802 | 119 | -0.13 | 99 |
| 31211346 | 3764 | M | L | O | N | N | L | 245 | 316 | .02 | 99 |
| 41211122 | 4048 | O | A | G | A | B | D | 553 | 1291 | .18 | 99 |
| 13211113 | 2496 | O | L | G | A | E | H | 244 | 786 | .22 | 99 |
| 41211188 | 5641 | O | L | L | A | B | D | 0 | 1218 | .22 | 99 |
| 41211127 | 4188 | O | X | O | A | B | D | 628 | 1280 | .16 | 99 |
| 23211538 | 2911 | X | A | G | A | A | G | 0 | 1431 | .49 | 99 |
| 23211527 | 5460 | X | A | X | A | B | G | 143 | 1356 | .22 | 99 |
| 23211539 | 6105 | X | A | X | A | B | G | 0 | 927 | .15 | 99 |
| 23111573 | 2792 | X | A | X | A | A | J | 54 | 459 | .15 | 99 |
| 23211551 | 3755 | X | A | X | A | A | G | 129 | 736 | .16 | 99 |
| 23211577 | 3885 | X | A | X | A | A | G | 114 | 374 | .07 | 99 |
| 41211158 | 1028 | X | O | X | X | A | X | 0 | 0 | .00 | 99 |
| 41111178 | 4068 | X | X | D | A | B | I | 0 | 598 | .15 | 99 |
| 23211560 | 1134 | X | X | G | X | X | G | 227 | 247 | .02 | 99 |

24-APR-86 infiltration barrier spreadsheet
13:55:53 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

NUMBER OF CASES READ = 357 NUMBER OF CASES LISTED = 357

## DOOR SPREADSHEET

**Door Type Code:**

A Insulated clad foam core

B Wood solid core

C Wood hollow core

D A and B

E A in both MCS and Current Practice

F B in both MCS and Current Practice

X Missing

Z Other

26-MAR-86 door spreadsheet
15:00:23 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23111574 | 40 | A | A | 0 | 0 | 70 | 84 | .35 | 1 |
| 23211526 | 43 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211558 | 41 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211572 | 43 | A | A | 0 | 0 | 70 | 84 | .33 | 1 |
| 23211578 | 41 | A | A | 0 | 0 | 923 | 923 | .00 | 1 |
| 23211531 | 40 | A | A | 0 | 0 | 730 | 855 | 3.13 | 1 |
| 23211570 | 81 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211502 | 77 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211507 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211515 | 39 | A | A | 0 | 0 | 439 | 439 | .00 | 1 |
| 23211518 | 38 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211528 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211538 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211541 | 22 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211544 | 58 | A | A | 0 | 0 | 320 | 320 | .00 | 1 |
| 23211547 | 38 | A | A | 0 | 0 | 889 | 909 | .53 | 1 |
| 23211552 | 44 | A | A | 0 | 0 | 40 | 54 | .32 | 1 |
| 23211556 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41111028 | 40 | A | A | 0 | 0 | 490 | 491 | .03 | 1 |
| 41111151 | 38 | A | A | 0 | 0 | 76 | 175 | 2.61 | 1 |
| 41111174 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41111176 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41111178 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41111239 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211001 | 37 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211019 | 20 | A | A | 0 | 0 | 0 | 30 | 1.50 | 1 |
| 41211020 | 88 | A | A | 0 | 0 | 905 | 935 | .34 | 1 |
| 41211032 | 40 | A | A | 0 | 0 | 0 | 16 | .40 | 1 |
| 41211038 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211055 | 80 | A | A | 0 | 0 | 848 | 896 | .60 | 1 |
| 41211056 | 95 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211058 | 18 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211059 | 40 | A | A | 0 | 0 | 0 | 120 | 3.00 | 1 |
| 41211062 | 20 | A | A | 0 | 0 | 180 | 219 | 1.95 | 1 |
| 41211063 | 37 | A | A | 0 | 0 | 180 | 247 | 1.81 | 1 |
| 41211065 | 37 | A | A | 0 | 0 | 180 | 247 | 1.81 | 1 |
| 41211067 | 40 | A | A | 0 | 0 | 53 | 90 | .93 | 1 |
| 41211069 | 95 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211071 | 40 | A | A | 0 | 0 | 460 | 545 | 2.13 | 1 |
| 41211083 | 58 | A | A | 0 | 0 | 286 | 308 | .38 | 1 |
| 41211089 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211108 | 40 | A | A | 0 | 0 | 90 | 190 | 2.50 | 1 |
| 41211120 | 38 | A | A | 0 | 0 | 0 | 57 | 1.50 | 1 |
| 41211122 | 40 | A | A | 0 | 0 | 0 | 86 | 2.15 | 1 |
| 41211123 | 40 | A | A | 0 | 0 | 0 | 65 | 1.63 | 1 |
| 41211125 | 74 | A | A | 0 | 0 | 983 | 941 | -0.57 | 1 |
| 41211126 | 40 | A | A | 0 | 0 | 500 | 552 | 1.30 | 1 |
| 41211131 | 60 | A | A | 0 | 0 | 0 | 24 | .40 | 1 |
| 41211158 | 60 | A | A | 0 | 0 | 0 | 61 | 1.02 | 1 |
| 41211161 | 20 | A | A | 0 | 0 | 0 | 50 | 2.50 | 1 |
| 41211162 | 74 | A | A | 0 | 0 | 670 | 925 | 3.45 | 1 |

26 MAR 86 User Spreadsheet
15:00:23 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211163 | 40 | A | A | 0 | 0 | 0 | 54 | 1.35 | 1 |
| 41211164 | 80 | A | A | 0 | 0 | 563 | 735 | 2.15 | 1 |
| 41211168 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211169 | 38 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211170 | 73 | A | A | 0 | 0 | 0 | 64 | .88 | 1 |
| 41211171 | 38 | A | A | 0 | 0 | 0 | 70 | 1.84 | 1 |
| 41211180 | 56 | A | A | 0 | 0 | 0 | 40 | .71 | 1 |
| 41211183 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211184 | 60 | A | A | 0 | 0 | 0 | 85 | 1.42 | 1 |
| 41211187 | 38 | A | A | 0 | 0 | 863 | 923 | 1.58 | 1 |
| 41211192 | 20 | A | A | 0 | 0 | 0 | 18 | .90 | 1 |
| 41211193 | 20 | A | A | 0 | 0 | 0 | 18 | .90 | 1 |
| 41211195 | 20 | A | A | 0 | 0 | 0 | 18 | .90 | 1 |
| 41211204 | 18 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211244 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211246 | 40 | A | A | 0 | 0 | 20 | 42 | .55 | 1 |
| 41211254 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211256 | 38 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211257 | 38 | A | A | 0 | 0 | 0 | 30 | .79 | 1 |
| 41211259 | 38 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211261 | 38 | A | A | 0 | 0 | 0 | 65 | 1.71 | 1 |
| 41211266 | 92 | A | A | 0 | 0 | 0 | 38 | .41 | 1 |
| 41211267 | 40 | A | A | 0 | 0 | 0 | 40 | 1.00 | 1 |
| 41211268 | 38 | A | A | 0 | 0 | 0 | 40 | 1.05 | 1 |
| 41211269 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41211675 | 80 | A | A | 0 | 0 | 0 | 60 | .75 | 1 |
| 41211677 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41311167 | 38 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 41311205 | 72 | A | A | 0 | 0 | 1460 | 1585 | 1.74 | 1 |
| 41311258 | 40 | A | A | 0 | 0 | 0 | 30 | .75 | 1 |
| 41311676 | 60 | A | A | 0 | 0 | 0 | 45 | .75 | 1 |
| 42111144 | 60 | A | A | 0 | 0 | 146 | 172 | .43 | 1 |
| 42211003 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211015 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211017 | 20 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211035 | 80 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211041 | 48 | A | A | 0 | 0 | 0 | 28 | .58 | 1 |
| 42211042 | 48 | A | A | 0 | 0 | 0 | 28 | .58 | 1 |
| 42211043 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211085 | 60 | A | A | 0 | 0 | 733 | 808 | 1.25 | 1 |
| 42211088 | 60 | A | A | 0 | 0 | 1005 | 1257 | 4.20 | 1 |
| 42211096 | 40 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211099 | 40 | A | A | 0 | 0 | 550 | 819 | 6.73 | 1 |
| 42211110 | 20 | A | A | 0 | 0 | 0 | 175 | 8.75 | 1 |
| 42211111 | 60 | A | A | 0 | 0 | 0 | 225 | 3.75 | 1 |
| 42211115 | 39 | A | A | 0 | 0 | 0 | 109 | 2.79 | 1 |
| 42211116 | 58 | A | A | 0 | 0 | 204 | 311 | 1.84 | 1 |
| 42211129 | 38 | A | A | 0 | 0 | 281 | 444 | 4.29 | 1 |
| 42211130 | 80 | A | A | 0 | 0 | 1346 | 1656 | 3.88 | 1 |
| 42211141 | 40 | A | A | 0 | 0 | 255 | 319 | 1.60 | 1 |
| 42211142 | 60 | A | A | 0 | 0 | 146 | 179 | .55 | 1 |

26-MAR-86 door spreadsheet
15:00:23 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 42211143 | 60 | A | A | 0 | 0 | 136 | 166 | .50 | 1 |
| 42211145 | 60 | A | A | 0 | 0 | 146 | 160 | .23 | 1 |
| 42211147 | 110 | A | A | 0 | 0 | 1510 | 1510 | .00 | 1 |
| 42211148 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 42211206 | 160 | A | A | 0 | 0 | 0 | 75 | .47 | 1 |
| 42211241 | 20 | A | A | 0 | 0 | 0 | 32 | 1.60 | 1 |
| 42211304 | 60 | A | A | 0 | 0 | 146 | 160 | .23 | 1 |
| 42311242 | 20 | A | A | 0 | 0 | 0 | 32 | 1.60 | 1 |
| 42311306 | 94 | A | A | 0 | 0 | 86 | 172 | .91 | 1 |
| 23211516 | 60 | A | A | 0 | 0 | 537 | 603 | 1.10 | 1 |
| 23111521 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211501 | 60 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211581 | 41 | A | A | 0 | 0 | 0 | 0 | .00 | 1 |
| 12211121 | 60 | A | A | 0 | 0 | 740 | 740 | .00 | 1 |
| 12211107 | 89 | A | A | 0 | 0 | 685 | 746 | .69 | 1 |
| 12211147 | 38 | A | A | 0 | 0 | 244 | 282 | 1.00 | 1 |
| 13211115 | 40 | A | A | 0 | 0 | 1800 | 1800 | .00 | 1 |
| 11211139 | 38 | A | A | 1 | 1 | 320 | 320 | .00 | 1 |
| 12211108 | 38 | A | A | 1 | 0 | 277 | 277 | .00 | 1 |
| 13211125 | 40 | A | A | 1 | 1 | 1070 | 1710 | 16.00 | 1 |
| 13211113 | 60 | A | A | 1 | 1 | 225 | 250 | .42 | 1 |
| 11111106 | 38 | A | A | 1 | 1 | 266 | 266 | .00 | 1 |
| 11111140 | 38 | A | A | 1 | 1 | 291 | 291 | .00 | 1 |
| 11111143 | 38 | A | A | 1 | 1 | 226 | 226 | .00 | 1 |
| 11111153 | 38 | A | A | 1 | 1 | 242 | 242 | .00 | 1 |
| 11211122 | 38 | A | A | 1 | 1 | 460 | 460 | .00 | 1 |
| 11211141 | 55 | A | A | 1 | 1 | 400 | 400 | .00 | 1 |
| 11211144 | 40 | A | A | 1 | 1 | 291 | 291 | .00 | 1 |
| 12111117 | 40 | A | A | 1 | 1 | 916 | 1097 | 4.53 | 1 |
| 12211102 | 38 | A | A | 1 | 1 | 0 | 0 | .00 | 1 |
| 12211130 | 20 | A | A | 1 | 1 | 125 | 125 | .00 | 1 |
| 12211132 | 80 | A | A | 1 | 1 | 769 | 724 | -0.56 | 1 |
| 13211101 | 42 | A | A | 1 | 1 | 750 | 1439 | 16.40 | 1 |
| 13211118 | 105 | A | A | 1 | 1 | 796 | 976 | 1.71 | 1 |
| 13211119 | 20 | A | A | 1 | 1 | 385 | 480 | 4.75 | 1 |
| 13211123 | 38 | A | A | 1 | 1 | 220 | 220 | .00 | 1 |
| 13211128 | 20 | A | A | 1 | 1 | 150 | 150 | .00 | 1 |
| 12211146 | 38 | A | A | 1 | 1 | 0 | 0 | .00 | 1 |
| 11211136 | 40 | A | A | 1 | 1 | 310 | 310 | .00 | 1 |
| 12211133 | 38 | A | A | 1 | 1 | 320 | 320 | .00 | 1 |
| 12211114 | 86 | A | A | 1 | 1 | 493 | 853 | 4.19 | 1 |
| 12211104 | 61 | A | A | 1 | 1 | 600 | 887 | 4.70 | 1 |
| 12211149 | 56 | A | A | 1 | 1 | 326 | 407 | 1.45 | 1 |
| 23211530 | 40 | A | A | 10 | 0 | 0 | 0 | .00 | 1 |
| 32211289 | 20 | A | A | 10 | 10 | 0 | 24 | 1.20 | 1 |
| 23211551 | 58 | A | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211505 | 39 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211529 | 40 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211535 | 20 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211539 | 64 | E | E | 0 | 0 | 974 | 978 | .06 | 1 |
| 23211543 | 57 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |

26-MAR-86 door spreadsheet
15:00:24 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 23211548 | 42 | E | E | 0 | 0 | 8 | 22 | .33 | 1 |
| 23211550 | 40 | E | E | 0 | 0 | 872 | 872 | .00 | 1 |
| 23211554 | 42 | E | E | 0 | 0 | 679 | 823 | 3.43 | 1 |
| 23211577 | 37 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23311510 | 40 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211565 | 103 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23111523 | 40 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211580 | 44 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23111512 | 42 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23111514 | 72 | E | E | 0 | 0 | 469 | 625 | 2.17 | 1 |
| 23211503 | 60 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211511 | 60 | E | E | 0 | 0 | 599 | 640 | .68 | 1 |
| 23211519 | 42 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211520 | 63 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211525 | 20 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211545 | 20 | E | E | 0 | 0 | 42 | 56 | .70 | 1 |
| 23211553 | 44 | E | E | 0 | 0 | 1190 | 1190 | .00 | 1 |
| 23211557 | 42 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211560 | 90 | E | E | 0 | 0 | 546 | 546 | .00 | 1 |
| 23211564 | 42 | E | E | 0 | 0 | 70 | 84 | .33 | 1 |
| 23211568 | 38 | E | E | 0 | 0 | 288 | 288 | .00 | 1 |
| 23211509 | 38 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211561 | 60 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23111573 | 58 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211563 | 41 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 23211537 | 40 | E | E | 0 | 0 | 0 | 0 | .00 | 1 |
| 31211403 | 83 | B | B | 0 | 0 | 450 | 546 | 1.16 | 2 |
| 31211410 | 36 | B | B | 0 | 0 | 93 | 117 | .67 | 2 |
| 31211292 | 60 | B | B | 0 | 0 | 600 | 923 | 5.38 | 2 |
| 41211095 | 60 | B | B | 1 | 0 | 710 | 889 | 2.98 | 2 |
| 41211051 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211073 | 80 | B | B | 1 | 1 | 0 | 74 | .93 | 2 |
| 41211097 | 38 | B | B | 1 | 1 | 332 | 478 | 3.84 | 2 |
| 41211118 | 110 | B | B | 1 | 1 | 0 | 625 | 5.68 | 2 |
| 41211133 | 40 | B | B | 1 | 1 | 150 | 461 | 7.78 | 2 |
| 41211165 | 162 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211173 | 137 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211181 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211234 | 92 | B | B | 1 | 1 | 0 | 150 | 1.63 | 2 |
| 41211271 | 79 | B | B | 1 | 1 | 0 | 100 | 1.27 | 2 |
| 41211303 | 38 | B | B | 1 | 1 | 0 | 225 | 5.92 | 2 |
| 41111174 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41111176 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41111178 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41111239 | 18 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211038 | 18 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211058 | 53 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211079 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211182 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211204 | 20 | B | B | 1 | 1 | 0 | 0 | .00 | 2 |
| 41211008 | 40 | B | A | 0 | 0 | 0 | 338 | 8.45 | 3 |

26-MAR-86 door spreadsheet
15:00:24 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 12211151 | 54 | B | A | 0 | 0 | 1104 | 1069 | -0.65 | 3 |
| 31211338 | 42 | B | A | 0 | 0 | 269 | 412 | 3.40 | 3 |
| 32211162 | 56 | B | A | 0 | 0 | 750 | 940 | 3.39 | 3 |
| 31211145 | 60 | B | A | 0 | 0 | 635 | 1160 | 8.75 | 3 |
| 31211183 | 110 | B | A | 0 | 0 | 460 | 830 | 3.36 | 3 |
| 32211111 | 100 | B | A | 0 | 0 | 1879 | 1437 | -4.42 | 3 |
| 31211346 | 37 | B | A | 0 | 0 | 70 | 30 | -1.00 | 3 |
| 23211517 | 66 | B | A | 0 | 0 | 259 | 555 | 4.48 | 3 |
| 23211522 | 45 | B | A | 0 | 0 | 236 | 632 | 8.80 | 3 |
| 31211128 | 56 | B | A | 0 | 0 | 933 | 1230 | 5.30 | 3 |
| 31211253 | 100 | B | A | 0 | 0 | 0 | 112 | 1.12 | 3 |
| 31211270 | 38 | B | A | 0 | 0 | 150 | 204 | 1.42 | 3 |
| 31111112 | 40 | B | A | 0 | 0 | 370 | 600 | 5.75 | 3 |
| 31211133 | 37 | B | A | 0 | 0 | 280 | 402 | 3.30 | 3 |
| 31211134 | 55 | B | A | 0 | 0 | 0 | 45 | .82 | 3 |
| 31211135 | 20 | B | A | 0 | 0 | 0 | 59 | 2.95 | 3 |
| 31211177 | 64 | B | A | 0 | 0 | 501 | 712 | 3.30 | 3 |
| 31211248 | 40 | B | A | 0 | 0 | 720 | 970 | 6.25 | 3 |
| 31211397 | 20 | B | A | 0 | 0 | 53 | 167 | 5.70 | 3 |
| 31211399 | 40 | B | A | 0 | 0 | 650 | 820 | 4.25 | 3 |
| 31211408 | 38 | B | A | 0 | 0 | 200 | 285 | 2.24 | 3 |
| 31211409 | 40 | B | A | 0 | 0 | 200 | 285 | 2.13 | 3 |
| 32211232 | 40 | B | A | 0 | 0 | 0 | 118 | 2.95 | 3 |
| 32211110 | 58 | B | A | 0 | 0 | 986 | 460 | -9.07 | 3 |
| 31211250 | 38 | B | A | 0 | 0 | 660 | 710 | 1.32 | 3 |
| 31211257 | 38 | B | A | 0 | 0 | 472 | 707 | 6.18 | 3 |
| 31211260 | 60 | B | A | 0 | 0 | 656 | 1146 | 8.17 | 3 |
| 31211265 | 84 | B | A | 0 | 0 | 720 | 1020 | 3.57 | 3 |
| 32211299 | 60 | B | A | 0 | 0 | 405 | 810 | 6.75 | 3 |
| 32211423 | 20 | B | A | 0 | 0 | 0 | 88 | 4.40 | 3 |
| 31211166 | 58 | B | A | 0 | 0 | 0 | 186 | 3.21 | 3 |
| 31211201 | 77 | B | A | 0 | 0 | 1040 | 831 | -2.71 | 3 |
| 31211259 | 38 | B | A | 0 | 0 | 296 | 355 | 1.55 | 3 |
| 31211308 | 38 | B | A | 0 | 0 | 612 | 968 | 9.37 | 3 |
| 31211341 | 57 | B | A | 0 | 1 | 332 | 549 | 3.81 | 3 |
| 32211186 | 40 | B | A | 0 | 1 | 1354 | 618 | -18.40 | 3 |
| 41111045 | 40 | B | A | 1 | 0 | 210 | 206 | -0.10 | 3 |
| 41211002 | 37 | B | A | 1 | 0 | 345 | 513 | 4.54 | 3 |
| 41211005 | 58 | B | A | 1 | 0 | 520 | 621 | 1.74 | 3 |
| 41211006 | 38 | B | A | 1 | 0 | 546 | 676 | 3.42 | 3 |
| 41211013 | 37 | B | A | 1 | 0 | 368 | 480 | 3.03 | 3 |
| 41211014 | 40 | B | A | 1 | 0 | 1095 | 1212 | 2.93 | 3 |
| 41211024 | 37 | B | A | 1 | 0 | 478 | 877 | 10.78 | 3 |
| 41211025 | 37 | B | A | 1 | 0 | 302 | 509 | 5.59 | 3 |
| 41211026 | 40 | B | A | 1 | 0 | 296 | 358 | 1.55 | 3 |
| 41211027 | 78 | B | A | 1 | 0 | 576 | 1193 | 7.91 | 3 |
| 41211033 | 38 | B | A | 1 | 0 | 335 | 429 | 2.47 | 3 |
| 41211036 | 20 | B | A | 1 | 0 | 0 | 0 | .00 | 3 |
| 41211039 | 60 | B | A | 1 | 0 | 676 | 855 | 2.98 | 3 |
| 41211040 | 37 | B | A | 1 | 0 | 227 | 250 | .62 | 3 |
| 41211047 | 40 | B | A | 1 | 0 | 1003 | 1096 | 2.33 | 3 |

26-MAR-86 door spreadsheet
15:00:24 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 41211048 | 40 | B | A | 1 | 0 | 336 | 329 | -0.18 | 3 |
| 41211049 | 40 | B | A | 1 | 0 | 610 | 754 | 3.60 | 3 |
| 41211050 | 60 | B | A | 1 | 0 | 955 | 1091 | 2.27 | 3 |
| 41211052 | 120 | B | A | 1 | 0 | 1245 | 3869 | 21.87 | 3 |
| 41211053 | 126 | B | A | 1 | 0 | 1857 | 2248 | 3.10 | 3 |
| 41211060 | 60 | B | A | 1 | 0 | 523 | 666 | 2.38 | 3 |
| 41211074 | 40 | B | A | 1 | 0 | 0 | 34 | .85 | 3 |
| 41211075 | 40 | B | A | 1 | 0 | 0 | 34 | .85 | 3 |
| 41211076 | 40 | B | A | 1 | 0 | 0 | 34 | .85 | 3 |
| 41211077 | 40 | B | A | 1 | 0 | 0 | 34 | .85 | 3 |
| 41211078 | 42 | B | A | 1 | 0 | 240 | 439 | 4.74 | 3 |
| 41211079 | 20 | B | A | 1 | 0 | 534 | 690 | 7.80 | 3 |
| 41211081 | 65 | B | A | 1 | 0 | 313 | 546 | 3.58 | 3 |
| 41211084 | 54 | B | A | 1 | 0 | 1149 | 1344 | 3.61 | 3 |
| 41211086 | 98 | B | A | 1 | 0 | 1270 | 1905 | 6.48 | 3 |
| 41211087 | 38 | B | A | 1 | 0 | 295 | 440 | 3.82 | 3 |
| 41211091 | 38 | B | A | 1 | 0 | 398 | 549 | 3.97 | 3 |
| 41211092 | 38 | B | A | 1 | 0 | 338 | 400 | 1.63 | 3 |
| 41211093 | 40 | B | A | 1 | 0 | 823 | 1377 | 13.85 | 3 |
| 41211094 | 38 | B | A | 1 | 0 | 0 | 291 | 7.66 | 3 |
| 41211106 | 60 | B | A | 1 | 0 | 642 | 831 | 3.15 | 3 |
| 41211107 | 38 | B | A | 1 | 0 | 373 | 520 | 3.87 | 3 |
| 41211119 | 58 | B | A | 1 | 0 | 300 | 650 | 6.03 | 3 |
| 41211124 | 96 | B | A | 1 | 0 | 1052 | 1343 | 3.03 | 3 |
| 41211127 | 80 | B | A | 1 | 0 | 1150 | 1313 | 2.04 | 3 |
| 41211132 | 58 | B | A | 1 | 0 | 0 | 114 | 1.97 | 3 |
| 41211146 | 40 | B | A | 1 | 0 | 0 | 15 | .38 | 3 |
| 41211153 | 60 | B | A | 1 | 0 | 254 | 530 | 4.60 | 3 |
| 41211156 | 58 | B | A | 1 | 0 | 0 | 61 | 1.05 | 3 |
| 41211157 | 118 | B | A | 1 | 0 | 0 | 81 | .69 | 3 |
| 41211159 | 38 | B | A | 1 | 0 | 269 | 412 | 3.76 | 3 |
| 41211182 | 40 | B | A | 1 | 0 | 0 | 0 | .00 | 3 |
| 41211188 | 38 | B | A | 1 | 0 | 565 | 461 | -2.74 | 3 |
| 41211196 | 40 | B | A | 1 | 0 | 303 | 459 | 3.90 | 3 |
| 41211197 | 60 | B | A | 1 | 0 | 204 | 323 | 1.98 | 3 |
| 41211201 | 38 | B | A | 1 | 0 | 522 | 554 | .84 | 3 |
| 41211202 | 38 | B | A | 1 | 0 | 422 | 521 | 2.61 | 3 |
| 41211203 | 38 | B | A | 1 | 0 | 107 | 199 | 2.42 | 3 |
| 41211220 | 60 | B | A | 1 | 0 | 550 | 667 | 1.95 | 3 |
| 41211251 | 58 | B | A | 1 | 0 | 750 | 1300 | 9.48 | 3 |
| 41211252 | 58 | B | A | 1 | 0 | 750 | 1300 | 9.48 | 3 |
| 41211265 | 55 | B | A | 1 | 0 | 472 | 625 | 2.78 | 3 |
| 41211274 | 38 | B | A | 1 | 0 | 1274 | 1345 | 1.87 | 3 |
| 41311186 | 76 | B | A | 1 | 0 | 1918 | 2843 | 12.17 | 3 |
| 42211030 | 84 | B | A | 1 | 0 | 1035 | 1807 | 9.19 | 3 |
| 42211121 | 58 | B | A | 1 | 0 | 450 | 725 | 4.74 | 3 |
| 42211134 | 37 | B | A | 1 | 0 | 460 | 600 | 3.78 | 3 |
| 42211135 | 37 | B | A | 1 | 0 | 460 | 600 | 3.78 | 3 |
| 42211136 | 37 | B | A | 1 | 0 | 460 | 600 | 3.78 | 3 |
| 42211137 | 37 | B | A | 1 | 0 | 460 | 600 | 3.78 | 3 |
| 42211138 | 37 | B | A | 1 | 0 | 460 | 600 | 3.78 | 3 |

26-MAR-86 door spreadsheet
15:00:24 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | CPTYPE | MCSTYPE | CPUVAL | MCSUVAL | CP$ | MCS$ | INCOST$ | GRP |
|---|---|---|---|---|---|---|---|---|---|
| 42211219 | 63 | B | A | 1 | 0 | 480 | 690 | 3.33 | 3 |
| 42211262 | 84 | B | A | 1 | 0 | 1035 | 1807 | 9.19 | 3 |
| 42211263 | 84 | B | A | 1 | 0 | 1035 | 1807 | 9.19 | 3 |
| 42211281 | 60 | B | A | 1 | 0 | 567 | 976 | 6.82 | 3 |
| 42211282 | 40 | B | A | 1 | 0 | 242 | 353 | 2.78 | 3 |
| 42211283 | 38 | B | A | 1 | 0 | 242 | 358 | 3.05 | 3 |
| 42211284 | 38 | B | A | 1 | 0 | 242 | 358 | 3.05 | 3 |
| 42211285 | 38 | B | A | 1 | 0 | 242 | 352 | 2.89 | 3 |
| 42311224 | 40 | B | A | 1 | 0 | 160 | 260 | 2.50 | 3 |
| 41211051 | 56 | B | A | 1 | 0 | 585 | 776 | 3.41 | 3 |
| 41211181 | 60 | B | A | 1 | 0 | 0 | 0 | .00 | 3 |
| 41211244 | 18 | B | A | 1 | 0 | 737 | 801 | 3.56 | 3 |
| 41211269 | 18 | B | A | 1 | 0 | 306 | 390 | 4.67 | 3 |
| 41211274 | 72 | B | A | 1 | 0 | 0 | 280 | 3.89 | 3 |
| 41211289 | 38 | B | A | 1 | 0 | 377 | 445 | 1.79 | 3 |
| 12211100 | 73 | B | A | 1 | 1 | 52 | 52 | .00 | 3 |
| 11111142 | 40 | B | A | 1 | 1 | 650 | 320 | -8.25 | 3 |
| 31211297 | 20 | B | A | 1 | 0 | 185 | 140 | -2.25 | 3 |
| 31211271 | 38 | B | A | 1 | 0 | 426 | 890 | 12.21 | 3 |
| 32211426 | 73 | B | A | 1 | 0 | 635 | 405 | -3.15 | 3 |
| 31211153 | 64 | B | A | 10 | 0 | 0 | 75 | 1.17 | 3 |
| 31211106 | 133 | A | B | 0 | 0 | 1683 | 1973 | 2.18 | 4 |
| 11111142 | 80 | A | B | 1 | 1 | 320 | 650 | 4.13 | 4 |
| 12211103 | 81 | A | D | 1 | 1 | 2200 | 2200 | .00 | 99 |
| 41111112 | 38 | D | D | 0 | 0 | 0 | 22 | .58 | 99 |
| 42211264 | 64 | D | D | 10 | 10 | 0 | 133 | 2.08 | 99 |
| 41211012 | 46 | X | A | 10 | 0 | 498 | 570 | 1.57 | 99 |
| 41211018 | 37 | X | A | 10 | 0 | 486 | 812 | 8.81 | 99 |
| 41211072 | 56 | X | A | 10 | 0 | 2490 | 2960 | 8.39 | 99 |
| 42211147 | 40 | Z | A | 10 | 0 | 350 | 560 | 5.25 | 99 |
| 42111021 | 37 | Z | A | 10 | 0 | 527 | 513 | -0.38 | 99 |
| 42211004 | 37 | Z | A | 10 | 0 | 527 | 513 | -0.38 | 99 |
| 42211011 | 37 | Z | A | 10 | 0 | 527 | 513 | -0.38 | 99 |
| 42211037 | 37 | Z | A | 10 | 0 | 527 | 513 | -0.38 | 99 |
| 41211140 | 37 | Z | Z | 0 | 0 | 0 | 0 | .00 | 99 |
| 23211567 | 62 | Z | Z | 0 | 0 | 0 | 0 | .00 | 99 |
| 31211259 | 40 | Z | Z | 0 | 0 | 220 | 657 | 10.93 | 99 |
| 41211256 | 40 | Z | Z | 1 | 1 | 0 | 0 | .00 | 99 |
| 13211124 | 55 | Z | Z | 1 | 0 | 800 | 800 | .00 | 99 |

NUMBER OF CASES READ = 345 NUMBER OF CASES LISTED = 345

## AIR-TO-AIR HEAT EXCHANGER SPREADSHEET

**AAHX Type Code:**

A The Air Changer Company

B Airxchange (NuTone)

E Conservation Energy Systems (VanEE)

F Des Champs (79m-4)

G Des Champs (79m-6)

H Des Champs (200 series)

I Des Champs (300 series)

J EER Products (Heat-X-changer)

K Ener-Corp (Enerex 250)

M Mountain Energy and Resources

O Star Heat Exchanger 100A

P Star Heat Exchanger 200A

R Enter Matrix

X Missing

Z Other

26-MAR-86 air-to-air heat exchanger spreadsheet
15:01:58 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 41211074 | 1176 | A | 1150 | .98 | 1 |
| 41211075 | 1176 | A | 1150 | .98 | 1 |
| 41211076 | 1176 | A | 1150 | .98 | 1 |
| 41211077 | 1176 | A | 1150 | .98 | 1 |
| 31211135 | 1200 | A | 1846 | 1.54 | 1 |
| 41211084 | 1425 | A | 1639 | 1.15 | 1 |
| 41211127 | 1449 | A | 1865 | 1.29 | 1 |
| 31211133 | 930 | B | 586 | .63 | 2 |
| 41211062 | 1008 | B | 706 | .70 | 2 |
| 41211063 | 1008 | B | 757 | .75 | 2 |
| 41111209 | 1143 | B | 1155 | 1.01 | 2 |
| 41111211 | 1143 | B | 1155 | 1.01 | 2 |
| 41111213 | 1143 | B | 1155 | 1.01 | 2 |
| 41111215 | 1143 | B | 1155 | 1.01 | 2 |
| 41111217 | 1143 | B | 1155 | 1.01 | 2 |
| 41211065 | 1144 | B | 787 | .69 | 2 |
| 31211268 | 1153 | B | 869 | .75 | 2 |
| 31111112 | 1193 | B | 925 | .78 | 2 |
| 41211009 | 1222 | B | 790 | .65 | 2 |
| 31211267 | 1239 | B | 812 | .66 | 2 |
| 31211221 | 1247 | B | 938 | .75 | 2 |
| 41211146 | 1288 | B | 780 | .61 | 2 |
| 41211108 | 1290 | B | 699 | .54 | 2 |
| 31211146 | 1304 | B | 1016 | .78 | 2 |
| 41211079 | 1312 | B | 773 | .59 | 2 |
| 41211033 | 1386 | B | 972 | .70 | 2 |
| 41211275 | 1390 | B | 997 | .72 | 2 |
| 31211259 | 1408 | B | 890 | .63 | 2 |
| 41211107 | 1413 | B | 895 | .63 | 2 |
| 41111151 | 1422 | B | 745 | .52 | 2 |
| 41211277 | 1445 | B | 1046 | .72 | 2 |
| 31211338 | 1450 | B | 1320 | .91 | 2 |
| 41211027 | 1465 | B | 1676 | 1.14 | 2 |
| 41211187 | 1480 | B | 916 | .62 | 2 |
| 31211195 | 1495 | B | 910 | .61 | 2 |
| 41211002 | 1495 | B | 950 | .64 | 2 |
| 41211025 | 1497 | B | 775 | .52 | 2 |
| 23211509 | 1169 | E | 1237 | 1.06 | 3 |
| 31211346 | 1230 | E | 1403 | 1.14 | 3 |
| 12211100 | 1288 | E | 1592 | 1.24 | 3 |
| 41211070 | 1326 | E | 1035 | .78 | 3 |
| 41211071 | 1326 | E | 1035 | .78 | 3 |
| 23111523 | 1392 | E | 1269 | .91 | 3 |
| 23211531 | 1478 | E | 1247 | .84 | 3 |
| 42211043 | 1499 | E | 1775 | 1.18 | 3 |
| 41211092 | 1104 | F | 899 | .81 | 4 |
| 41211082 | 1124 | F | 1214 | 1.08 | 4 |
| 41211059 | 1210 | F | 1069 | .88 | 4 |
| 41211040 | 1221 | F | 1115 | .91 | 4 |
| 41211023 | 1327 | F | 1134 | .85 | 4 |
| 41211024 | 1327 | F | 1090 | .82 | 4 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:01:59 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 41211036 | 1388 | F | 1121 | .81 | 4 |
| 41211067 | 1406 | F | 1543 | 1.10 | 4 |
| 42211044 | 1406 | F | 0 | .00 | 4 |
| 41211261 | 1418 | F | 1058 | .75 | 4 |
| 41211122 | 1494 | F | 1455 | .97 | 4 |
| 41211005 | 1232 | G | 1140 | .93 | 5 |
| 41211013 | 1248 | G | 1245 | 1.00 | 5 |
| 23111521 | 960 | H | 1232 | 1.28 | 6 |
| 23111573 | 960 | H | 1402 | 1.46 | 6 |
| 12211110 | 1224 | H | 1840 | 1.50 | 6 |
| 13211150 | 1294 | H | 1966 | 1.52 | 6 |
| 32211186 | 1403 | H | 1612 | 1.15 | 6 |
| 31211408 | 1423 | H | 1399 | .98 | 6 |
| 13211123 | 1277 | I | 2654 | 2.08 | 7 |
| 11211122 | 1426 | I | 1800 | 1.26 | 7 |
| 12211108 | 1176 | J | 1179 | 1.00 | 8 |
| 41111174 | 1435 | J | 1393 | .97 | 8 |
| 31211399 | 1089 | K | 970 | .89 | 9 |
| 23111512 | 1144 | M | 1568 | 1.37 | 10 |
| 41211089 | 1011 | O | 1133 | 1.12 | 11 |
| 41211050 | 1185 | O | 910 | .77 | 11 |
| 41111235 | 1246 | O | 1528 | 1.23 | 11 |
| 42211099 | 1247 | O | 0 | .00 | 11 |
| 41211289 | 1278 | O | 1652 | 1.29 | 11 |
| 41211008 | 1280 | O | 1171 | .91 | 11 |
| 41211068 | 1284 | O | 1217 | .95 | 11 |
| 42211088 | 1314 | O | 1011 | .77 | 11 |
| 41111237 | 1323 | O | 1486 | 1.12 | 11 |
| 12211131 | 1352 | O | 1266 | .94 | 11 |
| 41211120 | 1403 | O | 1470 | 1.05 | 11 |
| 41211038 | 1430 | O | 879 | .61 | 11 |
| 41211078 | 1440 | O | 1677 | 1.16 | 11 |
| 41211012 | 1491 | O | 842 | .56 | 11 |
| 41111176 | 1299 | P | 1406 | 1.08 | 12 |
| 41211119 | 1316 | P | 1282 | .97 | 12 |
| 42211282 | 1460 | P | 1193 | .82 | 12 |
| 41211090 | 1462 | P | 2070 | 1.42 | 12 |
| 31211250 | 943 | R | 1137 | 1.21 | 13 |
| 23111514 | 1195 | R | 1310 | 1.10 | 13 |
| 23211519 | 1356 | R | 1202 | .89 | 13 |
| 31211248 | 1380 | R | 970 | .70 | 13 |
| 41211163 | 1155 | X | 1192 | 1.03 | 14 |
| 31111218 | 1200 | X | 850 | .71 | 14 |
| 31211153 | 1334 | X | 730 | .55 | 14 |
| 12211147 | 1423 | X | 1507 | 1.06 | 14 |
| 41211182 | 1484 | X | 1047 | .71 | 14 |
| 31211410 | 1080 | Z | 686 | .64 | 15 |
| 32211423 | 1236 | Z | 1097 | .89 | 15 |
| 41111045 | 1271 | Z | 1819 | 1.43 | 15 |
| 32211111 | 1526 | A | 1579 | 1.03 | 16 |
| 32211110 | 1553 | A | 1506 | .97 | 16 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:Ø1:59 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 31211128 | 1653 | A | 1667 | 1.Ø1 | 16 |
| 41211123 | 173Ø | A | 1339 | .77 | 16 |
| 41211180 | 175Ø | A | 145Ø | .83 | 16 |
| 41211303 | 1776 | A | 1595 | .9Ø | 16 |
| 23211561 | 1792 | A | 135Ø | .75 | 16 |
| 41211ØØ1 | 1934 | A | 14Ø3 | .73 | 16 |
| 41211201 | 1936 | A | 14Ø7 | .73 | 16 |
| 31211155 | 23Ø3 | A | 1213 | .53 | 16 |
| 41211149 | 2321 | A | 16Ø7 | .69 | 16 |
| 41211220 | 2388 | A | 125Ø | .52 | 16 |
| 31211292 | 248Ø | A | 1536 | .62 | 16 |
| 41111Ø28 | 15Ø5 | B | 999 | .66 | 17 |
| 41211ØØ6 | 1521 | B | 1Ø47 | .69 | 17 |
| 41211168 | 1538 | B | 49Ø | .32 | 17 |
| 31211397 | 1587 | B | 1193 | .75 | 17 |
| 41211Ø87 | 1588 | B | 12ØØ | .76 | 17 |
| 41211169 | 1589 | B | 49Ø | .31 | 17 |
| 41211257 | 16Ø4 | B | 75Ø | .47 | 17 |
| 41311258 | 16Ø5 | B | 661 | .41 | 17 |
| 41211131 | 1623 | B | 996 | .61 | 17 |
| 41211276 | 163Ø | B | 997 | .61 | 17 |
| 41211Ø66 | 1651 | B | 884 | .54 | 17 |
| 42211141 | 1652 | B | 94Ø | .57 | 17 |
| 31211260 | 1688 | B | 89Ø | .53 | 17 |
| 31211137 | 1697 | B | 87Ø | .51 | 17 |
| 41211Ø32 | 17Ø5 | B | 97Ø | .57 | 17 |
| 41211Ø95 | 1725 | B | 874 | .51 | 17 |
| 31211271 | 1763 | B | 415 | .24 | 17 |
| 41211159 | 1764 | B | 834 | .47 | 17 |
| 41211259 | 1778 | B | 6Ø6 | .34 | 17 |
| 41211Ø72 | 1819 | B | 796 | .44 | 17 |
| 42111Ø21 | 1824 | B | 137Ø | .75 | 17 |
| 42211ØØ4 | 1888 | B | 1368 | .72 | 17 |
| 42211Ø37 | 1893 | B | 1368 | .72 | 17 |
| 41211132 | 19ØØ | B | 77Ø | .41 | 17 |
| 42211121 | 2Ø19 | B | Ø | .ØØ | 17 |
| 42211Ø11 | 2Ø45 | B | 137Ø | .67 | 17 |
| 42211219 | 2112 | B | Ø | .ØØ | 17 |
| 41311205 | 2132 | B | 1ØØØ | .47 | 17 |
| 31211395 | 22Ø8 | B | 9ØØ | .41 | 17 |
| 31211403 | 2245 | B | 1Ø7Ø | .48 | 17 |
| 41311676 | 2255 | B | 8Ø8 | .36 | 17 |
| 31211257 | 23Ø4 | B | 1325 | .58 | 17 |
| 41211128 | 2419 | B | 1956 | .81 | 17 |
| 41211675 | 2423 | B | 1Ø48 | .43 | 17 |
| 42211241 | 1637 | E | 14Ø3 | .86 | 18 |
| 23211525 | 18ØØ | E | 1618 | .9Ø | 18 |
| 42311242 | 1848 | E | Ø | .ØØ | 18 |
| 23211551 | 1872 | E | 18Ø1 | .96 | 18 |
| 23211560 | 1889 | E | 156Ø | .83 | 18 |
| 23211545 | 1974 | E | 1645 | .83 | 18 |

26-MAR-86 air-to-air heat exchanger spreadsheet
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| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 23211550 | 1976 | E | 1430 | .72 | 18 |
| 23211535 | 2016 | E | 1720 | .85 | 18 |
| 23211552 | 2026 | E | 2001 | .99 | 18 |
| 23211506 | 2034 | E | 1965 | .97 | 18 |
| 23211566 | 2034 | E | 1965 | .97 | 18 |
| 42211096 | 2044 | E | 1845 | .90 | 18 |
| 23211572 | 2132 | E | 1765 | .83 | 18 |
| 23211522 | 2200 | E | 1535 | .70 | 18 |
| 42211003 | 2289 | E | 2065 | .90 | 18 |
| 23211511 | 2312 | E | 1161 | .50 | 18 |
| 23111574 | 2356 | E | 1645 | .70 | 18 |
| 23211564 | 2359 | E | 1694 | .72 | 18 |
| 23211505 | 2395 | E | 980 | .41 | 18 |
| 31211308 | 2397 | E | 913 | .38 | 18 |
| 13211101 | 2400 | E | 1718 | .72 | 18 |
| 41211160 | 1535 | F | 1586 | 1.03 | 19 |
| 23211578 | 1628 | F | 1142 | .70 | 19 |
| 41211161 | 2016 | F | 1590 | .79 | 19 |
| 41211019 | 2471 | F | 1514 | .61 | 19 |
| 41211125 | 2421 | G | 1905 | .79 | 20 |
| 32211427 | 1536 | H | 1394 | .91 | 21 |
| 23211548 | 1582 | H | 1250 | .79 | 21 |
| 41211091 | 1592 | H | 1020 | .64 | 21 |
| 31211182 | 1686 | H | 1287 | .76 | 21 |
| 32211310 | 1776 | H | 1333 | .75 | 21 |
| 23211558 | 1787 | H | 1684 | .94 | 21 |
| 32211232 | 1804 | H | 1126 | .62 | 21 |
| 31211216 | 1844 | H | 400 | .22 | 21 |
| 31211409 | 1917 | H | 1490 | .78 | 21 |
| 13211125 | 1920 | H | 1424 | .74 | 21 |
| 32211162 | 1967 | H | 1300 | .66 | 21 |
| 32211426 | 2020 | H | 1332 | .66 | 21 |
| 41211153 | 2040 | H | 1752 | .86 | 21 |
| 41211140 | 2193 | H | 1230 | .56 | 21 |
| 41211156 | 2203 | H | 1230 | .56 | 21 |
| 42211115 | 2216 | H | 1637 | .74 | 21 |
| 23211515 | 2240 | H | 1135 | .51 | 21 |
| 41211157 | 2266 | H | 1330 | .59 | 21 |
| 41211274 | 2308 | H | 1554 | .67 | 21 |
| 23211543 | 2332 | H | 1296 | .56 | 21 |
| 23211571 | 2400 | H | 1178 | .49 | 21 |
| 41211273 | 2417 | H | 1197 | .50 | 21 |
| 31211424 | 2438 | H | 1634 | .67 | 21 |
| 42211116 | 2464 | H | 2040 | .83 | 21 |
| 41211166 | 2475 | H | 2045 | .83 | 21 |
| 13211113 | 2496 | H | 1405 | .56 | 21 |
| 32211289 | 2496 | H | 1226 | .49 | 21 |
| 11111106 | 1598 | I | 2120 | 1.33 | 22 |
| 41211094 | 1680 | I | 1371 | .82 | 22 |
| 41311189 | 1713 | I | 1266 | .74 | 22 |
| 41211269 | 1792 | I | 1341 | .75 | 22 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:01:59 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 2321153Ø | 1824 | I | 1214 | .67 | 22 |
| 2321150Ø1 | 1874 | I | 965 | .51 | 22 |
| 31211106 | 2Ø4Ø | I | 1305 | .64 | 22 |
| 31211265 | 2Ø89 | I | 600 | .29 | 22 |
| 13211115 | 2136 | I | 2137 | 1.ØØ | 22 |
| 23211554 | 2223 | I | 1758 | .79 | 22 |
| 2321150Ø7 | 226Ø | I | 1892 | .84 | 22 |
| 23211581 | 2456 | I | 246Ø | 1.ØØ | 22 |
| 23211562 | 2474 | I | 2151 | .87 | 22 |
| 23211524 | 2125 | M | 1523 | .72 | 23 |
| 23211526 | 17Ø9 | N | 1635 | .96 | 24 |
| 23211538 | 2Ø16 | N | 216Ø | 1.Ø7 | 24 |
| 41211196 | 1534 | O | 1368 | .89 | 25 |
| 41211183 | 1558 | O | 1Ø68 | .69 | 25 |
| 41111112 | 16Ø1 | O | 963 | .6Ø | 25 |
| 41211039 | 1625 | O | 1522 | .94 | 25 |
| 41211014 | 1649 | O | 1215 | .74 | 25 |
| 41111239 | 1658 | O | 1288 | .78 | 25 |
| 41211018 | 1684 | O | 1117 | .66 | 25 |
| 41211083 | 1692 | O | 1468 | .87 | 25 |
| 41211016 | 1713 | O | 1238 | .72 | 25 |
| 42211134 | 1768 | O | Ø | .ØØ | 25 |
| 42211135 | 1768 | O | 975 | .55 | 25 |
| 42211136 | 1768 | O | Ø | .ØØ | 25 |
| 42211137 | 1768 | O | 975 | .55 | 25 |
| 42211138 | 1768 | O | 975 | .55 | 25 |
| 41211026 | 1793 | O | 1595 | .89 | 25 |
| 42211085 | 1818 | O | Ø | .ØØ | 25 |
| 4221111Ø | 182Ø | O | 1319 | .72 | 25 |
| 42211017 | 1824 | O | 1253 | .69 | 25 |
| 41111178 | 1851 | O | 1395 | .75 | 25 |
| 41211227 | 1852 | O | 275Ø | 1.48 | 25 |
| 42211041 | 1876 | O | 112Ø | .6Ø | 25 |
| 42211042 | 1876 | O | 199Ø | 1.Ø6 | 25 |
| 42211015 | 191Ø | O | 1452 | .76 | 25 |
| 42211285 | 2144 | O | Ø | .ØØ | 25 |
| 42211283 | 2159 | O | 1454 | .67 | 25 |
| 42211284 | 2159 | O | 1454 | .67 | 25 |
| 1221113Ø | 152Ø | P | 1278 | .84 | 26 |
| 41211097 | 1611 | P | 1199 | .74 | 26 |
| 41211202 | 1634 | P | 1593 | .97 | 26 |
| 41211195 | 1715 | P | 866 | .5Ø | 26 |
| 41211204 | 1738 | P | 148Ø | .85 | 26 |
| 41211272 | 174Ø | P | 123Ø | .71 | 26 |
| 41211162 | 1756 | P | 12Ø5 | .69 | 26 |
| 41211254 | 177Ø | P | 1117 | .63 | 26 |
| 42111144 | 186Ø | P | 1331 | .72 | 26 |
| 42211142 | 186Ø | P | 1354 | .73 | 26 |
| 42211143 | 186Ø | P | 1136 | .61 | 26 |
| 42211145 | 186Ø | P | 1332 | .72 | 26 |
| 4221130Ø4 | 186Ø | P | 1332 | .72 | 26 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:02:00 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 41211051 | 1875 | P | 1198 | .64 | 26 |
| 41211020 | 1883 | P | 784 | .42 | 26 |
| 41211256 | 1883 | P | 784 | .42 | 26 |
| 41211677 | 1913 | P | 1460 | .76 | 26 |
| 41211251 | 1916 | P | 2195 | 1.15 | 26 |
| 41211252 | 1916 | P | 2195 | 1.15 | 26 |
| 41211184 | 2002 | P | 1058 | .53 | 26 |
| 41211203 | 2032 | P | 1552 | .76 | 26 |
| 41211265 | 2078 | P | 1585 | .76 | 26 |
| 31211166 | 2258 | P | 1890 | .84 | 26 |
| 41211192 | 2306 | P | 812 | .35 | 26 |
| 41211193 | 2306 | P | 812 | .35 | 26 |
| 41211244 | 2320 | P | 872 | .38 | 26 |
| 41211055 | 2430 | P | 1115 | .46 | 26 |
| 41211188 | 2460 | P | 1763 | .72 | 26 |
| 41211093 | 2468 | P | 1295 | .52 | 26 |
| 23211520 | 1560 | R | 1202 | .77 | 27 |
| 23211529 | 1720 | R | 1026 | .60 | 27 |
| 23211577 | 1879 | R | 945 | .50 | 27 |
| 23211544 | 1889 | R | 1353 | .72 | 27 |
| 23211547 | 1926 | R | 1464 | .76 | 27 |
| 23211556 | 2040 | R | 1118 | .55 | 27 |
| 23211513 | 2221 | R | 1271 | .57 | 27 |
| 23211568 | 2286 | R | 1135 | .50 | 27 |
| 31211270 | 1618 | X | 415 | .26 | 28 |
| 12211149 | 1896 | X | 1247 | .66 | 28 |
| 31211200 | 1900 | X | 1370 | .72 | 28 |
| 11211136 | 1996 | X | 1200 | .60 | 28 |
| 12111117 | 2004 | X | 1200 | .60 | 28 |
| 41211246 | 2028 | X | 1620 | .80 | 28 |
| 12211148 | 2049 | X | 1532 | .75 | 28 |
| 12211151 | 2059 | X | 1500 | .73 | 28 |
| 12211102 | 2088 | X | 1524 | .73 | 28 |
| 12211120 | 2092 | X | 1869 | .89 | 28 |
| 12211105 | 2096 | X | 1453 | .69 | 28 |
| 41211126 | 2184 | X | 1400 | .64 | 28 |
| 41211118 | 2193 | X | 1714 | .78 | 28 |
| 13211119 | 2208 | X | 1326 | .60 | 28 |
| 12111152 | 2252 | X | 1500 | .67 | 28 |
| 31211297 | 1536 | Z | 1071 | .70 | 29 |
| 42211129 | 1971 | Z | 0 | .00 | 29 |
| 31211253 | 2522 | A | 1675 | .66 | 30 |
| 41311186 | 2576 | A | 1978 | .77 | 30 |
| 41211271 | 2786 | A | 1175 | .42 | 30 |
| 41211170 | 2771 | B | 480 | .17 | 31 |
| 31211101 | 2791 | B | 1255 | .45 | 31 |
| 31211122 | 2948 | B | 789 | .27 | 31 |
| 42211147 | 3210 | B | 0 | .00 | 31 |
| 31211183 | 3245 | B | 1075 | .33 | 31 |
| 41211171 | 3366 | B | 678 | .20 | 31 |
| 41211165 | 3658 | B | 1282 | .35 | 31 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:02:00 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 23211539 | 3458 | D | 1695 | .49 | 32 |
| 23211516 | 2544 | E | 1328 | .52 | 33 |
| 23211553 | 2570 | E | 1612 | .63 | 33 |
| 12211132 | 2616 | E | 1677 | .64 | 33 |
| 23211527 | 2800 | E | 1613 | .58 | 33 |
| 23211541 | 2886 | E | 1600 | .55 | 33 |
| 23211528 | 2960 | E | 1232 | .42 | 33 |
| 23211567 | 3133 | E | 1368 | .44 | 33 |
| 23211517 | 3313 | E | 1579 | .48 | 33 |
| 12211114 | 3352 | E | 1260 | .38 | 33 |
| 23211502 | 3352 | E | 1407 | .42 | 33 |
| 31211341 | 3464 | E | 2131 | .62 | 33 |
| 42211264 | 5717 | E | 1452 | .25 | 33 |
| 41211106 | 3100 | F | 1684 | .54 | 34 |
| 41211069 | 3297 | F | 1142 | .35 | 34 |
| 41211056 | 3635 | F | 3980 | 1.09 | 34 |
| 41211054 | 2770 | G | 1301 | .47 | 35 |
| 41211124 | 3356 | G | 2913 | .87 | 35 |
| 41211181 | 3968 | G | 1591 | .40 | 35 |
| 41211073 | 5702 | G | 2940 | .52 | 35 |
| 31211177 | 2512 | H | 1813 | .72 | 36 |
| 42211035 | 2640 | H | 1442 | .55 | 36 |
| 31211201 | 2678 | H | 927 | .35 | 36 |
| 41211047 | 2687 | H | 1230 | .46 | 36 |
| 23211537 | 2688 | H | 1374 | .51 | 36 |
| 31211134 | 2956 | H | 1382 | .47 | 36 |
| 42311306 | 3048 | H | 2164 | .71 | 36 |
| 41211158 | 3056 | H | 1380 | .45 | 36 |
| 23211565 | 3336 | H | 2179 | .65 | 36 |
| 42211030 | 3458 | H | 1213 | .35 | 36 |
| 42211262 | 3458 | H | 1213 | .35 | 36 |
| 42211263 | 3458 | H | 1213 | .35 | 36 |
| 41211133 | 3530 | H | 2178 | .62 | 36 |
| 13211128 | 2526 | I | 1195 | .47 | 37 |
| 13211118 | 2628 | I | 2397 | .91 | 37 |
| 23211518 | 2800 | I | 1390 | .50 | 37 |
| 41311167 | 2868 | I | 2872 | 1.00 | 37 |
| 23311510 | 2944 | I | 2234 | .76 | 37 |
| 41211053 | 3300 | I | 1961 | .59 | 37 |
| 23211580 | 3628 | I | 1810 | .50 | 37 |
| 23211570 | 3690 | I | 1827 | .50 | 37 |
| 41211260 | 4456 | I | 1673 | .38 | 37 |
| 41211173 | 3383 | J | 1450 | .43 | 38 |
| 41211052 | 2700 | M | 1476 | .55 | 39 |
| 41211255 | 2501 | O | 1120 | .45 | 40 |
| 41211225 | 2535 | O | 2750 | 1.08 | 40 |
| 41211268 | 2670 | O | 1710 | .64 | 40 |
| 41211267 | 2803 | O | 1726 | .62 | 40 |
| 41211266 | 2853 | O | 1355 | .47 | 40 |
| 42211281 | 2979 | O | 0 | .00 | 40 |
| 41211048 | 2636 | P | 1026 | .39 | 41 |

26-MAR-86 air-to-air heat exchanger spreadsheet
15:Ø2:ØØ Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID | AREA | TYPE | COST$ | INCOST$ | GRP |
|---|---|---|---|---|---|
| 41211Ø81 | 2643 | P | 1326 | .5Ø | 41 |
| 41211Ø58 | 2647 | P | 1827 | .69 | 41 |
| 41211Ø49 | 265Ø | P | 997 | .38 | 41 |
| 41211Ø31 | 2714 | P | 1447 | .53 | 41 |
| 42211Ø6 | 2872 | P | Ø | .ØØ | 41 |
| 42211148 | 3Ø87 | P | 77 | .Ø2 | 41 |
| 42311224 | 3213 | P | 75 | .Ø2 | 41 |
| 41211197 | 3275 | P | 1558 | .48 | 41 |
| 41211245 | 3344 | P | 38ØØ | 1.14 | 41 |
| 41211Ø86 | 3424 | P | 1934 | .56 | 41 |
| 4231127Ø | 3426 | P | 162Ø | .47 | 41 |
| 41211234 | 3439 | P | 418Ø | 1.22 | 41 |
| 42211111 | 3838 | P | 2Ø83 | .54 | 41 |
| 23211557 | 27Ø3 | R | 1464 | .54 | 42 |
| 23211536 | 286Ø | R | 1251 | .44 | 42 |
| 23211549 | 317Ø | R | 1621 | .51 | 42 |
| 2321153 | 324Ø | R | 1499 | .46 | 42 |
| 31211145 | 3376 | R | 1475 | .44 | 42 |
| 23211563 | 35Ø9 | R | 1448 | .41 | 42 |
| 12211Ø3 | 4225 | T | 2633 | .62 | 43 |
| 12211121 | 27ØØ | X | 239Ø | .89 | 44 |
| 12211Ø4 | 32ØØ | X | 1686 | .53 | 44 |
| 12211146 | 32ØØ | X | 1462 | .46 | 44 |
| 12211Ø7 | 337Ø | X | 1825 | .54 | 44 |
| 32211299 | 282Ø | Z | 1Ø92 | .39 | 45 |
| 41211164 | 3Ø56 | Z | 1474 | .48 | 45 |
| 4221113Ø | 33ØØ | Z | 5545 | 1.68 | 45 |

NUMBER OF CASES READ = 384 NUMBER OF CASES LISTED = 384

This appendix contains a listing of homes ordered by "state calculated total cost" (see main text), as discussed in Chapter 9. The following information is provided for each home: identification number, state calculated total cost, total hard building cost, design cost, loan cost, and other cost. Column headings are explained in the glossary below.

## GLOSSARY

| | |
|---|---|
| SITEID[1] | Identification of house/builder |
| COST094 | State calculated total cost |
| TOTAL | Total hard building cost |
| DESIGN | Design cost |
| LOAN | Loan cost |
| OTHER | Other cost |

[1] SITEID is an eight digit number: the first digit indicates state location (1 = Idaho, 2 = Montana, 3 = Oregon, 4 = Washington); the second digit indicates climate zone location (1 = Zone 1, 2 = Zone 2, 3 = Zone 3); the third digit indicates a "matched pair" home (1 = matched, 2 = unmatched, 3 = unmatched and ELCAP, 4 = control home); the fourth digit indicates a MCS home (1 = MCS, 2 = current practice); the fifth digit indicates type of home (1 = single-family, 2 = multi-family-1, 3 = multi-family-2); and the last three digits indicate the house number (same number if it is a matched pair home).

25-APR-86 total cost spreadsheet
14:12:46 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 11211139 | .31 | .28 | .00 | .00 | .03 |
| 31211268 | .32 | 2.76 | .04 | .17 | .23 |
| 11111145 | .37 | .33 | .02 | .00 | .02 |
| 11211144 | .47 | .45 | .00 | .00 | .02 |
| 11111142 | .49 | .44 | .04 | .00 | .01 |
| 11211138 | .56 | .52 | .00 | .00 | .04 |
| 11111140 | .73 | .60 | .12 | .00 | .01 |
| 13211128 | .88 | .82 | .06 | .00 | .00 |
| 41211271 | .91 | .88 | .00 | .04 | .00 |
| 12211105 | 1.00 | 7.98 | .00 | .00 | .21 |
| 41211245 | 1.00 | .86 | .15 | .00 | .00 |
| 41211020 | 1.02 | 1.01 | .00 | .02 | .00 |
| 41211256 | 1.08 | 1.06 | .00 | .02 | .00 |
| 12211114 | 1.13 | 1.22 | .00 | .00 | .00 |
| 13211113 | 1.22 | 1.18 | .04 | .00 | .00 |
| 11111153 | 1.24 | 1.17 | .06 | .00 | .01 |
| 41211272 | 1.30 | 1.26 | .00 | .04 | .01 |
| 11211141 | 1.36 | 1.32 | .00 | .00 | .03 |
| 41111112 | 1.36 | 1.36 | .00 | .00 | .00 |
| 41211181 | 1.36 | 1.31 | .01 | .04 | .00 |
| 31211122 | 1.39 | 1.40 | .01 | .00 | .00 |
| 12211107 | 1.40 | 1.26 | .00 | .04 | .09 |
| 23211502 | 1.40 | 1.40 | .00 | .00 | .00 |
| 12211146 | 1.42 | 1.30 | .06 | .05 | .02 |
| 41211055 | 1.43 | 1.43 | .00 | .00 | .00 |
| 41211073 | 1.46 | 1.31 | .02 | .03 | .10 |
| 41211267 | 1.51 | 1.44 | .07 | .00 | .00 |
| 42211030 | 1.52 | 1.44 | .00 | .01 | .07 |
| 42211262 | 1.52 | 1.44 | .00 | .01 | .07 |
| 42211263 | 1.52 | 1.44 | .00 | .01 | .07 |
| 23211537 | 1.53 | 1.51 | .02 | .00 | .00 |
| 31211395 | 1.53 | 1.44 | .09 | .00 | .00 |
| 13211124 | 1.55 | 1.49 | .05 | .00 | .00 |
| 23211517 | 1.55 | 1.55 | .00 | .00 | .00 |
| 42211035 | 1.58 | 1.33 | .00 | .03 | .24 |
| 23211505 | 1.60 | 5.78 | .00 | .01 | .00 |
| 42211264 | 1.60 | 1.60 | .00 | .00 | .00 |
| 42211206 | 1.61 | 1.59 | .02 | .00 | .00 |
| 23211528 | 1.62 | 1.62 | .00 | .00 | .00 |
| 23211561 | 1.62 | 7.11 | .01 | .00 | .08 |
| 23211578 | 1.63 | 1.44 | .00 | .10 | .09 |
| 41211164 | 1.63 | 1.59 | .00 | .03 | .02 |
| 23211571 | 1.64 | 5.59 | .00 | .11 | .10 |
| 42211134 | 1.67 | 1.44 | .08 | .11 | .04 |
| 42211135 | 1.67 | 1.44 | .08 | .11 | .04 |
| 42211136 | 1.67 | 1.44 | .08 | .11 | .04 |
| 42211137 | 1.67 | 1.44 | .08 | .11 | .04 |
| 42211138 | 1.67 | 1.44 | .08 | .11 | .04 |
| 31211424 | 1.68 | 1.97 | .00 | .00 | .00 |
| 41211197 | 1.69 | 1.64 | .00 | .05 | .00 |
| 31211297 | 1.70 | 1.60 | .03 | .07 | .00 |

25-APR-86 total cost spreadsheet
14:12:48 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 41211261 | 1.70 | 1.52 | .02 | .01 | .16 |
| 41211048 | 1.71 | 1.52 | .02 | .02 | .16 |
| 23211515 | 1.73 | 1.41 | .00 | .11 | .21 |
| 23211543 | 1.75 | 1.53 | .00 | .11 | .11 |
| 11211122 | 1.77 | 1.60 | .16 | .00 | .02 |
| 23211539 | 1.77 | 1.77 | .00 | .00 | .00 |
| 23211577 | 1.78 | 7.09 | .00 | .00 | .01 |
| 41211170 | 1.78 | 1.64 | .09 | .05 | .00 |
| 41211268 | 1.79 | 1.71 | .09 | .00 | .00 |
| 41311676 | 1.79 | 1.75 | .04 | .00 | .00 |
| 31211253 | 1.80 | 1.76 | .04 | .00 | .00 |
| 31211257 | 1.80 | 1.80 | .00 | .00 | .00 |
| 41211675 | 1.81 | 1.77 | .04 | .00 | .00 |
| 42311224 | 1.82 | 1.78 | .00 | .05 | .00 |
| 23211567 | 1.83 | 1.73 | .00 | .08 | .01 |
| 23211503 | 1.88 | 1.79 | .06 | .03 | .00 |
| 41211259 | 1.89 | 1.88 | .00 | .02 | .00 |
| 31211265 | 1.90 | 1.90 | .00 | .00 | .00 |
| 13211119 | 1.91 | 1.91 | .00 | .00 | .00 |
| 12211104 | 1.93 | 1.93 | .00 | .00 | .00 |
| 41211049 | 1.94 | 1.89 | .00 | .03 | .02 |
| 12211151 | 1.95 | 1.66 | .10 | .19 | .00 |
| 41211244 | 1.95 | 1.95 | .00 | .00 | .00 |
| 42211281 | 1.95 | 1.89 | .02 | .04 | .02 |
| 41211266 | 1.96 | 1.88 | .09 | .00 | .00 |
| 41211254 | 1.98 | 1.78 | .02 | .03 | .15 |
| 12211121 | 2.02 | 2.02 | .00 | .00 | .00 |
| 41211192 | 2.02 | 1.96 | .00 | .07 | .00 |
| 41211169 | 2.05 | 2.05 | .00 | .00 | .00 |
| 23211516 | 2.08 | 2.04 | .04 | .00 | .00 |
| 41211171 | 2.08 | 1.86 | .00 | .08 | .14 |
| 31211410 | 2.09 | 3.65 | .00 | .02 | .05 |
| 41211032 | 2.12 | 2.06 | .00 | .06 | .00 |
| 42211003 | 2.13 | 1.85 | .28 | .00 | .00 |
| 23211560 | 2.14 | 2.14 | .00 | .00 | .00 |
| 41211131 | 2.14 | 2.08 | .00 | .02 | .04 |
| 31211341 | 2.16 | 2.06 | .00 | .07 | .03 |
| 41211158 | 2.16 | 2.01 | .00 | .16 | .00 |
| 41211140 | 2.17 | 2.07 | .06 | .02 | .02 |
| 41211162 | 2.17 | 2.00 | .04 | .07 | .07 |
| 23211530 | 2.18 | 2.18 | .00 | .00 | .00 |
| 12211149 | 2.19 | 2.10 | .09 | .00 | .00 |
| 41211193 | 2.21 | 2.15 | .00 | .07 | .00 |
| 31211146 | 2.22 | 2.22 | .00 | .00 | .00 |
| 41211050 | 2.22 | 2.02 | .04 | .02 | .15 |
| 41211274 | 2.22 | 2.22 | .00 | .00 | .00 |
| 11111106 | 2.24 | 1.96 | .26 | .00 | .02 |
| 23211536 | 2.25 | 2.24 | .01 | .00 | .00 |
| 41211026 | 2.25 | 2.02 | .08 | .04 | .11 |
| 23211568 | 2.26 | 2.26 | .00 | .00 | .00 |
| 41211019 | 2.26 | 2.09 | .00 | .03 | .15 |

25-APR-86 total cost spreadsheet
14:12:49 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 12211102 | 2.27 | 2.23 | .03 | .00 | .01 |
| 23211563 | 2.30 | 2.11 | .03 | .05 | .00 |
| 41211163 | 2.30 | 2.22 | .00 | .03 | .06 |
| 23211570 | 2.32 | 2.16 | .05 | .07 | .04 |
| 11111143 | 2.34 | 2.19 | .13 | .00 | .02 |
| 31211155 | 2.34 | 5.69 | .00 | .07 | .04 |
| 41211025 | 2.34 | 1.95 | .21 | .19 | .00 |
| 41211146 | 2.34 | 1.94 | .12 | .07 | .22 |
| 12211132 | 2.35 | 2.35 | .00 | .00 | .00 |
| 23311510 | 2.35 | 2.35 | .00 | .00 | .00 |
| 23211544 | 2.37 | 2.13 | .00 | .03 | .21 |
| 31211221 | 2.37 | 2.08 | .00 | .00 | .00 |
| 31211201 | 2.38 | 2.22 | .04 | .04 | .09 |
| 23211541 | 2.39 | 2.32 | .05 | .02 | .00 |
| 41211126 | 2.39 | 2.40 | .00 | .00 | .00 |
| 23211513 | 2.40 | 2.34 | .06 | .00 | .00 |
| 23211547 | 2.40 | 2.35 | .00 | .05 | .00 |
| 23211557 | 2.40 | 2.39 | .01 | .00 | .00 |
| 42211283 | 2.41 | 2.31 | .02 | .06 | .03 |
| 42211284 | 2.41 | 2.31 | .02 | .06 | .03 |
| 12111152 | 2.42 | 2.10 | .00 | .08 | .24 |
| 23211522 | 2.44 | 2.44 | .00 | .00 | .00 |
| 41211038 | 2.44 | 2.19 | .04 | .05 | .16 |
| 23211562 | 2.45 | 2.39 | .06 | .00 | .00 |
| 31211182 | 2.45 | 2.33 | .00 | .12 | .00 |
| 23111574 | 2.46 | 2.40 | .06 | .00 | .00 |
| 41211255 | 2.47 | 2.13 | .01 | .10 | .22 |
| 23211556 | 2.48 | 2.42 | .06 | .00 | .00 |
| 31111218 | 2.51 | 2.41 | .00 | .00 | .10 |
| 41311189 | 2.53 | 2.42 | .07 | .05 | .00 |
| 23211580 | 2.54 | 2.47 | .08 | .00 | .00 |
| 13211150 | 2.55 | 2.25 | .15 | .15 | .00 |
| 23211551 | 2.55 | 2.25 | .11 | .03 | .16 |
| 41211182 | 2.56 | 2.23 | .04 | .07 | .23 |
| 41211183 | 2.56 | 2.35 | .03 | .04 | .15 |
| 42211147 | 2.56 | 2.28 | .09 | .19 | .00 |
| 42311270 | 2.56 | 2.49 | .02 | .05 | .00 |
| 41211069 | 2.58 | 1.89 | .00 | .54 | .16 |
| 23211550 | 2.59 | 2.51 | .08 | .00 | .00 |
| 41111209 | 2.59 | 2.41 | .05 | .03 | .10 |
| 41111211 | 2.59 | 2.41 | .05 | .03 | .10 |
| 41111213 | 2.59 | 2.41 | .05 | .03 | .10 |
| 41111215 | 2.59 | 2.41 | .05 | .03 | .10 |
| 41111217 | 2.59 | 2.41 | .05 | .03 | .10 |
| 23211553 | 2.60 | 2.60 | .00 | .00 | .00 |
| 41211089 | 2.60 | 2.55 | .00 | .05 | .00 |
| 41211184 | 2.60 | 2.26 | .04 | .04 | .26 |
| 31211145 | 2.64 | 1.36 | .00 | .00 | .00 |
| 41211012 | 2.64 | 2.57 | .00 | .08 | .00 |
| 12211120 | 2.66 | 2.62 | .04 | .00 | .00 |
| 23211538 | 2.66 | 2.66 | .00 | .00 | .00 |

25-APR-86 total cost spreadsheet
14:12:55 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 31211346 | 2.67 | 2.67 | .00 | .00 | .00 |
| 41211118 | 2.68 | 2.61 | .00 | .07 | .00 |
| 41211053 | 2.70 | 2.46 | .00 | .06 | .19 |
| 42211285 | 2.70 | 2.66 | .00 | .00 | .04 |
| 41211168 | 2.72 | 2.72 | .00 | .00 | .00 |
| 41211277 | 2.73 | 2.40 | .00 | .07 | .27 |
| 42211096 | 2.73 | 2.73 | .00 | .00 | .00 |
| 41211195 | 2.74 | 2.65 | .00 | .09 | .00 |
| 41211091 | 2.76 | 2.61 | .16 | .00 | .00 |
| 41211201 | 2.77 | 2.71 | .07 | .00 | .00 |
| 23211558 | 2.78 | 3.70 | .08 | .11 | .00 |
| 31211271 | 2.79 | 2.60 | .07 | .04 | .08 |
| 41211002 | 2.79 | 2.50 | .00 | .10 | .19 |
| 42311242 | 2.80 | 2.44 | .05 | .30 | .01 |
| 41211257 | 2.81 | 2.55 | .00 | .19 | .08 |
| 41211031 | 2.82 | 2.57 | .06 | .07 | .13 |
| 23211511 | 2.83 | 2.69 | .04 | .10 | .00 |
| 41311258 | 2.83 | 2.33 | .09 | .03 | .38 |
| 31211133 | 2.84 | 2.74 | .08 | .00 | .02 |
| 23211535 | 2.86 | 2.79 | .07 | .00 | .00 |
| 41111028 | 2.86 | 1.96 | .17 | .42 | .31 |
| 41211165 | 2.86 | 2.86 | .00 | .00 | .00 |
| 42211037 | 2.86 | 2.56 | .01 | .03 | .27 |
| 23111514 | 2.87 | 2.33 | .13 | .01 | .40 |
| 23211564 | 2.87 | 2.81 | .06 | .00 | .00 |
| 42211004 | 2.87 | 2.57 | .01 | .03 | .26 |
| 41211159 | 2.88 | 2.47 | .03 | .08 | .31 |
| 13211101 | 2.89 | 3.41 | .00 | .00 | .00 |
| 23211518 | 2.89 | 2.70 | .00 | .03 | .15 |
| 41211107 | 2.89 | 2.81 | .00 | .08 | .00 |
| 41211161 | 2.89 | 2.80 | .00 | .09 | .00 |
| 41211276 | 2.89 | 2.50 | .07 | .09 | .23 |
| 41211093 | 2.90 | 2.91 | .00 | .00 | .00 |
| 12111117 | 2.91 | 2.33 | .15 | .11 | .26 |
| 23211527 | 2.91 | 2.80 | .09 | .01 | .00 |
| 41211120 | 2.91 | 2.77 | .00 | .14 | .00 |
| 41211220 | 2.91 | 2.62 | .04 | .13 | .13 |
| 41211108 | 2.92 | 2.52 | .00 | .11 | .30 |
| 12211108 | 2.93 | 2.46 | .46 | .00 | .00 |
| 41211051 | 2.93 | 2.70 | .04 | .03 | .16 |
| 42211111 | 2.93 | 2.90 | .04 | .00 | .00 |
| 42211011 | 2.94 | 2.74 | .02 | .02 | .16 |
| 12211148 | 2.95 | 2.70 | .12 | .06 | .08 |
| 12211147 | 2.96 | 3.04 | .06 | .00 | .00 |
| 42211017 | 2.96 | 2.65 | .12 | .01 | .18 |
| 11211136 | 2.97 | 2.92 | .05 | .00 | .00 |
| 12211100 | 2.98 | 2.63 | .31 | .00 | .00 |
| 12211133 | 2.98 | 2.62 | .00 | .13 | .23 |
| 41211018 | 2.98 | 2.67 | .06 | .10 | .15 |
| 23211545 | 2.99 | 2.89 | .10 | .00 | .00 |
| 41211106 | 3.00 | 2.72 | .12 | .17 | .00 |

25-APR-86 total cost spreadsheet
14:13:Ø4 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID1 | COSTØ94 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 42111144 | 3.ØØ | 2.55 | .ØØ | .Ø8 | .37 |
| 42211145 | 3.ØØ | 2.55 | .ØØ | .Ø8 | .37 |
| 42211Ø4 | 3.ØØ | 2.55 | .ØØ | .Ø8 | .37 |
| 41211Ø47 | 3.Ø1 | 2.86 | .Ø9 | .Ø7 | .ØØ |
| 41211149 | 3.Ø2 | 2.75 | .11 | .17 | .ØØ |
| 12211130 | 3.Ø3 | 2.28 | .ØØ | .ØØ | .75 |
| 23211507 | 3.Ø3 | 7.34 | .Ø5 | .Ø6 | .ØØ |
| 23211554 | 3.Ø4 | 3.Ø4 | .ØØ | .ØØ | .ØØ |
| 23211581 | 3.Ø4 | 2.64 | .24 | .15 | .Ø1 |
| 31211153 | 3.Ø5 | 3.Ø4 | .ØØ | .ØØ | .ØØ |
| 41211122 | 3.Ø5 | 2.64 | .13 | .Ø6 | .21 |
| 42111Ø21 | 3.Ø6 | 2.79 | .Ø1 | .Ø3 | .24 |
| 13211115 | 3.Ø7 | 2.88 | .19 | .ØØ | .ØØ |
| 23211509 | 3.Ø8 | 2.98 | .Ø6 | .ØØ | .Ø4 |
| 42311306 | 3.Ø8 | 2.99 | .Ø4 | .Ø5 | .Ø1 |
| 41211269 | 3.Ø9 | 2.9Ø | .Ø8 | .11 | .ØØ |
| 42211Ø88 | 3.Ø9 | 2.64 | .46 | .ØØ | .ØØ |
| 41211157 | 3.1Ø | 2.77 | .Ø9 | .Ø8 | .17 |
| 42211142 | 3.11 | 2.67 | .ØØ | .Ø8 | .37 |
| 42211148 | 3.13 | 2.99 | .Ø7 | .Ø6 | .ØØ |
| 31211292 | 3.14 | 3.Ø3 | .11 | .ØØ | .ØØ |
| 13211118 | 3.16 | 3.93 | .ØØ | .ØØ | .ØØ |
| 23211549 | 3.16 | 3.12 | .Ø3 | .ØØ | .ØØ |
| 41211125 | 3.17 | 3.18 | .ØØ | .ØØ | .ØØ |
| 23211552 | 3.18 | 2.93 | .Ø7 | .ØØ | .ØØ |
| 42211Ø15 | 3.19 | 2.8Ø | .12 | .Ø2 | .25 |
| 23211524 | 3.21 | 3.Ø2 | .19 | .ØØ | .ØØ |
| 31211134 | 3.21 | 3.21 | .ØØ | .ØØ | .ØØ |
| 41211ØØ1 | 3.21 | 2.97 | .ØØ | .Ø5 | .19 |
| 41211ØØ6 | 3.21 | 2.99 | .ØØ | .ØØ | .23 |
| 41211ØØ8 | 3.22 | 3.23 | .ØØ | .ØØ | .ØØ |
| 41211132 | 3.22 | 2.64 | .13 | .Ø8 | .37 |
| 23211572 | 3.23 | 3.16 | .Ø7 | .ØØ | .ØØ |
| 41211Ø16 | 3.23 | 2.94 | .Ø6 | .1Ø | .15 |
| 41211Ø67 | 3.26 | 2.86 | .Ø4 | .Ø7 | .29 |
| 42211282 | 3.26 | 2.91 | .Ø3 | .ØØ | .31 |
| 23211529 | 3.27 | 3.27 | .ØØ | .ØØ | .ØØ |
| 31211177 | 3.27 | 2.86 | .ØØ | .12 | .3Ø |
| 41311167 | 3.27 | 3.Ø7 | .Ø2 | .16 | .Ø2 |
| 23111521 | 3.28 | 2.9Ø | .Ø2 | .ØØ | .36 |
| 41211273 | 3.28 | 3.Ø1 | .1Ø | .17 | .ØØ |
| 41211Ø87 | 3.29 | 2.98 | .13 | .Ø3 | .16 |
| 42211143 | 3.29 | 2.6Ø | .11 | .Ø9 | .5Ø |
| 31211397 | 3.32 | 3.18 | .14 | .ØØ | .ØØ |
| 41311186 | 3.32 | 2.72 | .12 | .32 | .17 |
| 31211338 | 3.33 | 3.33 | .ØØ | .ØØ | .ØØ |
| 41211Ø68 | 3.33 | 2.46 | .ØØ | .36 | .52 |
| 41211275 | 3.33 | 2.79 | .Ø9 | .17 | .28 |
| 41111239 | 3.34 | 3.Ø3 | .ØØ | .13 | .18 |
| 41211251 | 3.41 | 3.42 | .ØØ | .ØØ | .ØØ |
| 31211267 | 3.42 | 3.ØØ | .44 | .16 | .21 |

25-APR-86 total cost spreadsheet
14:13:Ø9 Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 41111151 | 3.42 | 2.84 | .Ø6 | .Ø3 | .49 |
| 13211123 | 3.44 | 3.Ø9 | .16 | .18 | .ØØ |
| 23111573 | 3.46 | 3.11 | .Ø2 | .ØØ | .34 |
| 23211526 | 3.46 | 3.46 | .ØØ | .ØØ | .ØØ |
| 31211166 | 3.46 | 3.24 | .Ø9 | .Ø5 | .Ø8 |
| 41211127 | 3.46 | 3.46 | .ØØ | .ØØ | .ØØ |
| 41211181Ø | 3.46 | 3.3Ø | .ØØ | .17 | .ØØ |
| 42211Ø43 | 3.46 | 3.47 | .ØØ | .ØØ | .ØØ |
| 42211241 | 3.46 | 3.Ø7 | .Ø6 | .33 | .Ø1 |
| 12211131 | 3.47 | 3.26 | .ØØ | .11 | .11 |
| 41211188 | 3.47 | 3.46 | .ØØ | .ØØ | .Ø1 |
| 41211284 | 3.47 | 3.47 | .ØØ | .ØØ | .ØØ |
| 41211Ø24 | 3.48 | 3.15 | .ØØ | .34 | .ØØ |
| 41211Ø86 | 3.49 | 3.3Ø | .Ø9 | .11 | .ØØ |
| 41211Ø85 | 3.5Ø | 2.85 | .ØØ | .37 | .29 |
| 41211Ø62 | 3.53 | 2.82 | .12 | .15 | .44 |
| 23211581 | 3.54 | 3.39 | .Ø8 | .ØØ | .ØØ |
| 41211Ø79 | 3.55 | 2.97 | .ØØ | .12 | .46 |
| 41211Ø82 | 3.55 | 3.Ø5 | .Ø6 | .Ø4 | .4Ø |
| 41211Ø13 | 3.56 | 3.ØØ | .12 | .ØØ | .45 |
| 41211677 | 3.57 | 3.31 | .Ø8 | .18 | .ØØ |
| 42211115 | 3.57 | 3.4Ø | .Ø9 | .Ø5 | .Ø4 |
| 23211548 | 3.59 | 3.39 | .ØØ | .2Ø | .ØØ |
| 31211181 | 3.59 | 3.35 | .Ø5 | .29 | .Ø1 |
| 32211299 | 3.59 | 3.3Ø | .5Ø | .13 | .ØØ |
| 41211196 | 3.59 | 3.17 | .ØØ | .14 | .29 |
| 23211531 | 3.61 | 3.61 | .ØØ | .ØØ | .ØØ |
| 31211216 | 3.61 | 4.47 | .14 | .Ø8 | .ØØ |
| 41211Ø6Ø | 3.61 | 3.29 | .Ø6 | .Ø7 | .19 |
| 41211Ø95 | 3.63 | 3.42 | .Ø6 | .16 | .ØØ |
| 42211141 | 3.65 | 2.83 | .12 | .16 | .54 |
| 23211528 | 3.67 | 3.65 | .Ø2 | .ØØ | .ØØ |
| 32211232 | 3.69 | 3.19 | .33 | .13 | .Ø4 |
| 41211Ø58 | 3.71 | 3.32 | .Ø8 | .32 | .ØØ |
| 31211248 | 3.73 | 3.89 | .Ø7 | .Ø6 | .ØØ |
| 32211423 | 3.73 | 3.75 | .ØØ | .ØØ | .Ø8 |
| 41211283 | 3.73 | 3.68 | .ØØ | .ØØ | .Ø6 |
| 42211Ø41 | 3.73 | 3.2Ø | .13 | .13 | .28 |
| 42211Ø42 | 3.73 | 3.2Ø | .13 | .13 | .28 |
| 41211265 | 3.74 | 3.65 | .1Ø | .ØØ | .ØØ |
| 23111523 | 3.75 | 3.68 | .Ø7 | .ØØ | .ØØ |
| 41211123 | 3.75 | 2.82 | .67 | .12 | .14 |
| 23211586 | 3.76 | 3.56 | .ØØ | .ØØ | .2Ø |
| 23211519 | 3.76 | 3.74 | .Ø2 | .ØØ | .ØØ |
| 31211186 | 3.76 | 3.56 | .12 | .ØØ | .Ø7 |
| 41211156 | 3.78 | 3.35 | .11 | .Ø9 | .23 |
| 42211Ø44 | 3.79 | 2.94 | .14 | .14 | .57 |
| 31211183 | 3.8Ø | 3.51 | .Ø7 | .12 | .1Ø |
| 41211153 | 3.82 | 3.82 | .ØØ | .ØØ | .ØØ |
| 41211Ø33 | 3.83 | 2.84 | .ØØ | .36 | .64 |
| 41211Ø72 | 3.83 | 3.74 | .ØØ | .Ø9 | .ØØ |

25-APR-86 total cost spreadsheet
14:13:1Ø Lawrence Berkeley Laboratory DEC VAX-86ØØ VMS V4.1

| SITEID1 | COSTØ94 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 32211310 | 3.86 | 3.51 | .23 | .68 | .00 |
| 41211036 | 3.86 | 3.78 | .00 | .08 | .00 |
| 41211074 | 3.86 | 3.70 | .09 | .07 | .00 |
| 41211075 | 3.86 | 3.70 | .09 | .07 | .00 |
| 41211076 | 3.86 | 3.70 | .09 | .07 | .00 |
| 41211077 | 3.86 | 3.70 | .09 | .07 | .00 |
| 41211092 | 3.88 | 3.21 | .18 | .10 | .39 |
| 41211252 | 3.89 | 3.90 | .00 | .00 | .00 |
| 41111178 | 3.91 | 3.22 | .00 | .29 | .41 |
| 42211121 | 3.91 | 3.72 | .02 | .05 | .12 |
| 23211566 | 3.93 | 3.73 | .00 | .20 | .00 |
| 31211399 | 3.94 | 4.05 | .09 | .07 | .00 |
| 41211225 | 3.94 | 3.82 | .00 | .10 | .03 |
| 32211426 | 3.95 | 3.52 | .08 | .00 | .01 |
| 12211110 | 3.96 | 3.63 | .16 | .16 | .00 |
| 42211116 | 3.96 | 3.85 | .05 | .06 | .01 |
| 41211054 | 4.00 | 3.48 | .16 | .29 | .07 |
| 41211063 | 4.02 | 3.32 | .12 | .15 | .44 |
| 31211308 | 4.03 | 3.79 | .00 | .24 | .00 |
| 41111174 | 4.03 | 3.20 | .00 | .40 | .43 |
| 41211065 | 4.04 | 3.29 | .12 | .18 | .46 |
| 41211056 | 4.05 | 3.62 | .08 | .13 | .23 |
| 41211160 | 4.06 | 3.59 | .00 | .07 | .41 |
| 31211135 | 4.07 | 3.61 | .47 | .00 | .00 |
| 41211124 | 4.08 | 3.44 | .38 | .27 | .00 |
| 41211234 | 4.09 | 3.64 | .17 | .27 | .00 |
| 32211289 | 4.11 | 3.69 | .07 | .18 | .16 |
| 31211409 | 4.14 | 3.75 | .00 | .11 | .28 |
| 32211427 | 4.14 | 4.11 | .00 | .00 | .00 |
| 41211097 | 4.15 | 4.04 | .00 | .11 | .00 |
| 12211103 | 4.21 | 4.30 | .00 | .00 | .00 |
| 41211023 | 4.21 | 3.88 | .00 | .34 | .00 |
| 41211039 | 4.21 | 4.02 | .00 | .05 | .14 |
| 41211173 | 4.29 | 4.00 | .00 | .30 | .00 |
| 41211094 | 4.32 | 3.87 | .06 | .24 | .15 |
| 41211133 | 4.35 | 3.93 | .14 | .28 | .00 |
| 41211202 | 4.36 | 4.20 | .09 | .00 | .07 |
| 42211130 | 4.39 | 4.20 | .06 | .14 | .00 |
| 32211162 | 4.40 | 4.41 | .00 | .00 | .00 |
| 41111235 | 4.40 | 3.97 | .00 | .19 | .24 |
| 41211040 | 4.42 | 3.81 | .20 | .12 | .29 |
| 41211009 | 4.43 | 3.24 | .00 | .41 | .78 |
| 42211219 | 4.43 | 4.43 | .00 | .00 | .00 |
| 41211014 | 4.45 | 4.33 | .00 | .12 | .00 |
| 42211099 | 4.45 | 4.25 | .20 | .00 | .00 |
| 13211125 | 4.46 | 4.31 | .01 | .02 | .00 |
| 41211303 | 4.50 | 4.39 | .11 | .00 | .00 |
| 31211250 | 4.61 | 4.37 | .00 | .00 | .24 |
| 31211137 | 4.64 | 4.44 | .00 | .00 | .00 |
| 41211078 | 4.77 | 4.13 | .20 | .08 | .37 |
| 41211070 | 4.79 | 4.48 | .00 | .09 | .23 |

25-APR-86 total cost spreadsheet
14:13:11 Lawrence Berkeley Laboratory DEC VAX-8600 VMS V4.1

| SITEID1 | COST094 | TOTAL | DESIGN | LOAN | OTHER |
|---|---|---|---|---|---|
| 41211071 | 4.79 | 4.48 | .00 | .09 | .23 |
| 23211565 | 4.81 | 4.70 | .06 | .03 | .02 |
| 41111045 | 4.85 | 4.51 | .00 | .13 | .23 |
| 41211289 | 4.85 | 4.42 | .00 | .23 | .21 |
| 41211227 | 4.90 | 4.68 | .00 | .13 | .09 |
| 42211110 | 4.90 | 4.83 | .08 | .00 | .00 |
| 32211110 | 4.92 | 4.90 | .00 | .00 | .00 |
| 41311205 | 4.92 | 4.67 | .00 | .25 | .00 |
| 41211027 | 4.96 | 4.47 | .09 | .12 | .28 |
| 41111237 | 4.99 | 4.58 | .00 | .18 | .23 |
| 31211408 | 5.00 | 4.58 | .00 | .10 | .33 |
| 41211052 | 5.00 | 4.76 | .19 | .06 | .01 |
| 41211081 | 5.01 | 4.47 | .06 | .13 | .36 |
| 41211084 | 5.01 | 4.89 | .00 | .12 | .00 |
| 41211246 | 5.15 | 4.82 | .06 | .23 | .04 |
| 41111176 | 5.16 | 4.16 | .00 | .44 | .55 |
| 31111112 | 5.30 | 4.81 | .25 | .04 | .20 |
| 41211187 | 5.33 | 5.00 | .00 | .18 | .15 |
| 42211129 | 5.45 | 4.85 | .08 | .41 | .13 |
| 41211166 | 5.47 | 4.97 | .32 | .16 | .02 |
| 41211090 | 5.49 | 4.78 | .10 | .10 | .51 |
| 31211260 | 5.56 | 4.55 | .15 | 1.14 | .31 |
| 41211119 | 5.65 | 5.66 | .00 | .00 | .00 |
| 41211059 | 5.66 | 5.00 | .00 | .13 | .53 |
| 42211085 | 5.84 | 5.47 | .00 | .09 | .28 |
| 31211128 | 5.87 | 5.39 | .00 | .00 | .00 |
| 31211403 | 5.87 | 4.90 | .14 | .16 | .68 |
| 31211200 | 5.93 | 5.44 | .26 | .04 | .18 |
| 23211525 | 6.23 | 6.23 | .00 | .00 | .00 |
| 31211259 | 6.28 | 5.29 | .18 | .64 | .15 |
| 41211083 | 7.70 | 6.83 | .00 | .24 | .64 |
| 32211111 | 8.03 | 6.84 | .10 | .94 | .09 |
| 32211186 | 8.25 | 7.47 | .06 | .00 | .07 |
| *41211128 | 15.90 | 13.68 | .55 | 1.53 | .11 |

NUMBER OF CASES READ = 391 NUMBER OF CASES LISTED = 391

*This case is a foam block house whose costs include failed attempts to build it.

*LAWRENCE BERKELEY LABORATORY*
*TECHNICAL INFORMATION DEPARTMENT*
*UNIVERSITY OF CALIFORNIA*
*BERKELEY, CALIFORNIA 94720*