A THERMAL PERFORMANCE DESIGN OPTIMIZATION STUDY FOR SMALL ALASKAN RURAL SCHOOLS

by

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1.0 SUMMARY

The cost to the State of Alaska for owning and operating rural schools is a major budget item. These costs continue to accrue even after construction is complete, with long term operating and maintenance costs that must be paid until buildings are torn down and replaced. The total sum of these costs are termed total life cycle costs.

This research report presents results of studies to evaluate all lifetime costs associated with school ownership by the State for the range of current technology with respect to thermal envelope and energy system designs. The studies evaluate envelope stringency levels (insulation thickness, type and configuration) for two foundation system options, as well as design concepts for mechanical and electrical systems that will identify minimum total life cycle costs. Identifying these minimums defines a range of building design options which make up the energy consumption systems from which appropriate energy standards can be formulated. The results apply to school facilities and similar public buildings between 7,000 and 12,000 square feet in size.

The work was accomplished in 1982 at the University of Alaska, Fairbanks campus by the Mechanical Engineering Department and by J. S. Strandberg Consulting Engineers. A significant amount of additional professional assistance was provided by Maynard and Partch, Inc., Architectural Consultants; HMS, Inc., Cost Estimators; and Dave Olson, P.E., Electrical Engineer.

2.0 INTRODUCTION

Energy, as a major research topic under study within the State of Alaska, has the direct attention of the State's constituent population, lawmakers, and professional community. One important component of this topic is energy consuming characteristics of Alaska's buildings. This is of particular interest to the State's Department of Transportation and Public Facilities (DOTPF), the agency charged with facility procurement, design, construction, maintenance and operation of many of the State owned buildings and technical energy auditing, planning and programming for all State owned buildings.

The State's building stock consumes a significant portion of the State's annual energy budget, both in heating functions and in electrification. Rural structures are a critical factor in this regard because of high rural energy costs. The research reported herein deals with the thermal performance of a specific segment of the State's building inventory, that of small rural schools and other buildings of similar architectural style and size.

The work has been accomplished at the University of Alaska's Fairbanks campus by U of A Mechanical Engineering Department professional staff, and subconsultants from the in-state design community, under a contract between the University of Alaska and Department of Transportation and Public Facilities.

2.1 PURPOSE

The research activities for this "Thermal Standards Project" were structured as a design optimization process to establish the lowest cost design solution for future small rural schools. A life cycle cost analysis was the principal tool used in the study. The results of this research effort will be used as a foundation for a statewide thermal standard for new construction of small rural schools. The research work has been accomplished in response to a legislative directive expressed in Public Law A.S. 44.42.020, which states in part: "The Department will adopt an ASHRAE thermal and lighting standard adapted to high latitude cold region environs."

It must be stressed that the research reported herein does not represent a thermal standard. In order to acquaint the reader with the past events affecting thermal standards development on a nationwide level, and as it affects Alaska, Section 3 of the report deals with the different forms such a standard might take for Alaska. That section presents a backdrop against which to consider the results of this study.

2.2 SCOPE

The research to date has been centered on a particular class of public buildings that are routinely constructed throughout the state, that of small rural schools between 7,000 and 12,000 square feet in floor area. The study is concerned strictly with design optimization in new construction, and is not related to any renovation concepts in existing buildings for energy conservation.

It is important to note that a large percentage of buildings built by the state or used as public facilities are of the same building construction class and type as the schools described above. Therefore, the findings presented here have a considerably broader implication than it might first appear.

The reasons for beginning this work with special attention being given to rural schools are as follows:

1. Remote rural school facilities represent the highest energy costs to the state on a per square foot of facility because of the higher energy costs in most rural areas.

2. In recent years school facilities have been built with greater frequency than other types of facilities.

3. The generic type of building used for rural schools covers most of the spectrum of light construction types and sizes built by the State.

3.0 A DISCUSSION OF THERMAL STANDARDS

3.1 RECENT FEDERAL GOVERNMENT STUDIES

The federal government has produced a nationwide building standard to regulate the energy efficiency of new construction. This process is currently underway as a result of laws enacted at the federal level that seek to reduce the United States' dependence on foreign energy supplies.

Two major documents have been the focus for regulation of energy efficient construction, the American Society of Heating Refrigeration and Air Conditioning Engineer's (ASHRAE) Standard entitled "ASHRAE 90-75" (Reference 1) and the American Institute of Architect's (A.I.A.) document "Building Energy Performance Standards (B.E.P.S.)" (Reference 2). While the two documents each seek to regulate all non-process building energy consumptions, the approaches used are very different.

3.1.1 The ASHRAE Standard

The ASHRAE 90 Standard uses a "component standard" approach that breaks a building into it's energy consuming components, and impresses minimum requirements for thermal and electrical consumption characteristics of each component. The Standard specifies the following:

* Minimum overall thermal conductances (U-factors) of wall assemblies that consist of exterior walls, windows and doors, roof/ceiling assemblies, and floor systems. These U-factor requirements are varied with annual heating degree-days relevant to a specific location.

* Minimum air leakage characteristics for building components. Maximum allowable wall, window and door leakage rates are specified.

* Specific criteria are given for design of mechanical systems. Mechanical system controls are required by the standard to incorporate a number of energy conserving design features, and duct systems are required to be designed to reduce air transport energy requirements.

* Minimum requirements for lighting design are impressed. These criteria include regulation of allowable lighting levels by occupancy, requirements for task lighting design, and requirements for minimum "lamp efficacies", or the efficiency of lighting production in units of light output per unit power consumption rate.

This standard has been in existence now for some six years, and has been widely adopted at the local government level in city and municipal building departments across the United States. At present, the document is the existing thermal standard for the State of Alaska and Municipality of

Anchorage. It is generally easy to enforce in the plan review building permit phase of construction.

In writing the standard, ASHRAE involved numerous components of American industry in the review process. Substantial input was derived from manufacturers of building components. Thus, there is heavy impetus within the document on specific energy conservation design requirements for building components. These requirements are nearly always in terms of parameters that relate directly to commonly used equipment specifications and design criteria. This tends to make compliance to the standard easily accomplished and verified.

The more recent version of the ASHRAE standard, ASHRAE 90, (Reference 3) incorporates review comments from the consensus review of document 90-75R.1, a second generation standards document. While formatted in much the same manner as 90-75, the document has been broken into three standards.

Within the format of component standards, the document offers expanded treatments of required envelope, mechanical and electrical component performance, but maintains the same requirements for building energy consumption analysis and annual fuel resource determination (old chapters 10 through 12).

The "consensus" approach taken by ASHRAE has yielded a document that offers ease of implementation, and a moderate level of energy conservation in the new construction sector.

3.1.2 The United States Department of Energy Standard:

In the past several years, however, with large increases in unit costs for energy, the push for nationwide energy conservation spawned new research efforts in standards development. The federal government's Department of Energy (D.O.E.) funded the American Institute of Architects (A.I.A.) in 1978 to perform additional research on building systems performance, under the "Energy Conservation Standards For New Buildings Act of 1976" (Reference 1).

The A.I.A.'s research arm in 1978 and 1979 produced, in conjunction with subconsultants, a group of studies for D.O.E. that established standards of thermal performance for buildings by climate region and occupancy. This research effort subsequently was restructured by D.O.E. into a "Notice of Proposed Rulemaking" (NOPR), which consisted of a standards document defining thermal performance requirements for buildings dubbed "BEPS". In addition to publishing this NOPR (Reference 1), nine backup documentation reports were also published (References 4 through 11). D.O.E. conducted hearings throughout the United States to gather suggestions for final standards revisions, and for input on ways to best implement the standard. The review period for the NOPR ended in early 1980; at that time the federal government postponed actual implementation of the standard pending implementation of further studies and revisions. With a change of administration following the election of 1980, the Federal Government failed to follow-up on the program, and the future of the D.O.E. Standards are very much in doubt. At this time, the ASHRAE 90 Component Standard remains the only major nationwide standard for energy conservation regulation in general use. However, a discussion of the D.O.E. standard is instructive for the Alaskan situation, to add perspective to a State standards development.

The building performance document, or as it is commonly termed, the "BEPS" Standard, specified maximum levels of annual energy consumption in units of BTU's per building square foot for a one year time period, for 22 different climate regions within the contiguous United States, and for 78 different classes of building use. The performance standard approach taken seeks to regulate the overall performance of the building as a single energy consuming system, as opposed to ASHRAE component standard method of regulating the types of construction employed within each building energy system.

This approach evolved out of a well financed research project designed to maximize energy conservation in new construction. Creation of the standard occurred under a tight time schedule with development work occurring in consultant's offices throughout the country. There was not time for a thorough consensus approach for standards such as was the case with the ASHRAE 90-75 standard. Indeed, it was the intent of the research approach that the BEPS document would be a standard for "new residential and commercial buildings which are designed to achieve the maximum practicable improvements in energy efficiency and increases in the use of non-depletable sources of energy" (Reference 1). In this light, a research approach appears to have been warranted, so that new and state-of-the-art methods could be developed for maximum conservation. A consensus approach did not appear to match the aims of the Standards Act, since this approach tended to utilize existing or traditional methods of conservation, and did not favor newer, less established and more controversial methods of energy conservation, that could net greater additional savings.

Under a complex project organization, the A.I.A. Research Corporation divided the nation's building inventory into occupancy/use categories, and divided the nation geographically into 22 climate regions. Alaska was not included in the analysis.

Each of the building categories were dealt with statistically to establish the present energy consumption profiles of structures by age, occupancy and climate region. This phase of the research involved the following tasks for the A.I.A. group:

* Survey the nation's present building inventory and determine their annual energy consumption levels.

* Break down the building data in three categories:
  a) structures built after the first Arab oil embargo of 1973 and prior to 1976;
  b) buildings designed in 1976 to the then new ASHRAE Component Standard;
  c) buildings designed in 1978 to achieve maximum practical energy conservation.

In conjunction with this work, A.I.A. Research Corporation performed analysis of climate data, for formulation of a climate data base that could be used in computer models that simulate building thermal performance. These data sets generally consisted of classical climate variables such as heating degree-days, solar insolation, etc. Wind conditions were not taken as a factor.

A computerized thermal modeling technique was formulated to establish energy budgets. This technique used the standardized climate data, a set of standard building operating conditions, and a number of existing computer programs to compute annual energy consumption budgets. Programs used in the study were "DOE-2", a public domain simulator program used to compute annual energy budgets for non-solar structures; "TRNSYS", a program to simulate thermal performance of buildings with active solar heating and cooling systems; and "DEROB", a thermal simulator for buildings incorporating passive solar heating and cooling systems.

These programs were used in various combinations to arrive at the various design values used in the Standard. It is well to note that each simulator is, or was at the time the BEPS work was being carried out, a state-of-the-art computer tool, requiring a major computer facility and data input preparation for each simulation. With the completion of the BEPS Standards Document, the thermal standards criteria for a given location in the United States and a given occupancy was expressed in terms of a "Design Energy Budget". This number reflects the total allowable annual energy consumption for building heating, ventilating, cooling, and domestic hot water. Excluded here is any internal process energy consumption such as coffee pots, copy machines, and the like. Included within the budget number is a weighting factor that varied from 1 to 3.08, designed to penalize or discourage use of certain fuels.

According to A.I.A. Research Corporation, the prime BEPS consultant, the BEPS Standard would result in considerable additional energy savings beyond that possible with the ASHRAE Standard (Reference 3). This was generally not disputed during the BEPS public hearings. What was disputed, however, was the methods of proposed implementation.

Whereas the ASHRAE Component Standard can be implemented by incorporation of certain minimum levels of construction, compliance of a given building design to the BEPS Standard can only be assured by evaluating use of the building throughout the year, under certain "standard operating conditions" and computing total building energy consumption by fuel type. This evaluation requirement promised an extensive additional work effort for both designers and plan reviewers involved in compliance.

Critics of BEPS cited the current inability of local municipal building officials to evaluate compliance to BEPS, due to a lack of both technical expertise and personnel. The professional community cited the additional design requirements for determination of annual energy budgets, as well as increased costs for construction.

Proponents of BEPS cited the considerable savings that were possible through BEPS implementation. BEPS would give the designer impetus to consider new and innovative energy conservation options, and would require levels of construction based on a least life cycle cost approach, rather than on the commonly used "minimum first cost" approach. Further, the BEPS document would give a strong boost to alternative energy source concepts, something that is not accentuated in present consensus standards.

At the end of the public hearings of the BEPS document, in spring of 1980, the federal government had apparently conceded to BEPS opponents, by withdrawing the Standard from consideration. Articles in several technical magazines (Reference 12) indicated the federal government was planning on resubmitting a revised BEPS document for hearing review in 1981. This revised document was to be a modification from the nearly pure performance document to a part performance, part component standard, that could be implemented with present conformance standards concept. This was never accomplished, however, and the ultimate fate of the BEPS Standard remains in doubt under the present Federal administration.

Some of the major changes likely in a revised BEPS Document would be:

* Drafting of an ASHRAE Standard 90 type component standards based on BEPS life cycle cost economics.

* Drafting of a manual of recommended practice for builders to assist in BEPS compliance.

* Provide alternate energy budget calculation methods not involving the large scale computer modeling systems originally conceived in BEPS.

3.2 REQUIREMENTS FOR STANDARDS IN ALASKA

Under this backdrop of national standards development, the State of Alaska remains within the potential jurisdiction of final standards implementation. Given Alaska's extremes of climate and regional widely varying energy costs, it is quite unlikely that a national standard applied to the state would produce a rational energy conserving and/or economically acceptable result.

Thus, there is an impetus for the State of Alaska to perform research activities that will facilitate creation of a statewide thermal standard for new construction which will be a satisfactory alternative to the national standards. The form this standard should take is not immediately clear, given the lack of a universally accepted national standards document. However, research can still be accomplished, regardless of what that final form may take. By Statute (AS 44.42.040) DOTPF has the responsibility to adopt "an ASHRAE thermal and lighting standard adapted to high latitude cold region environs".

Since the vast majority of state buildings constructed in the past five years have conformed to ASHRAE 90-75 and since DOTPF Division of General Design and Construction has standardized on ASHRAE 90-75, some acceptance of thermal performance standards has already been accomplished. It is important, however, to consider that it is the "adapted to high latitude climates" which is of current interest. It is clear, based on apparent lack of interest in the physical environment of Alaska by the national level standards makers, that such a high latitude adaption will have to be developed here.

The critical step in that development will be to arrive at an end product which serves the energy conservation needs of the state and at the same time does not conflict with any national standard mandates. Just how this might be accomplished is beyond the scope of the work to date and will become a task for future consideration.

4.0 LIFE CYCLE COST EVALUATION TECHNIQUE

4.1 PURPOSE

The State of Alaska desires to create a thermal and lighting standard for Alaska that will result in reductions in building energy consumption. Technology exists that, when implemented throughout such a standard, could drastically reduce the energy consumed in new buildings. However, a firm basis must be developed for the standard that considers long term building economics.

In terms of steady state economics, it makes little sense to mandate the use of energy efficient building systems over a corresponding conventional system if the new equipment bears an exorbitant price tag. On the other hand, it may be prudent to spend a little more on energy efficient systems to lessen the risks associated with potential nation-wide energy drought. A standard to reduce energy consumption cannot be created without consideration of these economic and risk factors.

When the State of Alaska builds a public facility, energy is considered a consumable item, and a continuing cost to the state. We only become concerned about energy (from a State point of view) in two ways:

1. Can we get it? (Availability)
2. How much does it cost? (Affordability)

While the primary concerns remain as availability and affordability, intangibles such as changes the budgeting process for buildings, and social/technician training for more complex energy efficient building components must be strong determinates.

Any standard must therefore fit into current economic constraints in order to be rational and to be acceptable in society. The question then finally comes down to how much energy conservation can we afford? To answer this question, research is needed. In this regard, the Energy and Buildings Group has developed a method which approximates the cost of building, owning, and operating a building for it's lifetime. As a research tool, this method allows us to investigate the impact that various energy conserving design scenarios have on the total life cycle cost of a building in the real (or a close approximation) economic climate of Alaska. This life cycle cost model is described in this section. The results obtained from the life cycle cost approach allow us to determine, within reasonable limits, just which energy conserving design techniques should be included in a rational thermal and lighting standard for Alaska.

The analysis technique employed in this study models a building from time of construction to time of replacement, by accounting for construction and annual energy and maintenance costs for an assumed life of the building. As the study is directed toward evaluation of building thermal systems, the model deals strictly with the energy consuming components within the building. These components of the building are comprised of the building's "Thermal Envelope", and selected portions of the building's mechanical and electrical systems.

Portions of the building that do not influence thermal performance are not included in the analysis. For example, the cost of interior furniture, partitioning, artwork, and building foundation structures, are excluded from the analysis. It should be noted here that the term "model" applies to a series of equations that can simulate the operation of a building from a standpoint of total cost of ownership. Associated with these equations is a set of input parameters that describe the climate and economic environment within which the building exists, as well as the physical characteristics of the envelope and energy systems that make up the building.

As the purpose of the study is to establish the "best" way to design the thermal systems of buildings (from both the standpoint of energy conservation and cost), the analysis technique utilizes a life cycle cost model, with the following analysis assumptions:

1. For a given size and occupancy classification there are innumerable ways that building thermal systems may be designed. Each design has its own characteristic life cycle cost. This characteristic life cycle cost is composed of three major components, first, cost of construction; second, annual cost of energy; and third, annual cost of maintaining and operating envelope and energy systems.

2. The "best" design, for a given building size and occupancy, is that design which gives the lowest total life cycle cost of ownership. A rational thermal and lighting standard should help channel a particular design toward, not away from, this lowest life cycle cost point. The "best" design may not be the design that has the lowest first cost of construction. Use of more expensive building materials or equipment that represent a stringent thermal construction approach and that will result in lower long-term energy and operating costs, can result in a lower total life cycle cost. On the other hand, extreme stringency in thermal system design beyond that required by climate conditions can result in added life cycle cost beyond life cycle cost accruable with an optimum design.

3. The best design for one part of Alaska will not necessarily be the best design for another region of Alaska that has different climate and economic factors.

4. Good design practice must involve all building systems that use, transport or convert energy. To this end, consideration of the thermal envelope, which represents the end use of heating energy, must be accompanied by careful treatment of interior mechanical and electrical systems.

A total of 192 different design concepts were studied. Each concept involves a different combination of wall systems, mechanical systems, electrical systems and foundation systems. To identify the least life cycle cost design for a given building configuration concept, a comparison technique that considers the full range of designs available to the industry was used. For each concept, the building was conceptually separated into three building component systems, the exterior thermal envelope, and energy consuming portions of mechanical and electrical systems. The range of standard design practice was expressed for each of the systems as follows:

Thermal Envelope:	Four separate conceptual designs: Lenient, Moderate 1, Moderate 2, and Stringent.
Mechanical Systems:	Two separate conceptual designs: ME 1 (simple) and ME 2 (complex).
Electrical Systems:	Two separate conceptual designs: EE 1 (simple), and EE 2 (complex).

Each design evolved independently of other building systems, and was defined in terms of first cost and operating characteristics. Four separate mechanical/electrical system combinations were established; these four interior energy systems designs were then combined with thermal envelope systems combinations. This results in a total of sixteen different building design alternates for consideration with the life cycle cost model.

The sixteen design alternatives were then modeled to determine the total life cycle cost for each alternative. This modeling was accomplished for sixteen separate cost regions within the state. The output of the comparison procedure is a sixteen by sixteen matrix of total life cycle costs. Thus, there are sixteen discrete design opportunities presented in terms of total life cycle cost for each cost region. This allows a separate least life cycle cost design solution to be selected for each climate and cost region of the state, for that design concept.

4.2 PROTOTYPE BUILDING

A rural school of 8,960 square feet size was used as the basis for the building model. This size is typical of small schools designed under State Department of Education rules (Reference 13), and is felt to represent an appropriate size for a study concerned with rural facilities.

To allow a fair assessment of thermal systems available to the designer, the dimensions of the structure and the occupancy patterns within the school are held constant for all designs.

Dimensions, tabulated in Table 1, are based on efficiency for layout as well as for minimizing exterior wall area, and represent standard good design practices currently in use (see Figure 1). Space allocations within the building are based on State of Alaska Department of Education guidelines.

Occupancy patterns as shown in Table 2 are based on expected use patterns for a rural village school with considerable community use. Ventilation requirements for interior spaces are based solely on assumed maximum occupancy levels using the 5 CFM/person factor allowed by the DOT-PF Design Determinates and Options Report (Reference 14), with allowances made for building exhaust systems and flue losses in boilers and furnaces. Figure 2 shows ventilation requirements by occupancy for the building.

During unoccupied times, the building is assumed not to be admitting any ventilating air via the ventilating system. Air exchange is still assumed to occur, however, through natural envelope infiltration/exfiltration, as shown in Table 3. These levels of infiltration are based on assumed air change rates assignments for each of the climate regions. Actual values are set using an arbitrarily assumed schedule related to mean annual wind speed.

TABLE 1

PROTOTYPE BUILDING CHARACTERISTICS

I. BUILDING GEOMETRY

Nominal Outside Dimensions	80 x 112 ft.
Nominal Outside Building Square Footage	8,960 sq.ft.
Total Exterior Envelope Area	23,680 sq.ft.
Total Interior Volume	147,200 sq.ft.

II. ENVELOPE COMPONENT AREAS

Component	Nominal Area (Sq.Ft.)
Floors (Elevated Foundation)	8,960
Roof	8,960
Walls	6,080
Doors	100
Windows - Thermal Model	327
- Cost Model	376

III. OCCUPANCY CLASSIFICATIONS

	Area Allocation (%)	Gross Area (Sq.Ft.)	Ceiling height (Ft.)
Classroom	42	3,776	10
Gymnasium	43	3,840	20
Supplementary	15	1,344	20

NOTE: No allowances made for thickness of walls in this chart.

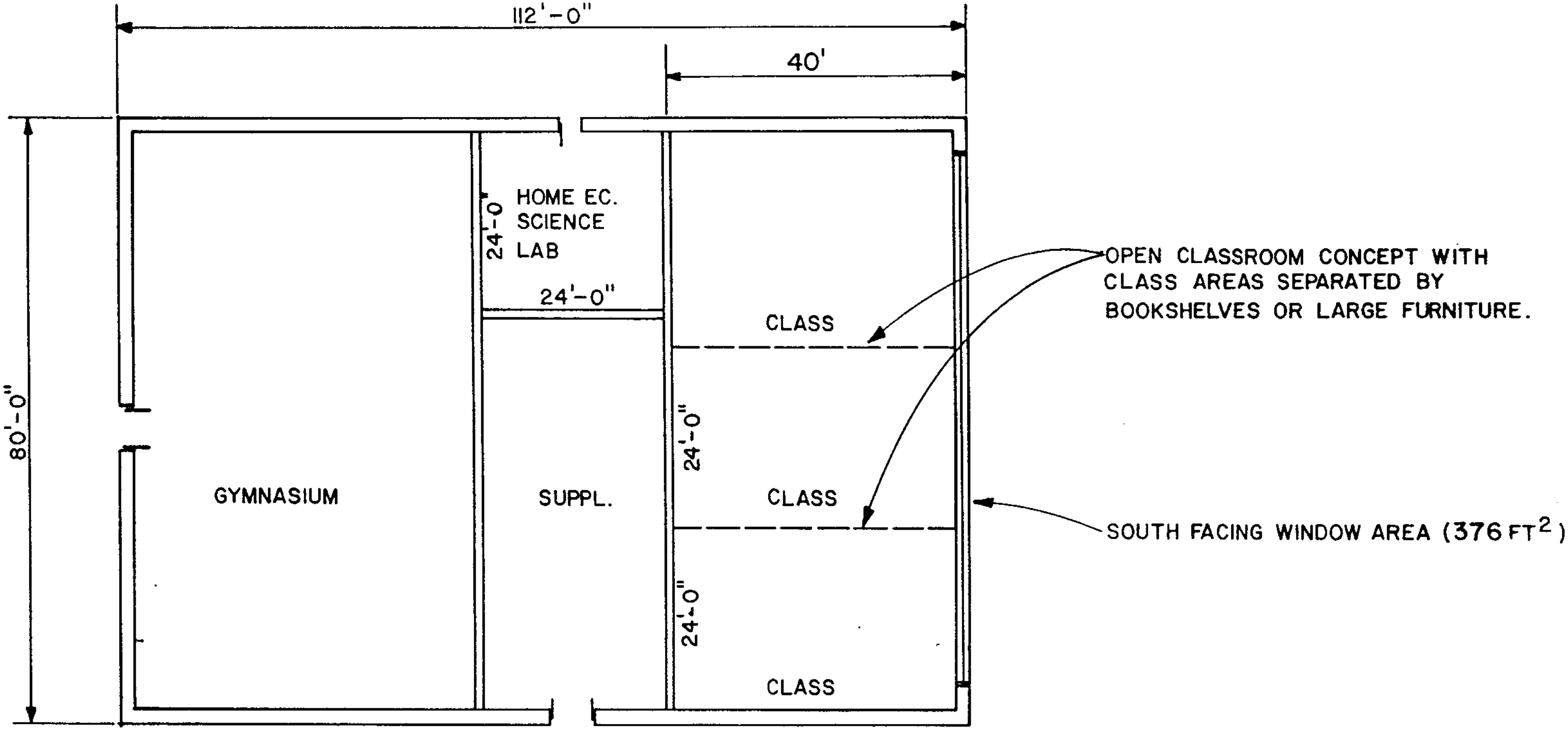
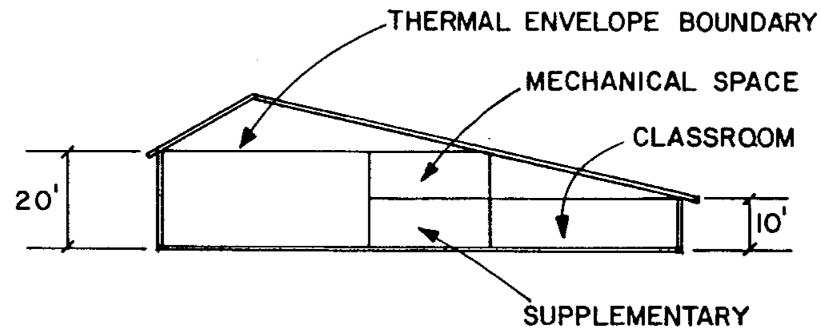


FIG.1 PROTOTYPE BUILDING

1" = 20'-0"



BUILDING CROSS SECTION

1" = 40'-0"

TABLE 2

OCCUPANCY/VENTILATION SCHEDULE

Time Schedule Category		Time Use Breakdown Hrs/Day	Days/Week	Weeks/Yr	Hrs/Yr	Total Occupancy Head Count	Required CFM Outside Air
I.	Normal Class	6	5	39	1,170	75	1,475
II.	Normal Class & Kitchen	2	5	93	390	75	1,475
III.	Afterhours Crowd In Gym	4	1	39	156	430	2,250
IV.	Afterhours Low Occupancy	6	6	39	1,404	75	975
V.	Night-Weekend Unoccupied				5,640	0	Varies see Table 3

NOTE: Minimum outside air exchange rates for any time schedule category is the computed natural ventilation rate defined in Table 3. This occupancy schedule is used only for determining outside air quantities for mechanical ventilation system. Lower occupancy levels are used for determining occupant heat gain credit.

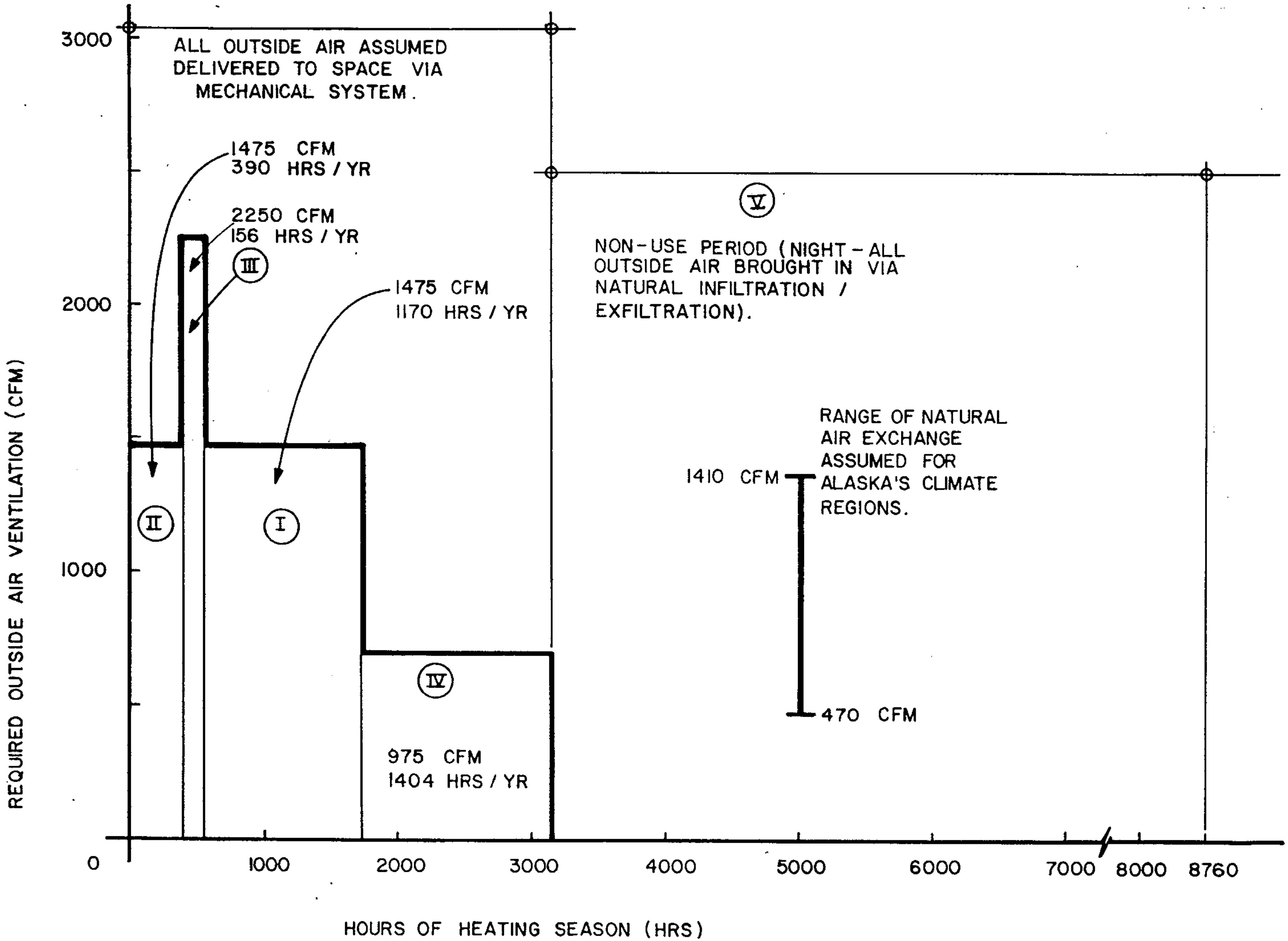


FIG. 2 VENTILATION SCHEMATIC

TABLE 3

VENTILATION SCHEDULE

(Due to Natural Wind/Stack Effects)

CLIMATE REGION	REGION NAME	AIR CHANGE RATE (AC/HR)	AIR CHANGE RATE (CFM)
1	South Central	1/2	940
2	South Eastern	1/2	940
3	Southern Interior	1/4	470
4	Aleutian	3/4	1,410
5	Western	3/4	1,410
6	Northern Interior	1/4	470
7	Arctic Slope	3/4	1,410

NOTE: These ventilation rates are used only for unoccupied night-time hours. Mechanical ventilation assumed to control during day-time. However, day-time ventilation rates are not allowed to be less than night-time rates, for any given climate region.

The prototypical building is designed with a structural wood stud wall framework with fiberglas insulation. Two additional wall insulation system alternates include the double stud wall concept and the polyurethane/isocyanurate foam insulation outer sheathing system. The structure is assumed either to be elevated on a pile or post and pad type foundation, with under floor insulation, or to rest on a heated crawl space foundation. No thermal allowance is taken for component to component connections, such as the floor-wall interfaces where thermal bridging is present.

4.3 ENVELOPE DESIGN ALTERNATIVES

Each of the five architectural components (walls, roof, windows, doors and floors) are dealt with separately, and four separate levels of thermal envelope construction are considered for each component, in the following categories:

Lenient: Lowest level of thermal insulation presently in use.

Moderate 1: Lower moderate level of thermal insulation presently in use.

Moderate 2: Higher moderate level of thermal insulation presently in use.

Stringent: Most highly insulative construction presently in use.

For each construction level, the overall thermal resistance in Hr-Sq.Ft.-degrees F/BTU, and the overall cost in dollars per square foot have been assessed. Figure 3 shows the typical thermal calculations for each component in each level of construction.

The design details and thermal characteristics of walls, floors, windows and doors for the four architectural alternates are shown in Table 4. Roof designs vary across the state, to accommodate widely varying climate conditions. Table 5 lists the roof designs used by climate region.

Architectural envelope designs used in the study are analyzed in detail in a supplement to this report and published separately, entitled "Report Supplement - Thermal and Cost Analysis of Thermal Envelopes for a Small Rural School". This supplement presents a detailed analysis of thermal envelope designs presently in use with wood stud wall construction, throughout the state.

4.4 MECHANICAL SYSTEMS DESIGN ALTERNATIVES

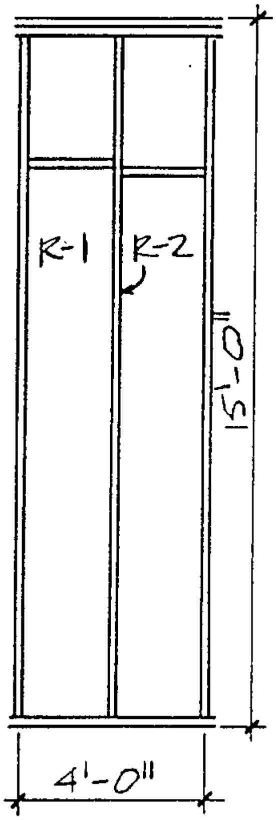
4.4.1 Existing Practice

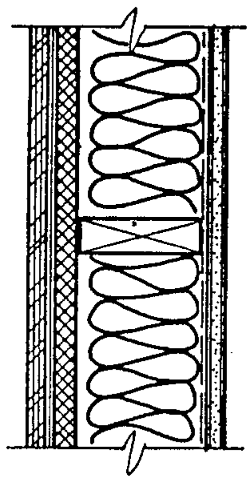
Within the building, energy systems generate heat, condition and move ventilating air, and provide lighting and process power at the convenience of occupants and their machines. The mechanical system converts raw fossil fuels (assumed in this

SANDWICH TYPE: Exterior Foam Wall

NOT FOR CONSTRUCTION

ENERGY LEVEL: Moderate #1





Description	R-Value	Cost $/Comp.SF
Inside Air	0.68	0.00
Paint Finish	0.00	0.85
5/8" Gyp.Board	0.55	1.20
4 Mil Poly-ethylene	0.00	0.24
R-19 Fiberglas Batts	19.00	0.62
1" Insulation Sheath	8.00	0.86
15# Bldg.Paper	0.06	0.32
5/8" Plywood	0.78	2.75
2X6 Stud @ 24"	6.93	1.34
Outside Air	0.17	0.00
TOTAL		8.18

$$\underset{R\text{-}1}{\left(\frac{54.37}{60}\right)}(29.24)+\underset{R\text{-}2}{\left(\frac{5.63}{60}\right)}(17.17)=28.11$$

BUILDING COMPONENT COST FACTOR: 0.678

COST PER BUILDING SQUARE FOOT: 5.55

TOTAL THERMAL RESISTANCE: 28.11

FIG. 3

TYPICAL THERMAL ENVELOPE COMPONENT ANALYSIS

TABLE 4

ENVELOPE COMPONENT DESCRIPTIONS

COMPONENT CATAGORY	COMPONENT R-VALUE (HR-SF-DEG.F/BTU)	INSULATION THICKNESS (INCHES - NOMINAL)	INSULATION TYPE	STRUCTURE
WALLS - STANDARD STUD CASE				
Lenient	20.11	6	Fiberglas Batt	Wood Stud Wall
Moderate 1	23.05	6-1/2		
Moderate 2	30.51	9		
Stringent	38.00	12		
WALLS - EXTERIOR FOAM CASE				
Lenient	20.10	6	Fiberglas Batt	Wood Stud Wall
Moderate 1	28.11	6 + 1 Urethane	w/exterior	
Moderate 2	32.11	6 + 1-1/2 Urethane	polyurethane/	
Stringent	36.10	6 + 2 Urethane	isocyanurate foam	
WALLS - DOUBLE STUD CASE				
Lenient	31.44	12	Fiberglas Batt	Double Stud
Moderate 1	42.44	14		
Moderate 2	50.44	16		
Stringent	61.44	18		
WINDOWS				
Lenient	2.04	-	-	Double Pane
Moderate 1	2.04	-	-	Double Pane
Moderate 2	3.23	-	-	Triple Pane
Stringent	6.50	-	Conventional Drapes	Triple Pane

TABLE 4 (CONT)

ENVELOPE COMPONENT DESCRIPTIONS

COMPONENT CATAGORY	COMPONENT R-VALUE (HR-SF-DEG.F/BTU)	INSULATION THICKNESS (INCHES - NOMINAL)	INSULATION TYPE	STRUCTURE
DOORS				
Lenient	9.24	1-3/4	Urethane Foam	Hollow Steel
Moderate 1	9.24	1-3/4	w/ext.uninsul.door	Door
Moderate 2	13.98	1-3/4	w/ext.uninsul.door	Construction
Stringent	23.53	1-3/4	w/ext.insul.door	
FLOOR - ELEVATED CASE				
Lenient	25.21	6	Fiberglas Batt	Wood-Steel
Moderate 1	36.04	9		Joist
Moderate 2	43.91	12		
Stringent	62.33	18		
FLOOR - HEATED CRAWLSPACE CASE				
Lenient	7.35	1	Rigid Extruded	Heated
Moderate 1	12.75	2	Polystyrene Foam	Crawlspace
Moderate 2	18.15	3		
Stringent	23.55			

TABLE 5

ROOF SYSTEM DESCRIPTIONS

COMPONENT CATEGORY	COMPONENT R-VALUE (HR-SF-DEG.F/BTU)	INSULATION THICKNESS (INCHES - NOMINAL)	INSULATION TYPE	STRUCTURE
ROOF - CLIMATE REGIONS 2, 3, 5, 6, 7.				
Lenient	22.70	6	Fiberglas Batt	Sloped Cold Roof
Moderate 1	33.60	9		Wood-Steel Truss
Moderate 2	41.48	12		Joist/Zip Rib
Stringent	60.84	18		Type Membrane
ROOF - CLIMATE REGION 4				
Lenient	12.39	2	Extruded Poly-	Sloped Warm Roof
Moderate 1	22.90	4	styrene Foam	Wood-Steel Truss
Moderate 2	35.12	6		Joint/Zip Rib
Stringent	52.29	9		Type Membrane
ROOF - CLIMATE REGION 1				
Lenient	12.82	2	Extruded Poly-	Flat Warm Roof
Moderate 1	23.42	4	styrene Foam	Wood-Steel Truss
Moderate 2	36.30	6		Joist/Structural
Stringent	53.51	10		Plywood Deck w/
				Hot Mop Membrane

case to be fuel oil) to useable thermal energy. The mechanical system distributes this energy throughout the interior of the architectural envelope, heating the space and providing metered amounts of ventilating air for occupant comfort.

As heating fuels are consumed in boiler/furnace equipment to produce useable heat, a portion of the resultant heat energy is lost as "stack losses". This is typically 15% to 30% of total energy content of the fuel burned. A gallon of heating fuel has a heating value of about 139,000 BTU's, most of which is "liberated" within the combustion chamber of the boiler. With an assumed conversion efficiency of 70% (normally defined as the ratio of useful heat energy delivered by the boiler to heat content of fuel burned X 100%), a total of 97,000 BTU's will be transferred to the heating water/glycol circulating through the boiler, and the remaining 42,000 BTU's will be lost through the boiler stack as hot gases and uncombusted hydrocarbons.

The mechanical system consumes energy in moving heating fluids and ventilating air throughout the building. The energy consumed is almost always in the form of electrical energy required to power fans and pumps. This is termed "distribution energy", and cannot be considered a true loss of energy since the power consumed is liberated as friction heat within the building envelope and/or as heat liberated through electrical resistance in conductors and motor windings which also remains within the building.

These two components of mechanical system energy consumption have some important differences. The boiler/furnace stack losses are true losses out of the envelope and should be minimized under all circumstances, through careful design of boiler/furnace systems. The pumps and fans that consume distribution energy are a different matter. These devices are located within building spaces, and a large part of the distribution energy they consume ends up as frictional heat within the envelope to partially offset envelope losses. This "energy credit" thus serves to reduce fossil heating fuel requirements.

The electrical energy used to power the pumps and fans is almost always more expensive on a dollars/BTU basis than fossil heating fuel, making this parasitic distribution energy for primary heating undesirable economically. Therefore, excessive levels of pump and fan energies represent a different type of loss, that when viewed at the point where energy is brought across the building property line represents an operational inefficiency.

In addition to the cost aspect of energy, the total amount of fossil fuel consumed in generation of the distribution energy is also of interest. Under a scenario where the school is served by an electric utility, or where fossil fuel is converted to electricity using conventional diesel engine-generator sets, conversion efficiencies can be as low as 15% to 20%. Thus, for every equivalent BTU of electrical energy delivered to a pump or fan, between 5 and 7 BTU's of fossil fuel must be consumed at the source conversion point. This is further justification to minimize the consumption of electrical energy.

Note that this criteria for minimizing electrical consumption within the building could change if an extremely cheap source of electricity is realized, as in the case of an area that has a strong hydropower base, or in certain situations where a cogeneration base is used to create heat and produce electricity. For the purposes of this study, availability of hydro or cogeneration is not considered, and the source of electricity is assumed to be a conventional low efficiency conversion process using diesel generators, with a high BTU cost of energy. Further discussion on this topic is included in section 4.4.4, Cogeneration Applicability.

As in the case of the envelope system, there are innumerable ways in which mechanical and electrical systems may be designed. There is also a wide variability in the energy efficiency of interior energy systems, that is, in how much energy is consumed in stack losses and in the heating and ventilating process. Each interior energy system design for a given building envelope will exhibit a particular behaviour pattern in the way interior heat gains from occupants, their activities, and energy expended in the lighting, heating and air conditioning processes interact with envelope heat losses.

Space temperature and zone control requirements, ventilation scheduling, as well as maintenance and operations considerations are strong determinates in how mechanical systems are designed. Where minimal control and zone requirements are impressed, system designs tend to be simple with a minimum of installed components. However, where control and zone requirements are rigorous, mechanical system complexity tends to increase.

Unfortunately, design complexity is closely related to building energy consumption and system costs. The low first cost, simple systems that offer low maintenance and easy operation, tend to use large amounts of energy and thus have high annual energy costs. A more complex system will usually be more expensive in first cost and possibly in maintenance, but will be more efficient in its' consumption of energy.

4.4.2 Modeling of Mechanical Systems

There are at present within the state, two identifiable design philosophies (out of many) for mechanical systems that address system complexity. One philosophy emphasizes low first cost and simplicity of operation, using hot air furnace systems and hot air ducting with a minimum of zones and system controls.

The other defined philosophy is a more complex system that uses boilers for heat generation, a perimeter baseboard system for heat distribution and a separate ducted ventilation system. This study addresses these two bounding philosophies from the standpoint of first cost, maintenance and operations costs, and parasitic energy consumption.

The mechanical portion of the building model assesses the energy consumed in the space heating and ventilating process. The following mechanical system operating parameters are used to describe energy consumption characteristics of each of the design alternatives:

- Heat generation conversion efficiency:
  Defined as ratio of useable energy output of the heating (mechanical) system annually to total energy consumed by the heating (mechanical) system annually.

- Distribution energy consumption:
  Defined as total electrical energy consumed in the heating and ventilating process within the envelope.

- Outside air ventilation schedule:
  Defined as outside air quantities in CFM by time schedule, for each mechanical system alternative.

The first scenario (ME 1) involves use of low first cost hot air furnace equipment. This design uses the following major components (see Figure 4):

- (2) Horizontal hot air furnaces with mixing boxes, filters, control dampers and required ductwork, diffusers and grilles and package unit controls.

- System controls, consisting of room thermostats, damper motors, duct thermostats, time clocks, and all associated equipment.

- Kitchen exhaust system, including ductwork, fan unit, roof or wall hood and controls.

- Toilet exhaust system, including grilles, balance dampers, ductwork, fan unit, controls and roof or wall hood.

Note that it is possible to input some but not all of the ventilation scheduling controls that are in ME 2, because furnace systems can only practically accommodate simple control sequences.

The second scenario (ME 2) models a high first cost, energy efficient mechanical system that has a heavy impact on construction budget, and additional annual maintenance and operating cost, but yields returns in increased operating

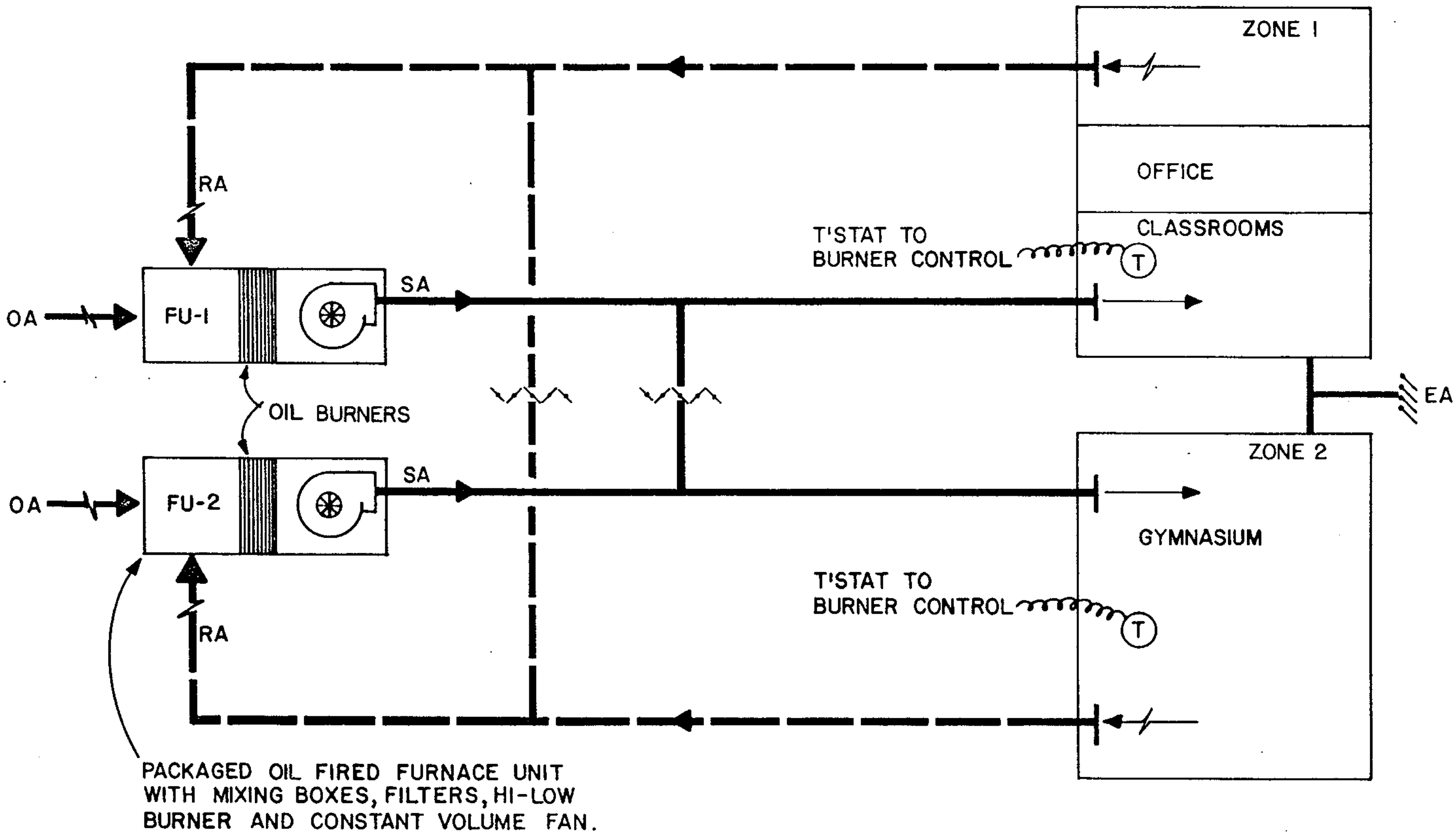


FIG. 4 SCHEMATIC PLAN - PACKAGED HEATING FURNACE PLAN

efficiency and lower energy consumption. This design involves use of the following major components for the mechanical system (see Figure 5):

- (2) Central cast iron wet base boilers with controls, breeching, stacks, and duplex circulating pumps.

- (2) Air handlers for ventilation of interior spaces, with required ductwork, diffusers and grilles, dampers and controls.

- Perimeter baseboard system for circulating glycol, including finned tube, piping, and finned tube enclosures.

- System controls, consisting of room thermostats, damper motors, control valves, and all associated control equipment.

- Kitchen exhaust system including ductwork, fan unit, roof or wall hood and controls.

- Toilet exhaust system, including grilles, balance dampers, ductwork, fan unit, controls and roof or wall hood.

The two alternative concepts for mechanical systems were arrived at through evaluation of a sampling of small schools

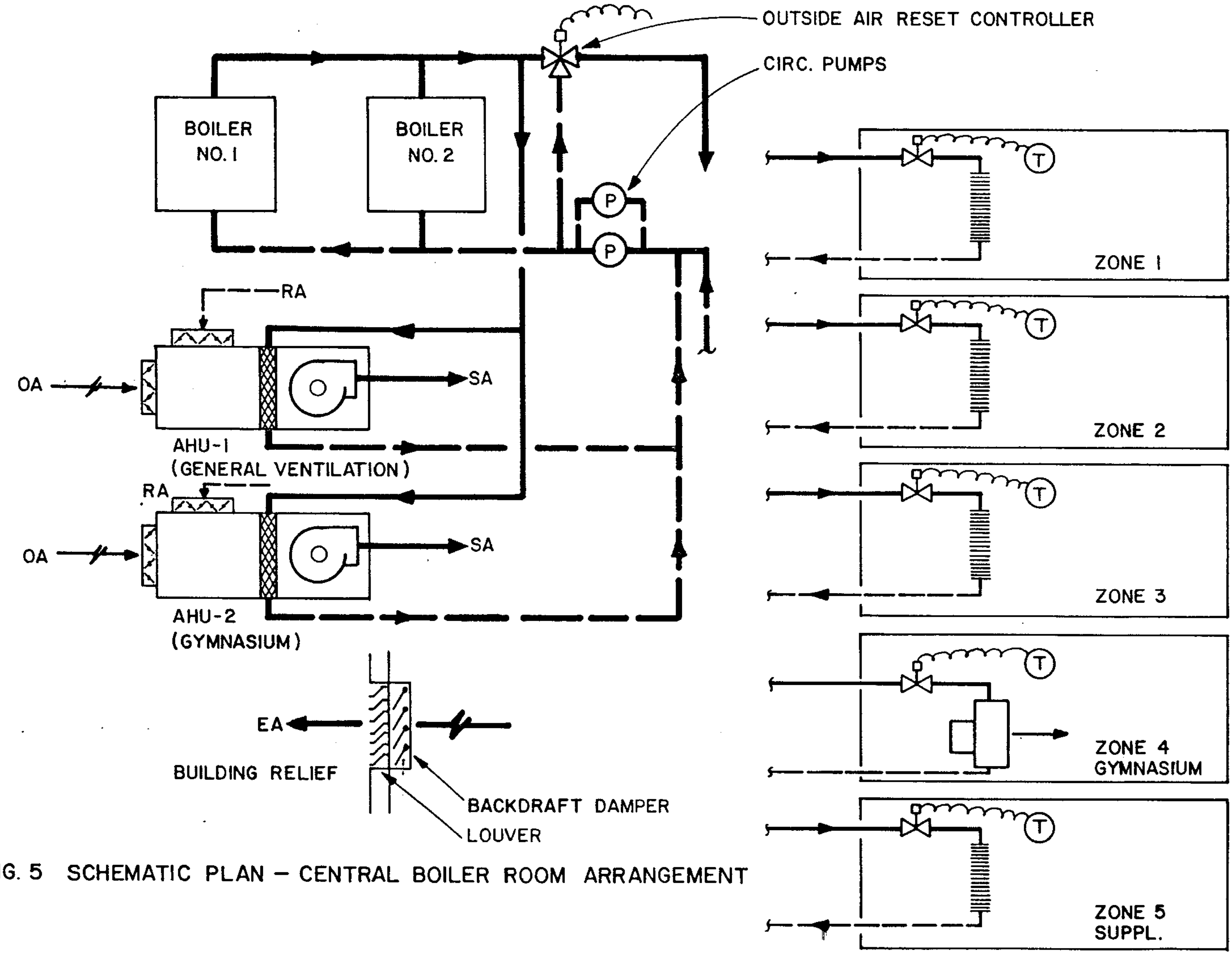


FIG. 5 SCHEMATIC PLAN – CENTRAL BOILER ROOM ARRANGEMENT

throughout the state. The designs were found to vary considerably in control sequences specified, arrangements of outside air/exhaust air ducting and fans, and in assumed quantities of outside air delivered. The prototype systems are assembled to reflect a composite of general practice. Details of systems concepts are purposefully restrained, to accommodate variations in designer preference.

Table 6 presents the major mechanical and electrical system modeling parameters. These parameters have been developed from analysis of operating parameters of two systems layouts using the 8,960 square foot school size. Table 7a list the amounts of outside air that are assumed to be admitted to the school for each alternative. Air quantities are listed in units of CFM by time schedule number, climate region, and mechanical system alternate. These quantities are based on assumed occupancies of 75 students for classroom areas and a gymnasium crowd of 430 people.

It is important to note that the ME 1 case has a continuous quantity of air for the first four schedule intervals. This is assumed because the simplified control system cannot schedule ventilation quantities, beyond closing outside air dampers at night. On the other hand, the ME 2 system which has two air handlers and a more complex modulating damper arrangement, allows outside air quantities to be modulated to reflect different occupancy levels. The ventilation requirements for the building are shown graphically in Figure 2.

TABLE 6

MECHANICAL AND ELECTRICAL SYSTEM

ENERGY CONSUMPTION CHARACTERISTICS

A. MECHANICAL SYSTEM CHARACTERISTICS

	ME 1 Simple Mechanical System	ME 2 Complex Mechanical System
Seasonal Heat Generation Efficiency (%)	70	70
Distribution Energy Consumption (BTU/SQ.FT.-YR)	11,130	3,610

B. ELECTRICAL LIGHTING SYSTEM ENERGY CONSUMPTION LEVELS (Watts/Sq.Ft.)

Occupancy	EE 1 Standard Design	EE 2 Alternate Design
Classroom	3.2	1.8
Multipurpose	1.15	0.85
Undefined	2.0	1.5

TABLE 7a

SCHEDULE OF OUTSIDE AIR VENTILATION RATES (CFM)

(Without Heat Recovery)

Climate Region	Level of Construction	Time Schedule [TT(I)] 1	2	3	4	5
1	ME 1	2,250	2,250	2,250	2,250	940
	ME 2	1,475	1,475	2,250	1,475	940
2	ME 1	2,250	2,250	2,250	2,250	940
	ME 2	1,475	1,475	2,250	1,475	940
3	ME 1	2,250	2,250	2,250	2,250	470
	ME 2	1,475	1,475	2,250	1,475	470
4	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	1,475	1,475	2,250	1,475	1,410
5	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	1,475	1,475	2,250	1,475	1,410
6	ME 1	2,250	2,250	2,250	2,250	470
	ME 2	1,475	1,475	2,250	1,475	470
7	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	1,475	1,475	2,250	1,475	1,410

NOTE: Time schedule intervals 1 through 4 are daytime or occupant use periods with mechanical systems bringing in metered amounts of outside air. During time schedule interval 5 outside air dampers are shut, with ventilation via natural infiltration/exfiltration.

The mechanical system is assumed to serve the classrooms, multipurpose room, offices, kitchen, toilet room and other undefined spaces that constitute the prototypical building. Mechanical equipment included in the design is only that equipment directly related to the energy consuming portions of the heating and ventilation systems for the building. A number of energy related systems are common to each of the mechanical system alternatives. These systems consist of domestic hot water heating equipment, assumed in the analysis to be an oil-fired storage heater, and kitchen and toilet ventilation units. The systems are shown in schematic on Figure 6.

The option of heat recovery is also included in the ME 2 mechanical systems model. A "run-around loop" type system was used, since the system offers simplicity and maximum flexibility in location of equipment and controls. A heat recovery coil is placed in toilet/locker room exhaust and outside air intake ductwork. A circulating pump moves glycol/water between coils to extract heat from exhaust air and transfer it to the fresh supply air. A total of 800 CFM is assumed to be exhausted from toilet/locker areas. The configuration is shown as Figure 7. Ventilation scheduling under the heat recovery option is shown in Table 7b.

The following building systems, while part of the typical mechanical system, are not included in this analysis, as they do not represent major energy consumers:

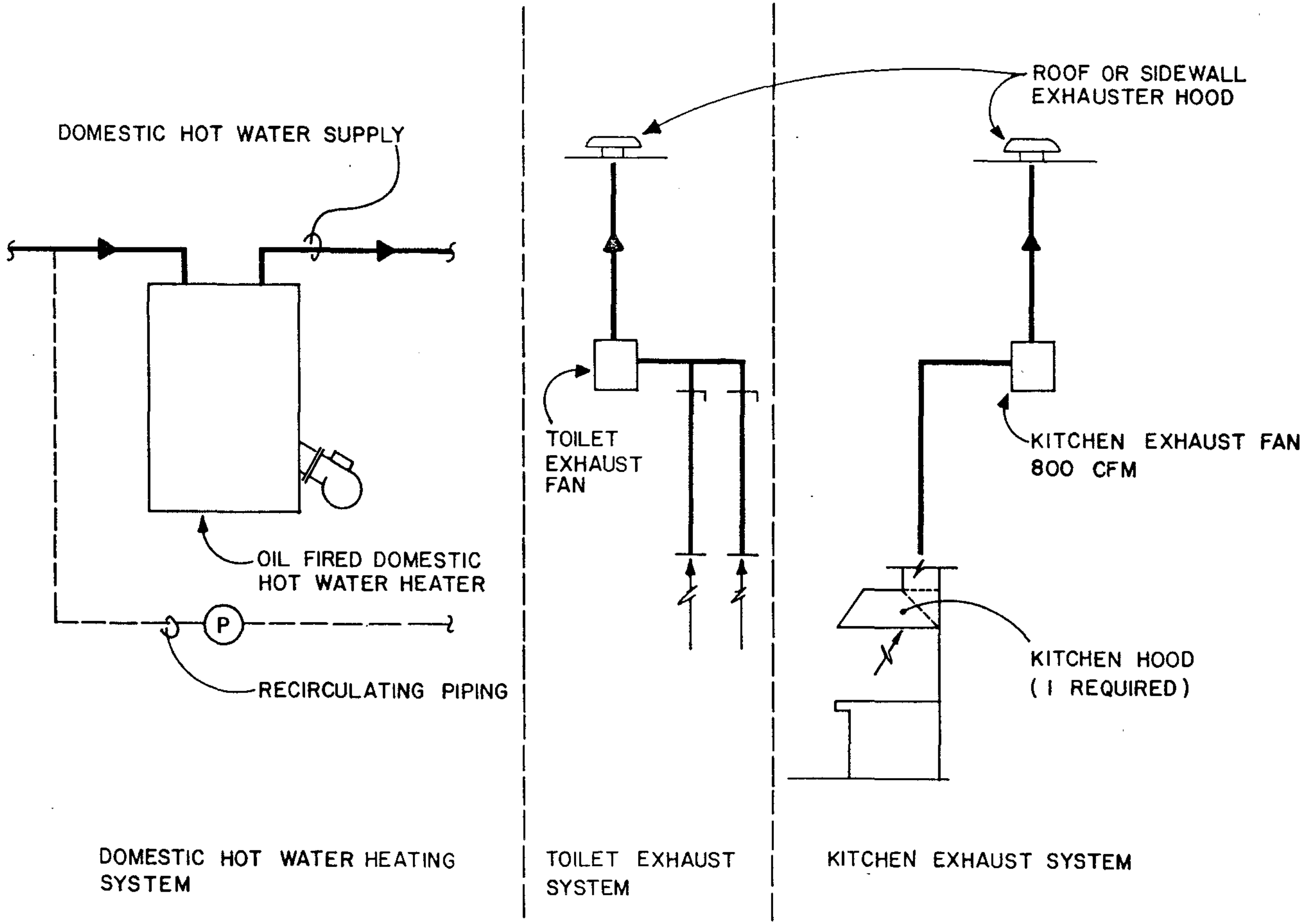


FIG. 6 SYSTEMS COMMON TO EACH MECHANICAL SYSTEM ALTERNATE

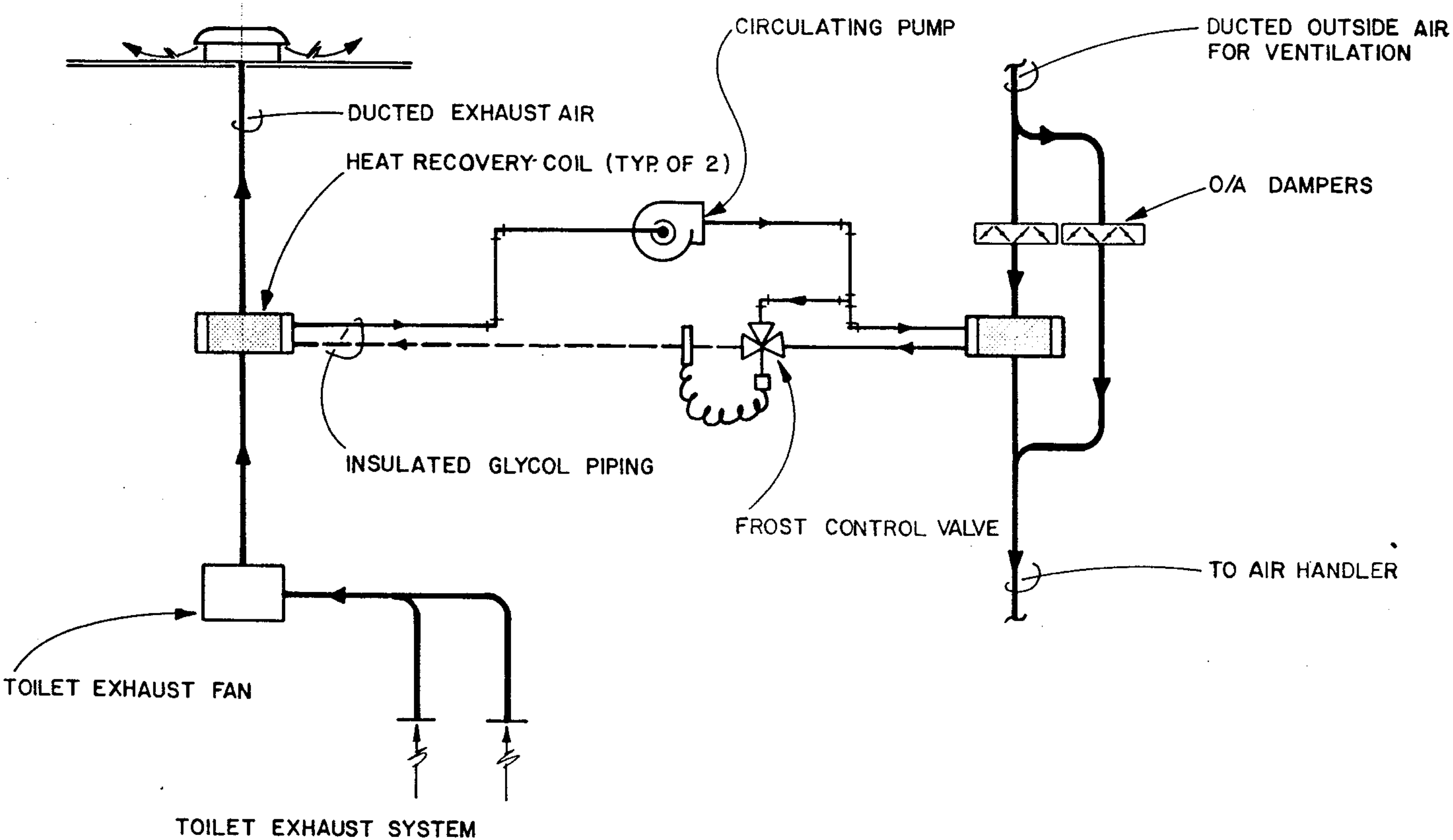


FIG. 7 AIR TO AIR HEAT RECOVERY SYSTEM

TABLE 7b

SCHEDULE OF OUTSIDE AIR VENTILATION RATES (CFM)

(With Heat Recovery)

Climate Region	Level of Construction	Time Schedule [TT(I)] 1	2	3	4	5
1	ME 1	2,250	2,250	2,250	2,250	940
	ME 2	995	995	1,770	995	940
2	ME 1	2,250	2,250	2,250	2,250	940
	ME 2	995	995	1,770	995	940
3	ME 1	2,250	2,250	2,250	2,250	470
	ME 2	995	995	1,770	995	470
4	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	995	995	1,770	995	1,410
5	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	995	995	1,770	995	1,410
6	ME 1	2,250	2,250	2,250	2,250	470
	ME 2	995	995	1,770	995	470
7	ME 1	2,250	2,250	2,250	2,250	1,410
	ME 2	995	995	1,770	995	1,410

NOTE: Time schedule interals 1 through 4 are daytime or occupant use periods with mechanical systems bringing in metered amounts of outside air. During time schedule interval 5 outside air dampers shut, with ventilation via natural infiltration/exfiltration.

- Plumbing fixtures.
- Domestic hot and cold water distribution system.
- Domestic water supply and pressurization systems.
- Domestic water treatment systems.
- Waste water systems.
- Sprinkler systems.

4.4.3 Maintenance and Operations Considerations

It is recognized that there are major problems in maintaining buildings in Alaska's bush, especially mechanical systems. These problems currently are causing major operational difficulties for bush school administrators. The complexity of mechanical systems in rural schools requires persons with considerable operating and repair expertise, a qualification not usually found in many areas of the state. Maintenance programs tend to be most successful with simple mechanical systems that include only the most basic temperature controls. However, the vast distances between school locations and high cost of transportation, linked with inadequately trained maintenance staff, tend to create problems even with the simplest systems.

The occurrence of these maintenance problems is variable. While certain Alaskan areas tend to have better luck with building operation than others, the more remote school sites tend to require simpler, less maintenance sensitive systems, since technical expertise in building operation is almost always unavailable.

Given these assumed conditions, there is no way to specify a single mechanical system design concept for all areas of Alaska that represents a best least life cycle cost solution. From a purely maintenance standpoint, simpler systems (ME 1) will be the best solution in remote areas. Complex systems (ME 2) will work better in areas closer to transportation centers, since these centers are experiencing considerable economic activity, and can be expected to experience growth and work force technical education throughout the building's lifetime.

For this reason, the ME 1 and ME 2 systems are maintained in the analysis as two viable options for the designer to select. For example, in a remote location where the simple ME 1 case is not the least life cycle cost solution for a climate region, a competent designer may properly elect to use the ME 1 system due to over-riding simplicity criteria. Conversely, adherence to life cycle cost results for less remote areas is probably the most favorable option for the designer.

4.4.4 Cogeneration Concepts

The environment that the typical rural school exists in varies from remote locations, far from transportation centers, to more developed locations near or in population centers. For this range of environments, there are two cases that often occur with respect to electric power supply, which influence the site support required to operate the school.

Case I:
School served by local electric utility. School maintains emergency generator, sized to operate heating, sanitary and freeze-up protection systems.

Case II:
School not served by local electric utility. Prime power generation facility included on school property.

In each of these cases, there is potential for abstracting waste heat from the jacket water of the generator's diesel engine, and using this to partially heat the building. The use of waste heat in this manner is one form of cogeneration. It is obvious that under certain circumstances this can result in 1) reductions in total cost of schools operation (Case I), and 2) reduction in total quantity of fuel oil burned annually (Case II).

For each of these scenarios, the economic viability of cogeneration is woven into the type of envelope and interior energy systems built into the school, price and availability of fuel and commercial power, and the extent of required transmission piping between the power house and school. It is acknowledged that the best (least) life cycle cost solution for building thermal systems is dependent on the source and cost of utilities, and the decision whether or not to use cogeneration. This study, however, does not include an analysis of cogeneration for the following reasons:

1. There are significant numbers of independent variables that determine cogeneration system life cycle cost, many of which are site specific.

2. It does not appear possible to equitably formulate a typical scenario for cogeneration that will allow determination of the actual cost of building utilities.

3. Load matching between community and school loads are indeterminate for a prototype model, since each site will have specific load match relationships. This match will strongly influence cogeneration viability.

Instead, this study assumes a least life cycle cost solution under non-cogeneration utility conditions as the basis of the building thermal standard. This standard is based on high utility costs that reflect a building served by a small private utility with a relatively stiff tariff charge.

With a framework for building thermal construction details established (by this study and a preliminary thermal standard), a basis for evaluation of the cogeneration concept is then available. This should be done as a separate study, and coordinated with other state agencies involved in village cogeneration systems.

4.5 ELECTRICAL SYSTEM DESIGN ALTERNATIVES

The electrical energy consumed within a building can be divided into three major uses: building lighting, motive power for mechanical system, and process power to be used by building occupants. Of these three components, mechanical system and lighting power are of major concern with envelope/energy systems studies. Process power conservation, as it is a specialized study not related to building system design, is not considered in the study.

As mechanical system electrical consumption is almost wholly dependent on selection of mechanical equipment, this subject has been discussed in Section 4.3 (Mechanical System Design Alternatives). The analysis of electrical systems thus centers on the design of interior and exterior electrical lighting.

Two basic design concepts are used in the analysis of lighting. The building is assumed to be in three area designations each with a different lighting level that results from fixture selection to match use, ceiling height, and room characteristics. The standard design (designated "EE 1") describes current practice, while the alternate design (designated EE 2") portrays the energy conserving design using current off-the-shelf hardware.

STANDARD DESIGN (EE 1):

The standard design utilizes for the classroom areas a 4-lamp wrap-around fluorescent fixture such as the Lithonia LB440A. This fixture will provide the IES recommended 70 footcandles when installed in a 960 square foot classroom. The number of fixtures required is 12. This assumes that the Room Cavity Ratio is 1.6, the floor reflectance is 30%, the ceiling reflectance is 80%, and the wall reflectance is 50%. It is assumed that the fixtures would be installed in 3 rows of 4 fixtures evenly spaced. The total watts/square foot with this design is 2.4. The final footcandle level is approximately 75.

It should be noted that frequently the designs will show lighting levels of 100 footcandles. In this case, 16 fixtures are used which produce 100 footcandles and consume 3.2 watts/square foot.

The multipurpose room (gymnasium) typically is 3840 square feet of space with a higher ceiling height. The room has a half-court basketball court and is also used for meetings. The lighting levels are usually 50 footcandles from surface-mounted, industrial fluorescent fixtures. The lighting layout is usually accomplished with standard 4-foot lamps to facilitate shipping to the remote areas. The layouts vary but would typically consist of tandem fixtures (2 4-foot fixtures connected end to end to form an 8-foot fixture). There would be approximately 21 tandem fixtures producing the 50 footcandles desired at a power loading of 1.15 watts/square foot.

Undefined spaces are usually illuminated with a combination of fluorescent and incandescent fixtures. These fixtures represent a power loading estimated at 4 watts/square foot. The hours of use should be much less than that for a classroom. Frequently, however, the building occupants will leave mechanical room and storeroom lighting on continuously.

ALTERNATE DESIGNS (EE 2):

The alternate design for the classroom utilizes the same parameters as above but utilizes a more energy efficient fixture. The overall average lighting level in the classroom calculates as lower, but due to the improved design, produces equal results to the standard design above. The alternate design provides the same zonal cavity footcandle level, but due to an improved diffuser which allows more efficient diffusing of the light, provides equal or better results. The fixture chosen is a Columbia #4643-43-243. This is a surface mounted "Parabolume" fixture. This fixture uses 3 lamps instead of the 4 for the standard design. The lamps used are the energy efficient "Wattmizer" lamps. The total number of fixtures required to give equivalent lighting is 12. This is the same as for the standard design. Energy savings are inherent, however, in the reduction of 1 lamp per fixture. The watts/square foot for this design is 1.8. This represents a savings of 1.4 watts/square foot over the "standard design".

A highly efficient design for the multipurpose room (gymnasium) would consist of high pressure sodium luminaires which are one of the most efficient sources of light in common use today. The same multipurpose room could be illuminated to 50 footcandles with 18 150-watt fixtures such as the General Electric "minimount". The total wattage is approximately 3150 watts or .85 watts/square foot.

Mechanical rooms and undefined spaces would be lighted with fluorescent fixtures, and a tremendous improvement in the watts/square foot indicator could be achieved. For these undefined spaces in a typical building, we can assume an average lighting level of approximately 50 footcandles. The lighting would be provided by fluorescent fixtures , with the load estimated at 3 watts/square foot.

4.6 COST ESTIMATING

The analysis of costs for the building's energy system involves definitions of first costs of construction, and analysis of both maintenance and operations costs and costs of energy. These component costs (Reference 15) have been defined at a reference location in Alaska, the City of Anchorage, and then related to other locations in Alaska, through use of cost indices. This index approach is discussed in Section 4.6.

4.6.1 Construction Costs for Thermal Envelope

Costing for envelope components was accomplished for each of the four levels of thermal construction. This was done by selecting a unit area of construction, and estimating all costs for that component. An example of a cost estimate for a typical envelope component is presented in Figure 3. This cost includes all direct labor and materials, as well as an allowance for indirect costs and contractor profit.

As can be seen in the example, which is for a 6" thick stud wall with 1" exterior foam insulation, the unit area for costing is taken as 60 square feet. All parts of the envelope affecting thermal performance are costed, including paint, interior wall board, vapor barrier, structural studs and plates, exterior sheathing and stain, and thermal insulation. A strict parity is maintained between the components costed and the components included in thermal resistance calculations (Section 4.2). The costs in units of dollars per component square foot are then totaled, to represent the total component cost of each square foot of wall space.

These costs for the 60 square foot area are then converted to construction cost per square foot of building floor area, using the following relationship:

Construction Cost($/Bldg.Sq.Ft.) =

Cost($/Component Sq.Ft.)(Bldg.Component Cost Factor)

where the component cost factor is the ratio of total component area to total floor area.

These costs are presented in Tables 8 and 9, and detailed development of numbers are included in the report supplement. These systems are based on applicability requirements for roof systems, discussed in Section 4.2. A summary of costs of the total thermal envelope, by climate region, is included in the companion report supplement.

4.6.2 Construction Costs for Mechanical and Electrical Systems

As described in Sections 4.3 and 4.4, only those components of mechanical and electrical systems contributing to or influencing building thermal performance are analyzed. For

TABLE 8

SUMMARY OF COMPONENT SQUARE FOOT COSTS

($/Envelope Component Square Feet)

	LENIENT	MODERATE 1	MODERATE 2	STRINGENT
I Floor:				
	$ 11.00/SF	$ 11.37/SF	$ 11.57/SF	$ 12.30SF
II Wall:				
Single Stud	$ 7.32/SF	$ 7.92/SF	$ 8.53/SF	$ 9.43/SF
Exterior Foam	$ 7.32/SF	$ 8.18/SF	$ 8.52/SF	$ 8.83/SF
Double Stud	$ 9.00/SF	$ 9.23/SF	$ 9.51/SF	$ 9.93/SF
III Heated Crawlspace:				
	$ 14.85/SF	$ 15.04.SF	$ 15.57/SF	$ 16.10/SF
IV Door:				
	$ 31.60/SF	$ 31.60/SF	$ 58.54/SF	$ 59.76/SF
V Window:				
	$ 22.50/SF	$ 22.50/SF	$ 26.50/SF	$ 44.10/SF
VI Roof:				
Cold Sloped	$ 14.35/SF	$ 14.66/SF	$ 14.86/SF	$ 16.57/SF
Warm Sloped	$ 13.35/SF	$ 14.40/SF	$ 15.82/SF	$ 18.54/SF
Warm Flat	$ 7.17/SF	$ 8.22/SF	$ 9.48/SF	$ 12.19/SF

TABLE 9

SUMMARY OF BUILDING SQUARE FOOT COSTS

($/Building Square Feet)

	LENIENT	MODERATE 1	MODERATE 2	STRINGENT
I Floor:				
	$ 11.00/SF	$ 11.37/SF	$ 11.57/SF	$ 12.30/SF
II Wall:				
Single Stud	$ 4.97/SF	$ 5.37/SF	$ 5.79/SF	$ 6.40/SF
Exterior Foam	$ 4.97/SF	$ 5.55/SF	$ 5.78/SF	$ 5.99/SF
Double Stud	$ 6.11/SF	$ 6.26/SF	$ 6.45/SF	$ 6.74/SF
III Heated Crawlspace:				
	$ 2.55/SF	$ 2.58/SF	$ 2.67/SF	$ 2.76/SF
IV Door:				
	$ .35/SF	$ .35/SF	$ .65/SF	$ .67/SF
V Window:				
	$ .94/SF	$ .94/SF	$ 1.11/SF	$ 1.85/SF
VI Roof:				
Cold Sloped	$ 15.13/SF	$ 15.45/SF	$ 15.66/SF	$ 17.47/SF
Warm Sloped	$ 14.07/SF	$ 15.18/SF	$ 16.68/SF	$ 19.54/SF
Warm Flat	$ 7.17/SF	$ 8.22/SF	$ 9.48/SF	$ 12.19/SF

mechanical systems, the two separate schools are selected for cost analysis. The mechanical designs are alternatively fit into the thermal envelope of an operating school near Bethel (Reference 16), and one near Dillingham (Reference 17).

This analysis yielded an Anchorage based construction cost of $10.85 /bldg.sq.ft. for the simple system (ME 1) and $13.85/bldg.sq.ft. for the complex system (ME 2). A breakdown of costs are included in Table 10.

Electrical systems are defined by a cost analysis of the two different design concepts discussed in Section 4.4. Costs are assessed on the basis of assumed layouts for fixtures and approximate wiring requirements. The costs of major service components and associate switching hardware are not included in the estimate as it is felt that these costs do not influence thermal performance and would, in most cases, be common to both an EE1 or EE2 system. The costs used in the analysis for the two electrical design alternatives are $1.94/bldg.sq.ft. for a standard design and $2.72/bldg.sq.ft. for an alternate energy conserving design. As described in Section 4.6, these costs are Anchorage base costs and are adjusted upward using cost indices to various cost regions in the state.

TABLE 10

CONSTRUCTION COST ANALYSIS - MECHANICAL SYSTEMS

DESIGN OPTION:

	ME 1 (Simple)	ME 2 (Complex)	ME 2 (Complex With Heat Recovery)
Hydronic System (includes airhandlers, cabinet unit heaters)	-	$ 93,760	$ 93,760
Hot Air Furnace	$ 15,280	-	-
Ductwork	$ 62,835	$ 12,640	$ 12,640
Kitchen/Toilet Exhaust	$ 5,290	$ 5,290	$ 5,290
Water Heating	$ 3,690	$ 3,690	$ 3,690
Controls	$ 7,735	$ 8,680	$ 8,680
Cost of Heat Recovery (ME 2 Only)			$ 5,860
Total Cost	$ 94,830	$ 124,060	$ 129,920
Gross Floor Area (Sq.Ft.)	$ 8,960	$ 8,960	$ 8,960
Unit Cost ($/Bldg.Sq.Ft.)	$ 10.58	$ 13.85	$ 14.50

4.6.3 Analysis of Maintenance Costs

Maintenance and operating costs for rural schools are strong determinates in total life cycle cost analysis. The cost of maintaining energy systems within the rural school is rather nebulous, as these costs tend to blend into costs of educational administration, and other non-related maintenance tasks such as painting and roof repair.

There are a number of overhead cost components associated with the rural energy system operation, as listed below:

- Onsite direct labor costs for scheduled preventative maintenance.
- Onsite direct labor costs for unscheduled repair and maintenance.
- Costs of scheduled major maintenance upgrade.
- Home office administration.
- Travel costs.
- Travel time.
- Maintenance materials.
- Overhead burden for labor force.

Each of these items is difficult to separate from maintenance and operations costs for other non-energy consuming systems. Further, hard data on thermal systems maintenance performance are generally not available from school districts.

For these reasons, maintenance costs for energy systems alternatives are assessed using a thirty year cash flow plan for the facility, and the following criteria.

1. Scheduled maintenance costs are assumed as preventative maintenance activities based on a normal schedule, over the lifetime of the structure.

2. Unscheduled maintenance is assessed on a progressively increasing frequency throughout the lifetime of the structure.

3. Scheduled maintenance renovations are assumed to occur throughout the lifetime of the structure for short lifetime items.

4. Maintenance costs include school district administration, travel and onsite labor. No differentiation is made as to whether the work would be accomplished by the contractor or school district personnel.

It is assumed that differences in cost of maintenance between architectural and electrical systems alternatives will be minimal. For this reason, maintenance costs for envelope and architectural systems are assumed zero in the analysis. Further, only energy systems components were included in the analysis. Maintenance costs for the building are presented below.

ANNUAL PREVENTATIVE MAINTENANCE COSTS

ME 1 (Simple System)	$0.133/Bldg.Sq.Ft.-Yr.
ME 2 (Complex System)	$0.158/Bldg.Sq.Ft.-Yr.

Mid term renovations are assumed to occur at years 10 and 20. These costs are based on the 30 year repair/renovation analysis. All costs have been grouped at years 10 and 20 using engineering economy equations, to conform to the LCC model.

	Year 10	Year 20
ME 1 (Simple System)	$ 4.6.3	$ 9.91
ME 2 (Complex System)	$ 2.23	$ 4.46

4.7 STATEWIDE CLIMATE AND COST REGIONS

Total life cycle costs of a typical building are sensitive to climate and cost conditions throughout the state. In recognition of this, the State of Alaska was divided into seven separate climate regions and sixteen separate cost regions. Climate regions within the state were chosen by an analysis of available long term weather information and review of existing climate literature (References 18 and 19). The seven regions are listed in Table 11, and shown in Figure 8.

TABLE 11

STATEWIDE COST INDEX

Cost Region Number	Cost Region Name	Climate Region Number	Climate Region Name	Construction Cost Index	Energy Cost Index	
					Heating *Fuel Oil	**Electricity
1	Anchorage Zone			1.22	1.04	2.11
2	Village	1	South Central	1.32	1.04	4.05
3	Kodiak Island		(Homer)	1.34	1.04	3.48
4	Juneau Zone			1.13	1.03	2.55
5	Main Center	2	South Eastern	1.29	1.00	1.84
6	Village		(Juneau)	1.81	1.06	2.73
7	Sitka			1.34	1.04	1.57
8	Fairbanks Zone	3	Southern Interior	1.30	1.00	2.43
9	Village		(Fairbanks)	2.13	1.36	5.75
10	Village	4	Aleutian (Adak)	2.25	1.08	3.36
11	Bethel			1.50	1.09	4.00
12	Large Village	5	Western	1.53	1.16	4.64
13	Coastal Village		(Nome)	2.44	1.40	9.09
14	Village	6	Northern Interior (Bettles)	2.67	2.86	9.09
15	Barrow	7	Arctic Slope	1.92	0.228	3.07
16	Coastal Village		(Barrow)	2.94	1.09	5.68

BASIS FOR INDICES:

* Base Heating Fuel Oil Cost $0.957/Gal ($6.91/Million BTU's)
** Base Electricity Cost $0.044/KWH ($12.89/Million BTU's)

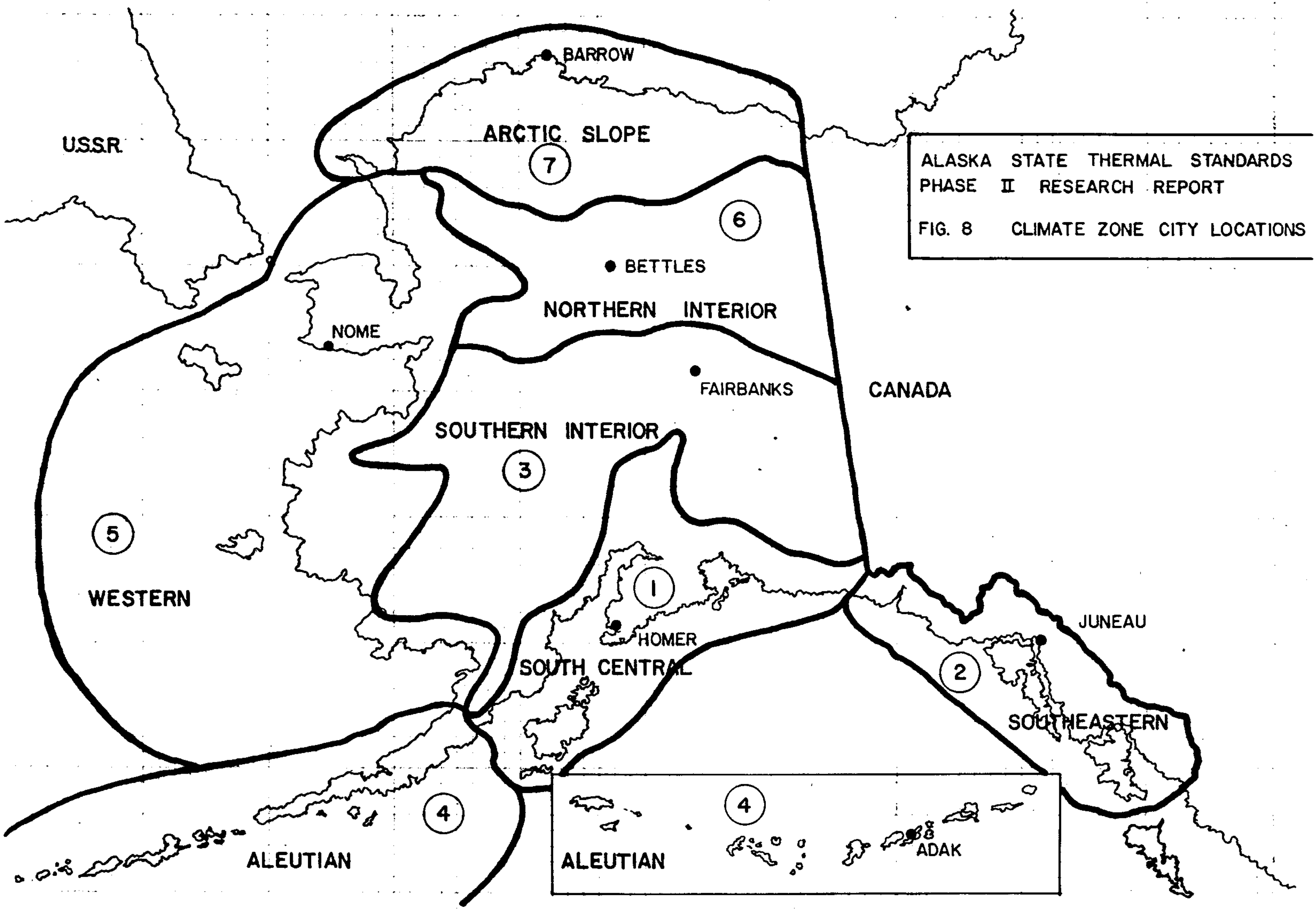


FIG.8 CLIMATE ZONE CITY LOCATIONS

Climate conditions for each region are modeled using city data included in the thermal analysis program data files (Table 12a and 12b). (This program is discussed in Section 4.8.) These data include the following:

1.	Site Latitude	Degrees
2.	Design Temperatures	Degrees C
3.	Mean Monthly Temperatures	Degrees C
4.	Mean Monthly Heating Degree Days	Degree C - Days
5.	Mean Monthly Solar Gain on a Horizontal Surface	Kilo-Joules/Sq.m.
6.	Yearly Totals for Items 3, 4 and 5.	

Sources of data are varied. Design temperatures are ASHRAE 97 1/2% values (Reference 20); mean monthly temperatures are generally 30 year records (Reference 18); while monthly solar data is from the Solmet Report (Reference 21).

Cost regions within the state were chosen by an evaluation of available cost analyses by in-state cost consultants (Reference 15). A total of sixteen different regions are identified to categorize rural Alaska; these regions are identified in Table 11. Within each of the regions, first costs of construction, as well as costs of fuel oil and electricity are assessed. These data are expressed as indices (Table 11) with base values for the City of Anchorage. Boundaries of climate regions were made to be coincident with cost region boundaries. Thus each cost region is wholly

TABLE 12a

CLIMATE DATA INPUT

	JAN	FEB	MAR	APR	MAY	JUNE	JULY
HOMER							
LT DT	59.63	-20.6	0.0	0.0	0.0	0.0	0.0
M TEMP	-6.00	-4.0	-2.0	2.0	6.0	9.0	11.0
DD	751.00	624.0	644.0	500.0	391.0	272.0	219.0
SOLAR	1,380.00	3,789.0	8,617.0	14,167.0	17,961.0	19,867.0	18,136.0
JUNEAU							
LT DT	58.37	-20.0	0.0	0.0	0.0	0.0	0.0
M TEMP	-5.00	-2.0	0.0	4.0	8.0	12.0	13.0
DD	715.00	576.0	570.0	435.0	313.0	197.0	160.0
SOLAR	1,320.00	3,205.0	6,923.0	11,870.0	14,655.0	16,052.0	14,508.0
FAIRBANKS							
LT DT	64.82	-46.1	0.0	0.0	0.0	0.0	0.0
M TEMP	-24.00	-19.0	-12.0	-2.0	8.0	15.0	16.0
DD	1,324.00	1,050.0	956.0	602.0	305.0	117.0	82.0
SOLAR	342.00	2,513.0	7,651.0	13,549.0	18,199.0	19,882.0	17,506.0
ADAK							
LT DT	51.53	-6.7	0.0	0.0	0.0	0.0	0.0
M TEMP	0.30	1.3	1.2	3.4	6.3	9.3	10.0
DD	555.60	474.4	545.6	444.4	372.0	267.8	255.0
SOLAR	645.80	553.3	616.6	444.4	0.0	353.3	344.4
NOME							
LT DT	64.50	-35.0	0.0	0.0	0.0	0.0	0.0
M TEMP	-14.00	-15.0	-14.0	-7.0	2.0	8.0	10.0
DD	1,016.00	930.0	992.0	768.0	520.0	325.0	257.0
SOLAR	338.00	2,541.0	7,163.0	13,456.0	17,852.0	19,898.0	16,049.0
BETTLES							
LT DT	66.91	-46.1	0.0	0.0	0.0	0.0	0.0
M TEMP	-25.00	-22.0	-17.0	-6.0	5.0	13.0	14.0
DD	1,347.00	1,132.0	1,094.0	742.0	401.0	150.0	128.0
SOLAR	114.00	1,955.0	6,986.0	13,940.0	19,278.0	21,077.0	17,734.0
BARROW							
LT DT	71.30	-42.8	0.0	0.0	0.0	0.0	0.0
M TEMP	-26.00	-28.0	-26.0	-18.0	-7.0	1.0	4.0
DD	1,373.00	1,301.0	1,381.0	1,098.0	791.0	533.0	453.0
SOLAR	0.00	837.0	5,567.0	11,919.0	12,938.0	17,336.0	16,559.0

TABLE 12b

CLIMATE DATA INPUT

	AUG	SEP	OCT	NOV	DEC	TOTALS	MEANS
HOMER							
LT DT	0.0	0.0	0.0	0.0	0.0	48.1	4.0
M TEMP	11.0	8.0	3.0	-2.0	-6.0	30.0	2.5
DD	217.0	300.0	476.0	613.0	751.0	5,758.0	479.8
SOLAR	13,491.0	8,982.0	4,961.0	1,990.0	726.0	114,067.0	9,505.6
JUNEAU							
LT DT	0.0	0.0	0.0	0.0	0.0	47.5	4.0
M TEMP	12.0	10.0	5.0	0.0	-3.0	54.0	4.5
DD	184.0	263.0	399.0	542.0	649.0	5,003.0	416.9
SOLAR	11,173.0	7,250.0	3,636.0	1,687.0	702.0	92,981.0	7,748.4
FAIRBANKS							
LT DT	0.0	0.0	0.0	0.0	0.0	27.9	2.3
M TEMP	13.0	7.0	-4.0	-16.0	-24.0	-42.0	-3.5
DD	169.0	343.0	686.0	1,037.0	1,298.0	7,969.0	664.
SOLAR	12,688.0	8,051.0	3,321.0	841.0	28.0	104,571.0	8,714.3
ADAK							
LT DT	0.0	0.0	0.0	0.0	0.0	53.9	4.5
M TEMP	9.9	9.7	6.0	2.7	1.7	61.8	5.2
DD	261.8	254.4	378.3	466.7	513.3	4,789.3	399.
SOLAR	0.0	341.7	468.4	553.3	602.8	4,924.0	410.
NOME							
LT DT	0.0	0.0	0.0	0.0	0.0	38.6	3.2
M TEMP	10.0	6.0	-2.0	-9.0	-15.0	-40.0	-3.
DD	272.0	382.0	629.0	823.0	1,044.0	7,888.0	657.
SOLAR	11,269.0	7,641.0	3,471.0	736.0	33.0	100,447.0	8,370.6
BETTLES							
LT DT	0.0	0.0	0.0	0.0	0.0	29.9	2.5
M TEMP	11.0	4.0	-7.0	-19.0	-25.0	-74.0	-6.2
DD	226.0	417.0	775.0	1,107.0	1,329.0	8.848.0	737.
SOLAR	12,201.0	7,629.0	2,861.0	457.0	0.0	104,232.0	8,686.0
BARROW							
LT DT	0.0	0.0	0.0	0.0	0.0	37.6	3.
M TEMP	3.0	-1.0	-9.0	-18.0	-25.0	-150.0	-12.5
DD	472.0	578.0	856.0	1,092.0	1,331.0	11,259.0	938.
SOLAR	9,712.0	4,702.0	1,426.0	41.0	0.0	81,037.0	6,753.

within a climate region, to simplify analysis logic. The basis of development of these cost regions is included in the report supplement.

4.8 THERMAL MODELING TECHNIQUES

The life cycle cost study uses a thermal model that evaluates the amounts of heating and electrical energy that will be consumed annually within the building. This model uses heating degree day indices for each of seven city locations in Alaska (Table 12a and 12b). This city data is used to create the seven climate regions of Alaska, used in the study (Figure 8). The thermal model uses a modified heating degree day calculation method, assessing internal energy gains from lights, motors, people, and from passive solar effects.

The thermal model is a composite of the F-Load energy model (Reference 22) and the Phase I Thermal Standard "Main-Dev" Energy Model (Reference 23). The data input format from Main-Dev, which allows flexibility in ventilation scheduling has been combined with the more accurate F-Load modified degree day calculation alogorithm as described in Section 4.8.3. This yields a comprehensive thermal modeling technique that addresses marginal heating period transient effects and accounts for passive solar gains.

4.8.1 Fuel Inputs

Two energy types are assumed to be supplied to the building. Number 2 fuel oil, with a heating value of 139,000 BTU/gallon, is the prime heating energy. Electrical energy for lighting and heating/ventilating system power is the second energy type. The calculation procedures used are presented in Figure 9, and the energy flows the model considers within the building are presented in Figure 10.

Conversion losses in heat generation equipment are included in the analysis, so that heating requirements computed are total amounts of energy that must be delivered to the building. Electrical energies required are also "site boundary" energy quantities that are fed to the main building service for internal consumption. However, the electrical energy budget does not include energies required for process loads such as coffee pots, film projectors, headbolt heaters, or exterior lighting.

4.8.2 Domestic Hot Water Heating Energy

Amounts of energy for domestic hot water are based on a daily level of consumption using an average occupancy and a 100 degree F temperature rise. No credits for interior building heat gain are allowed for losses from the hot water system.

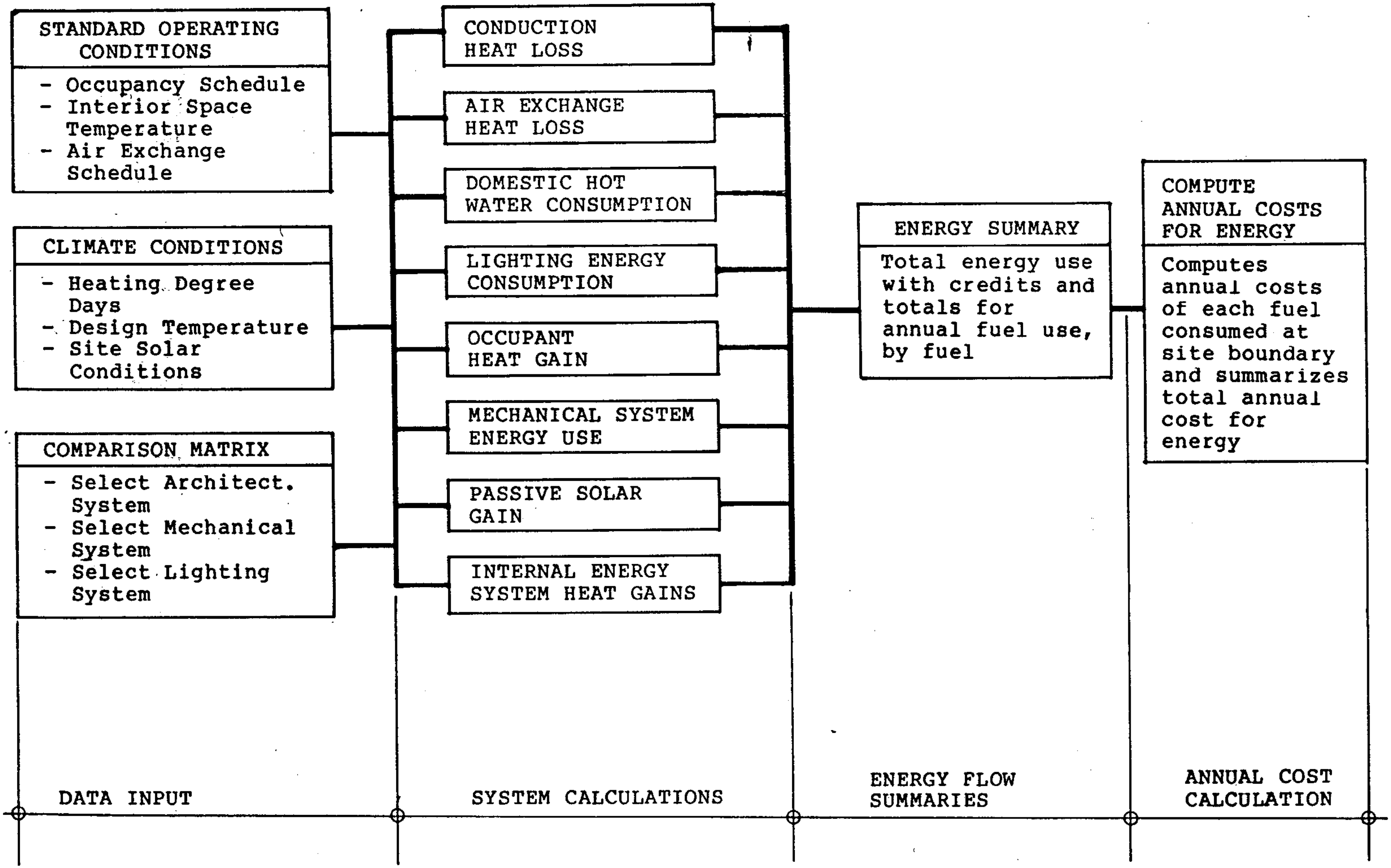


FIG. 9 THERMAL MODEL FLOW CHART

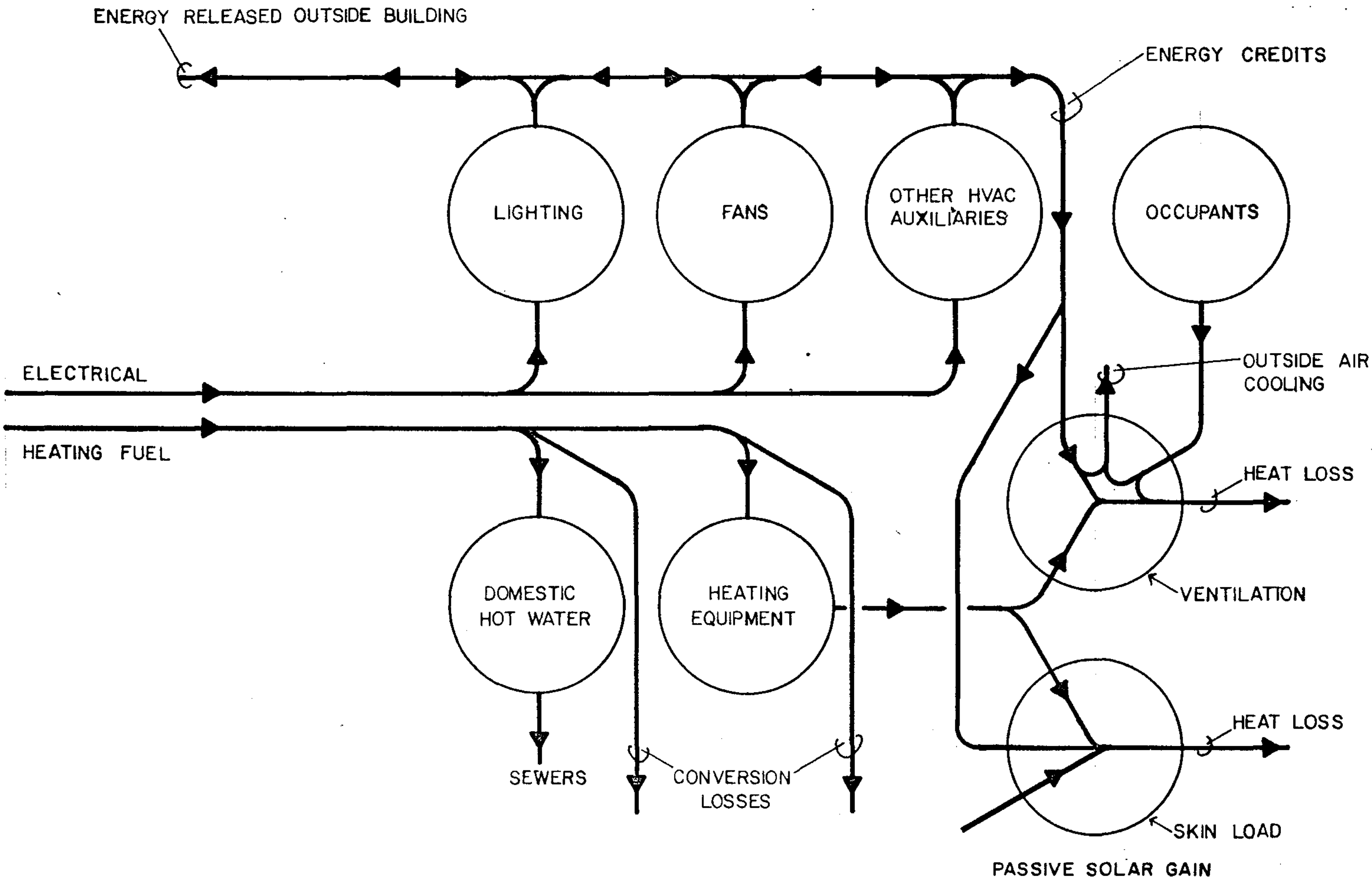


FIG. 10
BUILDING THERMAL MODEL
ENERGY FLOW SCHEMATIC

4.8.3 Internal and Passive Solar Heat Gain

The thermal model assesses internal and passive solar heat gains, and uses these gains to offset thermal envelope and ventilation heat loads. The model, using an analysis that incorporates building heat storage capabilities (Reference 22) and allowable daily swings in interior room temperature, also calculates the amounts of the heat gains that are not useable, that is, the gains (internal and passive) that must be vented from the building to prevent overheating. These excesses are not used to offset heating loads.

Established relations are used for determining amounts of passive solar gain that pass through window areas into interior spaces. The analysis takes into account the following:

* Wall orientation
* Window glazings
* Window overhangs

Primary calculation parameters include monthly average incident solar radiation, transmittance-ABSORBENCE product of the direct gain windows and window area.

The direct gain energy may be used either to offset the instantaneous heating load or is stored in the structure and used to offset loads during periods in which solar is not available. During periods of high incident solar radiation, all of the input energy may not be able to be stored, and this excess energy must be dumped to the environment through ventilation of the interior space. The amount of energy that must be vented is a function of the incident energy, the load, and a storage-ventilation ratio. This latter parameter is a function of the capacitance of the structure and the allowable daily temperature swing for the interior space.

The building storage capacity for this analysis is assumed to be light, corresponding to conventional frame-type residential construction, where the capacitance corresponds to 6 BTU/F-Sq.Ft.

Balance temperatures for day and night periods for each month of the year are calculated for the building being studied, that is, outside air temperatures at which internal heat gains are equal to heat loss through the thermal envelope. These balance temperatures are then used to calculate separate modified monthly heating degree day indices for daytime and nighttime periods. Monthly heating requirements are next calculated by combining these new indices with the building's overall UA factor, a composite factor incorporating all building exterior wall thermal conductances and areas, with units of BTU/degrees F-hr. Assumed air change rates are also included as a part of this overall UA factor.

4.8.4 Building Ventilation Scheduling

The schedule of ventilation assumed for each of the two mechanical system alternatives is incorporated in the model by weight averaging CFM levels for the full year, and converting this CFM to an equivalent annual air change rate.

The option of exhaust air heat recovery is included by reducing the appropriate CFM levels by schedule interval prior to weight averaging. The heat recovery option is installed only on 800 CFM of the toilet/locker exhaust, which runs during day schedule intervals, and thus is reflected in a partial reduction of ventilation heating load. An effectiveness of 60% is assumed in transferring heat from exhaust air to supply air.

4.8.5 Model Output

The output from the thermal model is annual consumption of heating oil and electrical energy. Both energy quantities are in terms of BTU/Year. Annual energy consumptions of all design cases considered are presented in Appendix A.

4.8.6 Model Validation

The model has been validated with fuel records from several small institutional sized buildings with interior mechanical systems that match the complexity of the prototype building used in this study, with generally good correlation. Further, the energy model used in this study was compared with the steady state simplified energy model used in the Phase I portion of the Thermal Standards project. Again, generally good correlation was observed.

The thermal model gives verified identical results to the F-Load version 3.2 copywritten passive solar analysis program (Reference 22), with the following exception. Under certain high latitude design cases for the month of December, passive solar heat gains calculated by the program's algorithms was observed to be less than zero. Here, the algorithm was modified to set all such negative gains to zero.

4.9 METHODS OF ECONOMIC ANALYSIS

All costs associated with the ownership of the rural school, are modeled in the analysis and expressed in a bottom line cost parameter termed "uniform annual cost of operation". This parameter is a derived number that represents all ownership costs spread equally throughout the building lifetime in a single annual dollar "payment", or uniform annual amount. The various calculation procedures used for the study account for the time value of money. The equations used are standard textbook equations in common use with feasibility analyses (References 24 and 25). A building lifetime of 30 years is assumed throughout the analysis. This parameter selection is highly subjective, and can be expected to be highly variable with location and circumstance. Lifetimes of 50 to 70 years are certainly possible, however, the 30 year value has been selected as a conservative middle ground value.

A cost of money of 10.5% annual compounded rate is selected for this study, based on conversations with State of Alaska life cycle cost personnel (Reference 26). This amount relates to the bonding cost the State of Alaska faces, should it choose to obtain construction monies via a bond sale approach.

To facilitate an equitable comparison of the 256 design alternatives created in the comparison matrix for each LCC run, all costs were computed in the same manner throughout the analysis. Life cycle cost methodology parallels that in use in the government sector (References 27 and 28).

It should be noted that, even though the state does not need to sell bonds for financing a given capital project, what is known as an opportunity investment rate does still exist. This rate of investment interest for the state is the rate of return the state could receive on its wealth should it choose to conservatively invest in bonds, instead of building buildings. Here the opportunity rate is taken as 10.5%, a conservative value.

4.9.1 Analysis of First Costs and Renovation Costs

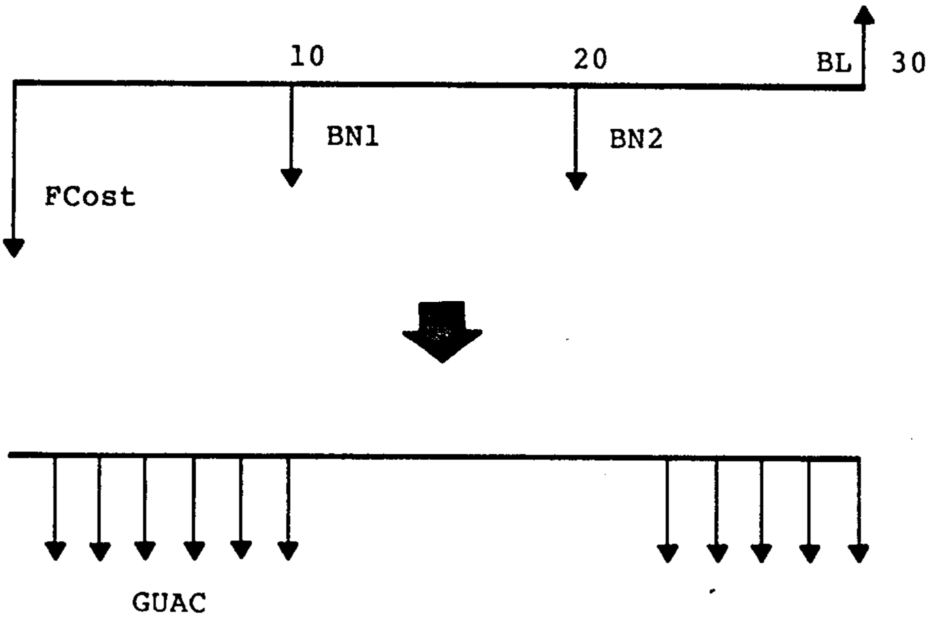
The first cost of construction, a single dollar value of cost burden assumed to accrue in the first year, is converted to a uniform annual cost. This work is accomplished for each of the three building energy systems. Similarly, renovation costs assumed to occur at years 10 and 20 and an end-of-lifetime salvage value are converted to uniform annual costs. As presented in Figure 11, these costs are summed and represent the capital expenditure portion of the life cycle cost analysis.

Note that for this phase of the study, the end of life salvage values are set to zero, since inadequate data were available during the analysis phase.

4.9.2 Analysis of Maintenance and Operations Costs

An assessment of maintenance and operations costs for the prototype building is made using yearly costs of maintenance for each of the three energy systems. These costs are assumed to accrue at a set annual amount for the first five years, and then at a compounded escalating rate thereafter. Figure 12 presents the calculation procedure used in the analysis. As presented in Figure 12, all lifetime costs are expressed as a uniform annual dollar amount.

CALCULATION PROCEDURE - CAPITAL OUTLAYS



Model Equation:

$$\mathrm{GUAC} = \mathrm{PVC} \left[\frac{\mathrm{BIE}/100\ (1+\mathrm{BIE}/100)\ \mathrm{EE}30}{(1 + \mathrm{BIE}/100)\ \mathrm{EE}30 - 1} \right]$$

WHERE

$$\mathrm{BIER} = \frac{1 + \mathrm{BIE}/100}{1 + \mathrm{EM}/100} - 1$$

$$\mathrm{PVC} = \mathrm{RENV}\ 1 + \mathrm{RENV}\ 2 + \mathrm{FCOST}$$

$$\mathrm{RENV}\ 1 = \frac{\mathrm{BN1}}{(1 + \mathrm{BIER})\ \mathrm{EE}10}$$

$$\mathrm{RENV}\ 2 = \frac{\mathrm{BN2}}{(1 + \mathrm{BIER})\ \mathrm{EE}20}$$

BN1 = Cost of Renovation 1 @ Year 10, $/SF

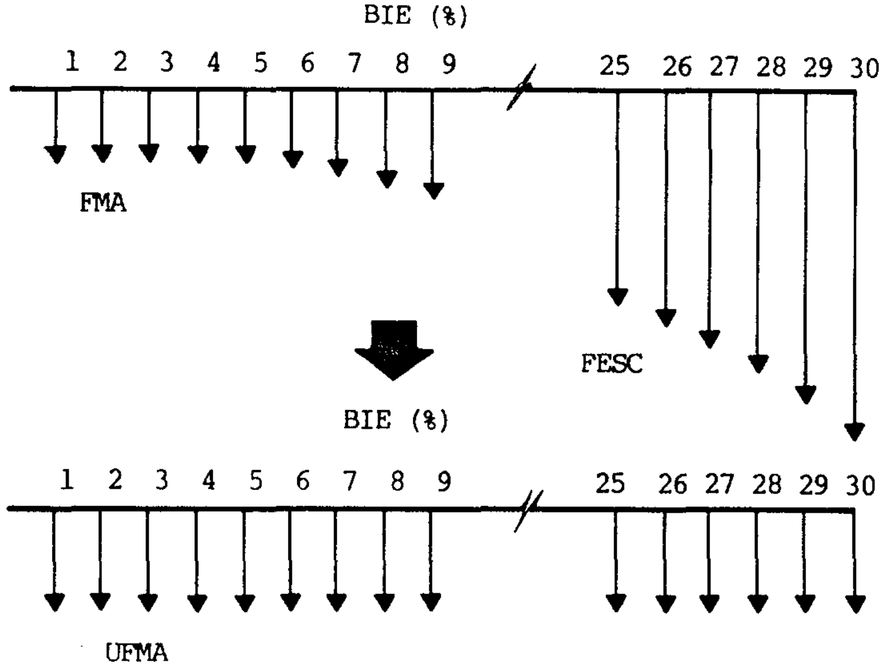
BN2 = Cost of Renovation 2 @ Year 20, $/SF

GUAC = Equivalent Uniform Annual Cost of Capitalization, $/SF-YR

FIG.11

CALCULATION PROCEDURE - MAINTENANCE

AND OPERATION COSTS



Model Equation:

$$\text{UFMA} = \left[\frac{(\text{BIE}/100)(1+\text{BIE}/100)\ \text{EE30}}{(1+(\text{BIE}/100))\ \text{EE30} - 1}\right](\text{FMA})\left[\frac{(1+\text{BIER})\ \text{EE5})-1}{(\text{BIER})(1+\text{BIER})\text{EE5}} + \frac{\text{FMA(PST)}}{(1+\text{BIER})\text{EE5}}\right]$$

WHERE PST = $\dfrac{(1+\text{DSE})\ \text{EE25} - 1}{\text{DSE}(1+\text{DSE})\ \text{EE25}}$

DSE = $\dfrac{1+\text{BIER}}{1+(\text{FESC}/100)} - 1$

UFMA = Equivalent Uniform Annual M & O costs

FMA = First Year M & O Cost ($/YR)

BIE = State of Alaska Minimum Acceptable Rate of Return (%)

FESC = Expected Annual Age Related Maintenance Escalation Rate (set to zero for the purposes of this study)

BIER = State of Alaska Real Acceptable Rate of Return (%)

= $\dfrac{(1+\text{BIE}/100)}{1+(\text{EM}/100)} - 1$

EM = Annual Escalation Rate for Unit Labor and Materials costs (%) = 8

FIG. 12

4.9.3 Analysis of Annual Energy Consumption

Energy expenses associated with the prototype building are treated as follows. Annual energy consumption for each of two fuels calculated by the thermal model are combined with fuel costs by region, using fuel cost indices discussed in Section 2, to arrive at present year fuel costs in dollars per year.

The values for each fuel are then assumed to escalate at a compounded yearly escalation rate to the building's end-of-lifetime. As presented in Figure 13, these assumed life costs are reduced to a single uniform annual amount that expresses life cycle cost.

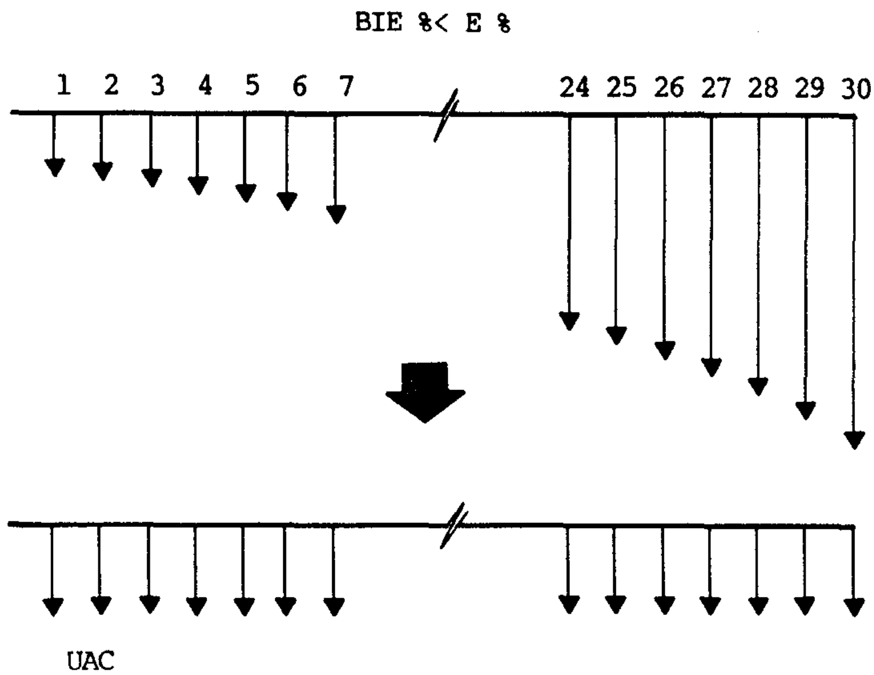
4.10 LCC COMPUTER MODEL "T-LOAD"

4.10.1 Program Description

Each of the twelve individual computer LCC simulation runs was accomplished using an in-house developed program, written in Fortran IV, and run on the University of Alaska's Honeywell Computer.

This program, named T-Load, consists of an annual energy analysis, and an engineering economy analysis to calculate costs associated with operation and maintenance of the building. The thermal model assumes that each prototype building is heated with fuel oil, and powered by electrical

CALCULATION PROCEDURE - ENERGY COSTS



Model Equation:

UAC = (P)(EA)(APT)

WHERE $P = \frac{(1 + DIA)\ EE30 - 1}{DIA(1 + DIA)\ EE30}$ $\qquad DIA = \frac{1 + BIE/100}{1 + E/100} - 1$

$EA = \frac{(BIE/100)(1 + BIE/100)\ EE30}{(1 + BIE/100)\ EE30 - 1}$

APT = (T FUEL)(AP)(ECIDX)

UAC = Uniform Annual Cost of Fuel ($/SF-YR)

BIE = State of Alaska Minimum Rate of Return (%)

E = Compounded Annual Fuel Escalation Rate (%) = 10

T FUEL = Annual Present Year Consumption of Fuel (BTU/YR)

AP = Baseline Cost of Fuel in Anchorage ($/10 EE6 BTU)

ECIDX = Fuel Cost Index For Cost Region (No Units)

FIG. 13

energy obtained from a local utility. Total life cycle costs of each building case are expressed in terms of a uniform annual cost in present value dollars, with units of dollars per square foot per year. Figure 14 gives a simplified flow chart for the program. A program listing is not included due to its bulk but is available on request from the authors.

The life cycle cost program models costs associated with the building as three components. These components are defined in discussion of the analysis method and presented in Figure 14. Costs are expressed in terms of uniform annual amounts (dollars) for each component of life cycle cost. Equations which are required to convert the various costs that occur throughout a building's lifetime to uniform annual amounts are included in Section 4.8.

4.10.2 Data Set Organization

A large amount of data are required to model the prototype building, in the widely varying climate and cost situations evaluated. Data are organized into an internal "block data" set that is included in the T-Load program. Other large volume data are organized into separate data files, listed below:

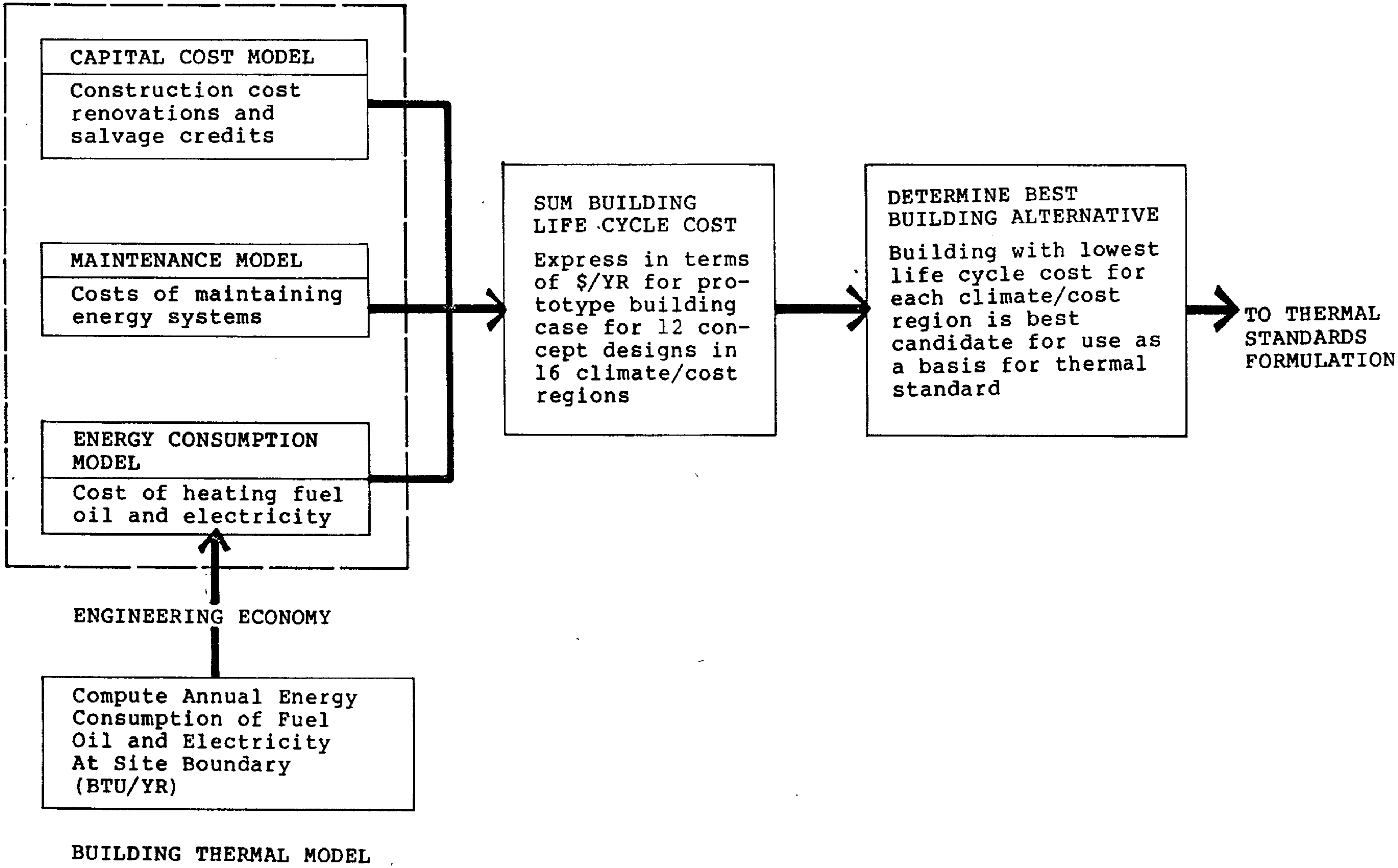


FIG 14 LCC EVALUATION FLOW CHART

TITLE	DESCRIPTION
AIRCHG	Defines computed air change rates by climate region
ARCH	Defines thermal envelope component R-values, by climate region.
CLIMATE	Provides climate data for the seven city locations.
CIDX	Defines cost and energy indices
FCOST	Defines first costs of construction for each of architectural, mechanical, and electrical systems.
FMA	Defines long term maintenance and operations costs, including periodic renovation costs and salvage value.

4.10.3 BUILDING CASES CONSIDERED

A large number of thermal envelope and energy system design options were modeled. Each building case considered is of the same architectural geometry, but with differing thermal envelope systems, as defined in Section 4.1 through 4.3.

Three separate wall systems were modeled: standard stud; exterior foam; and double stud cases. Two separate foundations systems were considered: heated crawl space and elevated construction. Three separate mechanical systems were analysed.

These "design variations" required that the LCC program be run a total of 12 times. Table 13 presents the record of runs performed. Note that for each run, a total of 256 building designs were evaluated (16 envelope options in 16 cost regions). Thus, this analysis actually dealt with a total of 3,072 separate designs. Figure 15 presents the individual design options analysed in the simulation.

4.10.4 PROGRAM OUTPUT

The output from the program for each building case considered is expressed in units defined below, and is presented in the Appendix A for all 12 building cases considered.

Annual Heating Fuel Use	Million BTU/YR
Annual Electrical Use	Million BTU/YR
Annual Energy Cost	Dollars/SQ.FT.-YR
Annual Cost of Capitalization	Dollars/SQ.FT.-YR
Annual Cost of Maintenance	Dollars/SQ.FT.-YR
Total Building Life Cycle Cost	Dollars/SQ.FT.-YR

TABLE 13

COMPUTER RUN SCHEDULE

COMPUTER RUN NO.	IDENTIFIER CODE	MECHANICAL SYSTEM	FOUNDATION SYSTEM	WALL SYSTEM
1	NES	NO HEAT RECOVERY	ELEVATED FLOOR	SINGLE STUD
2	NEE	NO HEAT RECOVERY	ELEVATED FLOOR	EXTERIOR FOAM
3	NED	NO HEAT RECOVERY	ELEVATED FLOOR	DOUBLE STUD
4	NHS	NO HEAT RECOVERY	HEATED CRAWLSPACE	SINGLE STUD
5	NHE	NO HEAT RECOVERY	HEATED CRAWLSPACE	EXTERIOR FOAM
6	NHD	NO HEAT RECOVERY	HEATED CRAWLSPACE	DOUBLE STUD
7	HES	HEAT RECOVERY	ELEVATED FLOOR	SINGLE STUD
8	HEE	HEAT RECOVERY	ELEVATED FLOOR	EXTERIOR FOAM
9	HED	HEAT RECOVERY	ELEVATED FLOOR	DOUBLE STUD
10	HHS	HEAT RECOVERY	HEATED CRAWLSPACE	SINGLE STUD
11	HHE	HEAT RECOVERY	HEATED CRAWLSPACE	EXTERIOR FOAM
12	HHD	HEAT RECOVERY	HEATED CRAWLSPACE	DOUBLE STUD

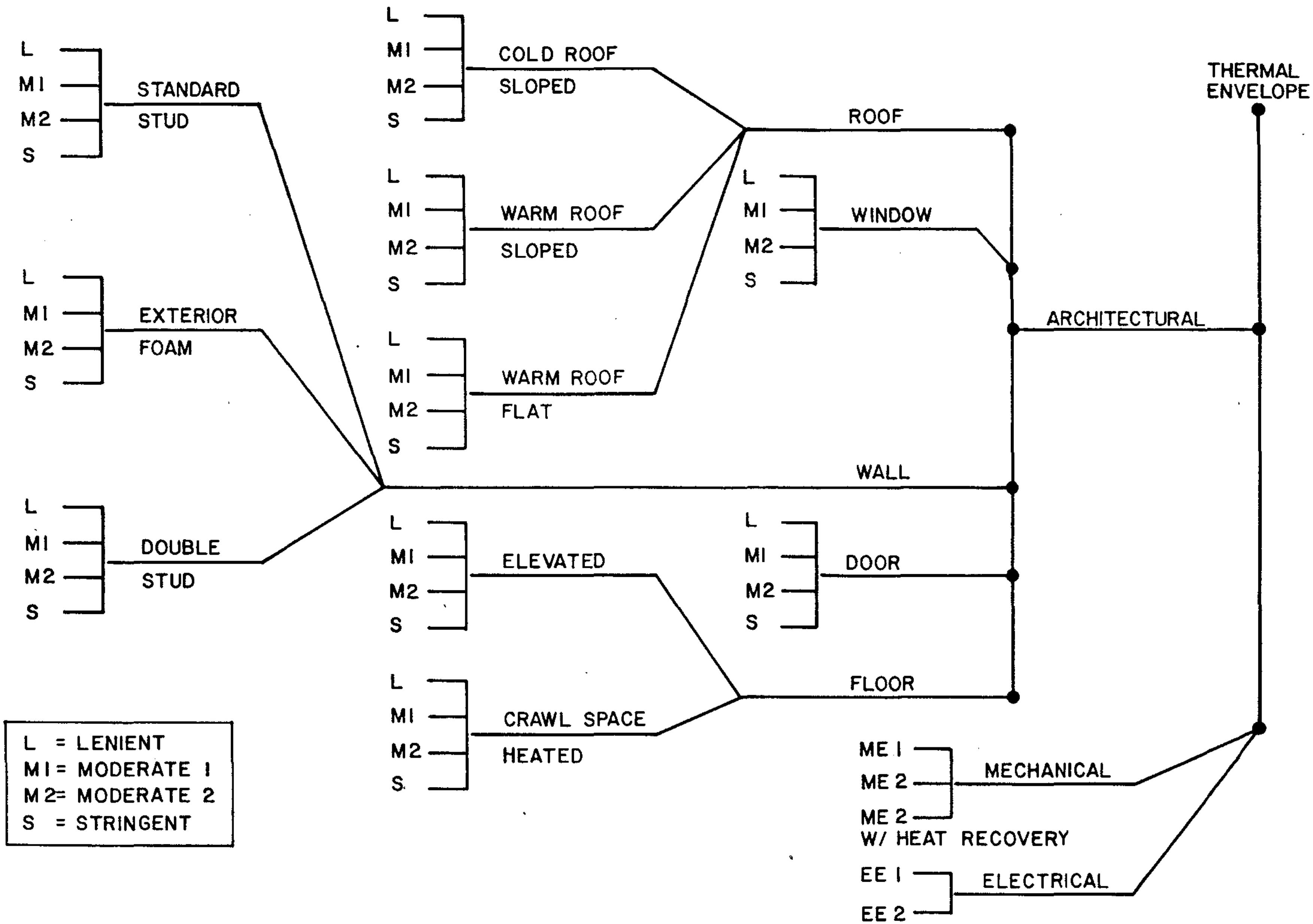


FIG. 15 LOGIC DIAGRAM
LIFE CYCLE COST ANALYSIS

5.0 ANALYSIS

5.1 DESCRIPTION OF LIFE CYCLE COST MODEL RESULTS:

Given the fact that 192 different buildings at 16 locations (3,072 cases) were evaluated, a tremendous amount of data is available for analysis. A selected amount of computer output and data reduction documentation is included in the report Appendix. These data are described below.

Appendix A: T-load computer program output matrices. This is the raw output from the computer, and consists of five separate matrices.

Appendix B: Total building life cycle cost minimum plots. Sixteen separate plots are provided for the least life cycle cost option for each cost region.

Analysis of Appendix A computer output was accomplished as follows:

Each of the 12 computer runs were analysed separately, to determine least life cycle cost design levels. For example, in the case of the standard stud option, with heat recovery, in an elevated foundation type (code HES), in cost region 11 (Bethel), a Moderate 1 thermal envelope, using complex ME2 and EE2 mechanical and electrical systems is the best solution.

Moderate 1 is an 8" wall thickness (Tables 4, 5 and 6) using R22 fiberglas insulation, with a cost per square foot of $7.92, in Anchorage. (Table 11 lists a 1.5 construction cost index which must be used to arrive at the Bethel price of $11.88.)

This analysis yields Tables 14a and 14b, which are a compilation of optimum design levels (least life cycle cost) for each of the 12 computer runs. Codes at the top of each table define each concept analysed (see Table 13). For example, the **NHS** code means a prototype building with no heat recovery, heated crawl space foundation, and a standard stud wall option. Tables 14a and 14b optimum levels are based on an analysis of life cycle annual costs in terms of dollars per useable building square foot. The life cycle cost numbers thus take into account wall thicknesses, and the consequent reduction in useable floor area that results when thicker wall sections are used.

The table allows the reader to view each of the twelve design concepts and to see the design level that yields the least life cycle cost in each of the 16 cost regions. Note that the codes used in the body of the table are defined at the bottom of the page.

The codes that are represented in bold print are design concepts that are least life cycle cost. Two "best" design options are normally selected for each cost region, one for

TABLE 14a

OPTIMUM LEVEL OF CONSTRUCTION - ELEVATED FLOOR

	-------NO HEAT RECOVERY-------			+++++++HEAT RECOVERY+++++		
	NES	NEE	NED	HES	HEE	HED
			*** SOUTH CENTRAL ***			
1	MOD1MECH1	**MOD1MECH1**	MOD1MECH1	MOD1MECH1	MOD1MECH1	MOD1MECH1
2	MOD1MECH2	MOD1MECH2	MOD1MECH2	MOD1MECH2	**MOD1MECH2**	MOD1MECH2
3	MOD1MECH1	MOD1MECH1	MOD1MECH1	MOD1MECH2	**MOD1MECH2**	MOD1MECH2
			*** SOUTH EASTERN ***			
4	MOD1MECH1	**MOD2MECH1**	MOD1MECH1	MOD1MECH1	MOD2MECH1	MOD1MECH1
5	MOD1MECH1	**MOD2MECH1**	MOD1MECH1	MOD1MECH1	MOD2MECH1	MOD1MECH1
6	LEN MECH1	**MOD1MECH1**	LEN MECH1	LEN MECH1	MOD1MECH1	LEN MECH1
7	MOD1MECH1	**MOD2MECH1**	MOD1MECH1	MOD1MECH1	MOD2MECH1	MOD1MECH1
			*** SOUTHERN INTERIOR ***			
8	MOD2MECH1	MOD2MECH1	MOD2MECH1	MOD1MECH2	**MOD2MECH2**	MOD1MECH2
9	MOD1MECH2	MOD2MECH2	MOD1MECH2	MOD1MECH2	**MOD2MECH2**	MOD1MECH2
			*** ALEUTIAN ***			
10	LEN MECH1	LEN MECH1	LEN MECH1	**MOD1MECH1**	LEN MECH1	LEN MECH1
			*** WESTERN ***			
11	MOD2MECH2	MOD2MECH2	MOD1MECH2	MDI2MECH2	**MOD2MECH2**	MOD1MECH2
12	MOD2MECH2	MOD2MECH2	MDI2MECH2	MOD2MECH2	**MOD2MECH2**	MOD1MECH2
13	MOD1MECH2	MOD2MECH2	MOD1MECH2	**MOD1MECH2**	MOD2MECH2	MOD1MECH2
			*** NORTHERN INTERIOR ***			
14	MOD2MECH2	MOD2MECH2	MOD2MECH2	MOD2MECH2	**MOD2MECH2**	MOD2MECH2
			*** ARCTIC SLOPE ***			
15	**LEN MECH1**	LEN MECH1	LEN MECH1	LEN MECH1	LEN MECH1	LEN MECH1
16	MOD2MECH1	MOD2MECH1	MOD2MECH1	MOD1MECH2	**MOD2MECH2**	MOD1MECH2

CODE	ARCHITECTURAL CONSTRUCTION LEVEL
LEN	= LENIENT
LMD1	= LENIENT - MODERATE 1 (TWO EQUAL MINIMUMS)
MOD1	= MODERATE 1
MD12	= MODERATE 1 - MODERATE 2 (TWO EQUAL MINIMUMS)
MOD2	= MODERATE 2

NOTE: EE2 Electrical system was found to be the cheapest alternative for all design cases evaluated.

TABLE 14b

OPTIMUM LEVEL OF CONSTRUCTION - HEATED CRAWLSPACE

	-------NO HEAT RECOVERY-------			+++++++HEAT RECOVERY+++++		
	NHS	NHE	NHD	HHS	HHE	HHD
			*** SOUTH CENTRAL ***			
1	MOD1MECH1	**MOD1MECH1**	MOD1MECH1	MOD1MECH1	**MOD1MECH1**	MOD1MECH
2	MOD1MECH2	MOD1MECH2	MOD1MECH2	MOD1MECH2	**MOD1MECH2**	MOD1MECH
3	MOD1MECH1	MOD1MECH1	MOD1MECH1	MOD1MECH2	**MOD1MECH2**	MOD1MECH
			*** SOUTH EASTERN ***			
4	MOD1MECH1	**MOD2MECH1**	MOD1MECH1	MOD1MECH1	**MOD2MECH1**	MOD1MECH
5	MOD1MECH1	**MD12MECH1**	MOD1MECH1	MOD1MECH1	**MD12MECH1**	MOD1MECH
6	LEN MECH1	**MOD1MECH1**	MOD1MECH1	LEN MECH1	**MOD1MECH1**	MOD1MECH
7	MOD1MECH1	**MD12MECH1**	MOD1MECH1	MOD1MECH1	**MD12MECH1**	MOD1MECH
			*** SOUTHERN INTERIOR ***			
8	MOD2MECH1	MOD2MECH1	MD12MECH1	MOD1MECH2	**MOD2MECH2**	MOD1MECH
9	MOD1MECH2	MOD2MECH2	MOD1MECH2	MOD1MECH2	**MOD2MECH2**	MOD1MECH
			*** ALEUTIAN ***			
10	**LEN MECH1**	**LEN MECH1**	LEN MECH1	**LEN MECH1**	**LEN MECH1**	LEN MECH
			*** WESTERN ***			
11	MOD1MECH2	MOD2MECH2	MOD1MECH2	MOD1MECH2	**MOD2MECH2**	MOD1MECH
12	MOD2MECH2	MOD2MECH2	MOD1MECH2	MOD1MECH2	**MOD2MECH2**	MOD1MECH
13	MOD1MECH2	MOD2MECH2	MOD1MECH2	MOD1MECH2	**MOD2MECH2**	MOD1MECH
			*** NORTHERN INTERIOR ***			
14	MOD2MECH2	MOD2MECH2	MOD2MECH2	MOD2MECH2	**MOD2MECH2**	MOD2MECH
			*** ARCTIC SLOPE ***			
15	**LEN MECH1**	**LEN MECH1**	LEN MECH1	**LEN MECH1**	**LEN MECH1**	LEN MECH
16	MOD2MECH1	MOD2MECH1	MD12MECH1	MOD1MECH2	**MOD2MECH2**	MOD1MECH

CODE	ARCHITECTURAL CONSTRUCTION LEVEL	
LEN	= LENIENT	
LMD1	= LENIENT - MODERATE 1	(TWO EQUAL MINIMUMS)
MOD1	= MODERATE 1	
MD12	= MODERATE 1 - MODERATE 2	(TWO EQUAL MINIMUMS)
MOD2	= MODERATE 2	

NOTE: EE2 Electrical system was found to be the cheape
alternative for all design cases evaluated.

the crawl space option and one for the elevated foundation option. For example, for cost region 9, a southern interior village, the least life cycle concept is for crawl space option "HHE", and the least life cycle design level is Moderate 1 or Moderate 2 with a complex ME 2 mechanical system that includes use of heat recovery. (Reference Table 13 for description of codes.)

Table 15a, elevated foundation case, and Table 15b, crawl space foundation case, present the design option and level resulting in least life cycle cost for each cost region. For example, in cost region 11, the least cost option for elevated foundation consists of exterior foam wall construction with a Moderate 2 design level, and a complex mechanical and electrical system. The least life cycle cost is an annual amount of $16.73 per square foot.

The curves of life cycle cost are plotted for each cost region in Appendix B. Here the minimum cost curve for each region is plotted. Figure 16 shows a typical curve, plotted for cost region 1. Note that the curve is the least cost selection out of some 48 curves for that cost region.

5.2 ANALYSIS OF RESULTS

The results of the LCC analysis consist of a selection of "best" design options for each of the 16 cost regions in the State, together with a computed annual life cycle cost in

TABLE 15a

LEAST LIFE CYCLE COST CONSTRUCTION METHOD BY COST REGION

FOR ELEVATED FLOOR BASED ON ACTUAL USEABLE FLOOR AREA

COST REG.	NAME OF COST REGION	CLIMATE REGION	MECHANICAL SYSTEM		CONSTRUCTION TYPE	CONSTRUCTION LEVEL	LC COST ($/SQ.FT.-YR)
1	Anchorage Zone	South Central	M1	No Heat Recovery	Exterior Foam	Moderate 1	10.70
2	Village	South Central	M2	Heat Recovery	Exterior Foam	Moderate 1	13.29
3	Kodiak Island	South Central	M2	Heat Recovery	Exterior Foam	Moderate 1	12.88
4	Juneau Zone	South Eastern	M1	No Heat Recovery	Exterior Foam	Moderate 2	11.32
5	Main Center	South Eastern	M1	No Heat Recovery	Exterior Foam	Moderate 2	11.37
6	Village	South Eastern	M1	No Heat Recovery	Exterior Foam	Moderate 1	15.75
7	Sitka	South Eastern	M1	No Heat Recovery	Exterior Foam	Moderate 2	11.41
8	Fairbanks Zone	South.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	13.01
9	Village	South.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	22.69
10	Village	Aleutian	M1	Heat Recovery	Single Stud	Moderate 1	19.26
11	Bethel	Western	M2	Heat Recovery	Exterior Foam	Moderate 2	16.73
12	Large Village	Western	M2	Heat Recovery	Exterior Foam	Moderate 2	17.69
13	Coastal Village	Western	M2	Heat Recovery	Single Stud	Moderate 1	29.28
14	Village	North.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	32.05
15	Barrow	Arctic Slope	M1	No Heat Recovery	Single Stud	Lenient	16.48
16	Coastal Village	Arctic Slope	M2	Heat Recovery	Exterior Foam	Moderate 2	31.04

NOTE: EE2 Electrical System was found to be the cheapest alternative for all design cases.

TABLE 15b

LEAST LIFE CYCLE COST CONSTRUCTION METHOD BY COST REGION

FOR HEATED CRAWL SPACE BASED ON ACTUAL USEABLE FLOOR AREA

COST REG.	NAME OF COST REGION	CLIMATE REGION	MECHANICAL SYSTEM		CONSTRUCTION TYPE	CONSTRUCTION LEVEL	LC COST ($/SQ.FT.-YR)
1	Anchorage Zone	South Central	M1	Heat Recovery	Exterior Foam	Moderate 1	9.40
2	Village	South Central	M2	Heat Recovery	Exterior Foam	Moderate 1	11.89
3	Kodiak Island	South Central	M2	Heat Recovery	Exterior Foam	Moderate 1	11.46
4	Juneau Zone	South Eastern	M1	Heat Recovery	Exterior Foam	Moderate 2	10.14
5	Main Center	South Eastern	M1	Heat Recovery	Exterior Foam	Moderate 1-2	10.03
6	Village	South Eastern	M1	Heat Recovery	Exterior Foam	Moderate 1	13.88
7	Sitka	South Eastern	M1	Heat Recovery	Exterior Foam	Moderate 1-2	10.01
8	Fairbanks Zone	South.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	11.63
9	Village	South.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	20.44
10	Village	Aleutian	M1	Heat Recovery	Exterior Foam	Lenient	17.06
11	Bethel	Western	M2	Heat Recovery	Exterior Foam	Moderate 2	15.14
12	Large Village	Western	M2	Heat Recovery	Exterior Foam	Moderate 2	16.07
13	Coastal Village	Western	M2	Heat Recovery	Exterior Foam	Moderate 2	26.43
14	Village	North.Interior	M2	Heat Recovery	Exterior Foam	Moderate 2	29.13
15	Barrow	Arctic Slope	M1	Heat Recovery	Exterior Foam	Lenient	14.59
16	Coastal Village	Arctic Slope	M2	Heat Recovery	Exterior Foam	Moderate 2	27.98

NOTE: EE2 Electrical System was found to be the cheapest alternative for all design cases.

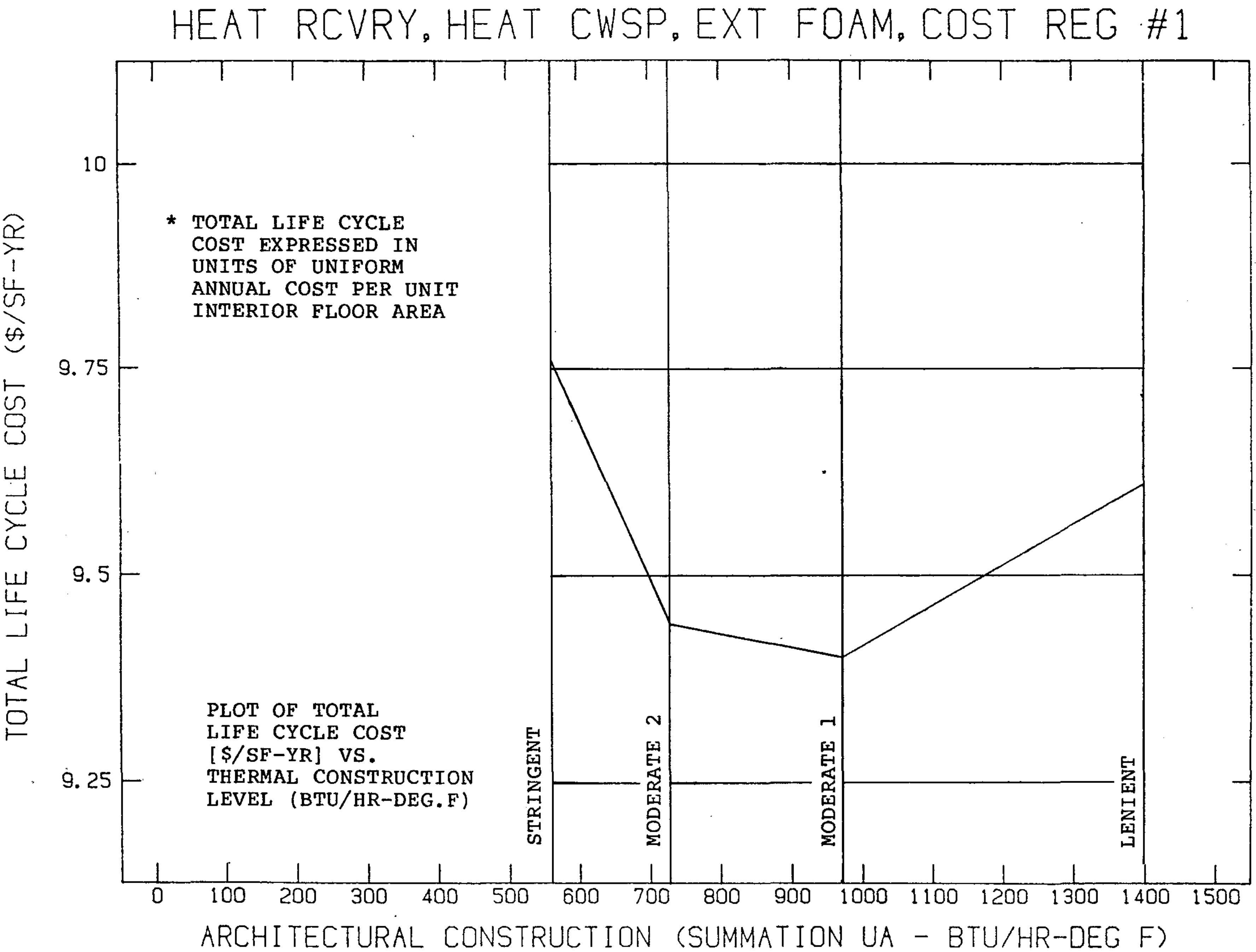


FIG. 16 — PLOT OF TOTAL LIFE CYCLE COST VS. THERMAL CONSTRUCTION LEVEL

dollars per building square foot. This cost is a uniform annual amount assumed to occur throughout the building's lifetime.

5.2.1 Design Concepts

In selecting best design options, the crawl space and elevated foundation alternatives are treated as independent variables, which must be selected based on site-by-site geotechnical conditions. The procedure used in analysis has therefore been to treat all elevated foundation options separately from crawl space options. In all cases, the crawl space option is the cheaper design option, but only because of the way that construction costing was accomplished.

5.2.2 Exterior Envelope

With the study results, the reader can select best wall design concept and option by climate region. The exterior foam construction option is seen to be the preferred LCC design option (Tables 15a and 15b) for all cost regions except cost region 10 (Aleutian Village), cost region 13 (Western Coastal Village), and cost region 15 (Barrow City). Each of these cost regions are either in moderate climates (10 and 13), where construction costs are much higher than energy costs, or have exceedingly inexpensive energy costs (15).

Design levels tend to focus on Moderate 1 and Moderate 2 levels, which represents a 2 x 6 insulated stud wall and 1" to 1-1/2" of rigid polyurethane/isocyanurate foam insulation (see Table 4), although the very temperate regions indicated that the standard stud 2 x 6 wall is preferred. Generally triple pane windows are the LCC choice, except in cost regions 10, 13 and 15, where double pane units are indicated.

5.2.3 Interior Energy Systems

As for mechanical systems, the LCC choice is evenly split between M1 (simple - furnace) and M2 (complex - boiler/airhandler) cases. The more energy efficient M2 system is indicated for colder climate areas, and appears to prevail even in the more remote site locations where maintenance costs are high.

The area surrounding Anchorage with considerably lower costs of electrical energy indicates a simple furnace system, while more outlying regions in South Central Alaska prefer the M2 complex system.

The complex EE2 electrical lighting systems that incorporate top-of-the-line, efficient fluorescent fixtures is the preferred electrical option throughout the study. Evaluation of the data indicates the total life cycle costs for all EE1 (simple systems) is considerably higher than EE2 options, indicating little sensitivity to variations of input variables for this analysis result.

5.3 SENSITIVITY ANALYSIS

In any analysis that incorporates a numerical model to simulate the real world, there must be concern for the accuracy of the simulation. Not only must input variables accurately represent the real world, but the simulation must also be reasonably stable. Occassionally, one input variable will very strongly influence the answers of a simulation, to the extent that a small change in the input variable will change the simulation results by a factor of ten. Here the simulation is said to be "highly sensitive" to that input variable. Such a detrimental condition can render a simulation useless.

A "sensitivity analysis" was accomplished for the life cycle cost model used in this study, to determine if any input variables had high "sensitivity" to simulator output. Each major variable value was changed by 10 percent, and the resulting total life cycle cost amount was compared to the base case amount to determine the percentage departure from base case.

These departures, expressed as a percentage, indicate how sensitive the LCC results are to small changes in the input variable. Therefore, those input variables with the highest departure are the most important (most sensitive) and must be dealt with very carefully in the analysis.

The departures for all variables analysed were in most cases less than 10 percent. Table 16 presents the bounding values of sensitivity for all variables analysed, listed in their order of importance. Of those variables with sensitivities greater than 5 percent, the long term escalation rates for electricity, heating fuel, and building useful life time, are variables that continue to influence the life cycle cost of the building throughout its lifetime.

Sudden catastrophic changes in these "high sensitivity variables", at some future time, will affect building economics. For this reason, analysis results must be viewed with the following analysis criteria in mind:

* Fuel Prices can be expected to fluctuate significantly over the lifetime of the building, up to and beyond the 10 percent variation assumed in the sensitivity analysis.

* The State of Alaska has no control over the future pricing profiles for energy, since these parameters are controlled on the world market.

The sensitivity analysis indicates that, while the modeling equations used are relatively stable, differences in sensitivity between architectural design levels are large in

TABLE 16

SENSITIVITY ANALYSIS FOR INPUT VARIABLES

Input Variable	Lower Bound Sensitivity (%)	Upper Bound Sensitivity (%)
Electrical Escalation Rate	2.59	11.06
Building Useful Lifetime	1.37	7.32
Building First Cost	2.88	7.04
Heating Fuel Escalation Rate	0.91	6.99
Electricity Rate	1.50	5.61
State's Minimum Rate of Return	-2.35	4.92
Heating Fuel Cost	0.43	3.55
Heating Conversion Efficiency	-0.43	-2.90
Ventilation Scheduling	0.43	2.58
Occupancy Level	0.0	-0.37

Note: Lower and upper bounds of sensitivity are minimum and maximum changes in total life cycle costs for 16 cost regions. A positive value indicates an increase in life cycle cost.

comparison to percentage differences between the total life cycle cost results. This comparison is an important one to make, since it indicates that the least life cycle cost design solutions (based on the numerical simulation) are only moderately secure in the face of major future economic or environmental changes.

If any of the first five listed variables in Table 16 were to change significantly in real life from the analysis value, the true least life cycle cost design level could shift in either direction, by at least one design level.
For this reason, the results of the study must be viewed carefully, with an understanding that drastic changes in any of the major economic or environmental parameters within the building's lifetime could change results significantly. This change could occur either toward the lenient or stringent side of the total life cycle cost design point.

6.0 CONCLUSIONS

The life cycle cost analysis has developed recommendations for thermal systems construction in 16 Alaskan cost regions. The recommendations define optimum design levels for the exterior thermal envelope and interior mechanical and electrical systems. Differing recommendations are resultant, due chiefly to the impacts of climate severity, local cost of construction, and local costs of heating fuel and electricity.

6.1 OPTIMUM DESIGN CONCEPTS

6.1.1 The exterior foam wall design concept is recommended in nearly all cost regions, with the exception of the temperate Aleutian and South Eastern portions of the State. Here a standard stud option, with six inch fiberglas insulated stud walls, is the least life cycle cost recommendation.

6.1.2 The mechanical system design selections are found to vary by cost region. The use of heat recovery is recommended for all non-temperate climate regions.

6.1.3 An exception to 6.1.1 and 6.1.2 recommendations is cost region 15 (Barrow). Here the primary heating fuel is natural gas, at an exceedingly inexpensive cost. The lenient standard stud option (6 inch wall), the simple M1 furnace system without heat recovery is recommended for this location, if based solely on the least life cycle cost.

6.1.4 It should be noted that low cost natural gas is also available in the Anchorage city area. However, as this study is concerned with rural areas of the State, this low cost fuel has not been included in the analysis.

6.1.5 Life Cycle Costs for the Double Stud Alternates were found to be higher than for the exterior foam case. Exterior foam walls derive high R factor with compact rigid insulation mounted on the exterior of the building line, while double stud walls make use of interior areas with thicker walls, and consequent smaller interior dimensions. As the Life Cycle Cost for each design option is expressed as dollars per **useable** square footage, this area reduction is a prime reason for the success of the exterior foam design option.

6.2 SENSITIVITY OF RESULTS

The sensitivity analysis performed in conjunction with the study indicated that modeling equations are relatively stable. The following five input variables have major influence in analysis results:

* Electrical Escalation Rate
* Building Useful Lifetime
* Building First Cost
* Heating Fuel Escalation Rate
* Electricity Rate

Actual variations in these variables will cause some skewing of actual ultimate economic viability of Least Life Cycle Cost Design Options. For a 10 percent departure of these variables, design options could shift by no more than one design level architecturally. Interior energy systems selections are much less sensitive to departures.

6.3 Interior Energy Systems

Selection of an integrated building thermal system is shown to be necessary. By properly selecting an interior energy system, and using an improper mechanical or electrical system, life cycle costs for a design can be raised significantly. This effect is prevalent in extremely remote areas with extremely expensive energy. In certain situations, selection of mechanical and electrical systems designs are of greater importance than architectural systems within the bounds of normally accepted envelope design practice.

6.4 APPLICABILITY OF RESULTS

The results of the study are general, with climate conditions based on city locations. With a historical climate data base, cost data are similarly generalized. The results are best applied for planning and programming functions, as opposed to individual circumstances. However, the modeling process employed can certainly be made to pertain to a certain building case merely by remodeling input data to fit that case.

Further, these studies model a building assumed to be served by a local public utility without benefit of cogeneration energy sources. This simplified approach serves to put all evaluations on a fair equitable basis.

Passive solar gain is assessed in the analysis and appears as an energy credit that serves to lower life cycle costs. Cogeneration concepts are not considered. While this concept could serve to lower life cycle costs, such a concept is difficult to handle from a complexity of calculation standpoint, because economics of the concept are so site specific. For this reason, a site-by-site evaluation of cogeneration options is recommended as a separate study using design levels recommended by this report.

6.5 SUMMARY

The results of this study suggest, within a reasonable degree of confidence, the "best choice" of design options concerning the energy systems for rural schools and similar type buildings. This choice of design options can now be broken down into their component parts from which a rational thermal and lighting standard can be formulated. The work of formulating the standard is in progress.

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8.0 APPENDICES

APPENDIX A: T-LOAD PROGRAM OUTPUT TABLES

TLOAD - NES - Ø02

NO HEAT RECOVERY

ELEVATED FLOOR

SINGLE STUD

Ø8/2Ø/82 13:4Ø:47

(82232) Friday

TLOAD - NES - 002 - PAGE 1

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHSGLS"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNES"
TITLE IS"B:FMA"

ROW NUMBER:       5    LAT.= 59.6    DESIGN TEMP.= -5.1 F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   121  333  758 1247 1581 1749 1596 1187  79Ø  436  175   63   BTU/FT2-DAY
  21.2 24.8 28.4 35.6 42.8 48.2 51.8 51.8 46.4 37.4 28.4 21.2   F
  1352 1123 1159  9ØØ  7Ø4  49Ø  394  391  54Ø  857 11Ø3 1352   F-DAYS

ROW NUMBER:      1Ø    LAT.= 58.4    DESIGN TEMP.= -4.Ø F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   116  282  6Ø9 1Ø45 129Ø 1413 1277  983  638  32Ø  148   61   BTU/FT2-DAY
  23.Ø 28.4 32.Ø 39.2 46.4 53.6 55.4 53.6 5Ø.Ø 41.Ø 32.Ø 26.6   F
  1287 1Ø37 1Ø26  783  563  355  288  331  473  718  976 1168   F-DAYS

ROW NUMBER:      15    LAT.= 64.8    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
    3Ø  221  673 1193 16Ø2 175Ø 1541 1117  7Ø8  292   74    2   BTU/FT2-DAY
 -11.2 -2.2 1Ø.4 28.4 46.4 59.Ø 6Ø.8 55.4 44.6 24.8  3.2-11.2   F
  2383 189Ø 1721 1Ø84  549  211  148  3Ø4  617 1235 1867 2336   F-DAYS

ROW NUMBER:      2Ø    LAT.= 51.5    DESIGN TEMP.= 19.9 F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   231  432  715 1Ø31 1178 1181 1119  948  758  527  3Ø7  187   BTU/FT2-DAY
  32.5 34.3 34.2 38.1 43.3 48.7 5Ø.Ø 49.8 49.5 42.8 36.9 35.1   F
  1ØØØ  854  982  8ØØ  67Ø  482  459  471  458  681  84Ø  924   F-DAYS

ROW NUMBER:      25    LAT.= 64.5    DESIGN TEMP.=-31.Ø F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
    29  223  63Ø 1184 1571 1752 1413  992  672  3Ø5   64    2   BTU/FT2-DAY
   6.8  5.Ø  6.8 19.4 35.6 46.4 5Ø.Ø 5Ø.Ø 42.8 28.4 15.8  5.Ø   F
  1829 1674 1786 1382  936  585  463  49Ø  688 1132 1481 1879   F-DAYS

ROW NUMBER:      3Ø    LAT.= 66.9    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
    1Ø  172  615 1227 1697 1855 1561 1Ø74  671  251   4Ø    Ø   BTU/FT2-DAY
 -13.Ø -7.6  1.4 21.2 41.Ø 55.4 57.2 51.8 39.2 19.4 -2.2-13.Ø   F
  2425 2Ø38 1969 1336  722  27Ø  23Ø  4Ø7  751 1395 1993 2392   F-DAYS

ROW NUMBER:      35    LAT.= 71.3    DESIGN TEMP.=-45.Ø F     SIGMA=  Ø.   F
   JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
     Ø   73  49Ø 1Ø49 1139 1526 1458  855  414  125    3    Ø   BTU/FT2-DAY
 -14.8-18.4-14.8 -Ø.4 19.4 33.8 39.2 37.4 3Ø.2 15.8 -Ø.4-13.Ø   F
  2471 2342 2486 1976 1424  959  815  85Ø 1Ø4Ø 1541 1966 2396   F-DAYS
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ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	80520.	92070.	68468.	80034.	60013.	70802.	48676.	59394.	46653.	57103.	36341.	46353.	35994.	45470.	26488.	35386.
2	80520.	92070.	68468.	80034.	60013.	70802.	48676.	59394.	46653.	57103.	36341.	46353.	35994.	45470.	26488.	35386.
3	80520.	92070.	68468.	80034.	60013.	70802.	48676.	59394.	46653.	57103.	36341.	46353.	35994.	45470.	26488.	35386.
4	58595.	68835.	48677.	58915.	47038.	56896.	37990.	47526.	38496.	47678.	30044.	38912.	29646.	37922.	21994.	29858.
5	58595.	68835.	48677.	58915.	47038.	56896.	37990.	47526.	38496.	47678.	30044.	38912.	29646.	37922.	21994.	29858.
6	58595.	68835.	48677.	58915.	47038.	56896.	37990.	47526.	38496.	47678.	30044.	38912.	29646.	37922.	21994.	29858.
7	58595.	68835.	48677.	58915.	47038.	56896.	37990.	47526.	38496.	47678.	30044.	38912.	29646.	37922.	21994.	29858.
8	111883.	121236.	91729.	100872.	94049.	102961.	74863.	83630.	79970.	88599.	61704.	70189.	65309.	73616.	48388.	56144.
9	111883.	121236.	91729.	100872.	94049.	102961.	74863.	83630.	79970.	88599.	61704.	70189.	65309.	73616.	48388.	56144.
10	71035.	82775.	62396.	74220.	52302.	63627.	44175.	55553.	40553.	51444.	32987.	43878.	30633.	40941.	23677.	33880.
11	139908.	152097.	120566.	132784.	120012.	131955.	101417.	113452.	104302.	115942.	86668.	98313.	87661.	98913.	71081.	82176.
12	139908.	152097.	120566.	132784.	120012.	131955.	101417.	113452.	104302.	115942.	86668.	98313.	87661.	98913.	71081.	82176.
13	139908.	152097.	120566.	132784.	120012.	131955.	101417.	113452.	104302.	115942.	86668.	98313.	87661.	98913.	71081.	82176.
14	129171.	139419.	105939.	116027.	108778.	118681.	86685.	96337.	92773.	102286.	71762.	81011.	76080.	85186.	56344.	65134.
15	230291.	243284.	199279.	212276.	201255.	214225.	171548.	184521.	177484.	190423.	149122.	162062.	152841.	165731.	125790.	138672.
16	230291.	243284.	199279.	212276.	201255.	214225.	171548.	184521.	177484.	190423.	149122.	162062.	152841.	165731.	125790.	138672.

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ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.33	4.62	4.42	3.72	4.87	4.14	3.98	3.26	4.57	3.84	3.71	2.97	4.33	3.58	3.49	2.72
2	8.55	6.96	7.07	5.48	8.09	6.49	6.62	5.02	7.79	6.18	6.35	4.73	7.56	5.92	6.13	4.49
3	7.59	6.26	6.28	4.95	7.14	5.79	5.84	4.50	6.84	5.49	5.57	4.21	6.60	5.23	5.35	3.96
4	5.54	4.61	4.56	3.63	5.29	4.34	4.32	3.37	5.10	4.14	4.15	3.18	4.90	3.93	3.97	2.99
5	4.33	3.71	3.56	2.94	4.08	3.45	3.33	2.70	3.90	3.25	3.16	2.51	3.71	3.05	2.99	2.32
6	5.88	4.87	4.84	3.83	5.62	4.60	4.60	3.57	5.43	4.39	4.42	3.37	5.23	4.17	4.23	3.17
7	3.92	3.44	3.23	2.75	3.67	3.17	2.99	2.49	3.48	2.97	2.82	2.30	3.28	2.75	2.64	2.10
8	6.46	5.55	5.30	4.39	6.08	5.16	4.94	4.02	5.78	4.85	4.66	3.73	5.46	4.53	4.37	3.43
9	12.86	10.51	10.55	8.20	12.34	9.98	10.06	7.69	11.93	9.56	9.68	7.30	11.50	9.13	9.29	6.89
10	7.26	6.00	6.05	4.79	6.83	5.56	5.63	4.36	6.56	5.27	5.37	4.09	6.33	5.03	5.16	3.86
11	9.95	8.41	8.30	6.76	9.48	7.94	7.85	6.31	9.12	7.57	7.50	5.95	8.73	7.17	7.14	5.58
12	11.21	9.40	9.34	7.53	10.72	8.95	8.87	7.05	10.33	8.51	8.50	6.65	9.92	8.08	8.12	6.28
13	19.36	15.58	16.05	12.27	18.76	14.97	15.48	11.70	18.29	14.50	15.04	11.24	17.80	13.99	14.58	10.76
14	23.07	19.56	18.93	15.40	21.83	18.29	17.75	14.20	20.85	17.29	16.84	13.26	19.83	16.24	15.90	12.29
15	6.25	4.91	5.17	3.84	6.10	4.77	5.04	3.70	5.99	4.65	4.93	3.59	5.87	4.53	4.82	3.48
16	16.16	13.95	13.56	11.35	15.32	13.11	12.76	10.54	14.63	12.42	12.11	9.89	13.92	11.70	11.43	9.21

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.62	5.71	6.79	6.88	5.87	5.96	7.04	7.12	6.19	6.28	7.36	7.44	6.84	6.93	8.00	8.09
2	6.06	6.16	7.32	7.42	6.33	6.42	7.59	7.68	6.67	6.77	7.93	8.03	7.37	7.47	8.63	8.73
3	6.15	6.25	7.43	7.52	6.42	6.52	7.70	7.79	6.77	6.87	8.05	8.14	7.48	7.58	8.76	8.85
4	6.21	6.29	7.29	7.37	6.34	6.42	7.42	7.50	6.51	6.59	7.59	7.67	6.99	7.08	8.08	8.16
5	7.04	7.13	8.27	8.36	7.20	7.29	8.42	8.52	7.38	7.48	8.61	8.70	7.94	8.03	9.16	9.26
6	9.90	10.03	11.62	11.75	10.11	10.24	11.84	11.97	10.38	10.51	12.10	12.23	11.16	11.29	12.88	13.01
7	7.34	7.43	8.62	8.71	7.50	7.60	8.78	8.87	7.69	7.79	8.97	9.07	8.27	8.37	9.55	9.65
8	7.10	7.19	8.33	8.43	7.25	7.35	8.49	8.58	7.44	7.53	8.68	8.77	8.00	8.09	9.24	9.33
9	11.67	11.82	13.70	13.86	11.93	12.08	13.96	14.11	12.24	12.39	14.27	14.42	13.15	13.31	15.19	15.34
10	12.07	12.23	14.22	14.38	12.54	12.70	14.68	14.85	13.18	13.35	15.33	15.49	14.42	14.58	16.57	16.73
11	8.21	8.31	9.64	9.74	8.39	8.49	9.82	9.92	8.60	8.71	10.03	10.14	9.25	9.36	10.68	10.79
12	8.39	8.50	9.85	9.96	8.56	8.69	10.04	10.15	8.80	8.91	10.26	10.37	9.46	9.57	10.92	11.03
13	13.38	13.55	15.71	15.89	13.67	13.85	16.00	16.18	14.03	14.20	16.36	16.53	15.08	15.26	17.41	17.59
14	14.59	14.78	17.13	17.32	14.91	15.10	17.45	17.64	15.29	15.48	17.83	18.03	16.44	16.63	18.98	19.18
15	10.48	10.62	12.31	12.44	10.71	10.85	12.54	12.67	10.99	11.13	12.81	12.95	11.81	11.95	13.64	13.78
16	16.10	16.31	18.90	19.11	16.45	16.66	19.26	19.47	16.88	17.09	19.68	19.89	18.15	18.36	20.95	21.16

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ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	11.33	10.72	11.67	11.05	11.12	10.49	11.48	10.84	11.14	10.50	11.52	10.87	11.56	10.89	11.95	11.27
2	15.03	13.53	14.88	13.39	14.84	13.33	14.71	13.20	14.88	13.37	14.78	13.25	15.35	13.81	15.26	13.7
3	14.17	12.93	14.21	12.98	13.98	12.73	14.04	12.79	14.03	12.78	14.12	12.85	14.51	13.23	14.61	13.32
4	12.11	11.25	12.27	11.42	11.99	11.13	12.17	11.30	11.96	11.09	12.16	11.28	12.26	11.36	12.47	11.57
5	11.77	11.25	12.31	11.79	11.68	11.15	12.24	11.70	11.69	11.14	12.26	11.70	12.05	11.48	12.64	12.06
6	16.35	15.47	17.14	16.26	16.30	15.41	17.11	16.22	16.37	15.47	17.19	16.28	16.95	16.03	17.79	16.86
7	11.68	11.29	12.35	11.96	11.59	11.19	12.27	11.87	11.59	11.18	12.29	11.87	11.97	11.54	12.69	12.25
8	13.97	13.15	14.12	13.30	13.74	12.92	13.91	13.09	13.63	12.80	13.82	12.99	13.87	13.03	14.09	13.24
9	25.20	23.01	25.05	22.85	24.94	22.73	24.82	22.61	24.84	22.62	24.74	22.52	25.33	23.11	25.28	23.03
10	20.04	18.94	21.11	20.01	20.07	18.96	21.16	20.05	20.45	19.33	21.55	20.43	21.45	20.32	22.57	21.43
11	18.63	17.23	18.49	17.06	18.34	16.91	18.23	16.79	18.19	16.75	18.10	16.66	18.45	17.00	18.38	16.93
12	20.05	18.37	19.77	18.07	19.78	18.07	19.48	17.78	19.61	17.98	19.34	17.62	19.86	18.14	19.61	17.86
13	33.51	29.90	32.68	29.07	33.21	29.59	32.40	28.79	33.09	29.47	32.32	28.69	33.65	30.02	32.90	29.27
14	38.50	35.17	37.05	33.72	37.58	34.23	36.20	32.84	36.98	33.61	35.67	32.29	37.11	33.72	35.88	32.47
15	17.33	16.13	18.20	17.00	17.42	16.22	18.29	17.10	17.58	16.38	18.46	17.26	18.29	17.09	19.17	17.98
16	33.19	31.19	33.56	31.56	32.70	30.70	33.12	31.11	32.44	30.43	32.89	30.89	32.99	30.99	33.48	31.48

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TLOAD - NEE - ØØ2

NO HEAT RECOVERY

ELEVATED FLOOR

EXTERIOR FOAM

Ø8/2Ø/82 13:56:47

(82232) Friday

TLOAD - NEE - 002 - PAGE 1

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHFOAM"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNEE"
TITLE IS"B:FMA"

ROW NUMBER:       5    LAT.= 59.6    DESIGN TEMP.= -5.1 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
   121   333   758  1247  1581  1749  1596  1187   790   436   175    63    BTU/FT2-DAY
  21.2  24.8  28.4  35.6  42.8  48.2  51.8  51.8  46.4  37.4  28.4  21.2    F
  1352  1123  1159   900   704   490   394   391   540   857  1103  1352    F-DAYS

ROW NUMBER:      10    LAT.= 58.4    DESIGN TEMP.= -4.0 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
   116   282   609  1045  1290  1413  1277   983   638   320   148    61    BTU/FT2-DAY
  23.0  28.4  32.0  39.2  46.4  53.6  55.4  53.6  50.0  41.0  32.0  26.6    F
  1287  1037  1026   783   563   355   288   331   473   718   976  1168    F-DAYS

ROW NUMBER:      15    LAT.= 64.8    DESIGN TEMP.=-51.0 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    30   221   673  1193  1602  1750- 1541  1117   708   292    74     2    BTU/FT2-DAY
 -11.2  -2.2  10.4  28.4  46.4  59.0  60.8  55.4  44.6  24.8   3.2-11.2     F
  2383  1890  1721  1084   549   211   148   304   617  1235  1867  2336    F-DAYS

ROW NUMBER:      20    LAT.= 51.5    DESIGN TEMP.= 19.9 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
   231   432   715  1031  1178  1181  1119   948   758   527   307   187    BTU/FT2-DAY
  32.5  34.3  34.2  38.1  43.3  48.7  50.0  49.8  49.5  42.8  36.9  35.1    F
  1000   854   982   800   670   482   459   471   458   681   840   924    F-DAYS

ROW NUMBER:      25    LAT.= 64.5    DESIGN TEMP.=-31.0 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    29   223   630  1184  1571  1752  1413   992   672   305    64     2    BTU/FT2-DAY
   6.8   5.0   6.8  19.4  35.6  46.4  50.0  50.0  42.8  28.4  15.8   5.0    F
  1829  1674  1786  1382   936   585   463   490   688  1132  1481  1879    F-DAYS

ROW NUMBER:      30    LAT.= 66.9    DESIGN TEMP.=-51.0 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    10   172   615  1227  1697  1855  1561  1074   671   251    40     0    BTU/FT2-DAY
 -13.0  -7.6   1.4  21.2  41.0  55.4  57.2  51.8  39.2  19.4  -2.2-13.0     F
  2425  2038  1969  1336   722   270   230   407   751  1395  1993  2392    F-DAYS

ROW NUMBER:      35    LAT.= 71.3    DESIGN TEMP.=-45.0 F     SIGMA=  0.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
     0    73   490  1049  1139  1526  1458   855   414   125     3     0    BTU/FT2-DAY
 -14.8-18.4-14.8  -0.4  19.4  33.8  39.2  37.4  30.2  15.8  -0.4-13.0     F
  2471  2342  2486  1976  1424   959   815   850  1040  1541  1966  2396    F-DAYS
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ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	80526.	92076.	68474.	80040.	58258.	68963.	46888.	57555.	46287.	56725.	36000.	45976.	36282.	45782.	26759.	35694.
2	80526.	92076.	68474.	80040.	58258.	68963.	46888.	57555.	46287.	56725.	36000.	45976.	36282.	45782.	26759.	35694.
3	80526.	92076.	68474.	80040.	58258.	68963.	46888.	57555.	46287.	56725.	36000.	45976.	36282.	45782.	26759.	35694.
4	58600.	68840.	48682.	58920.	45541.	55324.	36589.	45952.	38207.	47349.	29745.	38591.	29898.	38188.	22221.	30113.
5	58600.	68840.	48682.	58920.	45541.	55324.	36589.	45952.	38207.	47349.	29745.	38591.	29898.	38188.	22221.	30113.
6	58600.	68840.	48682.	58920.	45541.	55324.	36589.	45952.	38207.	47349.	29745.	38591.	29898.	38188.	22221.	30113.
7	58600.	68840.	48682.	58920.	45541.	55324.	36589.	45952.	38207.	47349.	29745.	38591.	29898.	38188.	22221.	30113.
8	111890.	121244.	91737.	100880.	91629.	100487.	72460.	81164.	79470.	88085.	61216.	69677.	65726.	74046.	48791.	56571.
9	111890.	121244.	91737.	100880.	91629.	100487.	72460.	81164.	79470.	88085.	61216.	69677.	65726.	74046.	48791.	56571.
10	71040.	82780.	62401.	74225.	50808.	62092.	42682.	54013.	40250.	51127.	32685.	43560.	30879.	41206.	23918.	34146.
11	139916.	152106.	120574.	132792.	117478.	129375.	98881.	110821.	103779.	115404.	86146.	97768.	88106.	99376.	71522.	82626.
12	139916.	152106.	120574.	132792.	117478.	129375.	98881.	110821.	103779.	115404.	86146.	97768.	88106.	99376.	71522.	82626.
13	139916.	152106.	120574.	132792.	117478.	129375.	98881.	110821.	103779.	115404.	86146.	97768.	88106.	99376.	71522.	82626.
14	129188.	139428.	105948.	116036.	106034.	115880.	83953.	93521.	92203.	101697.	71198.	80433.	76556.	85677.	56811.	65617.
15	230303.	243296.	199291.	212288.	197530.	210497.	167823.	180792.	176705.	189644.	148344.	161282.	153500.	166392.	126449.	139333.
16	230303.	243296.	199291.	212288.	197530.	210497.	167823.	180792.	176705.	189644.	148344.	161282.	153500.	166392.	126449.	139333.

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ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL ENERGY COST ($/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.33	4.62	4.42	3.72	4.83	4.10	3.94	3.22	4.56	3.83	3.70	2.96	4.34	3.59	3.49	2.73
2	8.55	6.96	7.07	5.48	8.05	6.45	6.59	4.98	7.78	6.17	6.34	4.72	7.56	5.93	6.14	4.49
3	7.59	6.26	6.28	4.95	7.10	5.75	5.80	4.46	6.83	5.48	5.56	4.20	6.61	5.24	5.36	3.97
4	5.54	4.61	4.56	3.63	5.25	4.31	4.29	3.34	5.09	4.13	4.14	3.18	4.91	3.93	3.98	2.99
5	4.33	3.71	3.56	2.94	4.05	3.42	3.30	2.67	3.89	3.25	3.16	2.51	3.71	3.05	3.00	2.33
6	5.88	4.87	4.84	3.83	5.59	4.56	4.57	3.53	5.42	4.38	4.41	3.37	5.23	4.18	4.24	3.18
7	3.92	3.44	3.23	2.75	3.63	3.14	2.96	2.46	3.47	2.96	2.81	2.29	3.28	2.75	2.64	2.10
8	6.46	5.55	5.30	4.39	6.03	5.11	4.89	3.97	5.77	4.84	4.65	3.72	5.47	4.54	4.38	3.44
9	12.86	10.51	10.55	8.20	12.27	9.91	9.99	7.62	11.92	9.55	9.66	7.29	11.52	9.14	9.30	6.90
10	7.26	6.00	6.05	4.79	6.79	5.52	5.60	4.32	6.55	5.27	5.36	4.08	6.33	5.04	5.16	3.87
11	9.95	8.41	8.33	6.76	9.42	7.88	7.79	6.25	9.10	7.55	7.49	5.94	8.74	7.18	7.15	5.59
12	11.21	9.41	9.34	7.53	10.66	8.84	8.81	6.99	10.32	8.49	8.49	6.66	9.93	8.09	8.13	6.29
13	19.36	15.58	16.05	12.27	18.69	14.90	15.41	11.62	18.26	14.48	15.03	11.23	17.81	14.00	14.59	10.78
14	23.05	19.56	18.93	15.40	21.66	18.12	17.59	14.03	20.82	17.25	16.81	13.23	19.86	16.27	15.93	12.32
15	6.25	4.91	5.17	3.84	6.09	4.75	5.02	3.69	5.98	4.65	4.93	3.59	5.87	4.54	4.82	3.48
16	16.16	13.95	13.56	11.35	15.21	13.00	12.65	10.43	14.61	12.39	12.08	9.87	13.94	11.72	11.45	9.23

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.62	5.71	6.79	6.88	5.89	5.98	7.06	7.15	6.19	6.27	7.35	7.44	6.78	6.87	7.95	8.04
2	6.06	6.16	7.32	7.42	6.35	6.45	7.61	7.71	6.67	6.77	7.93	8.03	7.31	7.41	8.57	8.67
3	6.15	6.25	7.43	7.52	6.45	6.54	7.72	7.82	6.77	6.86	8.05	8.14	7.42	7.52	8.70	8.79
4	6.21	6.29	7.29	7.37	6.36	6.45	7.45	7.53	6.50	6.59	7.59	7.67	6.94	7.02	8.02	8.11
5	7.04	7.13	8.27	8.36	7.22	7.31	8.45	8.54	7.38	7.47	8.61	8.70	7.88	7.97	9.11	9.20
6	9.90	10.03	11.62	11.75	10.15	10.28	11.87	12.00	10.37	10.50	12.10	12.23	11.07	11.20	12.80	12.93
7	7.34	7.43	8.62	8.71	7.53	7.62	8.81	8.90	7.69	7.79	8.97	9.07	8.21	8.31	9.49	9.59
8	7.10	7.19	8.33	8.43	7.28	7.37	8.52	8.61	7.44	7.53	8.68	8.77	7.94	8.03	9.18	9.27
9	11.67	11.82	13.70	13.86	11.97	12.12	14.00	14.16	12.23	12.39	14.27	14.42	13.06	13.21	15.09	15.25
10	12.07	12.23	14.22	14.38	12.58	12.74	14.73	14.89	13.18	13.34	15.33	15.49	14.31	14.48	16.46	16.62
11	8.21	8.31	9.64	9.74	8.42	8.52	9.85	9.95	8.60	8.71	10.03	10.14	9.18	9.29	10.61	10.72
12	8.39	8.50	9.85	9.96	8.61	8.72	10.07	10.18	8.80	8.91	10.26	10.37	9.39	9.50	10.85	10.96
13	13.38	13.55	15.71	15.89	13.72	13.90	16.05	16.23	14.02	14.20	16.36	16.53	14.97	15.15	17.30	17.48
14	14.59	14.78	17.13	17.32	14.96	15.15	17.50	17.69	15.29	15.48	17.83	18.02	16.32	16.51	18.86	19.05
15	10.48	10.62	12.31	12.44	10.75	10.89	12.58	12.71	10.99	11.12	12.81	12.95	11.73	11.86	13.55	13.69
16	16.10	16.31	18.90	19.11	16.51	16.72	19.32	19.53	16.87	17.09	19.68	19.89	18.01	18.22	20.82	21.03

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ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	11.33	10.72	11.67	11.05	11.11	10.47	11.46	10.82	11.13	10.49	11.51	10.86	11.51	10.84	11.90	11.22
2	15.03	13.53	14.88	13.39	14.82	13.31	14.69	13.18	14.87	13.36	14.77	13.24	15.29	13.75	15.20	13.65
3	14.17	12.93	14.21	12.96	13.97	12.72	14.03	12.78	14.02	12.77	14.11	12.84	14.45	13.18	14.56	13.27
4	12.11	11.25	12.27	11.42	11.98	11.11	12.16	11.29	11.96	11.08	12.15	11.27	12.21	11.31	12.43	11.52
5	11.77	11.25	12.31	11.79	11.68	11.14	12.24	11.69	11.68	11.13	12.25	11.69	12.00	11.43	12.59	12.01
6	16.35	15.47	17.14	16.26	16.31	15.41	17.12	16.22	16.36	15.46	17.19	16.27	16.87	15.95	17.71	16.78
7	11.68	11.29	12.35	11.96	11.58	11.18	12.27	11.86	11.58	11.17	12.28	11.86	11.92	11.48	12.64	12.19
8	13.97	13.15	14.12	13.30	13.72	12.89	13.89	13.06	13.61	12.78	13.81	12.97	13.82	12.98	14.04	13.19
9	25.20	23.01	25.05	22.85	24.91	22.70	24.79	22.58	24.82	22.61	24.73	22.51	25.25	23.02	25.19	22.95
10	20.04	18.94	21.11	20.01	20.08	18.97	21.17	20.06	20.44	19.32	21.54	20.42	21.36	20.22	22.47	21.33
11	18.63	17.22	18.53	17.25	18.31	16.89	18.20	16.76	18.18	16.74	18.09	16.64	18.39	16.94	18.33	16.87
12	[illegible]	18.39	19.77	18.07	19.75	18.04	19.45	17.74	19.60	17.83	19.32	17.61	19.80	18.05	19.55	17.83
13	33.51	29.90	32.68	29.07	33.18	29.57	32.37	28.76	33.07	29.45	32.30	28.68	33.55	29.92	32.81	29.17
14	38.50	35.18	37.06	33.72	37.46	34.11	36.09	32.72	36.95	33.57	35.64	32.25	37.02	33.63	35.79	32.37
15	17.33	16.13	18.20	17.00	17.44	16.24	18.31	17.12	17.57	16.38	18.46	17.26	18.20	17.00	19.09	17.89
16	33.19	31.19	33.57	31.56	32.65	30.65	33.07	31.06	32.41	30.41	32.87	30.86	32.88	30.87	33.37	31.36

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TLOAD - NED - ØØ2

NO HEAT RECOVERY

ELEVATED FLOOR

DOUBLE STUD

Ø8/2Ø/82 14:13:59

(82232) Friday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHDBLS"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNED"
TITLE IS"B:FMA"

ROW NUMBER:        5    LAT.= 59.6    DESIGN TEMP.= -5.1 F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  121  333  758 1247 1581 1749 1596 1187  79Ø  436  175   63   BTU/FT2-DAY
 21.2 24.8 28.4 35.6 42.8 48.2 51.8 51.8 46.4 37.4 28.4 21.2   F
 1352 1123 1159  9ØØ  7Ø4  49Ø  394  391  54Ø  857 11Ø3 1352   F-DAYS

ROW NUMBER:       1Ø    LAT.= 58.4    DESIGN TEMP.= -4.Ø F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  116  282  6Ø9 1Ø45 129Ø 1413 1277  983  638  32Ø  148   61   BTU/FT2-DAY
 23.Ø 28.4 32.Ø 39.2 46.4 53.6 55.4 53.6 5Ø.Ø 41.Ø 32.Ø 26.6   F
 1287 1Ø37 1Ø26  783  563  355  288  331  473  718  976 1168   F-DAYS

ROW NUMBER:       15    LAT.= 64.8    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   3Ø  221  673 1193 16Ø2 175Ø 1541 1117  7Ø8  292   74    2   BTU/FT2-DAY
-11.2 -2.2 1Ø.4 28.4 46.4 59.Ø 6Ø.8 55.4 44.6 24.8  3.2-11.2   F
 2383 189Ø 1721 1Ø84  549  211  148  3Ø4  617 1235 1867 2336   F-DAYS

ROW NUMBER:       2Ø    LAT.= 51.5    DESIGN TEMP.= 19.9 F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  231  432  715 1Ø31 1178 1181 1119  948  758  527  3Ø7  187   BTU/FT2-DAY
 32.5 34.3 34.2 38.1 43.3 48.7 5Ø.Ø 49.8 49.5 42.8 36.9 35.1   F
 1ØØØ  854  982  8ØØ  67Ø  482  459  471  458  681  84Ø  924   F-DAYS

ROW NUMBER:       25    LAT.= 64.5    DESIGN TEMP.=-31.Ø F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   29  223  63Ø 1184 1571 1752 1413  992  672  3Ø5   64    2   BTU/FT2-DAY
  6.8  5.Ø  6.8 19.4 35.6 46.4 5Ø.Ø 5Ø.Ø 42.8 28.4 15.8  5.Ø   F
 1829 1674 1786 1382  936  585  463  49Ø  688 1132 1481 1879   F-DAYS

ROW NUMBER:       3Ø    LAT.= 66.9    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   1Ø  172  615 1227 1697 1855 1561 1Ø74  671  251   4Ø    Ø   BTU/FT2-DAY
-13.Ø -7.6  1.4 21.2 41.Ø 55.4 57.2 51.8 39.2 19.4 -2.2-13.Ø   F
 2425 2Ø38 1969 1336  722  27Ø  23Ø  4Ø7  751 1395 1993 2392   F-DAYS

ROW NUMBER:       35    LAT.= 71.3    DESIGN TEMP.=-45.Ø F     SIGMA=  Ø.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
    Ø   73  49Ø 1Ø49 1139 1526 1458  855  414  125    3    Ø   BTU/FT2-DAY
-14.8-18.4-14.8 -Ø.4 19.4 33.8 39.2 37.4 3Ø.2 15.8 -Ø.4-13.Ø   F
 2471 2342 2486 1976 1424  959  815  85Ø 1Ø4Ø 1541 1966 2396   F-DAYS
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ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	76344.	87775.	64302.	75733.	55510.	66142.	44152.	54737.	43870.	54117.	33653.	43374.	33915.	43177.	24559.	33233.
2	76344.	87775.	64302.	75733.	55510.	66142.	44152.	54737.	43870.	54117.	33653.	43374.	33915.	43177.	24559.	33233.
3	76344.	87775.	64302.	75733.	55510.	66142.	44152.	54737.	43870.	54117.	33653.	43374.	33915.	43177.	24559.	33233.
4	54995.	65197.	45185.	55266.	43314.	52922.	34345.	43544.	36195.	45076.	27718.	36374.	27912.	36082.	20360.	28032.
5	54995.	65197.	45185.	55266.	43314.	52922.	34345.	43544.	36195.	45076.	27718.	36374.	27912.	36082.	20360.	28032.
6	54995.	65197.	45185.	55266.	43314.	52922.	34345.	43544.	36195.	45076.	27718.	36374.	27912.	36082.	20360.	28032.
7	54995.	65197.	45185.	55266.	43314.	52922.	34345.	43544.	36195.	45076.	27718.	36374.	27912.	36082.	20360.	28032.
8	106252.	115427.	86131.	95162.	87918.	96689.	68773.	77380.	76000.	84528.	57833.	66139.	62287.	70507.	45466.	53092.
9	106252.	115427.	86131.	95162.	87918.	96689.	68773.	77380.	76000.	84528.	57833.	66139.	62287.	70507.	45466.	53092.
10	67543.	79215.	58898.	70650.	48521.	59735.	40398.	51647.	38151.	48931.	30603.	41358.	28863.	39022.	21929.	31956.
11	134026.	146160.	114690.	126840.	113591.	125409.	95002.	106809.	100161.	111682.	82546.	94009.	84444.	95583.	67890.	78911.
12	134026.	146160.	114690.	126840.	113591.	125409.	95002.	106809.	100161.	111682.	82546.	94009.	84444.	95583.	67890.	78911.
13	134026.	146160.	114690.	126840.	113591.	125409.	95002.	106809.	100161.	111682.	82546.	94009.	84444.	95583.	67890.	78911.
14	122716.	132848.	99545.	109504.	101821.	111553.	79767.	89172.	88251.	97621.	67304.	76438.	72643.	81639.	53027.	61637.
15	221739.	234726.	190727.	203718.	191801.	204762.	162095.	175057.	171312.	184242.	142952.	155880.	148065.	160941.	121017.	133882.
16	221739.	234726.	190727.	203718.	191801.	204762.	162095.	175057.	171312.	184242.	142952.	155880.	148065.	160941.	121017.	133882.

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ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.23	4.52	4.33	3.62	4.77	4.04	3.88	3.15	4.51	3.77	3.65	2.90	4.29	3.53	3.44	2.67
2	8.45	6.86	6.97	5.38	7.99	6.38	6.52	4.92	7.73	6.12	6.29	4.66	7.51	5.87	6.09	4.44
3	7.50	6.17	6.19	4.86	7.04	5.69	5.74	4.39	6.78	5.42	5.51	4.14	6.56	5.18	5.31	3.92
4	5.46	4.53	4.48	3.55	5.21	4.26	4.24	3.29	5.05	4.08	4.10	3.13	4.87	3.89	3.94	2.94
5	4.25	3.63	3.49	2.86	4.00	3.37	3.26	2.61	3.85	3.20	3.11	2.46	3.67	3.01	2.96	2.28
6	5.80	4.79	4.76	3.75	5.54	4.51	4.51	3.48	5.37	4.33	4.36	3.32	5.19	4.13	4.20	3.13
7	3.84	3.36	3.15	2.66	3.58	3.08	2.91	2.40	3.42	2.91	2.77	2.24	3.24	2.71	2.60	2.06
8	6.34	5.43	5.18	4.27	5.95	5.03	4.81	3.88	5.69	4.77	4.57	3.64	5.40	4.47	4.31	3.36
9	12.70	10.34	10.39	8.03	12.16	9.80	9.88	7.51	11.82	9.44	9.56	7.18	11.42	9.04	9.20	6.80
10	7.18	5.92	5.97	4.71	6.74	5.47	5.54	4.27	6.50	5.22	5.32	4.03	6.29	4.99	5.12	3.81
11	9.81	8.27	8.16	6.62	9.33	7.79	7.72	6.15	9.02	7.47	7.41	5.85	8.65	7.09	7.07	5.56
12	11.07	9.26	9.20	7.39	10.56	8.74	8.71	6.89	10.23	8.40	8.40	6.57	9.84	8.00	8.04	6.20
13	19.18	15.40	15.88	12.10	18.57	14.78	15.29	11.50	18.17	14.37	14.92	11.12	17.76	13.89	14.48	10.67
14	22.68	19.16	18.54	15.00	21.40	17.85	17.33	13.76	20.57	17.00	16.57	12.98	19.62	16.03	15.70	12.08
15	6.20	4.87	5.13	3.80	6.06	4.72	4.99	3.66	5.96	4.62	4.90	3.56	5.84	4.51	4.79	3.46
16	15.92	13.70	13.31	11.10	15.05	12.83	12.48	10.27	14.45	12.24	11.93	9.71	13.78	11.56	11.29	9.07

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ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

CR	LENIENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.78	5.87	6.95	7.03	5.99	6.08	7.16	7.24	6.28	6.36	7.44	7.53	6.88	6.97	8.05	8.14
2	6.23	6.33	7.49	7.58	6.46	6.55	7.72	7.81	6.77	6.86	8.03	8.12	7.42	7.52	8.68	8.78
3	6.32	6.42	7.60	7.69	6.55	6.65	7.83	7.93	6.87	6.96	8.14	8.24	7.53	7.63	8.81	8.90
4	6.35	6.43	7.43	7.51	6.45	6.53	7.53	7.62	6.59	6.67	7.67	7.75	7.04	7.12	8.12	8.20
5	7.20	7.30	8.43	8.52	7.32	7.42	8.55	8.64	7.48	7.57	8.70	8.80	7.99	8.08	9.21	9.31
6	10.12	10.25	11.85	11.98	10.29	10.42	12.02	12.15	10.51	10.64	12.23	12.36	11.22	11.35	12.95	13.08
7	7.51	7.60	8.79	8.88	7.63	7.73	8.91	9.01	7.79	7.89	9.07	9.17	8.32	8.42	9.60	9.70
8	7.26	7.35	8.50	8.59	7.38	7.47	8.62	8.71	7.54	7.63	8.77	8.86	8.05	8.14	9.28	9.38
9	11.94	12.09	13.97	14.13	12.14	12.29	14.17	14.32	12.39	12.54	14.42	14.58	13.23	13.39	15.27	15.42
10	12.35	12.52	14.50	14.66	12.76	12.92	14.91	15.07	13.35	13.51	15.50	15.66	14.50	14.66	16.65	16.81
11	8.47	8.58	9.83	9.93	8.53	8.64	9.96	10.07	8.71	8.82	10.14	10.25	9.31	9.41	10.74	10.84
12	8.58	8.69	10.05	10.16	8.73	8.84	10.19	10.30	8.91	9.02	10.37	10.48	9.52	9.63	10.98	11.09
13	13.69	13.86	16.02	16.19	13.91	14.09	16.24	16.42	14.20	14.38	16.54	16.71	15.17	15.35	17.50	17.68
14	14.92	15.11	17.46	17.65	15.17	15.36	17.71	17.90	15.49	15.68	18.03	18.22	16.54	16.73	19.08	19.29
15	10.72	10.86	12.55	12.69	10.90	11.04	12.73	12.86	11.13	11.27	12.95	13.09	11.89	12.02	13.71	13.85
16	16.47	16.68	19.27	19.48	16.74	16.95	19.55	19.76	17.09	17.30	19.90	20.11	18.26	18.47	21.06	21.27

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

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TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	11.40	10.78	11.73	11.11	11.14	10.50	11.50	10.86	11.17	10.52	11.55	10.89	11.56	10.89	11.95	11.2
2	15.10	13.61	14.96	13.46	14.86	13.35	14.74	13.22	14.92	13.40	14.81	13.28	15.35	13.81	15.26	13.7
3	14.24	13.01	14.29	13.06	14.01	12.76	14.07	12.82	14.07	12.81	14.16	12.88	14.51	13.23	14.62	13.3
4	12.17	11.32	12.34	11.48	12.02	11.15	12.20	11.33	11.99	11.11	12.19	11.31	12.26	11.36	12.48	11.5
5	11.86	11.33	12.40	11.87	11.73	11.19	12.29	11.74	11.73	11.17	12.30	11.74	12.06	11.49	12.65	12.07
6	16.49	15.61	17.29	16.40	16.40	15.50	17.21	16.30	16.45	15.54	17.27	16.36	16.98	16.05	17.82	16.8
7	11.77	11.38	12.44	12.05	11.64	11.23	12.33	11.91	11.64	11.22	12.34	11.91	11.98	11.55	12.70	12.26
8	14.01	13.19	14.16	13.34	13.74	12.91	13.91	13.08	13.64	12.80	13.83	12.99	13.86	13.02	14.08	13.2
9	25.31	23.11	25.16	22.95	24.97	22.76	24.85	22.63	24.88	22.66	24.79	22.56	25.32	23.10	25.27	23.02
10	20.24	19.14	21.32	20.22	20.21	19.10	21.29	20.18	20.56	19.44	21.66	20.53	21.50	20.36	22.61	21.47
11	[illegible]	17.25	18.55	17.11	18.34	16.90	18.23	16.79	18.21	16.76	18.11	16.67	18.43	16.98	18.36	16.9
12	20.14	18.43	19.82	18.12	19.77	18.06	19.47	17.76	19.62	17.90	19.35	17.63	19.84	18.11	19.59	17.86
13	33.64	30.03	32.81	29.20	33.25	29.64	32.45	28.83	33.15	29.52	32.37	28.74	33.64	30.01	32.90	29.26
14	38.44	35.11	37.00	33.66	37.41	34.06	36.04	32.66	36.90	33.52	35.60	32.20	37.00	33.60	35.78	32.35
15	17.53	16.33	18.40	17.20	17.56	16.36	18.44	17.24	17.69	16.49	18.57	17.37	18.33	17.14	19.22	18.02
16	33.31	31.31	33.69	31.69	32.72	30.71	33.13	31.13	32.47	30.47	32.93	30.92	32.96	30.96	33.46	31.45

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TLOAD - HES - ØØ2

HEAT RECOVERY

ELEVATED FLOOR

SINGLE STUD

Ø8/2Ø/82   15:17:49

(82232)   Friday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHSGLS"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHES"
TITLE IS"B:FMA"

ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1167	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.Ø F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.Ø	28.4	32.Ø	39.2	46.4	53.6	55.4	53.6	50.Ø	41.Ø	32.Ø	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.Ø F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.[illegible]	-2.2	10.4	28.4	46.4	59.Ø	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1990	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.[illegible] DESIGN TEMP.= 19.9 F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	527	[illegible]	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.Ø	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.Ø F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.Ø	6.8	19.4	35.6	46.4	50.Ø	50.Ø	42.8	28.4	15.8	5.Ø	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.Ø F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1Ø	172	615	1227	1697	1855	1561	1074	671	251	4Ø	Ø	BTU/FT2-DAY
-13.Ø	-7.6	1.4	21.2	41.Ø	55.4	57.2	51.8	39.2	19.4	-2.2	-13.Ø	F
2425	2Ø38	1969	1336	722	27Ø	23Ø	4Ø7	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.Ø F SIGMA= Ø. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Ø	73	49Ø	1Ø49	1139	1526	1458	855	414	125	3	Ø	BTU/FT2-DAY
-14.8	-18.4	-14.8	-Ø.4	19.4	33.8	39.2	37.4	3Ø.2	15.8	-Ø.4	-13.Ø	F
2471	2342	2486	1976	1424	959	815	85Ø	1Ø4Ø	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	80520.	92070.	56103.	67202.	60013.	70802.	37306.	47291.	46653.	57103.	26142.	35002.	35994.	45470.	17559.	25219.
2	80520.	92070.	56103.	67202.	60013.	70802.	37306.	47291.	46653.	57103.	26142.	35002.	35994.	45470.	17559.	25219.
3	80520.	92070.	56103.	67202.	60013.	70802.	37306.	47291.	46653.	57103.	26142.	35002.	35994.	45470.	17559.	25219.
4	58595.	68835.	38455.	48049.	47038.	56896.	28600.	37282.	38496.	47678.	21516.	29322.	29646.	37922.	14426.	21297.
5	58595.	68835.	38455.	48049.	47038.	56896.	28600.	37282.	38496.	47678.	21516.	29322.	29646.	37922.	14426.	21297.
6	58595.	68835.	38455.	48049.	47038.	56896.	28600.	37282.	38496.	47678.	21516.	29322.	29646.	37922.	14426.	21297.
7	58595.	68835.	38455.	48049.	47038.	56896.	28600.	37282.	38496.	47678.	21516.	29322.	29646.	37922.	14426.	21297.
8	111583.	121236.	75071.	83843.	94049.	102961.	59077.	67353.	79970.	88599.	46977.	54656.	65309.	73616.	34428.	41810.
9	111583.	121236.	75071.	83843.	94049.	102961.	-59077.	67353.	79970.	88599.	46977.	54656.	65309.	73616.	34428.	41810.
10	71033.	82775.	51965.	63555.	52302.	63627.	34382.	45367.	40553.	51444.	23962.	34194.	30633.	40941.	15501.	24759.
11	139908.	152097.	102885.	114981.	120012.	131955.	84767.	96227.	104302.	115942.	70758.	81845.	87661.	98913.	56347.	66602.
12	139908.	152097.	102885.	114981.	120012.	131955.	84767.	96227.	104302.	115942.	70758.	81845.	87661.	98913.	56347.	66602.
13	139908.	152097.	102885.	114981.	120012.	131955.	84767.	96227.	104302.	115942.	70758.	81845.	87661.	98913.	56347.	66602.
14	129171.	139419.	86921.	96581.	108778.	118681.	68713.	77822.	92773.	102286.	54736.	63445.	76080.	85186.	40742.	48503.
15	230291.	243284.	173697.	186673.	201255.	214225.	146831.	159769.	177484.	190423.	125308.	138189.	152841.	165731.	102887.	115660.
16	230291.	243284.	173697.	186673.	201255.	214225.	146831.	159769.	177484.	190423.	125308.	138189.	152841.	165731.	102887.	115660.

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ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

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TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	11.33	10.72	11.48	10.85	11.12	10.49	11.31	10.66	11.14	10.50	11.38	10.70	11.56	10.89	11.84	11.13
2	15.03	13.53	14.70	13.20	14.84	13.33	14.55	13.02	14.88	13.37	14.64	13.09	15.35	13.81	15.15	13.58
3	14.17	12.93	14.03	12.79	13.98	12.73	13.89	12.62	14.03	12.78	13.99	12.70	14.51	13.23	14.51	13.19
4	12.11	11.25	12.13	11.26	11.99	11.13	12.05	11.16	11.96	11.09	12.05	11.15	12.26	11.36	12.39	11.46
5	11.77	11.25	12.19	11.65	11.68	11.15	12.13	11.57	11.69	11.14	12.17	11.59	12.05	11.48	12.57	11.97
6	16.35	15.47	17.04	16.14	16.30	15.41	17.03	16.11	16.37	15.47	17.13	16.19	16.95	16.03	17.75	16.79
7	11.69	11.29	12.22	11.82	11.59	11.19	12.16	11.74	11.59	11.18	12.20	11.75	11.97	11.54	12.62	12.15
8	13.97	13.15	13.86	13.03	13.74	12.92	13.67	12.83	13.63	12.80	13.60	12.75	13.87	13.03	13.89	13.03
9	25.22	23.01	24.72	22.51	24.94	22.73	24.51	22.28	24.84	22.62	24.47	22.22	25.33	23.11	25.02	22.77
10	20.64	18.94	21.03	19.93	19.82	18.71	20.85	19.73	20.45	19.33	21.50	20.37	21.45	20.32	22.54	21.38
11	[illegible]	17.21	18.15	16.76	18.04	16.91	17.95	16.50	18.19	16.75	17.84	16.32	18.45	17.08	18.15	16.67
12	[illegible]	[illegible]	19.44	17.74	19.76	18.07	19.16	17.46	19.61	17.50	19.05	17.32	19.66	18.14	19.36	17.61
13	33.51	29.90	32.33	28.72	33.21	29.59	32.38	28.45	33.09	29.47	32.02	28.38	33.65	30.02	32.64	28.98
14	36.55	35.17	36.05	32.72	37.58	34.23	35.29	31.90	36.98	33.61	34.82	31.40	37.11	33.72	35.12	31.64
15	17.33	16.13	18.21	17.01	17.42	16.22	18.31	17.11	17.58	16.38	18.48	17.29	18.29	17.09	19.20	18.00
16	33.19	31.19	33.03	31.03	32.70	30.70	32.61	30.61	32.44	30.43	32.41	30.41	32.99	30.99	33.03	31.02

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TLOAD - HEE - ØØ2

HEAT RECOVERY

ELEVATED FLOOR

EXTERIOR FOAM

Ø8/19/82 Ø8:51:42

(82231) Thursday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHFOAM"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHEE"
TITLE IS"B:FMA"

ROW NUMBER:      5   LAT.= 59.6   DESIGN TEMP.= -5.1 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  121  333  758 1247 1581 1749 1596 1187  790  436  175   63   BTU/FT2-DAY
 21.2 24.8 28.4 35.6 42.8 48.2 51.8 51.8 46.4 37.4 28.4 21.2   F
 1352 1123 1159  900  704  490  394  391  540  857 1103 1352   F-DAYS

ROW NUMBER:     10   LAT.= 58.4   DESIGN TEMP.= -4.0 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  116  282  609 1045 1290 1413 1277  983  638  320  148   61   BTU/FT2-DAY
 23.0 28.4 32.0 39.2 46.4 53.6 55.4 53.6 50.0 41.0 32.0 26.6   F
 1287 1037 1026  783  563  355  288  331  473  718  976 1168   F-DAYS

ROW NUMBER:     15   LAT.= 64.8   DESIGN TEMP.=-51.0 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   30  221  673 1193 1602 1750 1541 1117  708  292   74    2   BTU/FT2-DAY
-11.2 -2.2 10.4 28.4 46.4 59.0 60.8 55.4 44.6 24.8  3.2-11.2   F
 2383 1890 1721 1084  549  211  148  304  617 1235 1867 2336   F-DAYS

ROW NUMBER:     20   LAT.= 51.5   DESIGN TEMP.= 19.9 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  231  432  715 1031 1178 1181 1119  948  758  527  307  187   BTU/FT2-DAY
 32.5 34.3 34.2 38.1 43.3 48.7 50.0 49.8 49.5 42.8 36.9 35.1   F
 1000  854  982  800  670  482  459  471  458  681  840  924   F-DAYS

ROW NUMBER:     25   LAT.= 64.5   DESIGN TEMP.=-31.0 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   29  223  630 1184 1571 1752 1413  992  672  305   64    2   BTU/FT2-DAY
  6.8  5.0  6.8 19.4 35.6 46.4 50.0 50.0 42.8 28.4 15.8  5.0   F
 1829 1674 1786 1382  936  585  463  490  688 1132 1481 1879   F-DAYS

ROW NUMBER:     30   LAT.= 66.9   DESIGN TEMP.=-51.0 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
   10  172  615 1227 1697 1855 1561 1074  671  251   40    0   BTU/FT2-DAY
-13.0 -7.6  1.4 21.2 41.0 55.4 57.2 51.8 39.2 19.4 -2.2-13.0   F
 2425 2038 1969 1336  722  270  230  407  751 1395 1993 2392   F-DAYS

ROW NUMBER:     35   LAT.= 71.3   DESIGN TEMP.=-45.0 F    SIGMA=  0.  F
  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
    0   73  490 1049 1139 1526 1458  855  414  125    3    0   BTU/FT2-DAY
-14.8-18.4-14.8 -0.4 19.4 33.8 39.2 37.4 30.2 15.8 -0.4-13.0   F
 2471 2342 2486 1976 1424  959  815  850 1040 1541 1966 2396   F-DAYS
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TLOAD - HEE - 002 - PAGE 2

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT *ME1EE1	LENIENT ME1EE2	LENIENT ME2EE1	LENIENT ME2EE2	MODERATE 1 *ME1EE1	MODERATE 1 ME1EE2	MODERATE 1 ME2EE1	MODERATE 1 ME2EE2	MODERATE 2 *ME1EE1	MODERATE 2 ME1EE2	MODERATE 2 ME2EE1	MODERATE 2 ME2EE2	STRINGENT *ME1EE1	STRINGENT ME1EE2	STRINGENT ME2EE1	STRINGENT ME2EE2
1	80526.	92076.	56108.	67208.	58258.	68963.	35681.	45494.	46287.	56725.	25823.	34652.	36282.	45782.	17797.	25498.
2	80526.	92076.	56108.	67208.	58258.	68963.	35681.	45494.	46287.	56725.	25823.	34652.	36282.	45782.	17797.	25498.
3	80526.	92076.	56108.	67208.	58258.	68963.	35681.	45494.	46287.	56725.	25823.	34652.	36282.	45782.	17797.	25498.
4	58600.	68840.	38460.	48054.	45541.	55324.	27245.	35671.	38207.	47349.	21249.	29024.	29898.	38188.	14633.	21531.
5	58600.	68840.	38460.	48054.	45541.	55324.	27245.	35671.	38207.	47349.	21249.	29024.	29898.	38188.	14633.	21531.
6	58600.	68840.	38460.	48054.	45541.	55324.	27245.	35671.	38207.	47349.	21249.	29024.	29898.	38188.	14633.	21531.
7	58600.	68840.	38460.	48054.	45541.	55324.	27245.	35671.	38207.	47349.	21249.	29024.	29898.	38188.	14633.	21531.
8	111890.	121244.	75079.	83851.	91629.	100487.	56769.	64922.	79470.	88085.	46502.	54164.	65726.	74046.	34825.	42214.
9	111890.	121244.	75079.	83851.	91629.	100487.	56769.	64922.	79470.	88085.	46502.	54164.	65726.	74046.	34825.	42214.
10	71040.	82780.	51970.	63560.	50808.	62092.	32934.	43842.	40250.	51127.	23677.	33881.	30879.	41206.	15709.	25016.
11	139916.	152106.	102893.	114989.	117478.	129375.	82295.	93661.	103779.	115404.	70239.	81314.	88106.	99376.	56758.	67044.
12	139916.	152106.	102893.	114989.	117478.	129375.	82295.	93661.	103779.	115404.	70239.	81314.	88106.	99376.	56758.	67044.
13	139916.	152106.	102893.	114989.	117478.	129375.	82295.	93661.	103779.	115404.	70239.	81314.	88106.	99376.	56758.	67044.
14	129183.	139428.	86938.	96598.	106034.	115888.	66041.	75079.	92203.	101697.	54199.	62876.	76556.	85677.	41181.	48962.
15	230303.	243296.	173709.	186684.	197530.	210497.	143111.	156041.	176705.	189644.	124531.	137410.	153500.	166392.	103543.	116320.
16	230303.	243296.	173709.	186684.	197530.	210497.	143111.	156041.	176705.	189644.	124531.	137410.	153500.	166392.	103543.	116320.

TLOAD - HEE - 002 - PAGE 3

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.33	4.62	4.15	3.43	4.83	4.10	3.69	2.95	4.56	3.83	3.47	2.71	4.34	3.59	3.29	2.50
2	8.55	6.96	6.79	5.19	8.05	6.45	6.34	4.71	7.78	6.17	6.12	4.47	7.56	5.93	5.94	4.27
3	7.59	6.26	6.01	4.67	7.10	5.75	5.56	4.19	6.83	5.48	5.34	3.95	6.61	5.24	5.16	3.74
4	5.54	4.61	4.34	3.39	5.25	4.31	4.09	3.11	5.09	4.13	3.96	2.97	4.91	3.93	3.81	2.80
5	4.33	3.71	3.34	2.71	4.05	3.42	3.10	2.45	3.89	3.25	2.98	2.30	3.71	3.05	2.83	2.14
6	5.88	4.87	4.61	3.58	5.59	4.56	4.35	3.30	5.42	4.38	4.22	3.15	5.23	4.18	4.07	2.98
7	3.92	3.44	3.00	2.50	3.63	3.14	2.76	2.23	3.47	2.96	2.62	2.08	3.28	2.75	2.47	1.91
8	6.46	5.55	4.94	4.02	6.03	5.11	4.55	3.62	5.77	4.84	4.33	3.39	5.47	4.54	4.08	3.13
9	12.86	10.51	10.06	7.70	12.27	9.91	9.53	7.15	11.92	9.55	9.23	6.83	11.52	9.14	8.89	6.49
10	7.26	6.00	5.81	4.55	6.79	5.52	5.37	4.09	6.55	5.27	5.16	3.86	6.33	5.04	4.97	3.65
11	9.95	8.41	7.86	6.34	9.42	7.88	7.40	5.84	9.10	7.55	7.12	5.56	8.74	7.16	6.81	5.22
12	11.21	9.43	8.92	7.09	10.66	8.64	8.39	6.56	10.32	8.43	8.07	6.26	9.93	8.09	7.76	5.92
13	19.36	15.58	15.53	11.74	18.69	14.90	14.91	11.11	18.28	14.48	14.55	10.74	17.81	14.00	14.15	10.31
14	23.03	19.56	17.77	14.21	21.66	18.12	16.49	12.90	20.82	17.25	15.77	12.15	19.86	16.27	14.97	11.30
15	6.25	4.91	5.05	3.71	6.09	4.75	4.90	3.57	5.98	4.65	4.81	3.47	5.87	4.54	4.71	3.37
16	16.16	13.95	12.82	10.61	15.21	13.00	11.93	9.72	14.61	12.39	11.39	9.18	13.94	11.72	10.79	8.57

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ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.62	5.71	6.88	6.97	5.89	5.98	7.15	7.24	6.19	6.27	7.44	7.53	6.78	6.87	8.04	8.13
2	6.06	6.16	7.42	7.51	6.35	6.45	7.71	7.80	6.67	6.77	8.03	8.12	7.31	7.41	8.67	8.76
3	6.15	6.25	7.52	7.62	6.45	6.54	7.82	7.92	6.77	6.86	8.14	8.24	7.42	7.52	8.79	8.89
4	6.21	6.29	7.37	7.45	6.36	6.45	7.53	7.61	6.50	6.59	7.67	7.75	6.94	7.02	8.11	8.19
5	7.04	7.13	8.36	8.45	7.22	7.31	8.54	8.63	7.38	7.47	8.70	8.79	7.88	7.97	9.20	9.29
6	9.90	10.03	11.75	11.88	10.15	10.28	12.00	12.13	10.37	10.50	12.23	12.36	11.07	11.20	12.93	13.06
7	7.34	7.43	8.71	8.81	7.53	7.62	8.90	9.00	7.69	7.79	9.07	9.16	8.21	8.31	9.59	9.68
8	7.10	7.19	8.43	8.52	7.28	7.37	8.61	8.70	7.44	7.53	8.77	8.86	7.94	8.03	9.27	9.36
9	11.67	11.82	13.86	14.01	11.97	12.12	14.16	14.31	12.23	12.39	14.42	14.57	13.06	13.21	15.25	15.40
10	12.07	12.23	14.38	14.54	12.58	12.74	14.89	15.05	13.18	13.34	15.49	15.65	14.31	14.48	16.62	16.79
11	8.21	8.31	9.74	9.85	8.42	8.52	9.95	10.06	8.60	8.71	10.14	10.25	9.18	9.29	10.72	10.83
12	8.39	8.50	9.96	10.07	8.61	8.72	10.18	10.29	8.80	8.91	10.37	10.48	9.39	9.50	10.96	11.07
13	13.38	13.55	15.89	16.06	13.72	13.90	16.23	16.40	14.02	14.20	16.53	16.71	14.97	15.15	17.48	17.65
14	14.59	14.78	17.32	17.51	14.96	15.15	17.69	17.88	15.29	15.48	18.02	18.21	16.32	16.51	19.05	19.25
15	10.48	10.62	12.44	12.58	10.75	10.89	12.71	12.85	10.99	11.12	12.95	13.09	11.73	11.86	13.69	13.83
16	16.10	16.31	19.11	19.32	16.51	16.72	19.53	19.74	16.87	17.09	19.89	20.10	18.01	18.22	21.03	21.24

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ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT *ME1EE1	LENIENT ME1EE2	LENIENT ME2EE1	LENIENT ME2EE2	MODERATE 1 *ME1EE1	MODERATE 1 ME1EE2	MODERATE 1 ME2EE1	MODERATE 1 ME2EE2	MODERATE 2 *ME1EE1	MODERATE 2 ME1EE2	MODERATE 2 ME2EE1	MODERATE 2 ME2EE2	STRINGENT *ME1EE1	STRINGENT ME1EE2	STRINGENT ME2EE1	STRINGENT ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.46	0.46	0.57	0.57	0.46	0.48	0.57	0.57	0.46	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

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TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	11.33	10.72	11.48	10.86	11.11	10.47	11.30	10.64	11.13	10.49	11.37	10.69	11.51	10.84	11.79	11.08
2	15.03	13.53	14.70	13.20	14.82	13.31	14.54	13.01	14.87	13.36	14.64	13.08	15.29	13.75	15.10	13.52
3	14.17	12.93	14.03	12.79	13.97	12.72	13.88	12.61	14.02	12.77	13.98	12.69	14.45	13.18	14.45	13.14
4	12.11	11.25	12.13	11.26	11.98	11.11	12.04	11.15	11.96	11.08	12.05	11.14	12.21	11.31	12.34	11.41
5	11.77	11.25	12.19	11.65	11.68	11.14	12.13	11.56	11.68	11.13	12.16	11.58	12.00	11.43	12.52	11.92
6	16.35	15.47	17.04	16.14	16.31	15.41	17.04	16.11	16.36	15.46	17.12	16.19	16.87	15.95	17.67	16.72
7	11.68	11.29	12.22	11.82	11.58	11.18	12.16	11.73	11.58	11.17	12.19	11.75	11.92	11.48	12.56	12.10
8	13.97	13.15	13.86	13.03	13.72	12.89	13.64	12.80	13.61	12.78	13.58	12.73	13.82	12.98	13.84	12.98
9	25.20	23.01	24.72	22.51	24.91	22.70	24.49	22.26	24.82	22.61	24.45	22.21	25.25	23.02	24.94	22.68
10	20.04	18.94	21.03	19.93	20.08	18.97	21.11	19.99	20.44	19.32	21.49	20.36	21.36	20.22	22.44	21.29
11	18.63	17.23	18.19	16.76	18.31	16.85	17.92	16.47	18.18	16.74	17.82	16.37	18.39	16.94	18.09	16.61
12	20.09	18.39	19.44	17.74	19.75	18.04	19.15	17.43	19.60	17.88	19.04	17.31	19.80	18.08	19.30	17.55
13	33.51	29.90	32.33	28.72	33.18	29.57	32.05	28.43	33.07	29.45	32.00	28.36	33.55	29.92	32.54	28.88
14	38.50	35.18	36.06	32.72	37.46	34.11	35.18	31.78	36.95	33.57	34.79	31.37	37.02	33.63	35.02	31.55
15	17.33	16.13	18.21	17.01	17.44	16.24	18.33	17.13	17.57	16.38	18.48	17.28	18.20	17.00	19.12	17.92
16	33.19	31.19	33.04	31.03	32.65	30.65	32.56	30.56	32.41	30.41	32.39	30.38	32.88	30.87	32.92	30.91

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TLOAD - HED - ØØ2

HEATED CRAWLSPACE

ELEVATED FLOOR

DOUBLE STUD

Ø8/2Ø/82 15:32:1Ø

(82232) Friday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHDBLS"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHED"
TITLE IS"B:FMA"

ROW NUMBER:       5    LAT.= 59.6    DESIGN TEMP.= -5.1 F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
   121   333   758  1247  1581  1749  1596  1187   79Ø   436   175    63   BTU/FT2-DAY
  21.2  24.8  28.4  35.6  42.8  48.2  51.8  51.8  46.4  37.4  28.4  21.2   F
  1352  1123  1159   9ØØ   7Ø4   49Ø   394   391   54Ø   857  11Ø3  1352   F-DAYS

ROW NUMBER:      1Ø    LAT.= 58.4    DESIGN TEMP.= -4.Ø F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
   116   282   6Ø9  1Ø45  129Ø  1413  1277   983   638   32Ø   148    61   BTU/FT2-DAY
  23.Ø  28.4  32.Ø  39.2  46.4  53.6  55.4  53.6  5Ø.Ø  41.Ø  32.Ø  26.6   F
  1287  1Ø37  1Ø26   783   563   355   288   331   473   718   976  1168   F-DAYS

ROW NUMBER:      15    LAT.= 64.8    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    3Ø   221   673  1193  16Ø2  175Ø- 1541  1117   7Ø8   292    74     2   BTU/FT2-DAY
 -11.2  -2.2  1Ø.4  28.4  46.4  59.Ø  6Ø.8  55.4  44.6  24.8   3.2 -11.2   F
  2383  189Ø  1721  1Ø84   549   211   148   3Ø4   617  1235  1867  2336   F-DAYS

ROW NUMBER:      2Ø    LAT.= 51.5    DESIGN TEMP.= 19.9 F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
 [illegible]   431   715  1131  1170  1181  1119   946   758   527   3Ø7   187   BTU/FT2-DAY
  32.5  34.3  34.2  36.1  43.3  48.7  5Ø.Ø  49.6  49.5  42.8  36.9  35.1   F
  1ØØØ   854   982   6ØØ   67Ø   482   459   471   458   681   84Ø   924   F-DAYS

ROW NUMBER:      25    LAT.= 64.5    DESIGN TEMP.=-31.Ø F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    29   223   63Ø  1184  1571  1752  1413   992   672   3Ø5    64     2   BTU/FT2-DAY
   6.8   5.Ø   6.8  19.4  35.6  46.4  5Ø.Ø  5Ø.Ø  42.8  28.4  15.8   5.Ø   F
  1829  1674  1786  1382   936   585   463   49Ø   688  1132  1481  1879   F-DAYS

ROW NUMBER:      3Ø    LAT.= 66.9    DESIGN TEMP.=-51.Ø F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
    1Ø   172   615  1227  1697  1855  1561  1Ø74   671   251    4Ø     Ø   BTU/FT2-DAY
 -13.Ø  -7.6   1.4  21.2  41.Ø  55.4  57.2  51.8  39.2  19.4  -2.2 -13.Ø   F
  2425  2Ø38  1969  1336   722   27Ø   23Ø   4Ø7   751  1395  1993  2392   F-DAYS

ROW NUMBER:      35    LAT.= 71.3    DESIGN TEMP.=-45.Ø F     SIGMA=  Ø.   F
   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
     Ø    73   49Ø  1Ø49  1139  1526  1458   855   414   125     3     Ø   BTU/FT2-DAY
 -14.8 -18.4 -14.8  -Ø.4  19.4  33.8  39.2  37.4  3Ø.2  15.8  -Ø.4 -13.Ø   F
  2471  2342  2486  1976  1424   959   815   85Ø  1Ø4Ø  1541  1966  2396   F-DAYS
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ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	76344.	87775.	52043.	62942.	55510.	66142.	33200.	42745.	43870.	54117.	23681.	32236.	33915.	43177.	15846.	23210.
2	76344.	87775.	52043.	62942.	55510.	66142.	33200.	42745.	43870.	54117.	23681.	32236.	33915.	43177.	15846.	23210.
3	76344.	87775.	52043.	62942.	55510.	66142.	33200.	42745.	43870.	54117.	23681.	32236.	33915.	43177.	15846.	23210.
4	54995.	65197.	35189.	44441.	43314.	52922.	25234.	33368.	36195.	45076.	19412.	26981.	27912.	36082.	12940.	19606.
5	54995.	65197.	35189.	44441.	43314.	52922.	25234.	33368.	36195.	45076.	19412.	26981.	27912.	36082.	12940.	19606.
6	54995.	65197.	35189.	44441.	43314.	52922.	25234.	33368.	36195.	45076.	19412.	26981.	27912.	36082.	12940.	19606.
7	54995.	65197.	35189.	44441.	43314.	52922.	25234.	33368.	36195.	45076.	19412.	26981.	27912.	36082.	12940.	19606.
8	106252.	115427.	69563.	78191.	87918.	96689.	53264.	61195.	76000.	84528.	43213.	50759.	62287.	70507.	31566.	38884.
9	106252.	115427.	69563.	78191.	67918.	96689.	53264.	61195.	76000.	84528.	43213.	50759.	62287.	70507.	31566.	38884.
10	67543.	79215.	48504.	60004.	48521.	59735.	30724.	41502.	38151.	48931.	21705.	31713.	28863.	39022.	14001.	22906.
11	134026.	146160.	97066.	108944.	113591.	125409.	78513.	89723.	100161.	111682.	66651.	77638.	84444.	95583.	53360.	63407.
12	134026.	146160.	97066.	108944.	113591.	125409.	78513.	89723.	100161.	111682.	66651.	77638.	84444.	95583.	53360.	63407.
13	134026.	146160.	97066.	108944.	113591.	125409.	78513.	89723.	100161.	111682.	66651.	77638.	84444.	95583.	53360.	63407.
14	122716.	132848.	80663.	90103.	101821.	111553.	61951.	70871.	88251.	97621.	50482.	58945.	72643.	81639.	37561.	45182.
15	221739.	234726.	165150.	178116.	191801.	204762.	137390.	150307.	171312.	184242.	119152.	132010.	148065.	160941.	98139.	110876.
16	221739.	234726.	165150.	178116.	191801.	204762.	137390.	150307.	171312.	184242.	119152.	132010.	148065.	160941.	98139.	110876.

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ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

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ANNUAL ENERGY COST ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.23	4.52	4.06	3.34	4.77	4.04	3.64	2.89	4.51	3.77	3.42	2.65	4.29	3.53	3.25	2.45
2	8.45	6.86	6.70	5.10	7.99	6.38	6.28	4.65	7.73	6.12	6.07	4.42	7.51	5.87	5.89	4.21
3	7.50	6.17	5.92	4.58	7.04	5.69	5.50	4.13	6.78	5.42	5.29	3.89	6.56	5.18	5.12	3.69
4	5.46	4.53	4.26	3.31	5.21	4.26	4.04	3.06	5.05	4.08	3.91	2.92	4.87	3.89	3.77	2.76
5	4.25	3.63	3.27	2.63	4.00	3.37	3.06	2.40	3.85	3.20	2.94	2.26	3.67	3.01	2.80	2.10
6	5.80	4.79	4.53	3.50	5.54	4.51	4.31	3.25	5.37	4.33	4.18	3.10	5.19	4.13	4.03	2.94
7	3.84	3.36	2.93	2.42	3.58	3.08	2.71	2.18	3.42	2.91	2.58	2.03	3.24	2.71	2.44	1.87
8	6.34	5.43	4.82	3.90	5.95	5.03	4.47	3.54	5.69	4.77	4.26	3.31	5.40	4.47	4.01	3.06
9	12.70	10.34	9.90	7.53	12.16	9.80	9.43	7.04	11.82	9.44	9.14	6.74	11.42	9.04	8.80	6.39
10	7.19	5.92	5.73	4.46	6.74	5.47	5.32	4.04	6.50	5.22	5.11	3.81	6.29	4.99	4.93	3.61
11	9.81	8.27	7.75	6.21	9.33	7.79	7.31	5.75	9.02	7.47	7.04	5.47	8.65	7.09	6.73	5.14
12	[illegible]	9.21	8.76	6.94	10.56	8.74	8.33	6.46	10.03	8.43	8.01	6.12	9.54	8.00	7.66	5.51
13	19.18	15.42	15.35	11.56	18.57	14.78	14.80	10.99	18.17	14.37	14.44	10.63	17.70	13.89	14.05	10.22
14	22.69	19.16	17.78	13.82	21.40	17.85	16.24	12.64	20.57	17.00	15.54	11.91	19.62	16.03	14.75	11.07
15	6.20	4.87	5.01	3.67	6.06	4.72	4.87	3.54	5.96	4.62	4.76	3.45	5.84	4.51	4.68	3.35
16	15.92	13.70	12.57	10.36	15.05	12.83	11.77	9.55	14.45	12.24	11.24	9.02	13.78	11.56	10.63	8.41

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ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.78	5.87	7.03	7.12	5.99	6.08	7.24	7.33	6.28	6.36	7.53	7.62	6.88	6.97	8.14	8.23
2	6.23	6.33	7.58	7.68	6.46	6.55	7.81	7.91	6.77	6.86	8.12	8.22	7.42	7.52	8.78	8.87
3	6.32	6.42	7.69	7.79	6.55	6.65	7.93	8.02	6.87	6.96	8.24	8.34	7.53	7.63	8.90	9.00
4	6.35	6.43	7.51	7.59	6.45	6.53	7.62	7.70	6.59	6.67	7.75	7.83	7.04	7.12	8.20	8.28
5	7.20	7.30	8.52	8.62	7.32	7.42	8.64	8.74	7.48	7.57	8.80	8.89	7.99	8.08	9.31	9.40
6	10.12	10.25	11.98	12.11	10.29	10.42	12.15	12.28	10.51	10.64	12.36	12.49	11.22	11.35	13.08	13.21
7	7.51	7.60	8.88	8.98	7.63	7.73	9.01	9.10	7.79	7.89	9.17	9.26	8.32	8.42	9.70	9.79
8	7.26	7.35	8.59	8.68	7.38	7.47	8.71	8.80	7.54	7.63	8.86	8.96	8.05	8.14	9.38	9.47
9	11.94	12.09	14.13	14.28	12.14	12.29	14.32	14.48	12.39	12.54	14.58	14.73	13.23	13.39	15.42	15.58
10	12.35	12.52	14.66	14.83	12.76	12.92	15.07	15.23	13.35	13.51	15.66	15.82	14.50	14.66	16.81	16.97
11	[illegible]	8.52	9.97	10.04	8.53	8.64	10.07	10.18	8.71	8.82	10.25	10.36	9.31	9.41	10.84	10.95
12	8.58	8.69	10.16	10.27	8.73	8.84	10.31	10.41	8.91	9.02	10.48	10.57	9.52	9.63	11.09	11.20
13	13.69	13.86	16.19	16.37	13.91	14.09	16.42	16.60	14.20	14.38	16.71	16.89	15.17	15.35	17.68	17.86
14	14.92	15.11	17.65	17.85	15.17	15.36	17.90	18.09	15.49	15.68	18.22	18.41	16.54	16.73	19.28	19.47
15	10.72	10.86	12.69	12.82	10.90	11.04	12.86	13.00	11.13	11.27	13.09	13.23	11.89	12.02	13.85	13.99
16	16.47	16.68	19.48	19.70	16.74	16.95	19.76	19.97	17.09	17.30	20.11	20.32	18.26	18.47	21.27	21.48

TLOAD - HED - 002 - PAGE 6

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

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TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE
1	11.40	10.78	11.55	10.92	11.14	10.50	11.34	10.68	11.17	10.52	11.42	10.73	11.56	10.89	11.85	11.1
2	15.10	13.61	14.70	13.27	14.86	13.35	14.59	13.05	14.92	13.40	14.69	13.13	15.35	13.81	15.17	13.5
3	14.24	13.01	14.11	12.87	14.01	12.76	13.93	12.65	14.07	12.81	14.03	12.73	14.51	13.23	14.52	13.2
4	12.17	11.32	12.20	11.32	12.02	11.15	12.08	11.19	11.99	11.11	12.09	11.18	12.26	11.36	12.40	11.4
5	11.86	11.33	12.28	11.73	11.73	11.19	12.19	11.61	11.73	11.17	12.22	11.63	12.06	11.49	12.59	11.9
6	16.49	15.61	17.19	16.29	16.40	15.50	17.13	16.20	16.45	15.54	17.22	16.27	16.98	16.05	17.78	16.8
7	11.77	11.38	12.32	11.90	11.64	11.23	12.22	11.78	11.64	11.22	12.25	11.80	11.98	11.55	12.64	12.1
8	14.61	13.19	13.90	13.07	13.74	12.91	13.67	12.83	13.64	12.80	13.61	12.76	13.86	13.02	13.87	13.0
9	25.31	23.11	24.83	22.61	24.97	22.76	24.55	22.32	24.88	22.66	24.51	22.27	25.32	23.10	25.02	22.7
10	20.24	19.14	21.24	20.13	20.21	19.10	21.23	20.11	20.56	19.44	21.61	20.47	21.50	20.36	22.59	21.4
11	[illegible]	17.25	19.24	16.57	18.34	16.92	17.95	16.49	18.21	16.76	17.85	16.39	18.47	16.92	18.13	16.6
12	[illegible]	18.43	19.49	17.76	19.77	[illegible]	19.17	17.45	19.62	17.50	19.66	[illegible]	19.64	18.11	19.34	17.5
13	33.64	30.03	32.46	28.85	33.25	29.64	32.13	28.50	33.15	29.52	32.07	28.43	33.64	30.01	32.64	28.9
14	39.44	35.11	36.04	32.66	37.41	34.06	35.14	31.73	36.90	33.52	34.76	31.32	37.00	33.60	35.02	31.5
15	17.53	16.33	18.41	17.21	17.56	16.36	18.45	17.26	17.69	16.49	18.59	17.40	18.33	17.14	19.25	18.0
16	33.31	31.31	33.16	31.15	32.72	30.71	32.63	30.62	32.47	30.47	32.45	30.44	32.96	30.96	33.00	30.9

TLOAD - HED - 002 - PAGE 8

TLOAD — NHS — ØØ4

NO HEAT RECOVERY

HEATED CRAWLSPACE

SINGLE STUD WALL

10/01/82 15:16:07

(82274) Friday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHSGHC"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNHS"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

 1. CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW
 2. REFERENCE ANGLE WRT SOUTH............................     Ø.          DEGRE
 3. HEATED AIR VOLUME...................................147200.ØØ            F
 4. CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)... R AIRCHG
 5. NUMBER OF EXTERIOR WALLS............................     2.
 6. EXTERIOR WALL R-VALUE............................... R ARCH     FT2-HR-F/B
 7. WINDOW R-VALUE - DAYTIME............................ R ARCH     FT2-HR-F/B
 8. WINDOW R-VALUE - NIGHTTIME.......................... R ARCH     FT2-HR-F/B
 9. INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)    1.ØØ

***** WALLS *****                          1

 1. ORIENTATION WRT REFERENCE...........................     Ø.          DEGRE
 2. GROSS WALL AREA.....................................  6Ø8Ø.ØØ            F
 3. EXTERIOR WALL - R-VALUE............................. =PARBB(6) FT2-HR-F/B
 4. WINDOW - AREA.......................................     Ø.              F
 5. WINDOW - DAYTIME R-VALUE............................     Ø.     FT2-HR-F/B
 6. WINDOW - NIGHTTIME R-VALUE..........................     Ø.     FT2-HR-F/B
 7. WINDOW - % OF TIME SHADED...........................     Ø.
 8. DOOR - AREA.........................................   1ØØ.ØØ            F
 9. DOOR - R-VALUE......................................   R ARCH   FT2-HR-F/B

***** WALL  2 (DIRECT GAIN - PASSIVE) *****

 1. ORIENTATION WRT REFERENCE...........................     Ø.          DEGRE
 2. DIRECT GAIN WINDOW AREA.............................   327.ØØ            F
 3. NUMBER OF GLAZINGS (1 TO 3)......................... R ARCH
 4. DAYTIME GLAZING SYSTEM R-VALUE...................... =PARBB(7) FT2-HR-F/B
 5. NIGHTTIME GLAZING SYSTEM R-VALUE.................... =PARBB(8) FT2-HR-F/B
 6. OVERHANG SHADING? (1=YES,2=NO)......................    2.ØØ
 7.      WIDTH OF WINDOW................................     Ø.
 8.      PROJECTION OF OVERHANG.........................     Ø.
 9.      GAP BETWEEN OVERHANG AND WINDOW................     Ø.
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***** ROOF-FLOOR-BASEMENT-GARAGE *****

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 1. TOTAL CEILING AREA.................................. 8960.00             FT2
 2. CEILING R-VALUE..................................... R ARCH    FT2-HR-F/BTU
 3. BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).    2.00
 4. (FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...    2.00
 5. (FOR TYPE 1) PERIMETER OF SLAB......................   0.                 FT
 6. (FOR TYPE 1) R-VALUE OF EDGE INSULATION............   0.       FT2-HR-F/BTU
 7. (FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE..... 8960.00              FT2
 8. (FOR TYPE 2) FLOOR R-VALUE.......................... R ARCH    FT2-HR-F/BTU
 9. (FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......    1.00
10. (FOR TYPE 3) BASEMENT HEATED? (1=YES,2=N0).........   0.
11. (FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......   0.                 FT2
12. (FOR TYPE 3) FLOOR R-VALUE.........................=PARRFB(8) FT2-HR-F/BTU
13.(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).    4.00               FT
14.(TYPE2-3) BASEMENT/CRWLSP. WIDTH....................   80.00               FT
15.(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....   0.                 FT2
16.(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE. R ARCH     FT2-HR-F/BTU
17. (TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..  1536.00             FT2
18. (TYPE 2-3) BASEMENT/CRWLSP.WALL R-VALUE BELOW GRADE =PRFB(16) FT2-HR-F/BTU
25. HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......    2.00
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***** INTERNAL SPACE *****

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 1. THERMOSTAT SETTING - DAYTIME........................   70.00               F
 2. THERMOSTAT SETTING - NIGHT TIME.....................   60.00               F
 3. HOURS FOR NIGHT SETBACK.............................   12.60              HR
 4. ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......    7.00               F
 5. ANNUAL ELECTRICAL CONSUMPTION....................... =RMTT               KWH
 6. AVERAGE NUMBER OF OCCUPANTS.........................   38.00
 8. SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........   70.00               %
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ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	73451.	85023.	61405.	73000.	56317.	67191.	44980.	55799.	44354.	54859.	34082.	44112.	35646.	45275.	26116.	35198.
2	73451.	85023.	61405.	73000.	56317.	67191.	44980.	55799.	44354.	54859.	34082.	44112.	35646.	45275.	26116.	35198.
3	73451.	85023.	61405.	73000.	56317.	67191.	44980.	55799.	44354.	54859.	34082.	44112.	35646.	45275.	26116.	35198.
4	52246.	62489.	42462.	52573.	43715.	53541.	34722.	44176.	36422.	45533.	27913.	36789.	29164.	37600.	21516.	29501.
5	52246.	62489.	42462.	52573.	43715.	53541.	34722.	44176.	36422.	45533.	27913.	36789.	29164.	37600.	21516.	29501.
6	52246.	62489.	42462.	52573.	43715.	53541.	34722.	44176.	36422.	45533.	27913.	36789.	29164.	37600.	21516.	29501.
7	52246.	62489.	42462.	52573.	43715.	53541.	34722.	44176.	36422.	45533.	27913.	36789.	29164.	37600.	21516.	29501.
8	101648.	110964.	81503.	90664.	88474.	97462.	69273.	78128.	76280.	85018.	58057.	66593.	64474.	72905.	47529.	55394.
9	101648.	110964.	81503.	90664.	88474.	97462.	69273.	78128.	76280.	85018.	58057.	66593.	64474.	72905.	47529.	55394.
10	65166.	76945.	56529.	68403.	49255.	60648.	41129.	52589.	38628.	49610.	31059.	42057.	30355.	40866.	23368.	33815.
11	130335.	142609.	110910.	123313.	115150.	127232.	96531.	108659.	101330.	113163.	83667.	95509.	87585.	99096.	71030.	82386.
12	130335.	142609.	110910.	123313.	115150.	127232.	96531.	108659.	101330.	113163.	83667.	95509.	87585.	99096.	71030.	82386.
13	130335.	142609.	110910.	123313.	115150.	127232.	96531.	108659.	101330.	113163.	83667.	95509.	87585.	99096.	71030.	82386.
14	117892.	128151.	94607.	104750.	102804.	112711.	80686.	90332.	88908.	98553.	67873.	77225.	75392.	84669.	55570.	64593.
15	217021.	230035.	186011.	199031.	194845.	207844.	165139.	178143.	173904.	186882.	145541.	158525.	153647.	166598.	126588.	139544.
16	217021.	230035.	186011.	199031.	194845.	207844.	165139.	178143.	173904.	186882.	145541.	158525.	153647.	166598.	126598.	139544.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.17	4.46	4.27	3.56	4.79	4.06	3.90	3.18	4.52	3.79	3.66	2.92	4.32	3.58	3.48	2.72
2	8.39	6.80	6.91	5.32	8.01	6.41	6.54	4.94	7.74	6.13	6.30	4.68	7.55	5.92	6.12	4.48
3	7.44	6.11	6.13	4.80	7.06	5.71	5.76	4.42	6.79	5.44	5.52	4.16	6.60	5.23	5.34	3.96
4	5.40	4.47	4.42	3.49	5.21	4.27	4.25	3.30	5.05	4.09	4.10	3.14	4.89	3.92	3.96	2.98
5	4.19	3.57	3.43	2.81	4.01	3.38	3.26	2.63	3.85	3.21	3.12	2.47	3.70	3.04	2.98	2.31
6	5.74	4.73	4.70	3.68	5.54	4.52	4.52	3.49	5.38	4.34	4.37	3.33	5.21	4.16	4.22	3.16
7	3.78	3.30	3.09	2.60	3.59	3.10	2.92	2.42	3.43	2.92	2.77	2.25	3.27	2.74	2.63	2.09
8	6.24	5.33	5.08	4.17	5.96	5.04	4.82	3.90	5.70	4.78	4.58	3.65	5.44	4.52	4.35	3.41
9	12.56	10.21	10.25	7.90	12.18	9.82	9.90	7.53	11.82	9.46	9.57	7.20	11.48	9.11	9.26	6.87
10	7.12	5.86	5.92	4.66	6.76	5.49	5.56	4.29	6.51	5.23	5.33	4.05	6.32	5.03	5.15	3.86
11	9.72	8.19	8.07	6.54	9.37	7.83	7.74	6.20	9.05	7.50	7.43	5.89	8.73	7.17	7.14	5.58
12	10.98	9.17	9.10	7.30	10.60	8.79	8.75	6.93	10.26	8.44	8.43	6.61	9.92	8.09	8.11	6.28
13	19.07	15.29	15.76	11.99	18.62	14.83	15.34	11.55	18.20	14.41	14.95	11.16	17.79	13.99	14.57	10.77
14	22.39	18.87	18.24	14.71	21.46	17.92	17.39	13.83	20.61	17.06	16.60	13.03	19.79	16.21	15.85	12.26
15	6.18	4.85	5.11	3.77	6.07	4.74	5.01	3.67	5.97	4.64	4.91	3.58	5.87	4.54	4.82	3.48
16	15.78	13.57	13.18	10.96	15.14	12.92	12.57	10.36	14.53	12.31	12.00	9.79	13.94	11.73	11.45	9.24

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.48	4.57	5.65	5.74	4.68	4.77	5.85	5.93	4.98	5.07	6.15	6.24	5.55	5.63	6.71	6.80
2	4.83	4.93	6.09	6.19	5.05	5.14	6.30	6.40	5.37	5.47	6.63	6.73	5.98	6.08	7.24	7.33
3	4.90	5.00	6.18	6.27	5.12	5.22	6.40	6.49	5.45	5.55	6.73	6.83	6.07	6.16	7.35	7.44
4	5.15	5.23	6.23	6.31	5.24	5.32	6.32	6.40	5.39	5.47	6.47	6.55	5.80	5.88	6.88	6.96
5	5.84	5.93	7.07	7.16	5.95	6.04	7.17	7.27	6.12	6.21	7.34	7.44	6.58	6.67	7.81	7.90
6	8.21	8.34	9.93	10.06	8.36	8.49	10.08	10.21	8.60	8.73	10.32	10.45	9.25	9.38	10.97	11.10
7	6.09	6.18	7.37	7.46	6.20	6.29	7.48	7.57	6.37	6.47	7.65	7.75	6.86	6.95	8.14	8.23
8	5.89	5.98	7.12	7.22	5.99	6.09	7.23	7.32	6.16	6.26	7.40	7.49	6.63	6.73	7.87	7.96
9	9.68	9.83	11.71	11.87	9.85	10.01	11.89	12.04	10.14	10.29	12.17	12.32	10.91	11.06	12.94	13.09
10	9.96	10.13	12.11	12.28	10.35	10.51	12.53	12.66	10.97	11.13	13.12	13.28	12.04	12.20	14.19	14.35
11	6.81	6.91	8.24	8.34	6.93	7.04	8.36	8.47	7.13	7.24	8.56	8.67	7.67	7.78	9.10	9.21
12	6.96	7.07	8.42	8.53	7.09	7.20	8.55	8.66	7.29	7.40	8.75	8.86	7.84	7.95	9.30	9.41
13	11.10	11.27	13.43	13.60	11.30	11.47	13.63	13.80	11.62	11.80	13.95	14.13	12.50	12.68	14.83	15.01
14	12.10	12.29	14.64	14.83	12.32	12.51	14.86	15.05	12.67	12.86	15.21	15.40	13.63	13.82	16.17	16.36
15	8.69	8.83	10.52	10.66	8.85	8.99	10.68	10.81	9.10	9.24	10.93	11.07	9.79	9.93	11.62	11.76
16	13.35	13.56	16.16	16.37	13.59	13.80	16.40	16.61	13.98	14.19	16.79	17.00	15.04	15.25	17.85	18.06

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.03	9.42	10.37	9.75	9.85	9.22	10.20	9.57	9.89	9.25	10.27	9.61	10.26	9.60	10.65	9.98
2	13.64	12.15	13.49	12.00	13.47	11.96	13.34	11.83	13.53	12.02	13.43	11.90	13.95	12.41	13.86	12.31
3	12.76	11.53	12.81	11.58	12.60	11.35	12.66	11.41	12.67	11.41	12.75	11.49	13.09	11.81	13.19	11.90
4	10.91	10.05	11.08	10.22	10.81	9.95	11.00	10.13	10.80	9.92	11.00	10.12	11.05	10.16	11.27	10.36
5	10.44	9.91	10.98	10.45	10.36	9.82	10.92	10.38	10.38	9.82	10.95	10.39	10.68	10.12	11.27	10.70
6	14.52	13.64	15.31	14.42	14.47	13.58	15.28	14.38	14.55	13.64	15.37	14.46	15.03	14.11	15.87	14.94
7	10.29	9.90	10.96	10.57	10.21	9.81	10.90	10.49	10.23	9.81	10.93	10.50	10.55	10.12	11.27	10.83
8	12.54	11.72	12.69	11.87	12.36	11.54	12.53	11.71	12.27	11.44	12.47	11.63	12.49	11.65	12.71	11.86
9	22.92	20.72	22.77	20.56	22.71	20.50	22.58	20.37	22.63	20.42	22.54	20.32	23.06	20.84	23.00	20.76
10	17.83	16.70	18.87	17.78	17.81	16.71	18.90	17.79	18.19	17.07	19.29	18.17	19.07	17.94	20.18	19.05
11	17.00	15.58	16.87	15.44	16.77	15.34	16.66	15.22	16.65	15.21	16.56	15.12	16.87	15.42	16.80	15.35
12	18.42	16.72	18.10	16.41	18.17	16.47	17.87	16.17	18.03	16.32	17.75	16.04	18.24	16.52	17.99	16.27
13	30.94	27.34	30.11	26.51	30.69	27.08	29.88	26.27	30.60	26.98	29.82	26.21	31.07	27.44	30.32	26.69
14	35.33	32.00	33.88	30.54	34.62	31.27	33.24	29.88	34.13	30.76	32.81	29.43	34.26	30.87	33.02	29.62
15	15.48	14.28	16.35	15.15	15.53	14.33	16.40	15.20	15.68	14.48	16.56	15.36	16.27	15.07	17.16	15.96
16	30.06	28.06	30.44	28.43	29.66	27.65	30.07	28.07	29.44	27.44	29.89	27.89	29.91	27.91	30.40	28.40

TLOAD - NHE -ØØ4

NO HEAT RECOVERY

HEATED CRAWLSPACE

EXTERIOR FOAM

10/05/82   09:55:52

(82278)   Tuesday

TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHFMHC"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNHE"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

1.	CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW		
2.	REFERENCE ANGLE WRT SOUTH..........................	Ø.	DEGRE
3.	HEATED AIR VOLUME..................................	147200.00	F
4.	CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)...	R AIRCHG	
5.	NUMBER OF EXTERIOR WALLS...........................	2.	
6.	EXTERIOR WALL R-VALUE..............................	R ARCH	FT2-HR-F/B
7.	WINDOW R-VALUE - DAYTIME...........................	R ARCH	FT2-HR-F/B
8.	WINDOW R-VALUE - NIGHTTIME.........................	R ARCH	FT2-HR-F/B
9.	INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)	1.00	

***** WALLS ***** 1

1.	ORIENTATION WRT REFERENCE..........................	Ø.	DEGRE
2.	GROSS WALL AREA....................................	6080.00	F
3.	EXTERIOR WALL - R-VALUE............................	=PARBB(6)	FT2-HR-F/B
4.	WINDOW - AREA......................................	Ø.	F
5.	WINDOW - DAYTIME R-VALUE...........................	Ø.	FT2-HR-F/B
6.	WINDOW - NIGHTTIME R-VALUE.........................	Ø.	FT2-HR-F/B
7.	WINDOW - % OF TIME SHADED..........................	Ø.	
8.	DOOR - AREA..	100.00	F
9.	DOOR - R-VALUE.....................................	R ARCH	FT2-HR-F/B

***** WALL 2 (DIRECT GAIN - PASSIVE) *****

1.	ORIENTATION WRT REFERENCE..........................	Ø.	DEGRE
2.	DIRECT GAIN WINDOW AREA............................	327.00	F
3.	NUMBER OF GLAZINGS (1 TO 3)........................	R ARCH	
4.	DAYTIME GLAZING SYSTEM R-VALUE.....................	=PARBB(7)	FT2-HR-F/B
5.	NIGHTTIME GLAZING SYSTEM R-VALUE...................	=PARBB(8)	FT2-HR-F/B
6.	OVERHANG SHADING? (1=YES,2=NO).....................	2.00	
7.	WIDTH OF WINDOW....................................	Ø.	
8.	PROJECTION OF OVERHANG.............................	Ø.	
9.	GAP BETWEEN OVERHANG AND WINDOW....................	Ø.	

TLOAD — NHE — 004 PAGE 2

***** ROOF-FLOOR-BASEMENT-GARAGE *****

1.	TOTAL CEILING AREA..	8960.00	FT2
2.	CEILING R-VALUE...	R ARCH	FT2-HR-F/BTU
3.	BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).	2.00	
4.	(FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...	2.00	
5.	(FOR TYPE 1) PERIMETER OF SLAB......................	0.	FT
6.	(FOR TYPE 1) R-VALUE OF EDGE INSULATION...........	0.	FT2-HR-F/BTU
7.	(FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE.....	8960.00	FT2
8.	(FOR TYPE 2) FLOOR R-VALUE..........................	R ARCH	FT2-HR-F/BTU
9.	(FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......	1.00	
10.	(FOR TYPE 3) BASEMENT HEATED? (1=YES,2=N0).........	0.	
11.	(FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......	0.	FT2
12.	(FOR TYPE 3) FLOOR R-VALUE..........................	=PARRFB(8)	FT2-HR-F/BTU
13.	(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).	4.00	FT
14.	(TYPE2-3) BASEMENT/CRWLSP. WIDTH....................	80.00	FT
15.	(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....	0.	FT2
16.	(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE.	R ARCH	FT2-HR-F/BTU
17.	(TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..	1536.00	FT2
18.	(TYPE 2-3) BASEMENT/CRWLSP WALL R-VALUE BELOW GRADE	=PRFB(16)	FT2-HR-F/BTU
25.	HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......	2.00	

***** INTERNAL SPACE *****

1.	THERMOSTAT SETTING - DAYTIME........................	70.00	F
2.	THERMOSTAT SETTING - NIGHT TIME.....................	60.00	F
3.	HOURS FOR NIGHT SETBACK.............................	12.60	HR
4.	ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......	7.00	F
5.	ANNUAL ELECTRICAL CONSUMPTION.......................	=RMTT	KWH
6.	AVERAGE NUMBER OF OCCUPANTS.........................	38.00	
8.	SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........	70.00	%

ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	492	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	73457.	85029.	61411.	73006.	54559.	65347.	43205.	53949.	44005.	54479.	33741.	43732.	35932.	45590.	26390.	35501.
2	73457.	85029.	61411.	73006.	54559.	65347.	43205.	53949.	44005.	54479.	33741.	43732.	35932.	45590.	26390.	35501.
3	73457.	85029.	61411.	73006.	54559.	65347.	43205.	53949.	44005.	54479.	33741.	43732.	35932.	45590.	26390.	35501.
4	52251.	62494.	42466.	52578.	42299.	51965.	33273.	42598.	36132.	45209.	27621.	36474.	29414.	37869.	21745.	29756.
5	52251.	62494.	42466.	52578.	42299.	51965.	33273.	42598.	36132.	45209.	27621.	36474.	29414.	37869.	21745.	29756.
6	52251.	62494.	42466.	52578.	42299.	51965.	33273.	42598.	36132.	45209.	27621.	36474.	29414.	37869.	21745.	29756.
7	52251.	62494.	42466.	52578.	42299.	51965.	33273.	42598.	36132.	45209.	27621.	36474.	29414.	37869.	21745.	29756.
8	101655.	110972.	81511.	90672.	86047.	94982.	66865.	75655.	75777.	84502.	57567.	66079.	64888.	73338.	47933.	55825.
9	101655.	110972.	81511.	90672.	86047.	94982.	66865.	75655.	75777.	84502.	57567.	66079.	64888.	73338.	47933.	55825.
10	65171.	76950.	56534.	68408.	47756.	59108.	39632.	51043.	38323.	49292.	30756.	41738.	30604.	41133.	23614.	34083.
11	130343.	142617.	110918.	123322.	112606.	124646.	93990.	106053.	100803.	112624.	83142.	94965.	88026.	99561.	71466.	82842.
12	130343.	142617.	110918.	123322.	112606.	124646.	93990.	106053.	100903.	112624.	83142.	94965.	88026.	99561.	71466.	82842.
13	130343.	142617.	110918.	123322.	112606.	124646.	93990.	106053.	100803.	112624.	83142.	94965.	88026.	99561.	71466.	82842.
14	117901.	128160.	94616.	104759.	100044.	109902.	77952.	87519.	88326.	97963.	67307.	76647.	75872.	85161.	56042.	65090.
15	217033.	230047.	186023.	199042.	191118.	204114.	161411.	174413.	173125.	186103.	144762.	157745.	154307.	167259.	127249.	140205.
16	217033.	230047.	186023.	199042.	191118.	204114.	161411.	174413.	173125.	186103.	144762.	157745.	154307.	167259.	127249.	140205.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

CR	LENIENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.17	4.46	4.27	3.56	4.75	4.02	3.86	3.14	4.51	3.78	3.65	2.91	4.33	3.58	3.48	2.72
2	8.39	6.80	6.91	5.32	7.97	6.37	6.50	4.90	7.73	6.12	6.29	4.67	7.55	5.93	6.13	4.49
3	7.44	6.11	6.13	4.80	7.02	5.67	5.72	4.38	6.78	5.43	5.51	4.15	6.60	5.23	5.35	3.97
4	5.40	4.47	4.42	3.49	5.18	4.24	4.22	3.27	5.05	4.09	4.10	3.13	4.90	3.93	3.97	2.98
5	4.19	3.57	3.43	2.81	3.98	3.35	3.23	2.59	3.85	3.20	3.11	2.46	3.70	3.04	2.99	2.32
6	5.74	4.73	4.70	3.68	5.51	4.49	4.49	3.46	5.37	4.34	4.36	3.32	5.22	4.17	4.23	3.17
7	3.78	3.30	3.09	2.60	3.56	3.06	2.89	2.38	3.42	2.91	2.76	2.25	3.27	2.75	2.63	2.10
8	6.24	5.33	5.08	4.17	5.91	4.99	4.77	3.85	5.69	4.77	4.57	3.64	5.45	4.53	4.36	3.42
9	12.56	10.21	10.25	7.90	12.11	9.75	9.83	7.46	11.81	9.44	9.55	7.18	11.49	9.12	9.27	6.88
10	7.12	5.86	5.92	4.66	6.72	5.45	5.53	4.26	6.50	5.22	5.32	4.04	6.33	5.04	5.15	3.86
11	9.72	8.19	8.07	6.54	9.31	7.77	7.68	6.13	9.03	7.49	7.42	5.88	8.74	7.18	7.15	5.59
12	10.98	9.17	9.10	7.30	10.54	8.72	8.68	6.87	10.24	8.42	8.41	6.59	9.93	8.10	8.12	6.29
13	19.07	15.29	15.76	11.99	18.54	14.76	15.26	11.48	18.19	14.40	14.94	11.14	17.81	14.01	14.59	10.78
14	22.39	18.87	18.24	14.71	21.29	17.75	17.22	13.66	20.58	17.02	16.57	12.99	19.82	16.24	15.88	12.29
15	6.18	4.85	5.11	3.77	6.05	4.72	4.99	3.65	5.97	4.63	4.91	3.57	5.88	4.54	4.82	3.49
16	15.78	13.57	13.18	10.96	15.03	12.81	12.46	10.25	14.51	12.29	11.98	9.77	13.96	11.75	11.47	9.26

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.48	4.57	5.65	5.73	4.70	4.79	5.87	5.96	4.98	5.07	6.15	6.24	5.49	5.58	6.66	6.75
2	4.83	4.92	6.09	6.18	5.07	5.17	6.33	6.43	5.37	5.47	6.63	6.73	5.92	6.02	7.18	7.28
3	4.90	5.00	6.18	6.27	5.15	5.24	6.42	6.52	5.45	5.55	6.73	6.82	6.01	6.10	7.28	7.38
4	5.15	5.23	6.23	6.31	5.26	5.34	6.34	6.43	5.39	5.47	6.47	6.55	5.75	5.83	6.83	6.91
5	5.84	5.93	7.07	7.16	5.97	6.06	7.20	7.29	6.12	6.21	7.34	7.44	6.52	6.61	7.75	7.84
6	8.21	8.34	9.93	10.06	8.39	8.52	10.12	10.25	8.59	8.72	10.32	10.45	9.17	9.30	10.89	11.02
7	6.09	6.18	7.36	7.46	6.22	6.32	7.50	7.60	6.37	6.47	7.65	7.75	6.80	6.89	8.08	8.17
8	5.89	5.98	7.12	7.22	6.02	6.11	7.26	7.35	6.16	6.26	7.40	7.49	6.57	6.67	7.81	7.90
9	9.68	9.83	11.71	11.86	9.90	10.05	11.93	12.08	10.14	10.29	12.17	12.32	10.81	10.96	12.84	13.00
10	9.96	10.12	12.11	12.27	10.39	10.55	12.54	12.70	10.96	11.13	13.11	13.27	11.94	12.10	14.09	14.25
11	6.81	6.91	8.24	8.34	6.96	7.07	8.39	8.50	7.13	7.23	8.56	8.66	7.60	7.71	9.03	9.14
12	6.96	7.07	8.42	8.53	7.12	7.23	8.58	8.69	7.29	7.40	8.75	8.86	7.77	7.88	9.23	9.34
13	11.09	11.27	13.43	13.60	11.35	11.52	13.68	13.85	11.62	11.79	13.95	14.13	12.39	12.57	14.72	14.90
14	12.10	12.29	14.64	14.83	12.37	12.56	14.91	15.10	12.67	12.86	15.21	15.40	13.51	13.70	16.05	16.24
15	8.69	8.83	10.52	10.66	8.89	9.03	10.71	10.85	9.10	9.24	10.93	11.07	9.71	9.85	11.53	11.67
16	13.35	13.56	16.15	16.37	13.65	13.86	16.46	16.67	13.98	14.19	16.79	17.00	14.91	15.12	17.72	17.93

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.03	9.41	10.37	9.75	9.84	9.20	10.19	9.55	9.88	9.24	10.26	9.60	10.21	9.55	10.60	9.93
2	13.64	12.14	13.49	12.00	13.46	11.95	13.33	11.82	13.52	12.01	13.42	11.89	13.89	12.36	13.80	12.26
3	12.76	11.53	12.81	11.57	12.59	11.34	12.65	11.40	12.66	11.40	12.74	11.48	13.03	11.76	13.14	11.85
4	10.91	10.05	11.08	10.22	10.86	9.94	10.99	10.12	10.79	9.92	10.99	10.11	11.00	10.11	11.22	10.32
5	10.44	9.91	10.98	10.45	10.36	9.82	10.91	10.37	10.37	9.82	10.94	10.38	10.63	10.07	11.22	10.64
6	14.51	13.63	15.31	14.42	14.48	13.58	15.28	14.38	14.54	13.63	15.36	14.45	14.96	14.04	15.80	14.87
7	10.29	9.90	10.96	10.57	10.21	9.80	10.89	10.48	10.22	9.80	10.92	10.50	10.49	10.06	11.21	10.77
8	12.54	11.72	12.69	11.87	12.34	11.51	12.51	11.68	12.26	11.43	12.45	11.62	12.44	11.60	12.66	11.81
9	22.91	20.72	22.76	20.56	22.68	20.47	22.56	20.34	22.62	20.40	22.52	20.30	22.97	20.75	22.92	20.68
10	17.80	16.70	18.87	17.78	17.82	16.71	18.91	17.80	18.18	17.06	19.28	18.16	18.97	17.85	20.09	18.96
11	17.00	15.57	16.87	15.44	16.74	15.31	16.63	15.19	16.63	15.20	16.54	15.10	16.81	15.36	16.74	15.29
12	18.42	16.72	18.10	16.40	18.14	16.43	17.84	16.13	18.01	16.30	17.74	16.03	18.18	16.47	17.93	16.21
13	30.94	27.33	30.11	26.51	30.66	27.05	29.85	26.24	30.59	26.96	29.80	26.19	30.97	27.35	30.23	26.60
14	35.32	32.00	33.87	30.54	34.51	31.16	33.13	29.76	34.09	30.72	32.78	29.39	34.17	30.78	32.93	29.53
15	15.48	14.28	16.35	15.15	15.55	14.35	16.42	15.22	15.67	14.48	16.55	15.36	16.19	14.99	17.07	15.88
16	30.06	28.05	30.43	28.43	29.61	27.61	30.02	28.02	29.41	27.41	29.87	27.87	29.80	27.80	30.29	28.29

TLOAD - NHD - ØØ4

NO HEAT RECOVERY

HEATED CRAWLSPACE

DOUBLE STUD

10/05/82   10:16:08

(10.268)   (82278)   Tuesday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHDBHC"
TITLE IS"B:AIRCHGNR"
TITLE IS"B:FCOSTNHD"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

 1. CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW
 2. REFERENCE ANGLE WRT SOUTH...........................     Ø.          DEGRE
 3. HEATED AIR VOLUME...............................147200.ØØ              F
 4. CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)... R AIRCHG
 5. NUMBER OF EXTERIOR WALLS............................    2.
 6. EXTERIOR WALL R-VALUE............................... R ARCH     FT2-HR-F/B
 7. WINDOW R-VALUE - DAYTIME............................ R ARCH     FT2-HR-F/B
 8. WINDOW R-VALUE - NIGHTTIME.......................... R ARCH     FT2-HR-F/B
 9. INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)     1.ØØ

***** WALLS *****                              1

 1. ORIENTATION WRT REFERENCE...........................     Ø.          DEGRE
 2. GROSS WALL AREA.....................................  6080.ØØ            F
 3. EXTERIOR WALL - R-VALUE............................. =PARBB(6) FT2-HR-F/B
 4. WINDOW - AREA.......................................     Ø.              F
 5. WINDOW - DAYTIME R-VALUE............................     Ø.     FT2-HR-F/B
 6. WINDOW - NIGHTTIME R-VALUE..........................     Ø.     FT2-HR-F/B
 7. WINDOW - % OF TIME SHADED...........................     Ø.
 8. DOOR - AREA.........................................   1ØØ.ØØ            F
 9. DOOR - R-VALUE......................................   R ARCH   FT2-HR-F/B

***** WALL  2 (DIRECT GAIN - PASSIVE) *****

 1. ORIENTATION WRT REFERENCE...........................     Ø.          DEGRE
 2. DIRECT GAIN WINDOW AREA.............................   327.ØØ            F
 3. NUMBER OF GLAZINGS (1 TO 3)......................... R ARCH
 4. DAYTIME GLAZING SYSTEM R-VALUE...................... =PARBB(7) FT2-HR-F/B
 5. NIGHTTIME GLAZING SYSTEM R-VALUE.................... =PARBB(8) FT2-HR-F/B
 6. OVERHANG SHADING? (1=YES,2=NO)......................    2.ØØ
 7.      WIDTH OF WINDOW................................     Ø.
 8.      PROJECTION OF OVERHANG.........................     Ø.
 9.      GAP BETWEEN OVERHANG AND WINDOW................     Ø.
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***** ROOF-FLOOR-BASEMENT-GARAGE *****

1.	TOTAL CEILING AREA......................................	8960.00	FT2
2.	CEILING R-VALUE..	R ARCH	FT2-HR-F/BTU
3.	BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).	2.00	
4.	(FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...	2.00	
5.	(FOR TYPE 1) PERIMETER OF SLAB......................	0.	FT
6.	(FOR TYPE 1) R-VALUE OF EDGE INSULATION...........	0.	FT2-HR-F/BTU
7.	(FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE.....	8960.00	FT2
8.	(FOR TYPE 2) FLOOR R-VALUE.........................	R ARCH	FT2-HR-F/BTU
9.	(FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......	1.00	
10.	(FOR TYPE 3) BASEMENT HEATED? (1=YES,2=NO).........	0.	
11.	(FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......	0.	FT2
12.	(FOR TYPE 3) FLOOR R-VALUE.........................	=PARRFB(8)	FT2-HR-F/BTU
13.	(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).	4.00	FT
14.	(TYPE2-3) BASEMENT/CRWLSP. WIDTH....................	80.00	FT
15.	(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....	0.	FT2
16.	(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE.	R ARCH	FT2-HR-F/BTU
17.	(TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..	1536.00	FT2
18.	(TYPE 2-3) BASEMENT/CRWLSP WALL R-VALUE BELOW GRADE	=PRFB(16)	FT2-HR-F/BTU
25.	HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......	2.00	

***** INTERNAL SPACE *****

1.	THERMOSTAT SETTING - DAYTIME........................	70.00	F
2.	THERMOSTAT SETTING - NIGHT TIME.....................	60.00	F
3.	HOURS FOR NIGHT SETBACK.............................	12.60	HR
4.	ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......	7.00	F
5.	ANNUAL ELECTRICAL CONSUMPTION.......................	=RMTT	KWH
6.	AVERAGE NUMBER OF OCCUPANTS.........................	38.00	
8.	SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........	70.00	%

ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	69279.	80723.	57246.	68693.	51822.	62518.	40536.	51120.	41613.	51855.	31385.	41113.	33585.	43000.	24186.	33027.
2	69279.	80723.	57246.	68693.	51822.	62518.	40536.	51120.	41613.	51855.	31385.	41113.	33585.	43000.	24186.	33027.
3	69279.	80723.	57246.	68693.	51822.	62518.	40536.	51120.	41613.	51855.	31385.	41113.	33585.	43000.	24186.	33027.
4	48759.	58854.	39042.	48926.	40139.	49554.	31101.	40201.	34113.	42969.	25655.	34267.	27442.	35727.	19865.	27666.
5	48759.	58854.	39042.	48926.	40139.	49554.	31101.	40201.	34113.	42969.	25655.	34267.	27442.	35727.	19865.	27666.
6	48759.	58854.	39042.	48926.	40139.	49554.	31101.	40201.	34113.	42969.	25655.	34267.	27442.	35727.	19865.	27666.
7	48759.	58854.	39042.	48926.	40139.	49554.	31101.	40201.	34113.	42969.	25655.	34267.	27442.	35727.	19865.	27666.
8	96019.	105174.	75910.	84955.	82328.	91175.	63172.	71860.	72304.	80932.	54191.	62525.	61474.	69772.	44601.	52299.
9	96019.	105174.	75910.	84955.	82328.	91175.	63172.	71860.	72304.	80932.	54191.	62525.	61474.	69772.	44601.	52299.
10	61672.	73380.	53028.	64827.	45465.	56744.	37344.	48669.	36218.	47088.	28666.	39525.	28560.	38931.	21604.	31876.
11	124444.	136661.	104944.	117348.	108615.	120670.	90097.	102059.	97099.	108889.	79513.	91212.	84405.	95748.	67831.	79090.
12	124444.	136661.	104944.	117348.	108615.	120670.	90097.	102059.	97099.	108889.	79513.	91212.	84405.	95748.	67831.	79090.
13	124444.	136661.	104944.	117348.	108615.	120670.	90097.	102059.	97099.	108889.	79513.	91212.	84405.	95748.	67831.	79090.
14	111432.	121567.	88258.	98149.	95762.	105586.	73761.	83201.	84320.	93878.	63395.	72646.	71927.	81111.	52218.	61071.
15	208466.	221475.	177455.	190470.	185385.	198377.	155678.	168676.	167726.	180698.	139363.	152340.	148862.	161805.	121804.	134750.
16	208466.	221475.	177455.	190470.	185385.	198377.	155678.	168676.	167726.	180698.	139363.	152340.	148862.	161805.	121804.	134750.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.07	4.37	4.17	3.46	4.69	3.96	3.80	3.07	4.46	3.72	3.60	2.85	4.28	3.53	3.44	2.67
2	8.30	6.71	6.82	5.23	7.91	6.30	6.44	4.84	7.68	6.06	6.24	4.61	7.50	5.87	6.08	4.43
3	7.34	6.01	6.03	4.70	6.96	5.61	5.66	4.31	6.73	5.37	5.46	4.09	6.55	5.18	5.30	3.91
4	5.33	4.39	4.35	3.41	5.14	4.18	4.17	3.21	5.00	4.04	4.05	3.08	4.86	3.88	3.92	2.94
5	4.12	3.49	3.36	2.73	3.93	3.29	3.19	2.54	3.80	3.15	3.07	2.42	3.66	3.00	2.95	2.27
6	5.66	4.64	4.62	3.60	5.46	4.43	4.44	3.40	5.33	4.28	4.32	3.27	5.18	4.12	4.19	3.12
7	3.70	3.21	3.02	2.52	3.51	3.01	2.84	2.33	3.38	2.86	2.72	2.20	3.23	2.70	2.59	2.05
8	6.12	5.21	4.96	4.05	5.83	4.91	4.69	3.77	5.61	4.69	4.49	3.57	5.38	4.45	4.29	3.35
9	12.40	10.05	10.09	7.73	12.00	9.64	9.72	7.35	11.71	9.34	9.46	7.08	11.39	9.01	9.18	6.78
10	7.04	5.78	5.84	4.57	6.67	5.40	5.47	4.20	6.46	5.17	5.27	3.99	6.28	4.98	5.11	3.81
11	9.59	8.05	7.93	6.40	9.22	7.68	7.58	6.04	8.95	7.40	7.34	5.79	8.65	7.09	7.06	5.50
12	10.83	9.02	8.96	7.15	10.44	8.62	8.59	6.77	10.15	8.33	8.32	6.50	9.84	8.00	8.03	6.20
13	18.89	15.12	15.59	11.81	18.42	14.64	15.14	11.36	18.08	14.29	14.83	11.03	17.70	13.89	14.48	10.67
14	21.99	18.47	17.85	14.31	21.03	17.49	16.96	13.40	20.33	16.77	16.33	12.75	19.58	15.99	15.65	12.04
15	6.14	4.80	5.07	3.73	6.03	4.69	4.96	3.63	5.94	4.61	4.88	3.55	5.85	4.51	4.80	3.46
16	15.53	13.32	12.93	10.71	14.86	12.65	12.30	10.08	14.35	12.14	11.82	9.61	13.80	11.59	11.31	9.10

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.63	4.72	5.80	5.89	4.80	4.89	5.97	6.05	5.07	5.16	6.24	6.33	5.59	5.68	6.76	6.85
2	5.00	5.09	6.26	6.35	5.18	5.27	6.43	6.53	5.47	5.57	6.73	6.82	6.03	6.13	7.29	7.38
3	5.07	5.17	6.35	6.44	5.25	5.35	6.53	6.62	5.55	5.65	6.83	6.92	6.12	6.21	7.40	7.49
4	5.29	5.37	6.37	6.45	5.35	5.43	6.43	6.51	5.47	5.55	6.55	6.64	5.84	5.92	6.92	7.00
5	6.00	6.10	7.23	7.32	6.07	6.17	7.30	7.39	6.21	6.30	7.44	7.53	6.63	6.72	7.86	7.95
6	8.44	8.57	10.16	10.29	8.53	8.66	10.26	10.39	8.73	8.86	10.45	10.58	9.32	9.45	11.04	11.17
7	6.26	6.35	7.53	7.63	6.33	6.42	7.61	7.70	6.47	6.57	7.75	7.85	6.91	7.00	8.19	8.28
8	6.05	6.14	7.29	7.38	6.12	6.21	7.36	7.45	6.26	6.35	7.50	7.59	6.68	6.77	7.92	8.01
9	9.95	10.10	11.98	12.14	10.06	10.22	12.10	12.25	10.29	10.45	12.33	12.48	10.99	11.14	13.02	13.17
10	10.25	10.41	12.40	12.56	10.57	10.73	12.72	12.88	11.13	11.29	13.28	13.44	12.12	12.29	14.27	14.44
11	7.0[illegible]	7.10	8.43	8.53	7.08	7.18	8.51	8.62	7.24	7.35	8.67	8.78	7.73	7.83	9.16	9.26
12	7.15	7.26	8.62	8.73	7.24	7.35	8.70	8.81	7.40	7.51	8.86	8.97	7.90	8.01	9.36	9.47
13	11.41	11.58	13.74	13.91	11.54	11.71	13.87	14.04	11.80	11.98	14.13	14.31	12.59	12.77	14.93	15.10
14	12.43	12.63	14.98	15.17	12.58	12.77	15.12	15.31	12.87	13.06	15.41	15.60	13.73	13.92	16.27	16.46
15	8.93	9.07	10.76	10.90	9.04	9.18	10.86	11.00	9.24	9.38	11.07	11.21	9.87	10.00	11.69	11.83
16	13.72	13.93	16.53	16.74	13.88	14.09	16.69	16.90	14.20	14.41	17.00	17.21	15.15	15.37	17.96	18.17

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 $ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT $ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.10	9.47	10.43	9.81	9.87	9.23	10.23	9.59	9.92	9.27	10.29	9.64	10.26	9.59	10.65	9.98
2	13.71	12.22	13.57	12.07	13.50	11.99	13.37	11.86	13.57	12.05	13.46	11.93	13.95	12.41	13.86	12.31
3	12.84	11.60	12.88	11.65	12.63	11.38	12.69	11.44	12.70	11.44	12.79	11.52	13.09	11.81	13.20	11.91
4	10.97	10.12	11.14	10.28	10.84	9.97	11.03	10.15	10.83	9.95	11.03	10.14	11.05	10.16	11.27	10.37
5	10.53	9.99	11.07	10.53	10.41	9.87	10.97	10.42	10.42	9.86	10.99	10.43	10.70	10.13	11.29	10.71
6	14.67	13.78	15.46	14.57	14.57	13.67	15.38	14.47	14.63	13.71	15.45	14.53	15.06	14.14	15.90	14.97
7	10.39	9.99	11.05	10.66	10.26	9.86	10.95	10.53	10.27	9.85	10.97	10.55	10.56	10.13	11.28	10.84
8	12.58	11.76	12.73	11.91	12.36	11.53	12.53	11.70	12.28	11.45	12.48	11.64	12.47	11.63	12.69	11.84
9	23.02	20.82	22.87	20.67	22.74	20.53	22.62	20.40	22.67	20.46	22.58	20.36	23.05	20.83	23.00	20.75
10	18.00	16.90	19.08	17.98	17.95	16.84	19.03	17.92	18.30	17.18	19.40	18.28	19.11	17.98	20.23	19.09
11	17.06	15.63	16.92	15.49	16.77	15.33	16.65	15.22	16.66	15.22	16.57	15.13	16.85	15.40	16.78	15.33
12	18.47	16.77	18.15	16.45	18.16	16.45	17.86	16.15	18.04	16.33	17.76	16.05	18.22	16.50	17.97	16.25
13	31.07	27.47	30.24	26.64	30.73	27.12	29.93	26.32	30.65	27.03	29.87	26.26	31.07	27.44	30.32	26.69
14	35.27	31.93	33.82	30.48	34.45	31.10	33.08	29.71	34.04	30.67	32.73	29.35	34.15	30.76	32.92	29.51
15	15.68	14.48	16.55	15.35	15.67	14.47	16.54	15.35	15.79	14.59	16.67	15.47	16.32	15.12	17.21	16.01
16	30.18	28.18	30.56	28.56	29.67	27.67	30.09	28.08	29.48	27.47	29.93	27.93	29.88	27.88	30.38	28.37

TLOAD - HHS - ØØ4

HEAT RECOVERY

HEATED CRAWLSPACE

SINGLE STUD WALLS

1Ø/Ø5/82 1Ø:37:23

(82278) Tuesday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHSGHC"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHHS"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

 1. CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW
 2. REFERENCE ANGLE WRT SOUTH..........................     Ø.          DEGRE
 3. HEATED AIR VOLUME...................................147200.ØØ          F
 4. CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)... R AIRCHG
 5. NUMBER OF EXTERIOR WALLS...........................     2.
 6. EXTERIOR WALL R-VALUE.............................. R ARCH    FT2-HR-F/B
 7. WINDOW R-VALUE - DAYTIME........................... R ARCH    FT2-HR-F/B
 8. WINDOW R-VALUE - NIGHTTIME......................... R ARCH    FT2-HR-F/B
 9. INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)    1.ØØ

***** WALLS *****                              1

 1. ORIENTATION WRT REFERENCE..........................     Ø.          DEGRE
 2. GROSS WALL AREA....................................  6080.ØØ            F
 3. EXTERIOR WALL - R-VALUE............................ =PARBB(6) FT2-HR-F/B
 4. WINDOW - AREA......................................     Ø.              F
 5. WINDOW - DAYTIME R-VALUE...........................     Ø.    FT2-HR-F/B
 6. WINDOW - NIGHTTIME R-VALUE.........................     Ø.    FT2-HR-F/B
 7. WINDOW - % OF TIME SHADED..........................     Ø.
 8. DOOR - AREA........................................   100.ØØ            F
 9. DOOR - R-VALUE.....................................   R ARCH  FT2-HR-F/B

***** WALL  2 (DIRECT GAIN - PASSIVE) *****

 1. ORIENTATION WRT REFERENCE..........................     Ø.          DEGRE
 2. DIRECT GAIN WINDOW AREA............................   327.ØØ            F
 3. NUMBER OF GLAZINGS (1 TO 3)........................ R ARCH
 4. DAYTIME GLAZING SYSTEM R-VALUE..................... =PARBB(7) FT2-HR-F/B
 5. NIGHTTIME GLAZING SYSTEM R-VALUE................... =PARBB(8) FT2-HR-F/B
 6. OVERHANG SHADING? (1=YES,2=NO).....................    2.ØØ
 7.      WIDTH OF WINDOW...............................     Ø.
 8.      PROJECTION OF OVERHANG........................     Ø.
 9.      GAP BETWEEN OVERHANG AND WINDOW...............     Ø.
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***** ROOF-FLOOR-BASEMENT-GARAGE *****

 1. TOTAL CEILING AREA..................................  8960.00          FT2
 2. CEILING R-VALUE..................................... R ARCH   FT2-HR-F/BTU
 3. BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).     2.00
 4. (FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...     2.00
 5. (FOR TYPE 1) PERIMETER OF SLAB......................    0.              FT
 6. (FOR TYPE 1) R-VALUE OF EDGE INSULATION.............    0.    FT2-HR-F/BTU
 7. (FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE.....  8960.00          FT2
 8. (FOR TYPE 2) FLOOR R-VALUE......................... R ARCH   FT2-HR-F/BTU
 9. (FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......     1.00
10. (FOR TYPE 3) BASEMENT HEATED? (1=YES,2=N0).........     0.
11. (FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......     0.             FT2
12. (FOR TYPE 3) FLOOR R-VALUE.........................=PARRFB(8) FT2-HR-F/BTU
13.(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).     4.00            FT
14.(TYPE2-3) BASEMENT/CRWLSP. WIDTH....................    80.00            FT
15.(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....     0.             FT2
16.(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE. R ARCH    FT2-HR-F/BTU
17. (TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..  1536.00           FT2
18. (TYPE 2-3) BASEMENT/CRWLSP WALL R-VALUE BELOW GRADE =PRFB(16) FT2-HR-F/BTU
25. HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......     2.00

***** INTERNAL SPACE *****

 1. THERMOSTAT SETTING - DAYTIME.......................    70.00             F
 2. THERMOSTAT SETTING - NIGHT TIME....................    60.00             F
 3. HOURS FOR NIGHT SETBACK............................    12.60            HR
 4. ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......     7.00             F
 5. ANNUAL ELECTRICAL CONSUMPTION...................... =RMTT              KWH
 6. AVERAGE NUMBER OF OCCUPANTS........................    38.00
 8. SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........    70.00             %
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ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	73451.	85023.	49071.	60154.	56317.	67191.	33769.	43646.	44354.	54859.	23975.	32795.	35646.	45275.	17130.	24922.
2	73451.	85023.	49071.	60154.	56317.	67191.	33769.	43646.	44354.	54859.	23975.	32795.	35646.	45275.	17130.	24922.
3	73451.	85023.	49071.	60154.	56317.	67191.	33769.	43646.	44354.	54859.	23975.	32795.	35646.	45275.	17130.	24922.
4	52246.	62489.	32446.	41711.	43715.	53541.	25496.	33834.	36422.	45533.	19489.	27254.	29164.	37600.	13906.	20884.
5	52246.	62489.	32446.	41711.	43715.	53541.	25496.	33834.	36422.	45533.	19489.	27254.	29164.	37600.	13906.	20884.
6	52246.	62489.	32446.	41711.	43715.	53541.	25496.	33834.	36422.	45533.	19489.	27254.	29164.	37600.	13906.	20884.
7	52246.	62489.	32446.	41711.	43715.	53541.	25496.	33834.	36422.	45533.	19489.	27254.	29164.	37600.	13906.	20884.
8	101648.	110964.	64864.	73630.	88474.	97462.	53631.	61801.	76280.	85018.	43372.	51030.	64474.	72905.	33520.	40963.
9	101648.	110964.	64864.	73630.	88474.	97462.	53631.	61801.	76280.	85018.	43372.	51030.	64474.	72905.	33520.	40963.
10	65166.	76945.	46094.	57719.	49255.	60648.	31322.	42367.	38628.	49610.	22006.	32329.	30355.	40866.	15161.	24591.
11	130335.	142609.	93250.	105328.	115150.	127232.	79804.	91464.	101330.	113163.	67736.	79001.	87585.	99096.	56035.	66631.
12	130335.	142609.	93250.	105328.	115150.	127232.	79804.	91464.	101330.	113163.	67736.	79001.	87585.	99096.	56035.	66631.
13	130335.	142609.	93250.	105328.	115150.	127232.	79804.	91464.	101330.	113163.	67736.	79001.	87585.	99096.	56035.	66631.
14	117892.	128151.	75725.	85249.	102804.	112711.	62681.	71867.	88908.	98553.	50832.	59610.	75392.	84669.	39881.	47781.
15	217621.	230035.	160416.	173421.	194845.	207844.	140490.	153382.	173964.	186882.	121690.	134638.	153647.	166598.	103613.	116508.
16	217921.	230035.	160416.	173421.	194845.	207844.	140400.	153382.	173904.	186892.	121690.	134639.	153647.	166598.	103613.	116508.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.17	4.46	3.99	3.27	4.79	4.06	3.65	2.91	4.52	3.79	3.43	2.66	4.32	3.58	3.28	2.49
2	8.39	6.80	6.63	5.04	8.01	6.41	6.29	4.67	7.74	6.13	6.08	4.43	7.55	5.92	5.92	4.25
3	7.44	6.11	5.85	4.51	7.06	5.71	5.51	4.15	6.79	5.44	5.30	3.91	6.60	5.23	5.14	3.73
4	5.40	4.47	4.20	3.25	5.21	4.27	4.05	3.07	5.05	4.09	3.92	2.93	4.89	3.92	3.79	2.79
5	4.19	3.57	3.22	2.57	4.01	3.38	3.07	2.41	3.85	3.21	2.94	2.27	3.70	3.04	2.82	2.13
6	5.74	4.73	4.47	3.44	5.54	4.52	4.31	3.26	5.38	4.34	4.18	3.11	5.21	4.16	4.05	2.97
7	3.78	3.30	2.87	2.36	3.59	3.10	2.72	2.19	3.43	2.92	2.58	2.04	3.27	2.74	2.46	1.90
8	6.24	5.33	4.72	3.80	5.96	5.04	4.48	3.55	5.70	4.78	4.26	3.32	5.44	4.52	4.05	3.10
9	12.56	10.21	9.77	7.40	12.18	9.82	9.44	7.06	11.82	9.46	9.14	6.74	11.48	9.11	8.85	6.45
10	7.12	5.86	5.67	4.41	6.76	5.49	5.33	4.06	6.51	5.23	5.12	3.82	6.32	5.03	4.96	3.64
11	9.72	8.19	7.66	6.12	9.37	7.83	7.34	5.79	9.05	7.50	7.06	5.50	8.73	7.17	6.79	5.21
12	10.98	9.17	8.67	6.85	10.60	8.79	8.33	6.51	10.26	8.44	8.03	6.20	9.92	8.09	7.74	5.89
13	19.07	15.29	15.24	11.45	18.62	14.83	14.84	11.04	18.20	14.41	14.48	10.67	17.79	13.99	14.13	10.30
14	22.39	18.87	17.08	13.52	21.46	17.92	16.29	12.70	20.61	17.06	15.56	11.95	19.79	16.21	14.89	11.23
15	6.18	4.85	4.99	3.65	6.07	4.74	4.89	3.55	5.97	4.64	4.80	3.46	5.87	4.54	4.71	3.37
16	15.78	13.57	12.43	10.22	15.14	12.92	11.85	9.64	14.53	12.31	11.31	9.10	13.94	11.73	10.79	8.57

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.48	4.57	5.74	5.82	4.68	4.77	5.93	6.02	4.98	5.07	6.24	6.33	5.55	5.63	6.80	6.89
2	4.83	4.93	6.19	6.28	5.05	5.14	6.40	6.49	5.37	5.47	6.73	6.82	5.98	6.08	7.33	7.43
3	4.90	5.00	6.27	6.37	5.12	5.22	6.49	6.59	5.45	5.55	6.83	6.92	6.07	6.16	7.44	7.54
4	5.15	5.23	6.31	6.39	5.24	5.32	6.40	6.48	5.39	5.47	6.55	6.63	5.80	5.88	6.96	7.04
5	5.84	5.93	7.16	7.25	5.95	6.04	7.27	7.36	6.12	6.21	7.44	7.53	6.58	6.67	7.90	7.99
6	8.21	8.34	10.06	10.19	8.36	8.49	10.21	10.34	8.60	8.73	10.45	10.58	9.25	9.38	11.10	11.23
7	6.09	6.18	7.46	7.56	6.20	6.29	7.57	7.67	6.37	6.47	7.75	7.85	6.86	6.95	8.23	8.33
8	5.89	5.98	7.22	7.31	5.99	6.09	7.32	7.42	6.16	6.26	7.49	7.59	6.63	6.73	7.96	8.06
9	9.68	9.83	11.87	12.02	9.85	10.01	12.04	12.19	10.14	10.29	12.32	12.48	10.91	11.06	13.09	13.25
10	9.96	10.13	12.28	12.44	10.35	10.51	12.66	12.82	10.97	11.13	13.28	13.44	12.04	12.20	14.35	14.51
11	6.81	6.91	8.34	8.45	6.93	7.04	8.47	8.58	7.13	7.24	8.67	8.77	7.67	7.78	9.21	9.31
12	6.96	7.07	8.53	8.64	7.09	7.20	8.66	8.77	7.29	7.40	8.86	8.97	7.84	7.95	9.41	9.52
13	11.10	11.27	13.60	13.78	11.30	11.47	13.80	13.98	11.62	11.80	14.13	14.30	12.50	12.68	15.01	15.19
14	12.10	12.29	14.83	15.02	12.32	12.51	15.05	15.24	12.67	12.86	15.40	15.60	13.63	13.82	16.36	16.56
15	8.69	8.83	10.66	10.80	8.85	8.99	10.81	10.95	9.10	9.24	11.07	11.21	9.79	9.93	11.76	11.90
16	13.35	13.56	16.37	16.58	13.59	13.80	16.61	16.82	13.98	14.19	17.00	17.21	15.04	15.25	18.06	18.27

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.03	9.42	10.18	9.56	9.85	9.22	10.04	9.39	9.89	9.25	10.13	9.45	10.26	9.60	10.54	9.84
2	13.64	12.15	13.31	11.81	13.47	11.96	13.19	11.66	13.53	12.02	13.30	11.75	13.95	12.41	13.75	12.18
3	12.76	11.53	12.63	11.39	12.60	11.35	12.51	11.24	12.67	11.41	12.62	11.33	13.09	11.81	13.09	11.77
4	10.91	10.05	10.94	10.06	10.81	9.95	10.68	9.98	10.80	9.92	10.89	9.99	11.05	10.16	11.18	10.26
5	10.44	9.91	10.86	10.31	10.36	9.82	10.82	10.25	10.38	9.82	10.86	10.28	10.68	10.12	11.20	10.60
6	14.52	13.64	15.21	14.31	14.47	13.58	15.20	14.28	14.55	13.64	15.31	14.37	15.03	14.11	15.83	14.88
7	10.29	9.90	10.84	10.42	10.21	9.81	10.79	10.36	10.23	9.81	10.83	10.39	10.55	10.12	11.19	10.73
8	12.54	11.72	12.43	11.60	12.36	11.54	12.29	11.45	12.27	11.44	12.24	11.39	12.49	11.65	12.50	11.64
9	22.92	20.72	22.43	20.22	22.71	20.50	22.28	20.05	22.63	20.42	22.26	20.02	23.06	20.84	22.75	20.58
10	17.80	16.70	18.88	17.69	17.81	16.71	18.83	17.72	18.19	17.07	19.24	18.11	19.07	17.94	20.15	19.68
11	17.03	15.58	16.57	15.13	16.77	15.34	16.37	14.93	16.65	15.21	16.29	14.84	16.87	15.42	16.56	15.09
12	18.42	16.72	17.77	16.07	18.17	16.47	17.56	15.85	18.03	16.32	17.47	15.75	18.24	16.52	17.73	15.99
13	30.94	27.34	29.76	26.15	30.69	27.08	29.56	25.94	30.60	26.98	29.52	25.89	31.07	27.44	30.05	26.40
14	35.33	32.00	32.91	29.54	34.62	31.27	32.33	28.94	34.13	30.76	31.96	28.55	34.26	30.87	32.26	28.79
15	15.48	14.28	16.36	15.16	15.53	14.33	16.42	15.22	15.68	14.48	16.58	15.38	16.27	15.07	17.18	15.99
16	30.06	28.06	29.91	27.90	29.66	27.65	29.57	27.56	29.44	27.44	29.41	27.41	29.91	27.91	29.95	27.94

TLOAD - HHE - ØØ4

HEAT RECOVERY

HEATED CRAWLSPACE

EXTERIOR FOAM

1Ø/Ø5/82 1Ø:54:55

(82278) Tuesday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHFMHC"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHHE"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

 1. CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW
 2. REFERENCE ANGLE WRT SOUTH.........................     Ø.          DEGRE
 3. HEATED AIR VOLUME.................................147200.ØØ           F
 4. CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)... R AIRCHG
 5. NUMBER OF EXTERIOR WALLS..........................     2.
 6. EXTERIOR WALL R-VALUE............................. R ARCH    FT2-HR-F/B
 7. WINDOW R-VALUE - DAYTIME.......................... R ARCH    FT2-HR-F/B
 8. WINDOW R-VALUE - NIGHTTIME........................ R ARCH    FT2-HR-F/B
 9. INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)    1.ØØ

***** WALLS *****                          1

 1. ORIENTATION WRT REFERENCE.........................     Ø.          DEGRE
 2. GROSS WALL AREA...................................  6080.ØØ           F
 3. EXTERIOR WALL - R-VALUE........................... =PARBB(6) FT2-HR-F/B
 4. WINDOW - AREA.....................................     Ø.             F
 5. WINDOW - DAYTIME R-VALUE..........................     Ø.    FT2-HR-F/B
 6. WINDOW - NIGHTTIME R-VALUE........................     Ø.    FT2-HR-F/B
 7. WINDOW - % OF TIME SHADED.........................     Ø.
 8. DOOR - AREA.......................................   1ØØ.ØØ           F
 9. DOOR - R-VALUE....................................   R ARCH  FT2-HR-F/B

***** WALL  2 (DIRECT GAIN - PASSIVE) *****

 1. ORIENTATION WRT REFERENCE.........................     Ø.          DEGRE
 2. DIRECT GAIN WINDOW AREA...........................   327.ØØ           F
 3. NUMBER OF GLAZINGS (1 TO 3)....................... R ARCH
 4. DAYTIME GLAZING SYSTEM R-VALUE.................... =PARBB(7) FT2-HR-F/B
 5. NIGHTTIME GLAZING SYSTEM R-VALUE.................. =PARBB(8) FT2-HR-F/B
 6. OVERHANG SHADING? (1=YES,2=NO)....................     2.ØØ
 7.      WIDTH OF WINDOW..............................     Ø.
 8.      PROJECTION OF OVERHANG.......................     Ø.
 9.      GAP BETWEEN OVERHANG AND WINDOW..............     Ø.
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***** ROOF-FLOOR-BASEMENT-GARAGE *****

1.	TOTAL CEILING AREA..................................	8960.00	FT2
2.	CEILING R-VALUE.....................................	R ARCH	FT2-HR-F/BTU
3.	BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).	2.00	
4.	(FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...	2.00	
5.	(FOR TYPE 1) PERIMETER OF SLAB......................	0.	FT
6.	(FOR TYPE 1) R-VALUE OF EDGE INSULATION............	0.	FT2-HR-F/BTU
7.	(FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE.....	8960.00	FT2
8.	(FOR TYPE 2) FLOOR R-VALUE.........................	R ARCH	FT2-HR-F/BTU
9.	(FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......	1.00	
10.	(FOR TYPE 3) BASEMENT HEATED? (1=YES,2=NO).........	0.	
11.	(FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......	0.	FT2
12.	(FOR TYPE 3) FLOOR R-VALUE.........................	=PARRFB(8)	FT2-HR-F/BTU
13.	(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).	4.00	FT
14.	(TYPE2-3) BASEMENT/CRWLSP. WIDTH....................	80.00	FT
15.	(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....	0.	FT2
16.	(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE.	R ARCH	FT2-HR-F/BTU
17.	(TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..	1536.00	FT2
18.	(TYPE 2-3) BASEMENT/CRWLSP WALL R-VALUE BELOW GRADE	=PRFB(16)	FT2-HR-F/BTU
25.	HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......	2.00	

***** INTERNAL SPACE *****

1.	THERMOSTAT SETTING - DAYTIME........................	70.00	F
2.	THERMOSTAT SETTING - NIGHT TIME.....................	60.00	F
3.	HOURS FOR NIGHT SETBACK.............................	12.60	HR
4.	ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......	7.00	F
5.	ANNUAL ELECTRICAL CONSUMPTION.......................	=RMTT	KWH
6.	AVERAGE NUMBER OF OCCUPANTS.........................	38.00	
8.	SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........	70.00	%

ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2383	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	73457.	85029.	49077.	60160.	54559.	65347.	32145.	41842.	44005.	54479.	23666.	32443.	35932.	45590.	17370.	25204.
2	73457.	85029.	49077.	60160.	54559.	65347.	32145.	41842.	44005.	54479.	23666.	32443.	35932.	45590.	17370.	25204.
3	73457.	85029.	49077.	60160.	54559.	65347.	32145.	41842,	44005.	54479.	23666.	32443.	35932.	45590.	17370.	25204.
4	52251.	62494.	32451.	41716.	42299.	51965.	24182.	32385.	36132.	45209.	19223.	26958.	29414.	37869.	14116.	21121.
5	52251.	62494.	32451.	41716.	42299.	51965.	24182.	32385.	36132.	45209.	19223.	26958.	29414.	37869.	14116.	21121.
6	52251.	62494.	32451.	41716.	42299.	51965.	24182.	32385.	36132.	45209.	19223.	26958.	29414.	37869.	14116.	21121.
7	52251.	62494.	32451.	41716.	42299.	51965.	24182.	32385.	36132.	45209.	19223.	26958.	29414.	37869.	14116.	21121.
8	101655.	110972.	64871.	73638.	86047.	94982.	51350.	59362.	75777.	84502.	42897.	50537.	64888.	73338.	33919.	41367.
9	101655.	110972.	64871.	73638.	86047.	94982.	51350.	59362.	75777.	84502.	42897.	50537.	64888.	73338.	33919.	41367.
10	65171.	76950.	46098.	57724.	47756.	59108.	29875.	40837.	38323.	49292.	21721.	32014.	30604.	41133.	15373.	24852.
11	130343.	142617.	93258.	105336.	112606.	124646.	77317.	88888.	100803.	112624.	67214.	78465.	88026.	99561.	56449.	67079.
12	130343.	142617.	93258.	105336.	112606.	124646.	77317.	88888.	100803.	112624.	67214.	78465.	88026.	99561.	56449.	67079.
13	130343.	142617.	93258.	105336.	112606.	124646.	77317.	88888.	100803.	112624.	67214.	78465.	88026.	99561.	56449.	67079.
14	117901.	128160.	75734.	85258.	100044.	109902.	60003.	69119.	88326.	97963.	50294.	59039.	75872.	85161.	40321.	48259.
15	217033.	230047.	160428.	173433.	191118.	204114.	136675.	149652.	173125.	186103.	120912.	133859.	154307.	167259.	104272.	117169.
16	217033.	230047.	160428.	173433.	191118.	204114.	136675.	149652.	173125.	186103.	120912.	133859.	154307.	167259.	104272.	117169.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.17	4.46	3.99	3.27	4.75	4.02	3.61	2.87	4.51	3.78	3.42	2.66	4.33	3.58	3.28	2.49
2	8.39	6.80	6.63	5.04	7.97	6.37	6.26	4.63	7.73	6.12	6.07	4.42	7.55	5.93	5.93	4.26
3	7.44	6.11	5.85	4.51	7.02	5.67	5.48	4.11	6.78	5.43	5.29	3.90	6.60	5.23	5.15	3.74
4	5.40	4.47	4.20	3.25	5.18	4.24	4.02	3.04	5.05	4.09	3.91	2.92	4.90	3.93	3.80	2.79
5	4.19	3.57	3.22	2.57	3.98	3.35	3.04	2.38	3.85	3.20	2.93	2.26	3.70	3.04	2.82	2.13
6	5.74	4.73	4.47	3.44	5.51	4.49	4.28	3.23	5.37	4.34	4.17	3.10	5.22	4.17	4.06	2.97
7	3.78	3.30	2.87	2.36	3.56	3.06	2.69	2.15	3.42	2.91	2.58	2.03	3.27	2.75	2.46	1.90
8	6.24	5.33	4.72	3.80	5.91	4.99	4.43	3.50	5.69	4.77	4.25	3.31	5.45	4.53	4.06	3.11
9	12.56	10.21	9.77	7.40	12.11	9.75	9.37	6.99	11.81	9.44	9.13	6.73	11.49	9.12	8.87	6.46
10	7.12	5.86	5.67	4.41	6.72	5.45	5.30	4.02	6.50	5.22	5.11	3.82	6.33	5.04	4.96	3.65
11	9.72	8.19	7.66	6.12	9.31	7.77	7.29	5.73	9.03	7.49	7.05	5.49	8.74	7.18	6.80	5.22
12	10.98	9.17	8.67	6.85	10.54	8.72	8.27	6.44	10.24	8.42	8.02	6.19	9.93	8.10	7.75	5.90
13	19.07	15.29	15.24	11.45	18.54	14.76	14.76	10.96	18.19	14.40	14.46	10.65	17.81	14.01	14.14	10.31
14	22.39	18.87	17.08	13.52	21.29	17.75	16.12	12.53	20.58	17.02	15.53	11.92	19.82	16.24	14.92	11.26
15	6.18	4.85	4.99	3.65	6.05	4.72	4.87	3.53	5.97	4.63	4.79	3.46	5.88	4.54	4.71	3.38
16	15.78	13.57	12.43	10.22	15.03	12.81	11.75	9.53	14.51	12.29	11.29	9.07	13.96	11.75	10.81	8.59

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.48	4.57	5.73	5.82	4.70	4.79	5.96	6.05	4.98	5.07	6.24	6.33	5.49	5.58	6.75	6.83
2	4.83	4.92	6.18	6.28	5.07	5.17	6.43	6.52	5.37	5.47	6.73	6.82	5.92	6.02	7.28	7.37
3	4.90	5.00	6.27	6.37	5.15	5.24	6.52	6.62	5.45	5.55	6.82	6.92	6.01	6.10	7.38	7.48
4	5.15	5.23	6.31	6.39	5.26	5.34	6.43	6.51	5.39	5.47	6.55	6.63	5.75	5.83	6.91	6.99
5	5.84	5.93	7.16	7.25	5.97	6.06	7.29	7.38	6.12	6.21	7.44	7.53	6.52	6.61	7.84	7.93
6	8.21	8.34	10.06	10.19	8.39	8.52	10.25	10.38	8.59	8.72	10.45	10.58	9.17	9.30	11.02	11.15
7	6.09	6.18	7.46	7.56	6.22	6.32	7.60	7.69	6.37	6.47	7.75	7.84	6.80	6.89	8.17	8.27
8	5.89	5.98	7.22	7.31	6.02	6.11	7.35	7.44	6.16	6.26	7.49	7.59	6.57	6.67	7.90	8.00
9	9.68	9.83	11.86	12.02	9.90	10.05	12.08	12.24	10.14	10.29	12.32	12.48	10.81	10.96	13.00	13.15
10	9.96	10.12	12.27	12.44	10.39	10.55	12.70	12.86	10.96	11.13	13.27	13.44	11.94	12.10	14.25	14.41
11	6.81	6.91	8.34	8.45	6.96	7.07	8.50	8.61	7.13	7.23	8.66	8.77	7.60	7.71	9.14	9.25
12	6.96	7.07	8.53	8.64	7.12	7.23	8.69	8.80	7.29	7.40	8.86	8.97	7.77	7.88	9.34	9.46
13	11.09	11.27	13.60	13.78	11.35	11.52	13.85	14.03	11.62	11.79	14.13	14.30	12.39	12.57	14.90	15.07
14	12.10	12.29	14.83	15.02	12.37	12.56	15.10	15.29	12.67	12.86	15.40	15.59	13.51	13.70	16.24	16.44
15	8.69	8.83	10.66	10.79	8.89	9.03	10.85	10.99	9.10	9.24	11.07	11.20	9.71	9.85	11.67	11.81
16	13.35	13.56	16.37	16.58	13.65	13.86	16.67	16.88	13.98	14.19	17.00	17.21	14.91	15.12	17.93	18.14

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

CR	LENIENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 1 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	MODERATE 2 *ME1EE1	ME1EE2	ME2EE1	ME2EE2	STRINGENT *ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.03	9.41	10.18	9.55	9.84	9.20	10.03	9.37	9.88	9.24	10.12	9.44	10.21	9.55	10.49	9.79
2	13.64	12.14	13.31	11.81	13.46	11.95	13.18	11.64	13.52	12.01	13.29	11.74	13.89	12.36	13.70	12.12
3	12.76	11.53	12.63	11.39	12.59	11.34	12.50	11.22	12.66	11.40	12.61	11.32	13.03	11.76	13.03	11.72
4	10.91	10.05	10.94	10.06	10.80	9.94	10.87	9.97	10.79	9.92	10.89	9.98	11.00	10.11	11.13	10.21
5	10.44	9.91	10.86	10.31	10.36	9.82	10.81	10.24	10.37	9.82	10.85	10.27	10.63	10.07	11.15	10.55
6	14.51	13.63	15.21	14.31	14.48	13.58	15.21	14.28	14.54	13.63	15.30	14.36	14.96	14.04	15.75	14.80
7	10.29	9.90	10.83	10.42	10.21	9.80	10.79	10.35	10.22	9.80	10.83	10.38	10.49	10.06	11.14	10.67
8	12.54	11.72	12.42	11.60	12.34	11.51	12.27	11.42	12.26	11.43	12.23	11.38	12.44	11.60	12.45	11.59
9	22.91	20.72	22.43	20.22	22.68	20.47	22.26	20.02	22.62	20.40	22.25	20.00	22.97	20.75	22.66	20.41
10	17.80	16.70	18.79	17.69	17.92	16.71	18.85	17.73	18.18	17.06	19.23	18.10	18.97	17.85	20.06	18.91
11	17.00	15.57	16.56	15.13	16.74	15.31	16.35	14.90	16.63	15.20	16.28	14.82	16.81	15.36	16.50	15.03
12	18.42	16.72	17.77	16.07	18.14	16.43	17.53	15.82	18.01	16.30	17.45	15.73	18.18	16.47	17.67	15.93
13	30.94	27.33	29.76	26.15	30.66	27.05	29.53	25.91	30.58	26.96	29.50	25.87	30.97	27.35	29.95	26.30
14	35.32	32.00	32.91	29.54	34.51	31.16	32.22	28.83	34.09	30.72	31.93	28.51	34.17	30.78	32.16	28.69
15	15.48	14.28	16.36	15.16	15.55	14.35	16.44	15.24	15.67	14.48	16.58	15.38	16.19	14.99	17.10	15.90
16	30.06	28.05	29.90	27.90	29.61	27.61	29.52	27.51	29.41	27.41	29.39	27.38	29.80	27.80	29.84	27.83

TLOAD - HHD - ØØ4

HEAT RECOVERY

HEATED CRAWLSPACE

DOUBLE STUD WALLS

1Ø/Ø5/82   11:12:22

(82278)   Tuesday

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TITLE IS"B:CIDX"
TITLE IS"B:CLIMATE"
TITLE IS"B:ARCHDBHC"
TITLE IS"B:AIRCHGHR"
TITLE IS"B:FCOSTHHD"
TITLE IS"B:FMA"

***** BASIC BUILDING *****

 1. CITY LOCATION: HOMER,JUNEAU,FAIRBANKS,ADAK,NOME,BETTLES,BARROW
 2. REFERENCE ANGLE WRT SOUTH..........................     Ø.         DEGRE
 3. HEATED AIR VOLUME..................................147200.ØØ           F
 4. CONSTRUCTION QUALITY (1=VERY TIGHT,5=VERY LOOSE)... R AIRCHG
 5. NUMBER OF EXTERIOR WALLS...........................     2.
 6. EXTERIOR WALL R-VALUE.............................. R ARCH     FT2-HR-F/B
 7. WINDOW R-VALUE - DAYTIME........................... R ARCH     FT2-HR-F/B
 8. WINDOW R-VALUE - NIGHTTIME......................... R ARCH     FT2-HR-F/B
 9. INTERNAL STORAGE CAPACITY(1=LIGHT,2=MEDIUM,3=HEAVY)    1.ØØ

***** WALLS *****                                1

 1. ORIENTATION WRT REFERENCE..........................     Ø.         DEGRE
 2. GROSS WALL AREA....................................  6ØBØ.ØØ           F
 3. EXTERIOR WALL - R-VALUE............................ =PARBB(6) FT2-HR-F/B
 4. WINDOW - AREA......................................     Ø.             F
 5. WINDOW - DAYTIME R-VALUE...........................     Ø.     FT2-HR-F/B
 6. WINDOW - NIGHTTIME R-VALUE.........................     Ø.     FT2-HR-F/B
 7. WINDOW - % OF TIME SHADED..........................     Ø.
 8. DOOR - AREA........................................   1ØØ.ØØ           F
 9. DOOR - R-VALUE.....................................   R ARCH   FT2-HR-F/B

***** WALL  2 (DIRECT GAIN - PASSIVE) *****

 1. ORIENTATION WRT REFERENCE..........................     Ø.         DEGRE
 2. DIRECT GAIN WINDOW AREA............................   327.ØØ           F
 3. NUMBER OF GLAZINGS (1 TO 3)........................ R ARCH
 4. DAYTIME GLAZING SYSTEM R-VALUE..................... =PARBB(7) FT2-HR-F/B
 5. NIGHTTIME GLAZING SYSTEM R-VALUE................... =PARBB(8) FT2-HR-F/B
 6. OVERHANG SHADING? (1=YES,2=NO).....................    2.ØØ
 7.      WIDTH OF WINDOW...............................     Ø.
 8.      PROJECTION OF OVERHANG........................     Ø.
 9.      GAP BETWEEN OVERHANG AND WINDOW...............     Ø.
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ROOF-FLOOR-BASEMENT-GARAGE *****

1.	TOTAL CEILING AREA................................	8960.00	FT2
2.	CEILING R-VALUE....................................	R ARCH	FT2-HR-F/BTU
3.	BASEMENT TYPE (1=SLAB,2=CRAWLSPACE,3=FULL,4=COMB.).	2.00	
4.	(FOR TYPE 1) HEATING DUCTS IN SLAB? (1=YES,2=NO)...	2.00	
5.	(FOR TYPE 1) PERIMETER OF SLAB....................	0.	FT
6.	(FOR TYPE 1) R-VALUE OF EDGE INSULATION...........	0.	FT2-HR-F/BTU
7.	(FOR TYPE 2) GROUND FLOOR AREA OVER CRAWLSPACE.....	8960.00	FT2
8.	(FOR TYPE 2) FLOOR R-VALUE........................	R ARCH	FT2-HR-F/BTU
9.	(FOR TYPE 2) CRAWLSPACE HEATED? (1=YES,2=NO).......	1.00	
10.	(FOR TYPE 3) BASEMENT HEATED? (1=YES,2=N0).........	0.	
11.	(FOR TYPE 3) GROUND FLOOR AREA OVER BASEMENT.......	0.	FT2
12.	(FOR TYPE 3) FLOOR R-VALUE.........................	=PARRFB(8)	FT2-HR-F/BTU
13.	(TYPE2-3) BASEMENT/CRWLSP. DEPTH BELOW GRADE(3-8FT).	4.00	FT
14.	(TYPE2-3) BASEMENT/CRWLSP. WIDTH..................	80.00	FT
15.	(TYPE2-3) AREA BASEMENT/CRWLSP. WALL ABOVE GRADE....	0.	FT2
16.	(TYPE2-3) BASEMENT/CRWLSP. WALL R-VALUE ABOVE GRADE.	R ARCH	FT2-HR-F/BTU
17.	(TYPE 2-3) BASEMENT/CRWLSP. WALL AREA BELOW GRADE..	1536.00	FT2
18.	(TYPE 2-3) BASEMENT/CRWLSP WALL R-VALUE BELOW GRADE	=PRFB(16)	FT2-HR-F/BTU
25.	HEATING DUCTS IN UNHEATED SPACE (1=YES,2=NO).......	2.00	

INTERNAL SPACE *****

1.	THERMOSTAT SETTING - DAYTIME.......................	70.00	F
2.	THERMOSTAT SETTING - NIGHT TIME....................	60.00	F
3.	HOURS FOR NIGHT SETBACK............................	12.60	HR
4.	ALLOWABLE TEMPERATURE SWING (PASSIVE SYSTEMS)......	7.00	F
5.	ANNUAL ELECTRICAL CONSUMPTION......................	=RMTT	KWH
6.	AVERAGE NUMBER OF OCCUPANTS........................	38.00	
8.	SEASONAL EFFICIENCY OF CONVENTIONAL FURNACE........	70.00	%

ROW NUMBER: 5 LAT.= 59.6 DESIGN TEMP.= -5.1 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
121	333	758	1247	1581	1749	1596	1187	790	436	175	63	BTU/FT2-DAY
21.2	24.8	28.4	35.6	42.8	48.2	51.8	51.8	46.4	37.4	28.4	21.2	F
1352	1123	1159	900	704	490	394	391	540	857	1103	1352	F-DAYS

ROW NUMBER: 10 LAT.= 58.4 DESIGN TEMP.= -4.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
116	282	609	1045	1290	1413	1277	983	638	320	148	61	BTU/FT2-DAY
23.0	28.4	32.0	39.2	46.4	53.6	55.4	53.6	50.0	41.0	32.0	26.6	F
1287	1037	1026	783	563	355	288	331	473	718	976	1168	F-DAYS

ROW NUMBER: 15 LAT.= 64.8 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
30	221	673	1193	1602	1750	1541	1117	708	292	74	2	BTU/FT2-DAY
-11.2	-2.2	10.4	28.4	46.4	59.0	60.8	55.4	44.6	24.8	3.2	-11.2	F
2303	1890	1721	1084	549	211	148	304	617	1235	1867	2336	F-DAYS

ROW NUMBER: 20 LAT.= 51.5 DESIGN TEMP.= 19.9 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
231	432	715	1031	1178	1181	1119	948	758	527	307	187	BTU/FT2-DAY
32.5	34.3	34.2	38.1	43.3	48.7	50.0	49.8	49.5	42.8	36.9	35.1	F
1000	854	982	800	670	482	459	471	458	681	840	924	F-DAYS

ROW NUMBER: 25 LAT.= 64.5 DESIGN TEMP.=-31.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
29	223	630	1184	1571	1752	1413	992	672	305	64	2	BTU/FT2-DAY
6.8	5.0	6.8	19.4	35.6	46.4	50.0	50.0	42.8	28.4	15.8	5.0	F
1829	1674	1786	1382	936	585	463	490	688	1132	1481	1879	F-DAYS

ROW NUMBER: 30 LAT.= 66.9 DESIGN TEMP.=-51.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
10	172	615	1227	1697	1855	1561	1074	671	251	40	0	BTU/FT2-DAY
-13.0	-7.6	1.4	21.2	41.0	55.4	57.2	51.8	39.2	19.4	-2.2	-13.0	F
2425	2038	1969	1336	722	270	230	407	751	1395	1993	2392	F-DAYS

ROW NUMBER: 35 LAT.= 71.3 DESIGN TEMP.=-45.0 F SIGMA= 0. F

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
0	73	490	1049	1139	1526	1458	855	414	125	3	0	BTU/FT2-DAY
-14.8	-18.4	-14.8	-0.4	19.4	33.8	39.2	37.4	30.2	15.8	-0.4	-13.0	F
2471	2342	2486	1976	1424	959	815	850	1040	1541	1966	2396	F-DAYS

ANNUAL HEATING FUEL USE (BTU/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	69279.	80723.	45030.	55892.	51822.	62518.	29667.	39083.	41613.	51855.	21534.	30013.	33585.	43000.	15399.	22891.
2	69279.	80723.	45030.	55892.	51822.	62518.	29667.	39083.	41613.	51855.	21534.	30013.	33585.	43000.	15399.	22891.
3	69279.	80723.	45030.	55892.	51822.	62518.	29667.	39083.	41613.	51855.	21534.	30013.	33585.	43000.	15399.	22891.
4	48759.	58854.	29241.	38188.	40139.	49554.	22177.	30183.	34113.	42969.	17426.	24918.	27442.	35727.	12406.	19175.
5	48759.	58854.	29241.	38188.	40139.	49554.	22177.	30183.	34113.	42969.	17426.	24918.	27442.	35727.	12406.	19175.
6	48759.	58854.	29241.	38188.	40139.	49554.	22177.	30183.	34113.	42969.	17426.	24918.	27442.	35727.	12406.	19175.
7	48759.	58854.	29241.	38188.	40139.	49554.	22177.	30183.	34113.	42969.	17426.	24918.	27442.	35727.	12406.	19175.
8	96019.	105174.	59424.	67976.	82328.	91175.	47845.	55624.	72304.	80932.	39605.	47125.	61474.	69772.	30639.	38031.
9	96019.	105174.	59424.	67976.	82328.	91175.	47845.	55624.	72304.	80932.	39605.	47125.	61474.	69772.	30639.	38031.
10	61672.	73380.	42634.	54161.	45465.	56744.	27669.	38489.	36218.	47088.	19740.	29835.	28560.	38931.	13647.	22711.
11	124444.	136661.	87445.	99376.	108615.	120670.	73510.	84933.	97099.	108889.	63604.	74759.	84405.	95748.	53040.	63390.
12	124444.	136661.	87445.	99376.	108615.	120670.	73510.	84933.	97099.	108889.	63604.	74759.	84405.	95748.	53040.	63390.
13	124444.	136661.	87445.	99376.	108615.	120670.	73510.	84933.	97099.	108889.	63604.	74759.	84405.	95748.	53040.	63390.
14	111432.	121567.	69487.	78846.	95762.	105586.	55915.	64902.	84320.	93878.	46586.	55088.	71927.	81111.	36691.	44405.
15	208466.	221475.	151863.	164862.	185385.	198377.	130946.	143916.	167726.	180698.	115521.	128455.	148862.	161805.	98841.	111717.
16	208466.	221475.	151863.	164862.	185385.	198377.	130946.	143916.	167726.	180698.	115521.	128455.	148862.	161805.	98841.	111717.

ANNUAL ELECTRICAL USE (BTU/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	#ME1EE1	ME1EE2	ME2EE1	ME2EE2	#ME1EE1	ME1EE2	ME2EE1	ME2EE2	#ME1EE1	ME1EE2	ME2EE1	ME2EE2	#ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
2	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
3	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
4	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
5	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
6	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
7	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
8	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
9	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
10	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
11	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
12	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
13	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
14	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
15	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.
16	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.	41884.	30451.	34362.	22929.

ANNUAL ENERGY COST ($/SQFT-YR)

	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	5.07	4.37	3.90	3.18	4.69	3.96	3.56	2.80	4.46	3.72	3.38	2.60	4.28	3.53	3.24	2.44
2	8.30	6.71	6.54	4.94	7.91	6.30	6.20	4.57	7.68	6.06	6.02	4.37	7.50	5.87	5.88	4.21
3	7.34	6.01	5.76	4.42	6.96	5.61	5.42	4.05	6.73	5.37	5.24	3.84	6.55	5.18	5.11	3.69
4	5.33	4.39	4.13	3.17	5.14	4.18	3.98	2.99	5.00	4.04	3.87	2.88	4.86	3.89	3.76	2.75
5	4.12	3.49	3.15	2.50	3.93	3.29	3.00	2.33	3.80	3.15	2.89	2.22	3.66	3.00	2.79	2.09
6	5.66	4.64	4.40	3.36	5.46	4.43	4.24	3.18	5.33	4.28	4.13	3.06	5.18	4.12	4.02	2.93
7	3.70	3.21	2.80	2.28	3.51	3.01	2.64	2.11	3.38	2.86	2.54	1.99	3.23	2.70	2.42	1.86
8	6.12	5.21	4.61	3.68	5.83	4.91	4.36	3.42	5.61	4.69	4.18	3.23	5.38	4.45	3.99	3.04
9	12.40	10.05	9.61	7.24	12.00	9.64	9.27	6.88	11.71	9.34	9.03	6.63	11.39	9.01	8.77	6.36
10	7.04	5.78	5.59	4.33	6.67	5.40	5.25	3.97	6.46	5.17	5.07	3.77	6.28	4.98	4.92	3.60
11	9.59	8.05	7.52	5.98	9.22	7.68	7.20	5.64	8.95	7.40	6.97	5.40	8.65	7.09	6.72	5.14
12	10.83	9.02	8.52	6.70	10.44	8.62	8.18	6.35	10.15	8.33	7.93	6.09	9.84	8.00	7.67	5.81
13	18.89	15.12	15.06	11.28	18.42	14.64	14.65	10.85	18.08	14.29	14.35	10.54	17.70	13.89	14.04	10.20
14	21.99	18.47	16.70	13.13	21.03	17.49	15.87	12.28	20.33	16.77	15.30	11.68	19.58	15.99	14.70	11.02
15	6.14	4.80	4.94	3.61	6.03	4.69	4.84	3.51	5.94	4.61	4.77	3.43	5.85	4.51	4.68	3.35
16	15.53	13.32	12.19	9.97	14.86	12.65	11.58	9.37	14.35	12.14	11.13	8.92	13.80	11.59	10.65	8.43

ANNUAL COST OF CAPITALIZATION ($/SQFT-YR)

CR	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	4.63	4.72	5.89	5.98	4.80	4.89	6.05	6.14	5.07	5.16	6.33	6.42	5.59	5.68	6.85	6.94
2	5.00	5.09	6.35	6.45	5.18	5.27	6.53	6.62	5.47	5.57	6.82	6.92	6.03	6.13	7.38	7.48
3	5.07	5.17	6.44	6.54	5.25	5.35	6.62	6.72	5.55	5.65	6.92	7.02	6.12	6.21	7.49	7.59
4	5.29	5.37	6.45	6.53	5.35	5.43	6.51	6.60	5.47	5.55	6.64	6.72	5.84	5.92	7.00	7.09
5	6.00	6.10	7.32	7.42	6.07	6.17	7.39	7.49	6.21	6.30	7.53	7.62	6.63	6.72	7.95	8.04
6	8.44	8.57	10.29	10.42	8.53	8.66	10.39	10.52	8.73	8.86	10.58	10.71	9.32	9.45	11.17	11.30
7	6.26	6.35	7.63	7.73	6.33	6.42	7.70	7.80	6.47	6.57	7.85	7.94	6.91	7.00	8.28	8.38
8	6.05	6.14	7.38	7.47	6.12	6.21	7.45	7.54	6.26	6.35	7.59	7.68	6.68	6.77	8.01	8.10
9	9.95	10.10	12.14	12.29	10.06	10.22	12.25	12.40	10.29	10.45	12.48	12.63	10.99	11.14	13.17	13.33
10	10.25	10.41	12.56	12.72	10.57	10.73	12.88	13.04	11.13	11.29	13.44	13.60	12.12	12.29	14.44	14.60
11	7.00	7.10	8.53	8.64	7.08	7.18	8.62	8.72	7.24	7.35	8.78	8.88	7.73	7.83	9.26	9.37
12	7.15	7.26	8.73	8.84	7.24	7.35	8.81	8.92	7.40	7.51	8.97	9.08	7.90	8.01	9.47	9.58
13	11.41	11.58	13.91	14.09	11.54	11.71	14.04	14.22	11.80	11.98	14.31	14.48	12.59	12.77	15.10	15.28
14	12.43	12.63	15.17	15.36	12.58	12.77	15.31	15.50	12.87	13.06	15.60	15.79	13.73	13.92	16.46	16.66
15	8.93	9.07	10.90	11.04	9.04	9.18	11.00	11.14	9.24	9.38	11.21	11.35	9.87	10.00	11.83	11.97
16	13.72	13.93	16.74	16.95	13.88	14.09	16.90	17.11	14.20	14.41	17.21	17.43	15.15	15.37	18.17	18.38

ANNUAL COST OF MAINTENANCE ($/SQFT-YR)

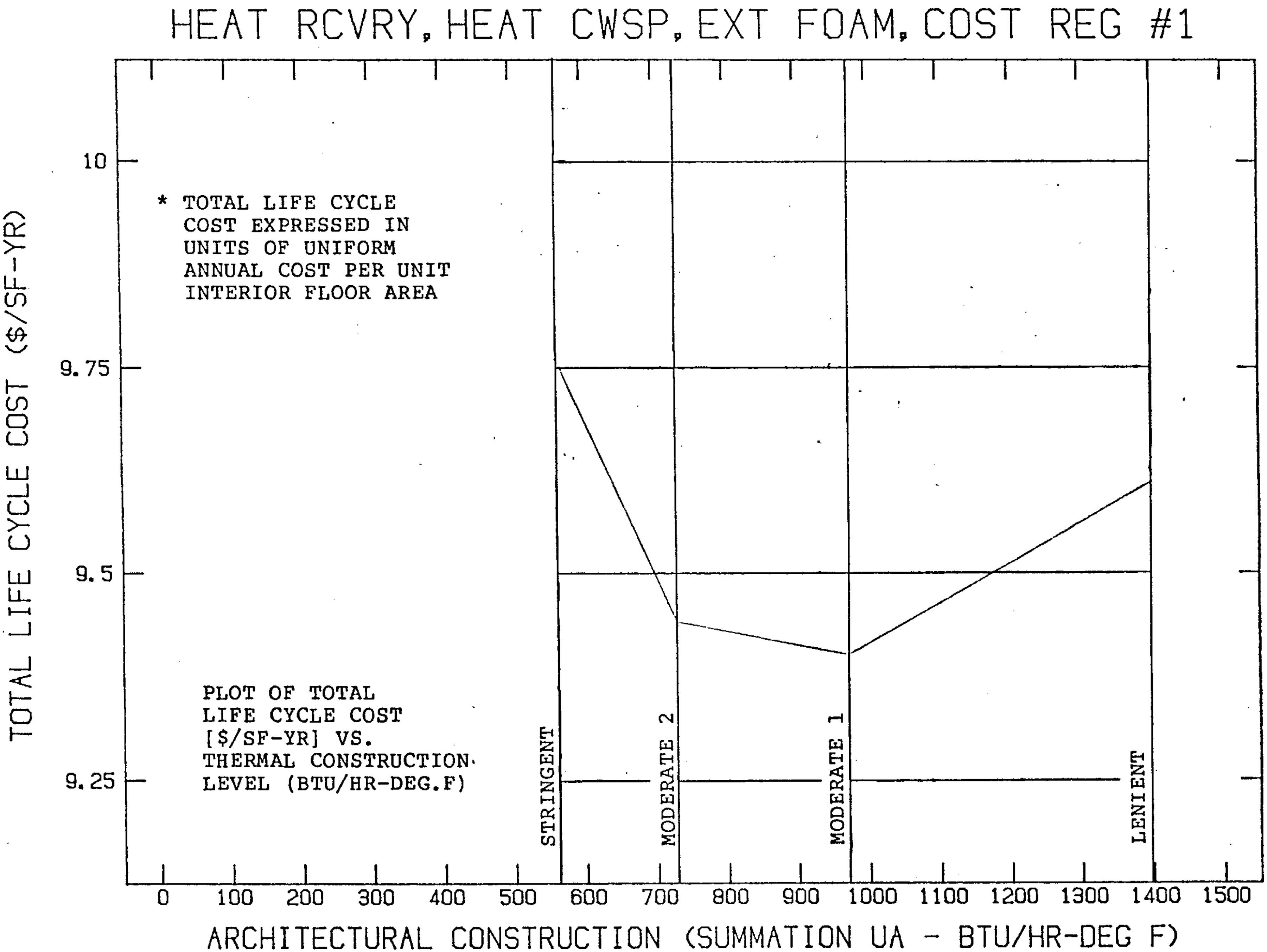
	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2	$ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46	0.39	0.39	0.46	0.46
2	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49	0.42	0.42	0.49	0.49
3	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
4	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42	0.36	0.36	0.42	0.42
5	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48	0.41	0.41	0.48	0.48
6	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68	0.57	0.57	0.68	0.68
7	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50	0.42	0.42	0.50	0.50
8	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49	0.41	0.41	0.49	0.49
9	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80	0.67	0.67	0.80	0.80
10	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84	0.71	0.71	0.84	0.84
11	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56	0.47	0.47	0.56	0.56
12	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57	0.48	0.48	0.57	0.57
13	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92	0.77	0.77	0.92	0.92
14	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00	0.84	0.84	1.00	1.00
15	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72	0.60	0.60	0.72	0.72
16	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10	0.93	0.93	1.10	1.10

TOTAL BUILDING LIFE CYCLE COST ($/SQFT-YR)

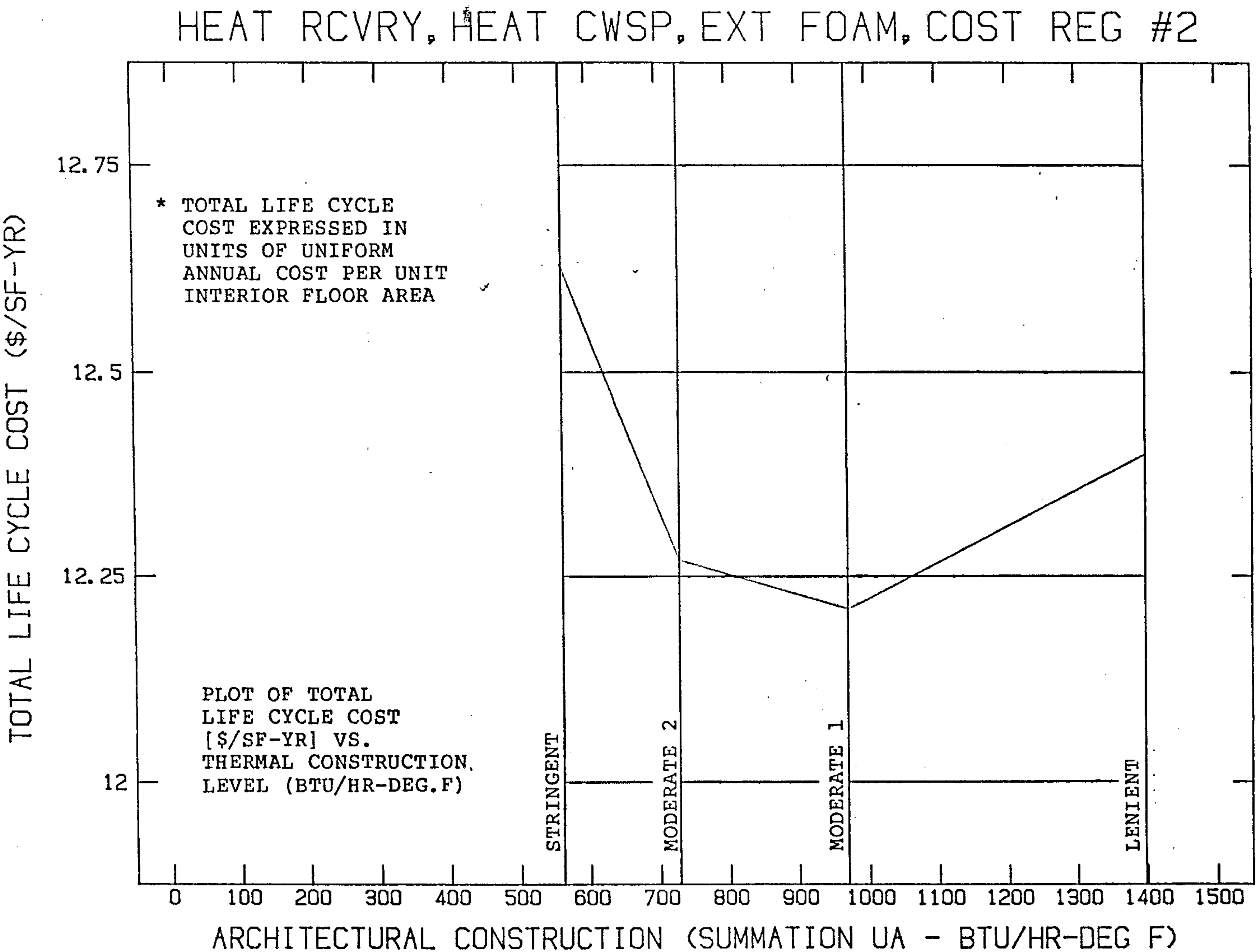
	LENIENT				MODERATE 1				MODERATE 2				STRINGENT			
CR	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2	*ME1EE1	ME1EE2	ME2EE1	ME2EE2
1	10.10	9.47	10.25	9.61	9.87	9.23	10.07	9.41	9.92	9.27	10.16	9.48	10.26	9.59	10.55	9.84
2	13.71	12.22	13.39	11.88	13.50	11.99	13.23	11.69	13.57	12.05	13.34	11.78	13.95	12.41	13.76	12.18
3	12.84	11.60	12.71	11.46	12.63	11.38	12.55	11.27	12.70	11.44	12.67	11.37	13.09	11.81	13.10	11.78
4	10.97	10.12	11.01	10.13	10.84	9.97	10.92	10.01	10.83	9.95	10.93	10.02	11.05	10.16	11.19	10.26
5	10.53	9.99	10.95	10.40	10.41	9.87	10.87	10.30	10.42	9.86	10.91	10.32	10.70	10.13	11.22	10.62
6	14.67	13.78	15.37	14.46	14.57	13.67	15.31	14.37	14.63	13.71	15.39	14.45	15.06	14.14	15.87	14.91
7	10.39	9.99	10.93	10.51	10.26	9.86	10.85	10.41	10.27	9.85	10.89	10.43	10.56	10.13	11.21	10.74
8	12.58	11.76	12.47	11.64	12.36	11.53	12.29	11.45	12.28	11.45	12.26	11.40	12.47	11.63	-12.49	11.63
9	23.02	20.82	22.54	20.33	22.74	20.53	22.32	20.08	22.67	20.46	22.31	20.06	23.05	20.83	22.74	20.49
10	18.00	16.90	19.00	17.89	17.95	16.84	18.97	17.85	18.30	17.18	19.35	18.21	19.11	17.98	20.20	19.04
11	17.06	15.63	16.62	15.18	16.77	15.33	16.37	14.93	16.66	15.22	16.30	14.85	16.85	15.40	16.54	15.07
12	18.47	16.77	17.82	16.12	18.16	16.45	17.56	15.84	18.04	16.33	17.48	15.75	18.22	16.50	17.71	15.97
13	31.07	27.47	29.89	26.28	30.73	27.12	29.61	25.98	30.65	27.03	29.58	25.94	31.07	27.44	30.06	26.40
14	35.27	31.93	32.87	29.49	34.45	31.10	32.18	28.78	34.04	30.67	31.90	28.47	34.15	30.76	32.16	28.68
15	15.68	14.48	16.56	15.36	15.67	14.47	16.56	15.36	15.79	14.59	16.69	15.49	16.32	15.12	17.23	16.03
16	30.18	28.18	30.03	28.03	29.67	27.67	29.58	27.58	29.48	27.47	29.45	27.45	29.88	27.88	29.92	27.92

8.0 APPENDICES

APPENDIX B: TOTAL LIFE CYCLE COST MINIMUM PLOTS

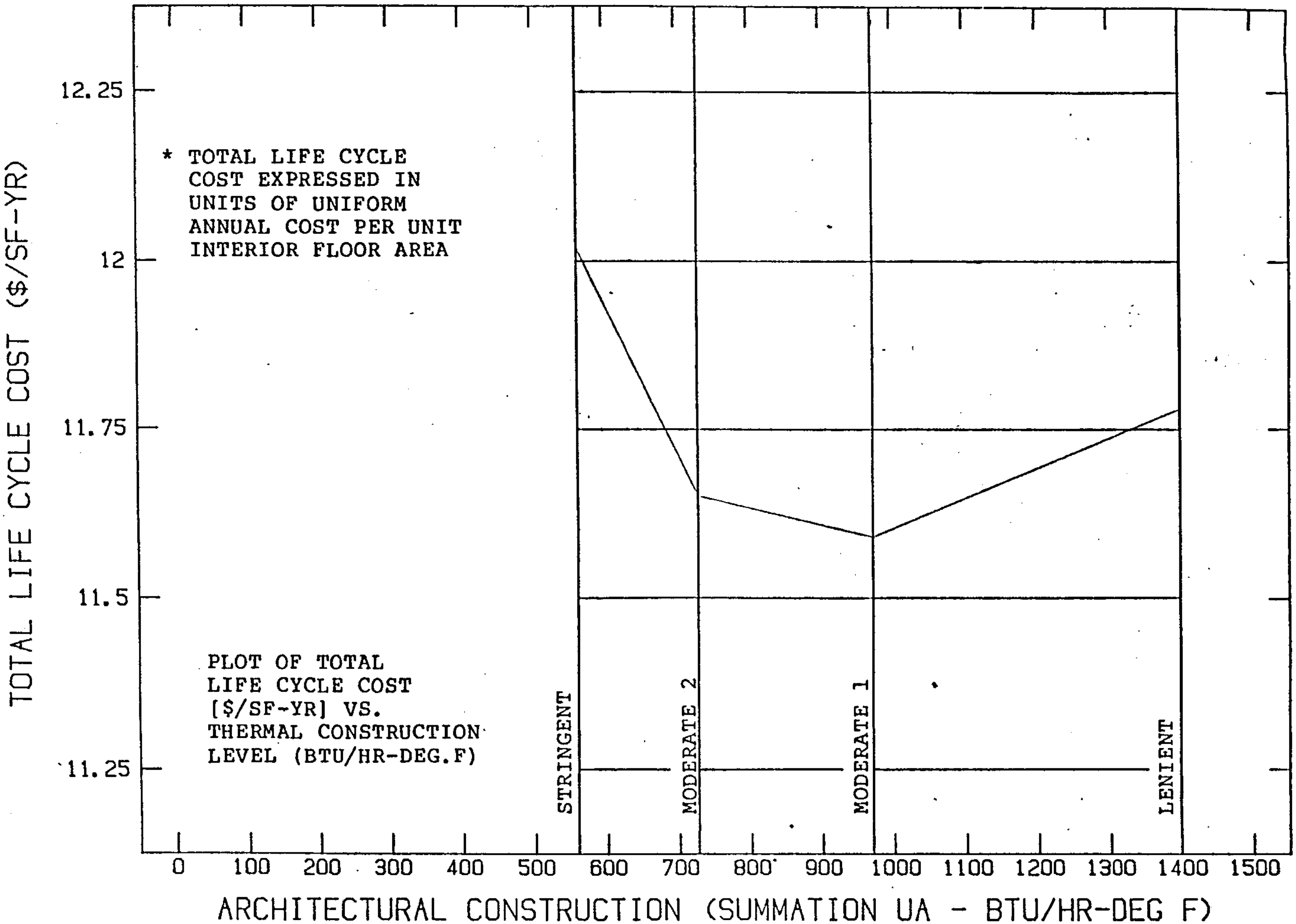


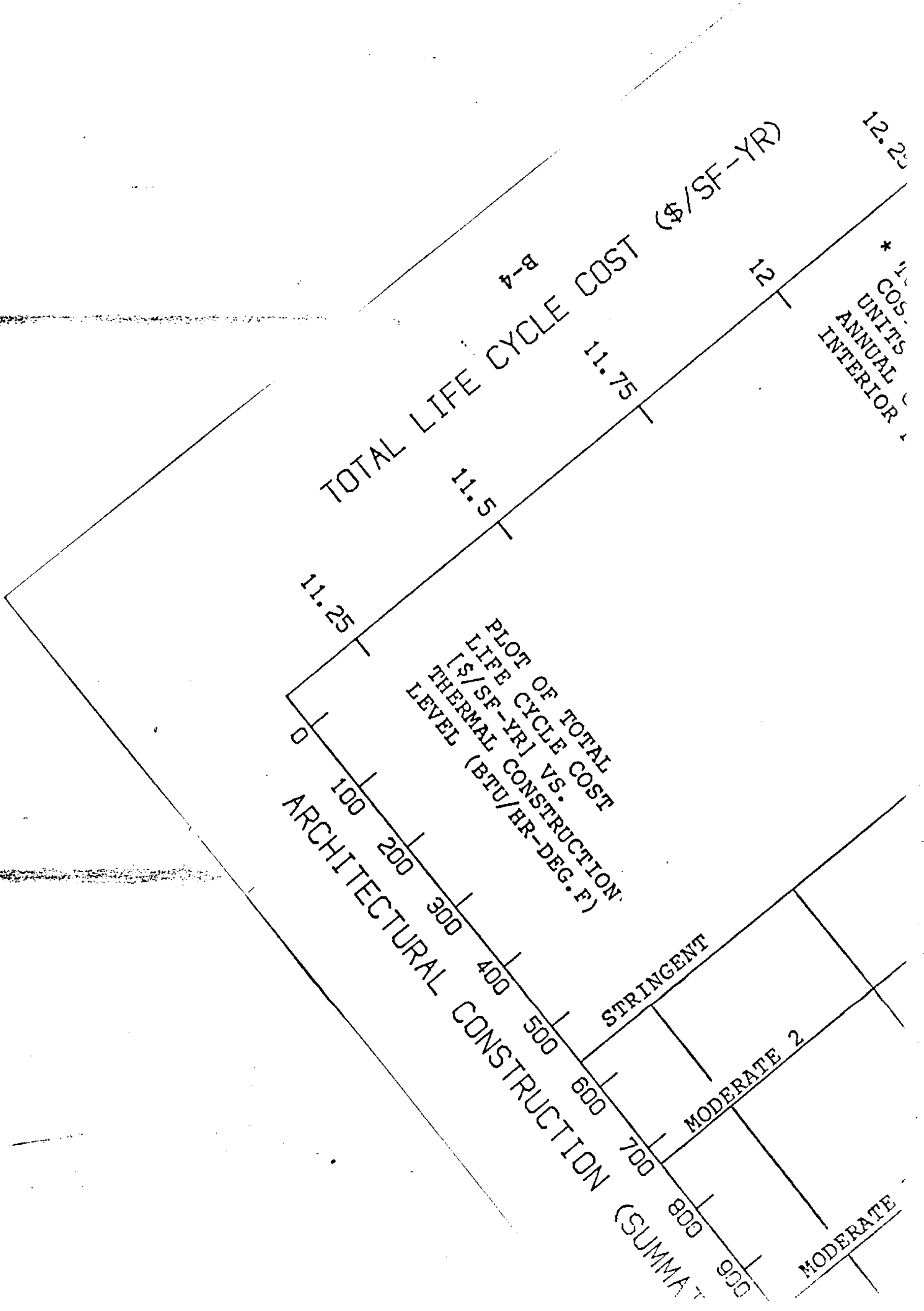
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #1
TOTAL LIFE CYCLE COST ($/SF-YR)
10
9.75
9.5
9.25
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)



HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #2
TOTAL LIFE CYCLE COST ($/SF-YR)
12.75
12.5
12.25
12
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)

HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #3

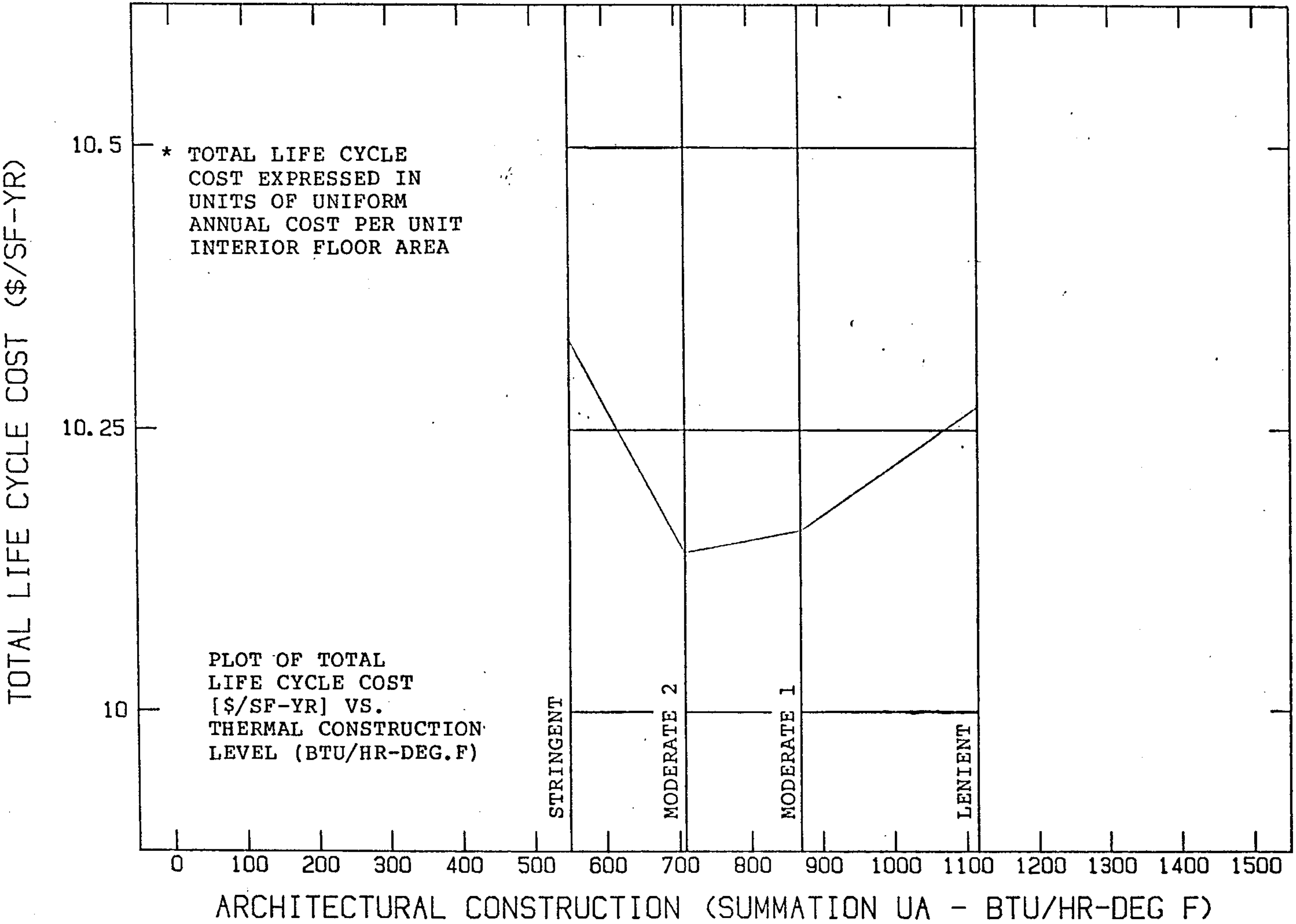


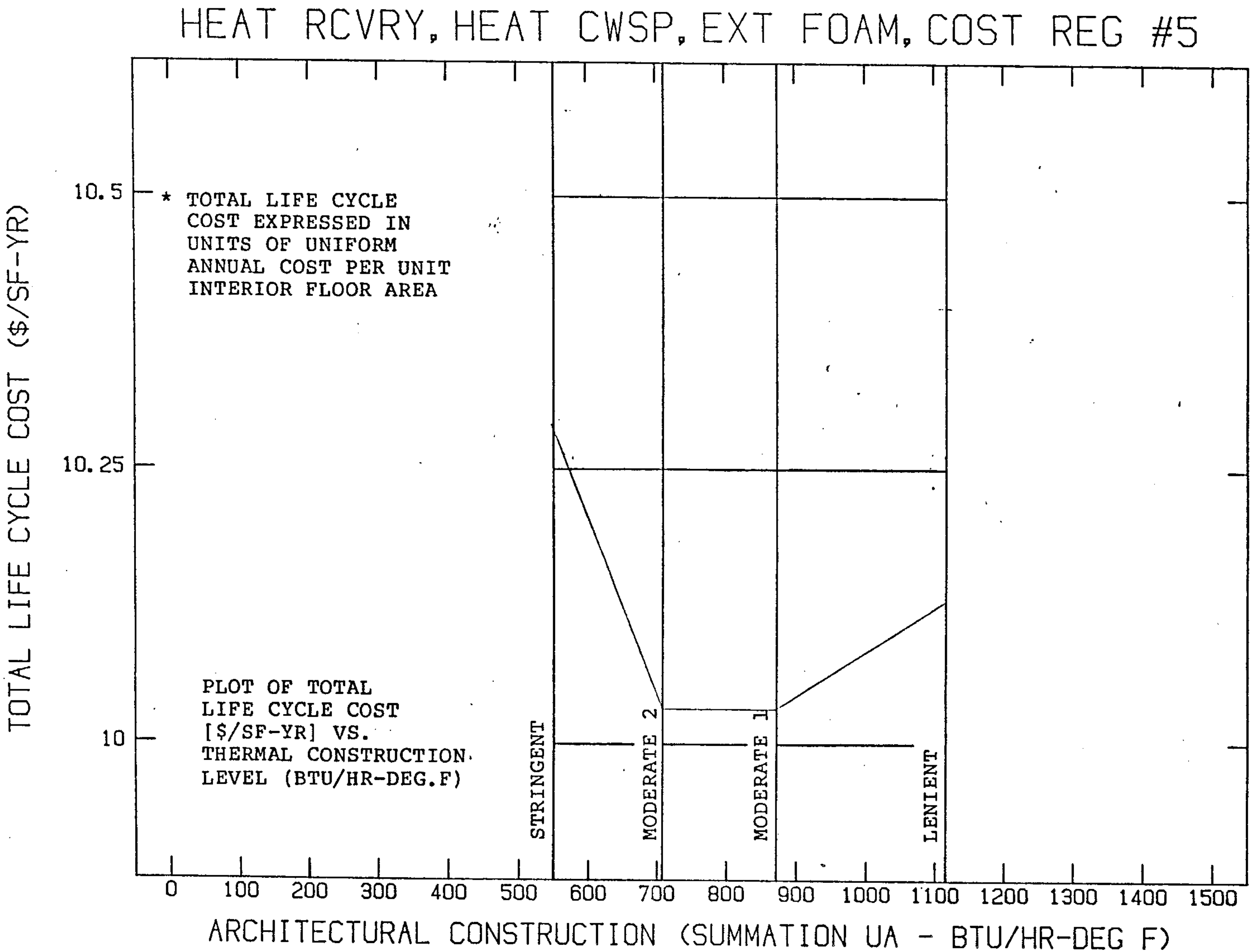


TOTAL LIFE CYCLE COST ($/SF-YR)
11.25
11.5
11.75
12
12.2
PLOT OF TOTAL
LIFE CYCLE COST
[$/SF-YR] VS.
THERMAL CONSTRUCTION
LEVEL (BTU/HR-DEG.F)
0
100
200
300
400
500
600
700
800
900
ARCHITECTURAL CONSTRUCTION (SUMMA
STRINGENT
MODERATE 2
MODERATE

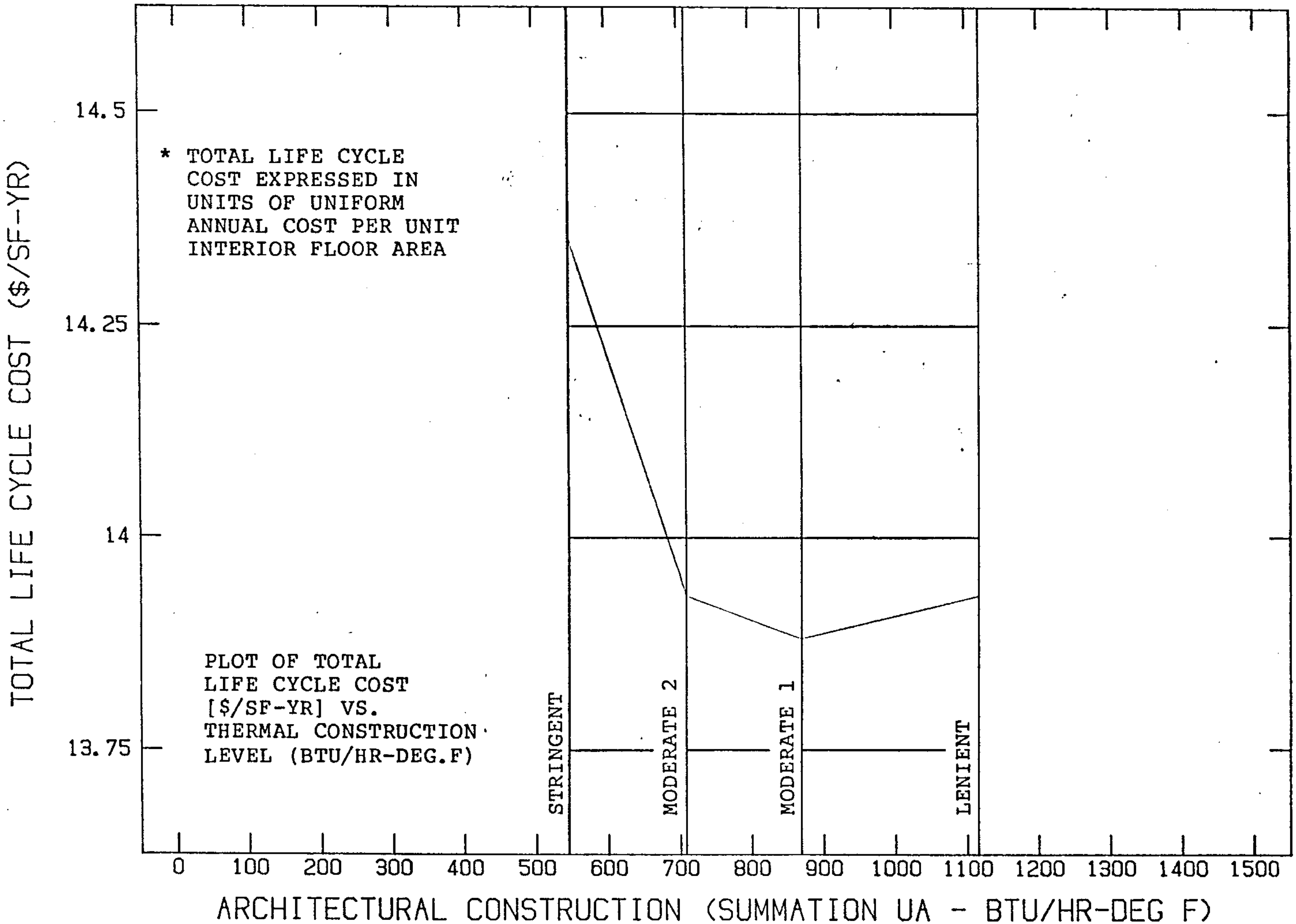
B-4

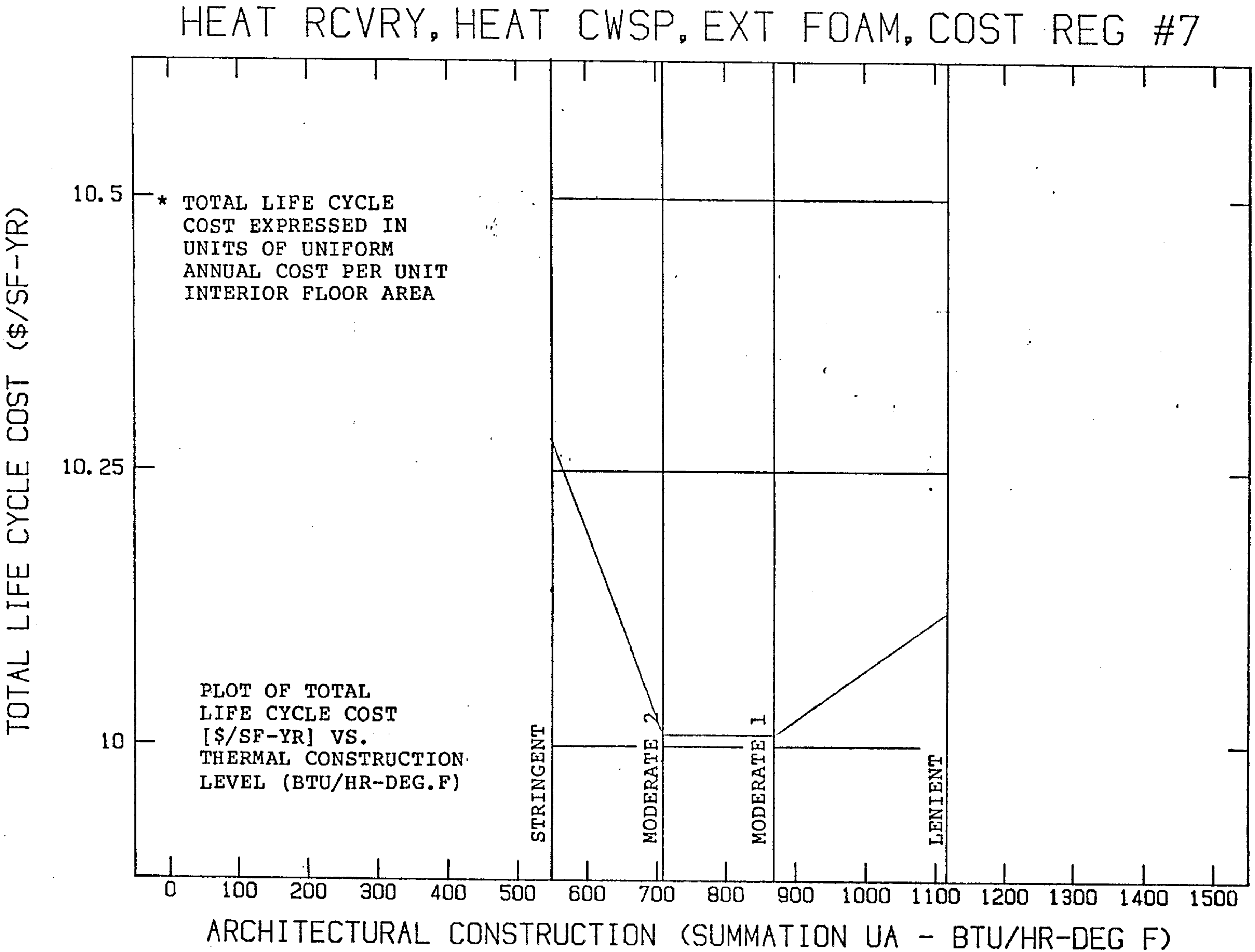
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #4



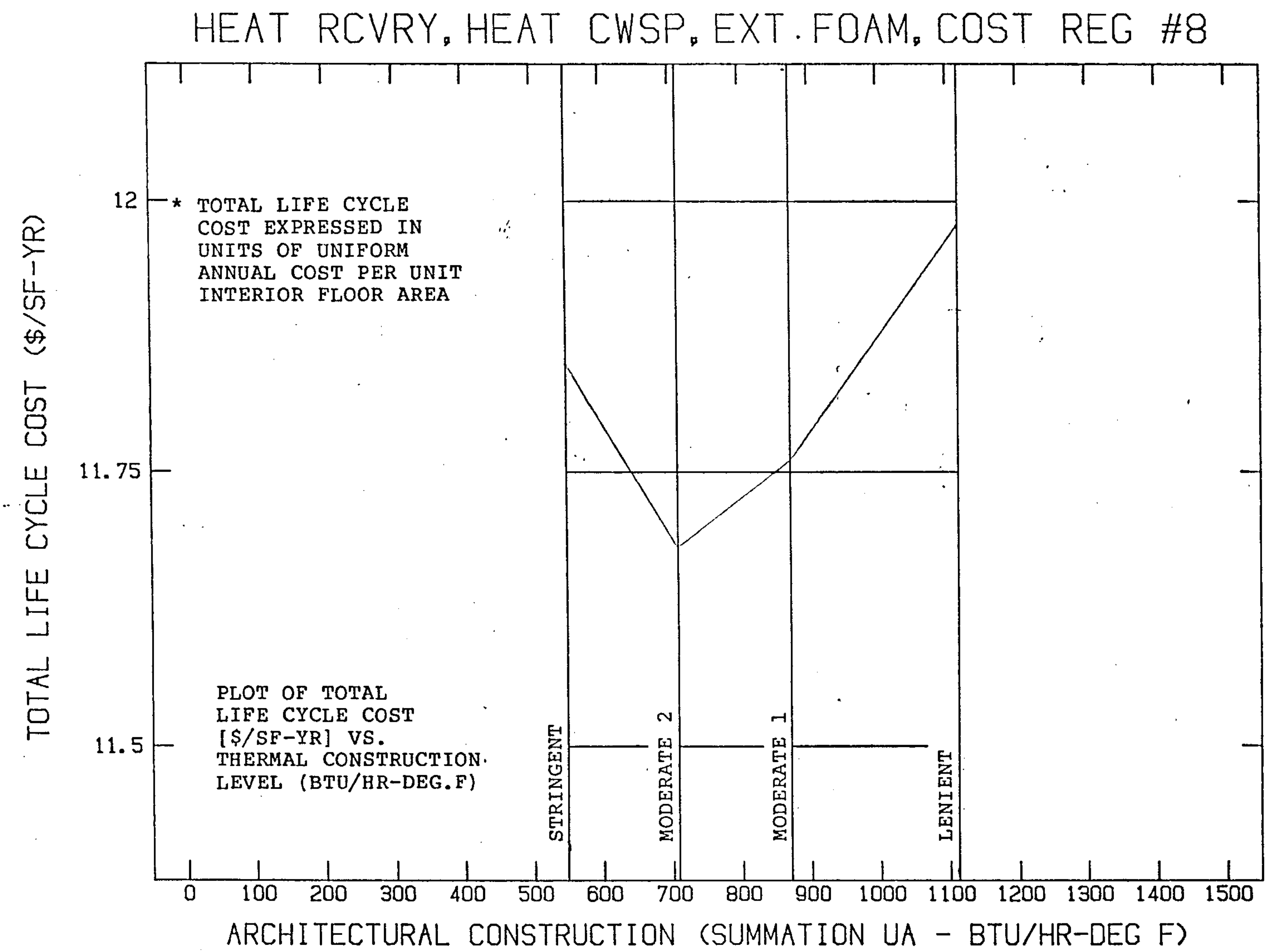

HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #5
TOTAL LIFE CYCLE COST ($/SF-YR)
10.5
10.25
10
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)

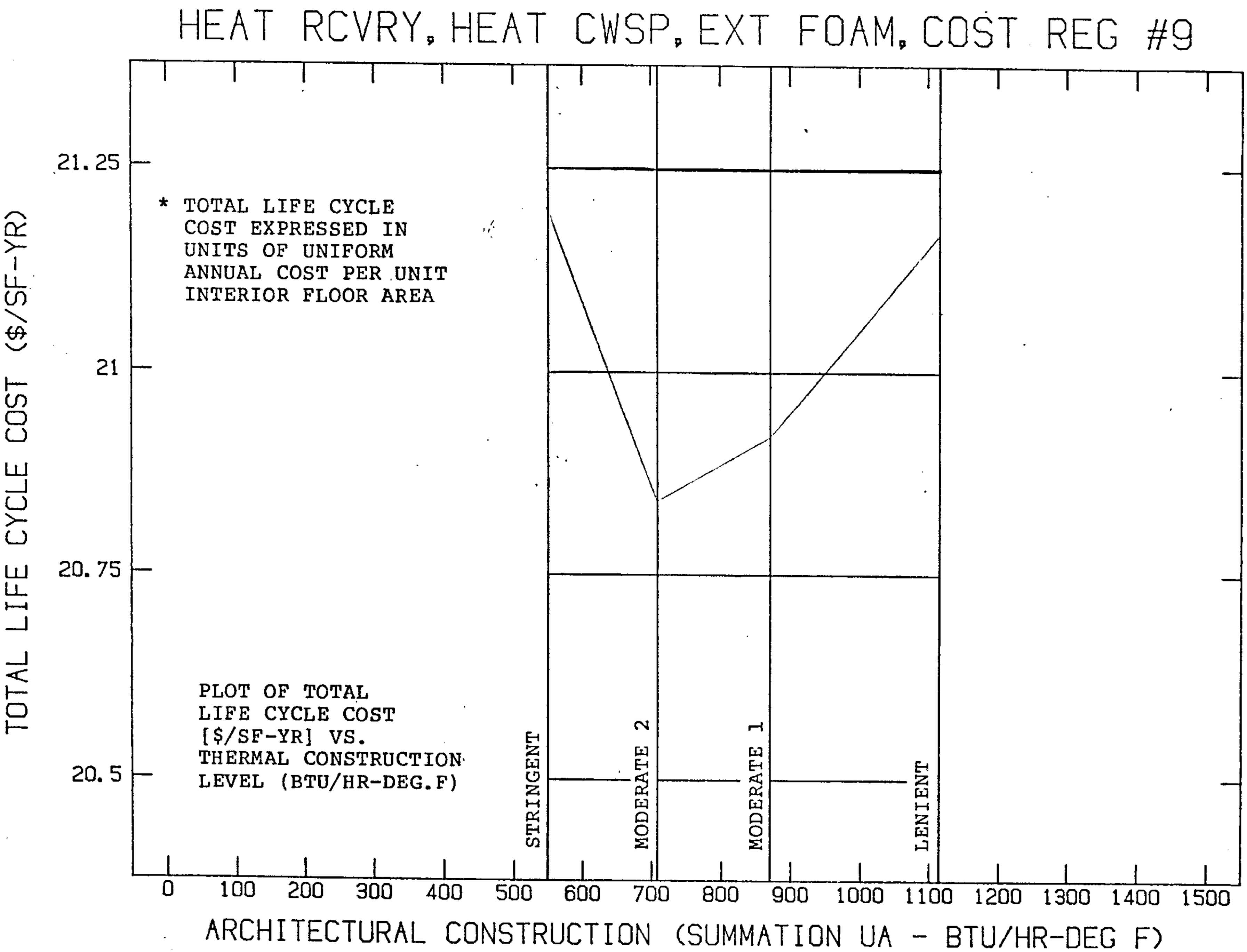
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #6

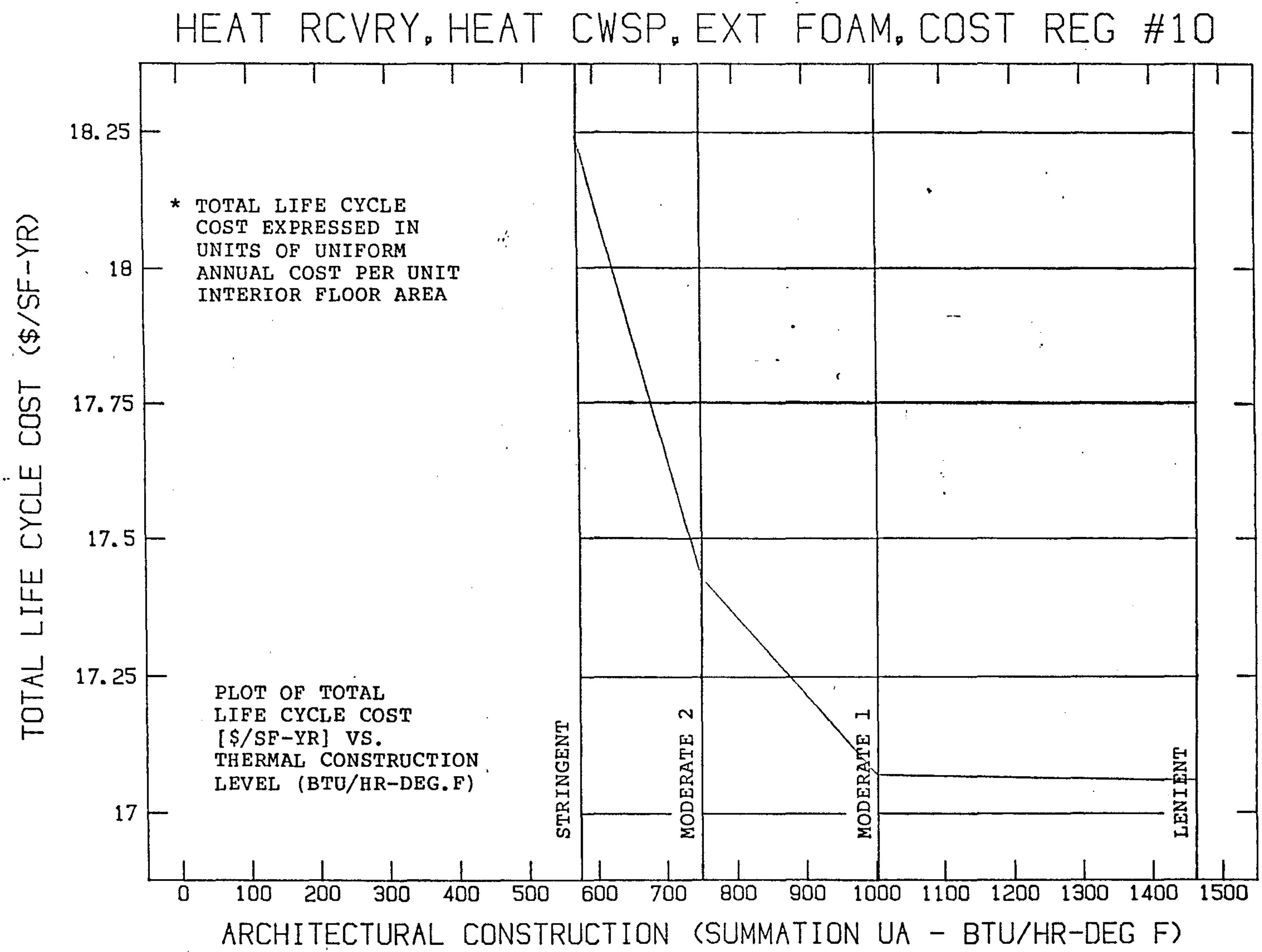




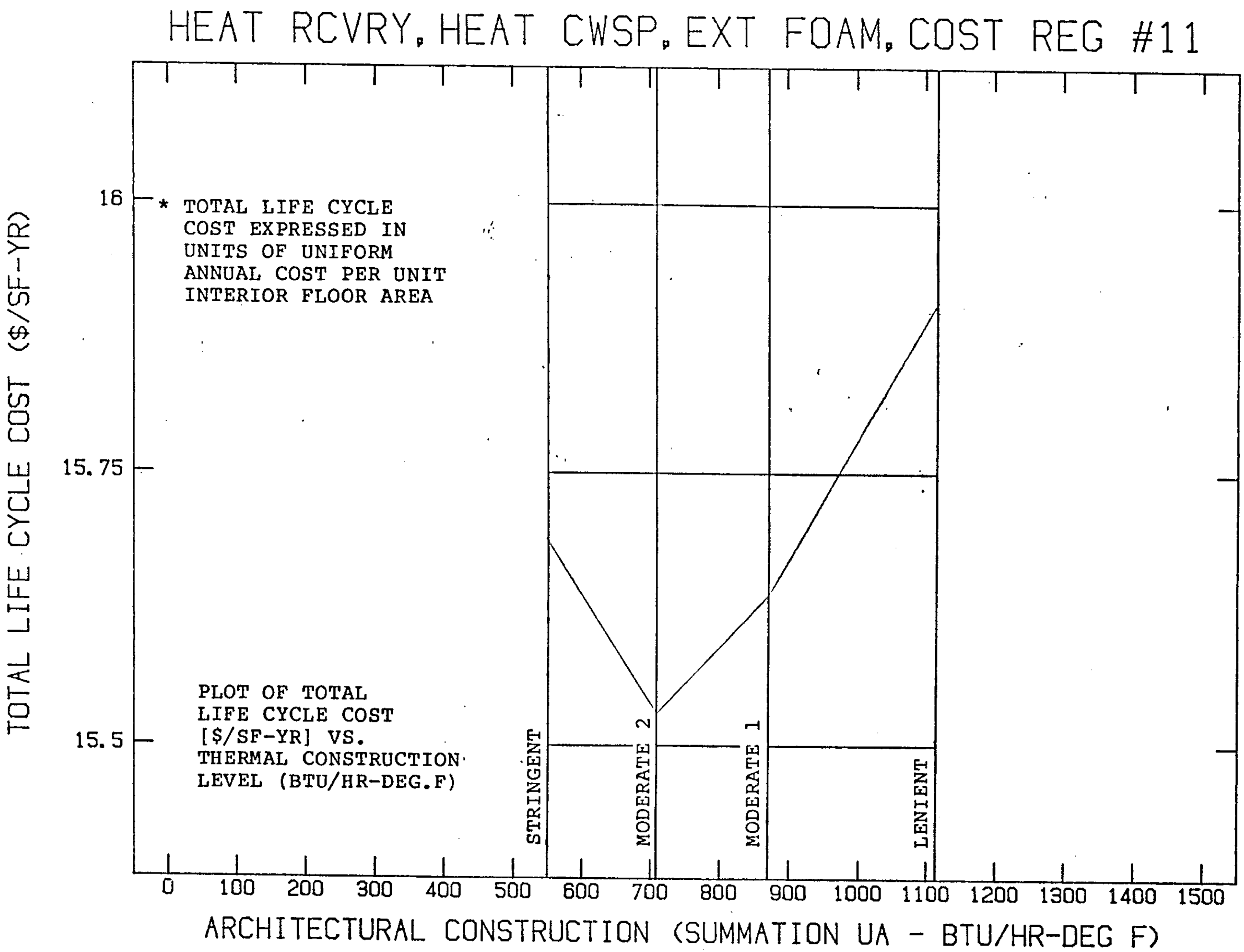
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #7
TOTAL LIFE CYCLE COST ($/SF-YR)
10.5
10.25
10
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)

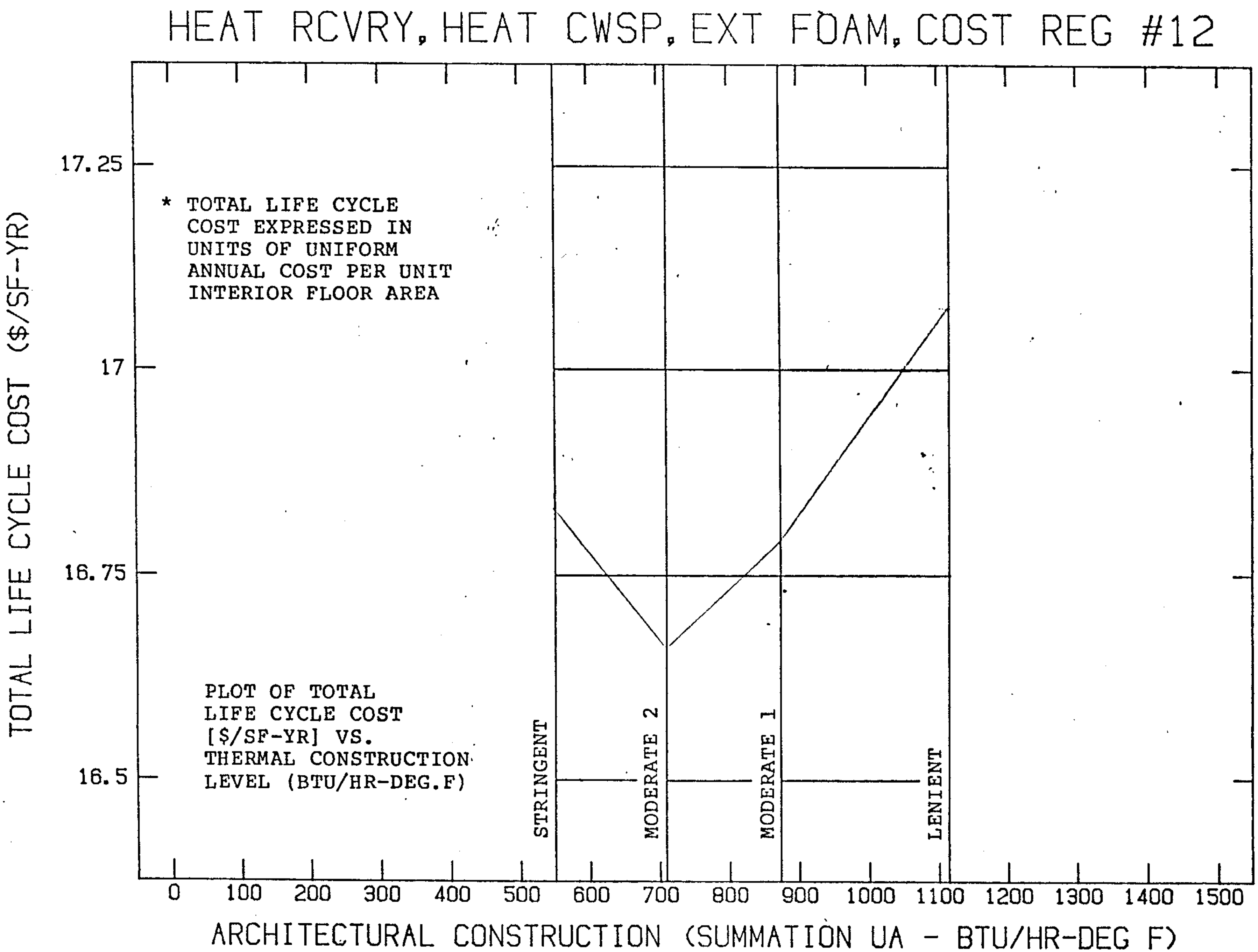

HEAT RCVRY, HEAT CWSP, EXT. FOAM, COST REG #8
TOTAL LIFE CYCLE COST ($/SF-YR)
12
11.75
11.5
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)


HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #9
TOTAL LIFE CYCLE COST ($/SF-YR)
21.25
21
20.75
20.5
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)



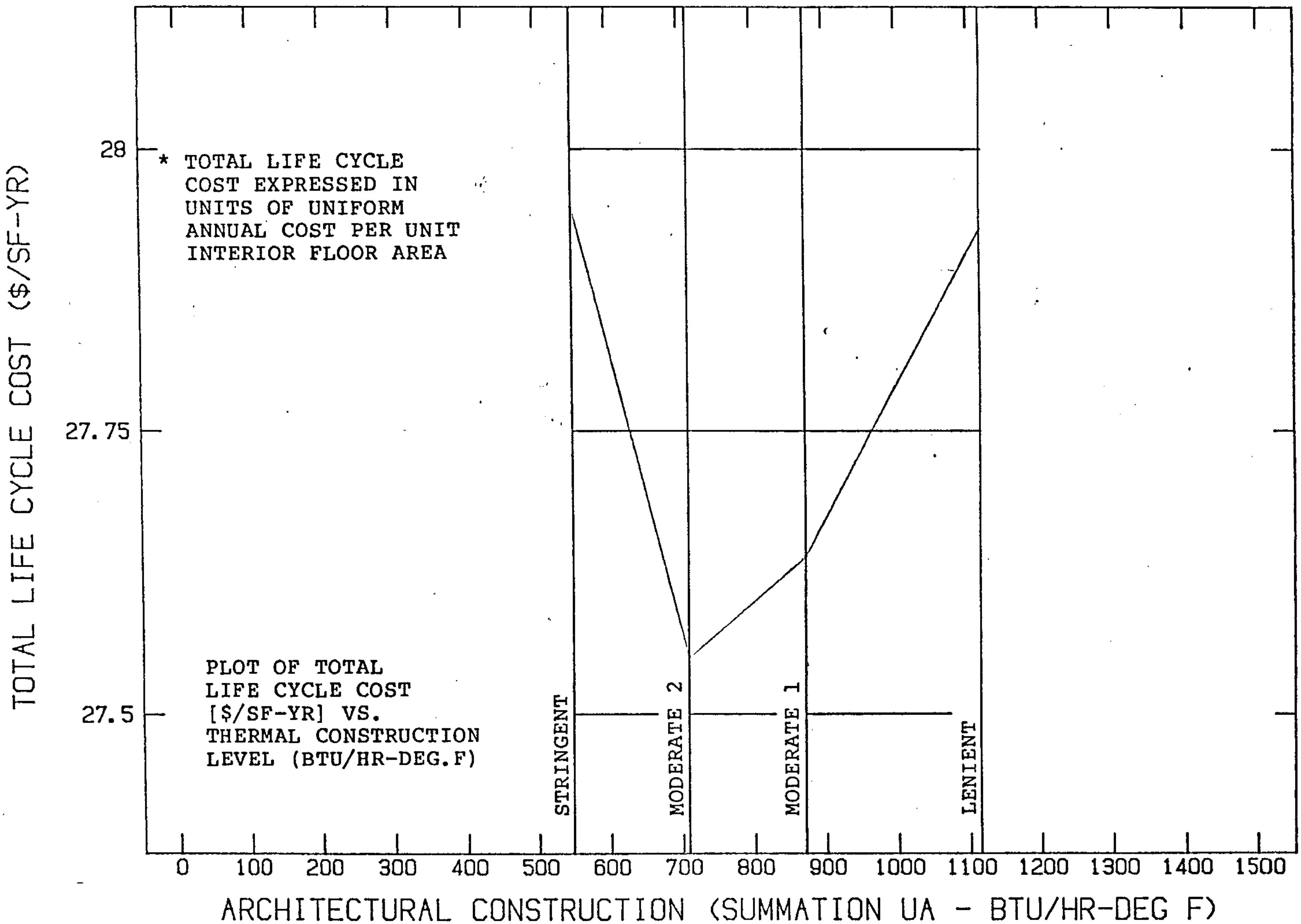
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #10
TOTAL LIFE CYCLE COST ($/SF-YR)
18.25
18
17.75
17.5
17.25
17
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)


HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #11
TOTAL LIFE CYCLE COST ($/SF-YR)
16
15.75
15.5
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)

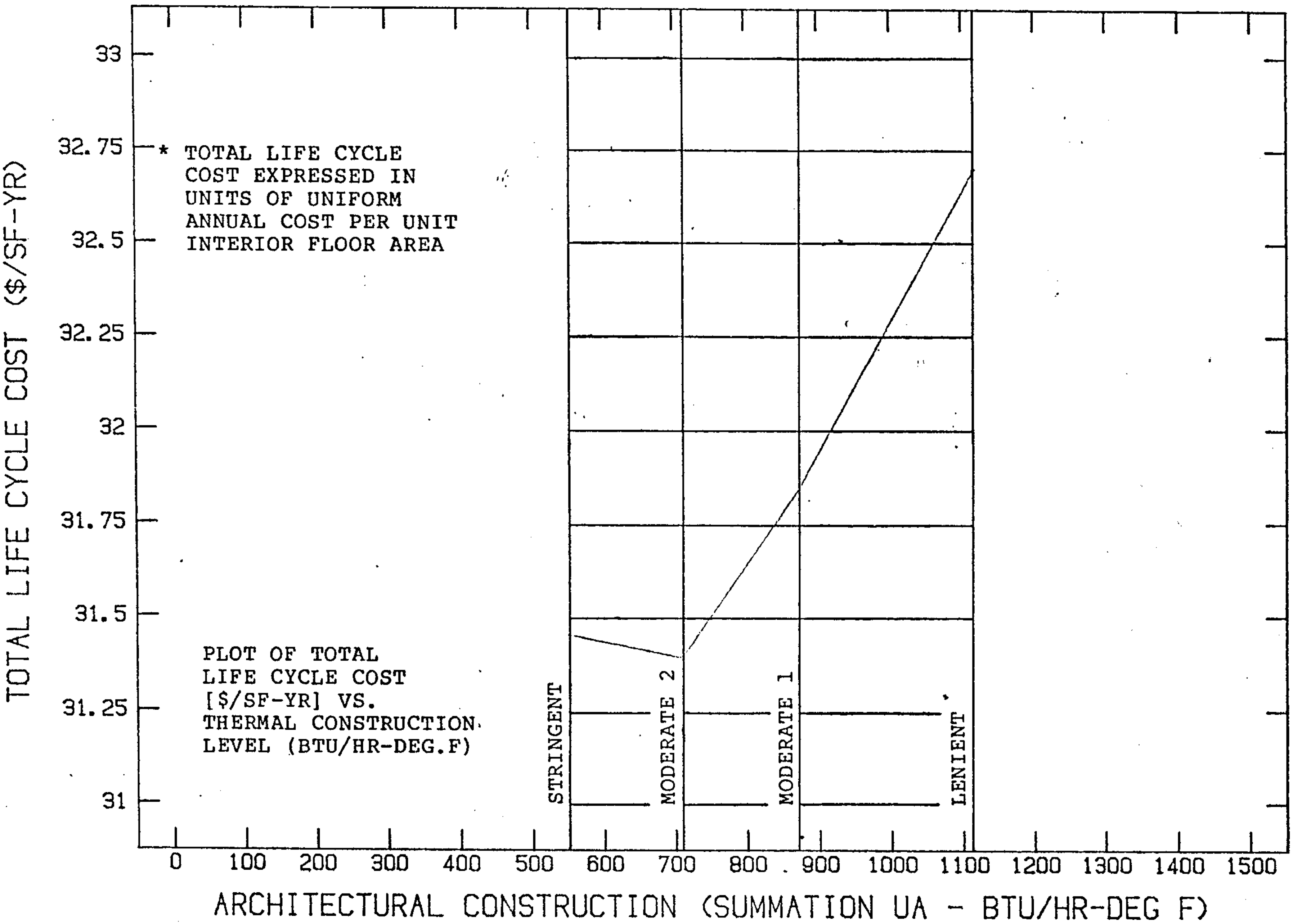


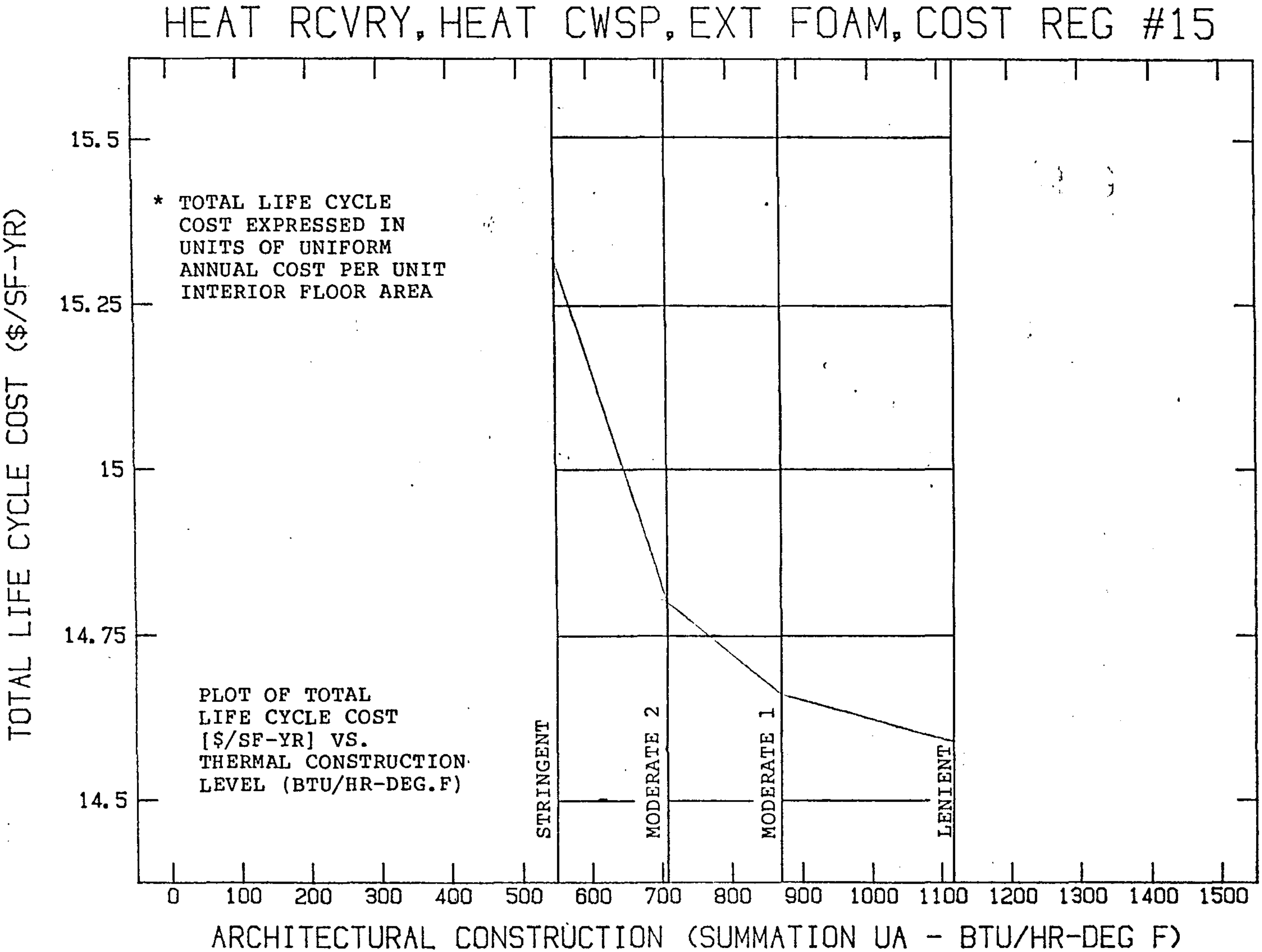
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #12
TOTAL LIFE CYCLE COST ($/SF-YR)
17.25
17
16.75
16.5
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)

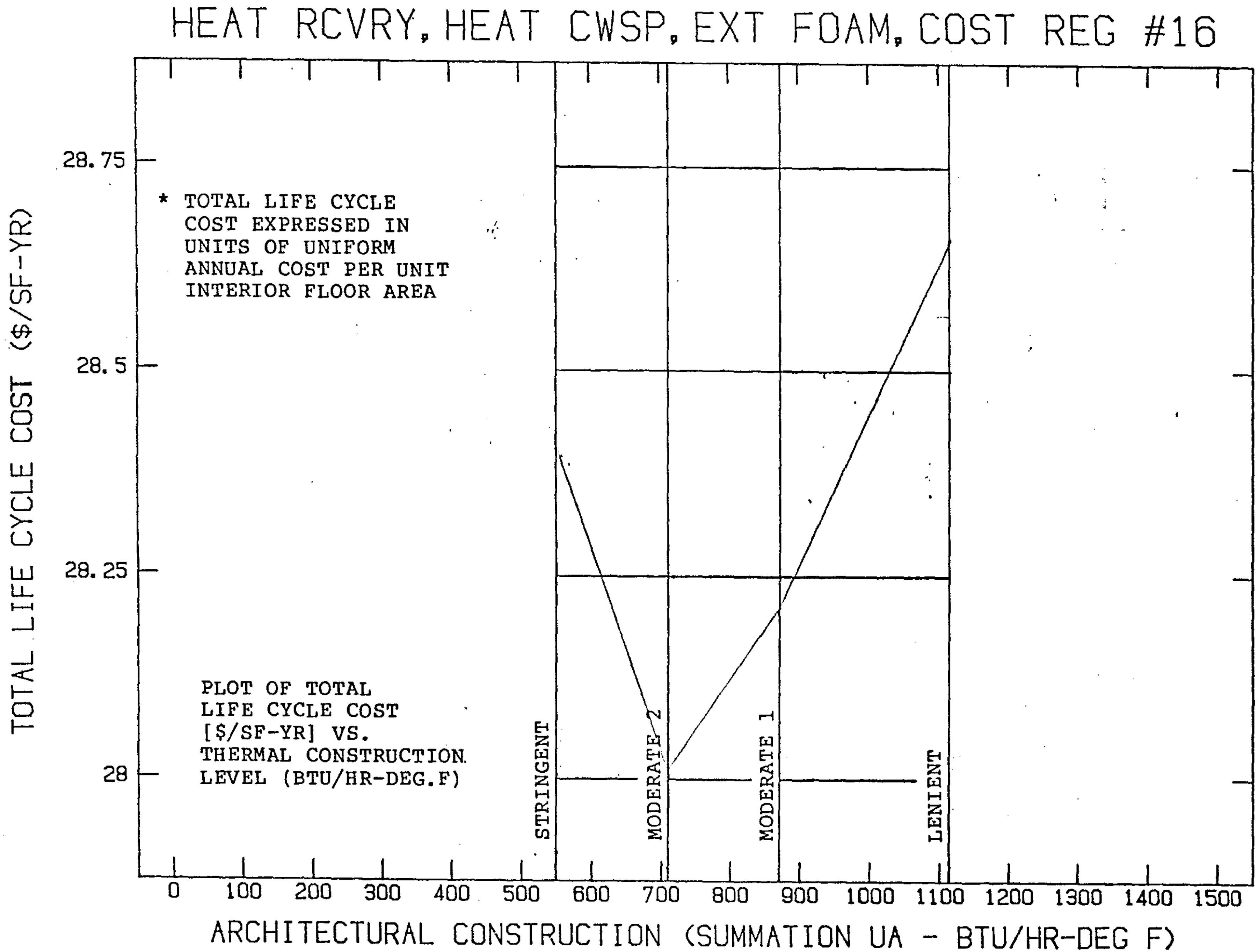
HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #13



HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #14




HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #15
TOTAL LIFE CYCLE COST ($/SF-YR)
15.5
15.25
15
14.75
14.5
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)


HEAT RCVRY, HEAT CWSP, EXT FOAM, COST REG #16
TOTAL LIFE CYCLE COST ($/SF-YR)
28.75
28.5
28.25
28
* TOTAL LIFE CYCLE COST EXPRESSED IN UNITS OF UNIFORM ANNUAL COST PER UNIT INTERIOR FLOOR AREA
PLOT OF TOTAL LIFE CYCLE COST [$/SF-YR] VS. THERMAL CONSTRUCTION LEVEL (BTU/HR-DEG.F)
STRINGENT
MODERATE 2
MODERATE 1
LENIENT
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
ARCHITECTURAL CONSTRUCTION (SUMMATION UA - BTU/HR-DEG F)