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An Approach to Open Building Systems Building Product Information Retrieval

Josh Gurlitz

AN APPROACH TO OPEN BUILDING SYSTEMS
BUILDING PRODUCT INFORMATION RETRIEVAL

by

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Abstract of Thesis
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Abstract

The efficient utilization of information about marketed building products is a requisite for open building systems. There exist, however, few rationalized methods of product information transfer. The methods available to most practi - tioners do not afford a large enough range of performence attribute information efficiently. Those methods which do indicate a large range of performence information with a high degree of access are presently beyond the economic reach of most practitioners.

The method proposed here utilizes an intermediate tech- nological vehicle which allows efficient accessability coupled with a cost factor which may enable it's use by many practicing architects. This system is based upon the categorization of performence criteria and the subsequent selection of building products through these performnece categories. Information is both coded and written, with the coded information enabling efficient access and the written information yielding precise data on each of the products categorized.

Products are categorized through eight different, in-situ, functional types. They are further characterized through seven primary performence attributes. Both functional type and primary performence attribute compose the initial points of entry into the system. Additional points of entry are the U.C.I. referent and materials composition.

Use of this rationalized method of product information retrieval will enable immediate comparisons of specific performence attributes between marketed building products.

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I wish to grate fully acknowledge the continuing support and assistance of Professor Kermit Lee who helped nurture this generalized and broad concept into a specific and definitive system.

The constructive criticism of Professor Roger Orkin was of considerable importance in bringing this thesis to it's final form. Ideas and materials contributed by Professor Walter Kroner of Rensellaer Polytechnic Institute were both essential informational elements in the formulation of this thesis.

Lastly, I would like to thank my wife, Robin, who gave me much needed support and assurance.

CONTENTS

SECTION I

PROBLEM STATEMENT

Since the middle of the nineteenth century, the factory production of building components has played an increasingly important role in the erection and construction of buildings. A few materials, such as masonry units, have histories of mass-production that pre-dates the nineteenth century. However, these materials which have a tradition of mass production are rare, and it is within the last quarter of the nineteenth century that a wide range of products used in building were beginning to be factory produced and extensively marketed. Cast iron enjoyed a brief span of popularity in the 1840's/50's. This material was factory fabricated for a large number of uses, ranging from complete sidewalk assemblies to entire building systems. The period over which cast iron was used coincided with high rates of expansion in several Eastern urban centres, and cast iron buildings were used extensively.[1] Cast iron was somewhat of an exception in the general trend towards mechanization of production of building parts. Initially, most products that were factory made were ornamental (i.e. lathe turned balusters) or were used in the place of finish carpentry. The number of items that were generally obtainable, both ornamental and finished small components, increased dramatically through the last quarter of the century. Catalogues from the latter

1- Condit, Carl W., American Building, The University of Chicago Press, 1969. pp. 81-86

part of the nineteenth century attest to the large number of items obtainable.[2]

With the advent of steel as a major building material, industrialized production of large scale components took its most secure roots. It was no longer possible for the conventional builder to even attempt fabrication of this material. Additionally, the economic and spatial forces in urban areas dictated taller and more dense building forms-the structural potential of steel could not be ignored.[3]

Today, conventional building techniques are heavily oriented towards the assembly of pre-engineered, mass produced, components. We tend to think of 'industrialized building' only when it is presented as large scale prefabrications. Actually, even the most conventional structure consists of pre-cut studs, sash, finish materials, etc. While much emphasis has been placed on the research of use of large scale components in industrialized building, quite the opposite may be true of most smaller components.

The image of 'industrialized building' as a system composed of a limited number of parts that can be assembled in an even more limited set of variations, constitutes what is termed a "closed building system".[4] Generally, these components, connectors, etc. are designed in such a way that only building parts

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2- White, Diana S. Architectural Elements, The Technological Revolution, The American Historical Catalogue Collection.

3- Kaufmann, Edgar, Editor. The Rise of An American Architecture, Praeger Publishers, 1970. pp. 116

4- Schmid, Thomas and Testa, Carlo. Systems Building-An Internal Survey of Methods, Frederick A. Praeger, N.Y., 1969. pp.38.

belonging to one system can be employed.[4] There exists, in theory, a counterpart to this image of industrialized building. This counter concept is that of "open building systems".

Open building systems are quite similar to conventional building methods, in that the 'components' of an open system are potentially many products that are manufactured independently. This array of manufactured products can be combined in a large variety of ways to suit the specific requirements of many different building types and functions. What constitutes the difference between conventional building methods and 'open building systems' is the rationalization of the selection process. In this case rationalization is meant as:

> "...the use of organizational, planning and control techniques in building to improve quality and increase productivity. It aims at the optimum utilization of ...building elements." 5

There have been several successful attempts to combine manufactured products in such a way as to obtain a rationalized and product. The first notable example of this may be Charles Eames' house for himself, which is composed of entirely factory finished manufactured elements.[6] Eames assembled his residence in 1949 and since then the use of pre-finished manufactured components has increased. A more recent example is the work

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5- Department of Economic and Social Affairs. Guidlines for Government Policies and Measures For the Gradual Industrialization of Building, United Nations, N.Y., 1974. U.N. publication ST/ESA/7. Chapter I, section 10

6- Jencks, Charles. Modern Movements In Architecture, Anchor Books/Doubleday, N.Y., 1973. pp. 213-215.

of Ezra Ehrenkranz who developed a 'kit of parts' for assembling school buildings in Southern California.[7] The term used most frequently for these experiments in the use of pre-finished building components is 'off-the-shelf technology' or some varient of that phrase. What each of the experiments have in common is the search for components which meet performance requirements and are compatable with each other. The purpose of this thesis is to propose a methodology and a subsequent office 'tool' that will rationalize the selection of building components. There is, to date, an absence of both method and tool for the purpose of selecting building components for a variety of performance characteristics. One extra-ordinary effort in this direction was attempted by the Building Systems Information Clearinghouse.[8] This group quantified a range of performance characteristics for a limited number of products and entered these data into a computer. The objective was to allow retrieval of information by participating architects and designers. Unfortunately the BSIC ceased it's activities in February of 1975. Too few professionals had subscribed to the system and the maintenance costs were too great to distribute among those who had. BSIC was absorbed into it's parent body, Educational Facilities Laboratories, and is now researching

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7- IBID. pp. 75

8- Building Systems Information Clearing House, Educational Facilities Laboratories, Inc. California, 1971.

energy conservation for school buildings.[9]

What may be learned from the failure of BSIC is that the dissemination of information must rely on a vehicle which is inexpensive and may be widely circulated. The validity of the concept promoted by BSIC is evidenced through the successful completion of projects which utilized their methods.[10] Another, earlier, experiment with information dissemination, this time based upon compatability of manufactured building materials, was attempted by the Producers Council in the 1950's. This industry-backed organization published compatability information sporadically during the 1950's but has not published equivalent data for over 15 years. The Producers Council remains a valuable source of contact with manufactures representatives.[11]

The research for this thesis has indicated that there may be no performance information systems operating on a wide distribution base presently in this country.

9- IBID BSIC/EFL Newsletter, December, 1974 (Last Issue).

10- Metropolitan Toronto School Board, Study of Educational Facilities, Ontario, Canada- Report T-7, Sub-System Purposals For The First SEF Building System.

11- The Producer's Council, Inc., U.S. Directory of Modular Building Materials, 1955.

SECTION II

METHODS

Noted above was the fact that there exists no system of product categorization that enables a user to cross reference both performance and functional characteristics. As this type of reference is essential to the success of devising a type or series or method of open systems design, it is necessary to devise such a system. The following will describe the objectives of a cross referenced cataloguing system, and a description of the vehicle this author has chosen to implement this system.

Objectives:

The principal objective in the design of this system is to enable persons who choose products to utilize a wide variety of selection criteria, occuring in the initial stages of selection.

There are two critical issues which immediately become apparent in the design of an access catalogue system that attempts to fulfill the above objective. The first issue, or area of concern, is the information itself. Products and materials perform in many ways, and the persons who chose products and materials utilize many different criteria in their selection process.

The second critical issue is the choice of vehicle, or format, for this system. The vehicle must be clear, useable, and enable an wide variety of user processes. In addition, the vehicle must enable a user to retrieve a product with a minimum of

effort and a maximal range of selectivity.

The resolution of the above two issues is the substance of this section.

Information:- Criteria

In the selection of criteria upon which to categorize building products, a wide range of sources was utilized. Two sequential procedures were followed that would result in a cogent and useable categorization system.

The first is to determine general areas of information that would enable a user to know where to look for specific information. There are several methods by which this is accomplished currently, foremost among them is the categorization by product type.[1] This is most noteable in the product information catalogues which locate all of the doors, steel framing members, saunas, etc., in separate "slots". This system gives rise to some confusion due to the number and the types of categories. For example: a metal door is found under the classification "doors" not under the classification "metals", whereas a steel building system is found under "metals" and is not classified under "building systems". Some partitions are classified under "partitions" and other are found under the heading of their principal material.

1-For the most comprehensive example of a catalogue utilizing this type of categorization see "Sweet's Catalogue Files", published annually by McGraw Hill, Inc., N.Y., N.Y.

An emergent method of classifying building products is by the functional role they play in defining or enclosing a building.[2] Through this method all structural systems, whether metal or concrete, would be located in a category entitled "structural systems". All products that may be used to enclose a building, whether metal panels, masonry, or wood were the principal material, would be located in a category entitled "envelope". The benefits of this second method are 1) when a designer is making a certain type of decision (i.e. what material to use to enclose a building) all of the appropriate products are in one location, and 2) this method is more amenable to immediate comparison of a wider range of products with greater efficiency.

The two benefits noted above for a "functional role" type of classification are consistant with the aims of this thesis. For this reason a "functional role" type of product information general classification system will be utilized.

In order to enable the comparison of products in terms of their performance, several categories that are additional to "functional roles" have been introduced. These categories represent broad areas of product evaluation and constitute the initial steps in the process of performance comparison. The performance information categories were chosen using two criteria. These are 1) the relative importance of a specific performance

2-Center for Architectural Research, The Role of Hardware Information in Using Industrialized Building Products In Military Construction, Rensselaer Polytechnic Institute, Troy, N.Y. 1975 p.69.

attribute, and 2) the degree to which a wide range of products may be measured by that single attribute.

The first criterion, that of relative importance in the selection of a product, is essential for an initial ordering of information. It is not feasible, nor may it be possible to enumerate all of the attributes of any one product. If the objective of the system is to allow retrieval of information based upon performance attributes and the system is not to become so complex as to be difficult to use, then some hierarchy of performance attributes must be imposed. The more important attributes will be coded to allow easy access and comparison, while the less important will be written. As an example, for a performance selection system, the basic size of a product (planning module) may be more important than the range of colors that the product may be obtained in. Colors may be applied on the site, or may be negotiated with the producer. However, the physical nature of the object in terms of size and tolerance is much more difficult to adjust, either in the factory or in the field.

The second criterion, (degree to which a wide range of products can be evaluated through a specific attribute), is also essential to efficient access and product comparison. An example of this would be spans for structural systems. The attribute of span or bay size is unique to structural systems, however the expression of spans or bay sizes in terms of a planning module is common to a wide range of products. Therefore, planning

modules would be both important enough (criterion 1) and applicable to a wide enough range of products (criterion 2) to be considered an essential performance information category.

The above represents the first procedural step in defining and selecting information categories. The list below indicates the general categories of information that will be used in this system of information retrieval.

1 -Functional Role

2 -Performance

- a)-planning module
- b)-degree of factory finish
- c)-fire rating
- d)-sound transmission
- e)- installation/manipulation
- f)-thermal attributes

3 -Materials

4 -Uniform Construction Index referent

5 -Compatibility Matrix

This list is derived using the criteria mentioned above for determining the general areas of information.

The second procedural step consists of further definition within these general categories. The criteria used to determine a scale or hierarchy within each general category will be most common usage. That is, that the specific performance attributes will be those most frequently utilized or required in the selection of a product within the general areas of information. Below is a description of the specific attributes with the application of "most common usage" applied. For a more detailed description of

all coded information see section III of this thesis.

1) Functional Role

Products can be generally considered as either whole, or part of, functional sub-systems relative to the finished building. These sub-systems must have a degree of compatability that will allow them to function in conjunction with each other.[3] The distribution of functional roles used in this product information system are as follows:

1-Structural Subsystems

2-Internal or Infill Subsystems

3-Mechanical or HVAC Subsystems

4-Lighting/Ceiling Subsystems

5-External Skin or Envelope Subsystems

6-Electrical Distribution Subsystems

7-Wet Subsystems (water and waste removal)*

8-Energy Subsystems (generation)

Products exist within each of the above categories except those marked with an asterisk (*).

2) Performance Attributes

Performance attributes will be classified into four (4) hierarchical catergories for each general performance

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3-IBID

area. This is a function of the vehicle used for the storage and retrieval of information (see section II, part 3) and is adequate for retrieval of specific attributes.

B) Planning Module

The specific performance attributes of planning module are based upon the standard 4"/10cm. recommendation of the United Nations[4] and the Congress of Industrialized Building.[5] Four in. and multiples of 4" are common throughout the United States in the building industry, and the 10 cm. unit is the common multiple throughout those countries utilizing the metric system. Additionally, it is understood that the United States will be experiencing a slow but steady conversion to the metric system, and that to be accurate through time, systems should employ direct conversion capability. The multiples of the 4"/10cm. module utilized in this retrieval system appear below:

(1 M = 10 cm. = 4")

1- 20 M = 5'0" = 200 cm.

2- 16 M = 4'0" = 160 cm.

4-Department of Economic and Social Affairs, Modular Coordination of Low Cost Housing, United Nations Document ST/SOA/90, United Nations, N.Y., 1970. p.8.

5-Proceedings of the Third Congress, Towards Industrialized Building, Rotterdam, Netherlands, 1964.

3- 14 M = 3'-6" = 140 cm.

4- 12 M = 3'-0" = 120 cm.

Through the use of the four specific module attributes above, a large number of other planning modules may be incorporated through the use of multi-modules or parts of the module attributes.[6] For example a 10'-0" planning module would be considered through the 5'-0" module attribute.

b) Degree of factory finish

This is a simple hierarchical attribute ranging from complete factory finish to no factory finish.

c) Fire rating

Fire rating is described through an hourly rating method which is common to national building codes in the United States. These codes also include other fire rating attributes such as flame spread and fuel contribution. However the initial relationships between occupancy groups and adequate fire ratings are usually described in hourly ratings.[7]

The specific fire rating attributes utilized in this information retrieval system are:

6-Modular Co-ordination of Low Cost Housing, pp.10.

7-Building Officials & Code Administrators International, Inc., The Boca Basic Building Code, Sixth Edition, 1975, Article 9, section 902.

1- One (1) Hour

2- Two (2) Hours

3- Three (3) Hours

4- Non Combustable

d) Sound Transmission

Sound transmission information is presented through the Sound Transmission Class of complete assemblies for finished components. The attribute categories used in this system are:

1- STC of 55 or above

2- STC of between 45 and 55

3- STC of between 35 and 45

4- STC of 35 and below

e) Installation/ manipulation

Attributes of installation and manipulation are determined by the combined effects of weight and size of a particular product. The attributes are presented through the use of the number of men or the size of machinery required to install the product. The attribute categories are:

1- One person

2- A group of persons (3 or 4)

3- Forklift

4- Crane

f) Thermal

Thermal attributes are specified through the "u" factor of completed assemblies or products. The range of "u" factors follows:

1- "U" value of .10 or less

2- "U" value of .10 to .20

3- "U" value of .20 to .40

4- "U" value of .40 and above

3) Materials

Materials composition of products is classified when feasible. Products which are composed of several different materials will be classified by their major or identifying materials use. For example a metal partition with fibrous insulation would be classified under metals. The insulative value would be found under the appropriate performance attributes.

Materials classification will be divided into three (3) sections, metals, organics, and minerals. Each section will have the following sub-sections:

a-Metals

1-Iron

2-Steels

3-Aluminum

4-Miscellaneous metals

b-Organics

1-Wood and wood products

2-Petroleum based products

3-Natural Fibres

c-Mineral Products

1-Glass

2-Concrete

3-Masonry and clay products

4-Stone

4) Uniform Construction Index referent

This area of information will be based directly upon the numerical outline published by the Uniform Construction Index.[8] Use of this coded information will enable this system to integrate with the Construction Specifications Institute CSI Format for Building Specifications, The Standard Filing System and Alphabetical Index originally published by the A.I.A., and the Suggested Guide for Field Cost Accounting originally published by the Associated General Contractors of America, Inc.

8- The Uniform Construction Index is a joint venture communications method proposed and supported by the following professional and trade associations; The American Institute of Architects, Associated General Contractors of America, Inc., The Construction Specifications Institute, Council of Mechanical Specialty Contracting Industries, Inc., Consulting Engineers Council of the United States, Professional Engineers, Producer's Council Inc., Specifications Writers Association of Canada. Individual members of these organizations are not required to utilize the U.C.I., however, most information is transmitted using U.C.I. guidelines.

Vehicle:

The vehicle, or format, chosen for this type of integrated catalogue system is termed an "access system".[9] This system was chosen as the vehicle for this access catalogue for a variety of reasons. Foremost among those reasons is the ability of the card to contain a large amount of coded information that can be retrieved with minimal effort. In addition, no special skills are necessary to operate the system, and the costs involved with printing and distributing the system are low.

The use of access cards is a form of "intermediate technology", which was considered appropriate to the aims of this thesis. An intermediate technology is one in which the processes and methods of current technological thought are utilized in the absence of highly sophisticated "hardware".[10] In this case,

9-The specific access sytem that this thesis will develop was originally designed for inventory control for the United States Armed Forces, and is marketed by McBee Systems, a division of Litton Industries.

10-Intermediate technologies are emerging as feasible solution types in many developing countries, especially in the field of housing. Self help programs using manually operated machinery have proven successful in several South American countries. In many countries, the capital necessary for large building programs does not exist, therefore a more labour intensive methods have been utilized. These methods utilize modular building materials, safe and sturdy construction, and other characteristics of construction found in technologically advanced countries-in the absence of highly sophisticated construction methods. An analogy may be made between capital-poor countries and capital-poor professionals. An intermediate technology may be the most efficient way of capital-poor professionals gaining access to information.

the organization and quantification of performance characteristics are approached at a "systems" level, but the vehicle remains rather conventional. The "totally technological" solution would have been to assemble all of the performance information and enter it into a computer program that would allow easy access. The use of this high, or "total technology" solution was rejected primarily for the reasons noted in Section I regarding Building Systems Information House experience. At this point in time, too few architects can afford access to the expensive and sophisticated computer technology. Additionally, it is necessary to organize performance information prior to entering it into a computer program. This "intermediate technology" solution entails the categorization of performance information enabling it to be transferred into a computerized program when those programs do become economically attractive to a larger number of practicing architects.

The access system consists of a series of cards, approximately $3^{1/4}$" by $7^{1/2}$". The cards have continuous discrete holes punched around the perimeter, and have an adequate empty space in the centre of the card for written information. There exists a printed subdivision of holes, grouping them in fours, which allows for 22 distinct categories. Each group of four holes is numbered, generating a possible 14 subdivisions within each of of the 22 distinct categories. This yields a virtually unlimited range of combinations possible and is considered to be sufficient for the purposes of product evaluation and maximal

choice to the user. In addition to the 22 groups of four holes each there are various miscellaneous holes which allow for general classification (i.e. classification that is not subdivided but is of a yes/no nature.) Examples of the use of these miscellaneous holes will be given under the discussion of the performance categories.

The mechanics of using this system are quite simple. They will be treated first as fabrication mechanics and secondly as utilization mechanics.

Fabrication- Entering Information

Necessary tools for fabrication of the system are 1) the card, 2) a punch for the card, 3) a pen, typewriter, etc. & 4) information to be recorded. From product date (#4, information) the specific performance categories and subdivisions which the product fulfills can be obtained. These are then transferred to the card by punching the correct holes. The punch used alters the prepared, discrete, hole in such a way as to make it continuous with the perimeter of the card; i.e. it is no longer a hole but a discontinuity of edge at the card perimeter. This is repeated in all of the various categories that the product relates to. Additionally, information about the product or material is recorded in the open space at the centre of the card. This information may consist of the product name, manufacturer, isometric if applicable, and any other relevant or useful fact.

Utilization- Retrieving Information.

Necessary tools for utilization are 1) fabricated cards, 2) a long needle or ice pick, 3) an open container or a rigid, continuous right angle (a shelf, a brick on a table, etc.), & 4) a list of the categories and their respective notches.

To use the system, the cards are first placed in the right angle, thereby causing all of the holes to line up perfectly. The list of categories is then consulted for the specific performance or function division which is to be chosen. The needle (#2) is then threaded through all of the cards in the appropriate hole, and lifted. When lifted, all of those cards in which that particular hole has been notched will fall out. All of these cards which have fallen will contain products which meet the performance criterion represented by the particular hole through which the needle had been threaded.

Through the mechanics of use, it can be seen that this is a self-organizing system. There is never any need to place the cards in any particular order. If an order is desired, this can be achieved by using the miscellaneous holes and repeating the above utilization mechanism, in which cards will fall out in a pre-determined order.

Each card will contain relevant information on a single product. Where manufacturers produce more than one "model" of a specific product, each "model" will have a seperate card if there are substantial performance differences between the models. If the

differences between models consist of less-than-significant performance attributes, they will be indicated on the same card with indications for both models, or a range of models. (refer... Tech. Manual Code Class).

In order that a wide range of information of interest to the user be included, both written and coded modes will be used on each card. The written information will vary with each functional subcategory-depending upon what type of characteristics are uniquely relevant to that subcategory (i.e. the span lengths of a specific framing system). The coded characteristics will remain uniform for all products in the file and consist of information that is used as a common performance standard for any or all products (i.e. the planning module for the above framing system, which can be compared with a planning module for a ceiling system, etc.).

As is common with coding systems or any coded information, the most difficult requirement to fulfill is that of making the coding easy to learn and use. Simple coding systems rely on memory or massive volumes of coding-decoding information. The telephone system is one of the more obvious systems where access is coded. The user is generally able to memorize a limited number of specific codes- my girlfriend translated to BEachwood-4-5789- beyond which, however, volumes of printed code translation must be consulted to successfully use the system. The telephone system does have a certain amount of built-in logic-the user can

easily contact a specific geographical area-but cannot connect with a specific terminal.

To simplify the problem of code translation, the code should integrate with commonly used references. This will not only allow a person to use this system more easily, but will allow cross-reference to be made with a minimum of difficulty. As this system is to be primarily utilized for performance selection of marketed products, the cards will contain information relating to criteria for performance selection.

Each card contains coded information for five essential categories. These categories comprise the primary points of access into the system. They were chosen because they represent the initial decision areas which must be considered when choosing most products.[11] The information categories, read counter-clockwise around each card are:

1) Functional Category
2) Performance Standards
3) Materials Composition
4) Uniform Construction Index Referent
5) Compatability

A typical sequence might be for the selection of a partition system. The first type of selection would be through "functional category" (1 above), to retrieve all those products in the system that are partition systems. The second set of decisions would be the application of performance criteria (2 above).

11-See Section II of this thesis.

A third set of decisions may relate to materials (3 above) if say, metal partitions were required. A fourth set of decisions would then be to determine the compatability of the partition systems that have 'survived' the previous selection process with other elements which have been chosen.

The above represents only one way of using these five categories. It is possible to enter the system through any one of the five categories. For example, if an entire building or a portion of a building is known to require a specific planning module (say 5'-0") the system may be initially entered through the appropriate performance category (2 above).

SECTION 3

SYSTEM DESCRIPTION/TECHNICAL MANUAL

In this section the details of the classification method described in section 2 will be presented. Two types of information are included in this presentation; 1) Data classification, and 2) coding classification.

Data classification represents an enumeration of the kinds of information that may be required for evaluating products. This classification is sub-divided into categories of product information, properties, characteristics, and performance. This list is further sub-divided to indicate what information will be written on the access cards and what information will be coded on the access cards. The criteria for coding appear in section 2 of this thesis. All pages on which data classification appear have the following heading in the upper right hand corner:

TECHNICAL
MANUAL

DATA CLASS
(XXXXXXXX)

Coding classification is the direct application of coded information onto the cards. The information included in this portion of section 3 is only that information which is coded. The left hand column indicates the punched hole that represents the specific attribute noted in the right hand column. The middle column describes the defining references for the

attribute in the right hand column. All pages on which coding classification appears have the following heading in the upper right hand corner, as well as a diagramatic representation of a card with the appropriate section indicated:

TECHNICAL
MANUAL

CODE CLASS
(XXXXXXXX)

TECHNICAL
MANUAL

DATA CLASS
INDEX

MANUFACTURER	INFORMATION
CLASSIFICATION	
COMPANY	
SUPPLY	
SERVICES	
CONDITIONS OF SALE	
STANDARDS	PROPERTIES
STRENGTH	
THERMAL	
FIRE RESISTANCE	
MOISTURE	
BIO-RESISTANCE	
SOUND	
LIGHT	
ELECTRICAL	
CORROSION	
DIMENSIONAL	CHARACTERISTICS
COLOUR	
FINISH	
ASSEMBLY	PERFORMANCE
CHARACTERISTICS	
WEATHERING	
COMPATABILITY	
LIFE	
MAINTENANCE	
REPAIR	

KEYCARD LOCATION		TECHNICAL MANUAL DATA CLASS INFORMATION
WRITTEN	ENCODED	MANUFACTURER CLASSIFICATION COMPANY
Manufacturer Trade name(s) Address-Headquarters Address-Local supply or Distributor Telephone, Telex	Code referenced to standard catalogue (i.e. Sweets)	MANUFACTURER
Service system Equipment,accesories Assembly	Materials Functional classification Subsystem classification	CLASSIFICATION
Examples of recent use Status-public/private Production capacity		COMPANY

KEYCARD LOCATION		DATA CLASS INFORMATION
WRITTEN	ENCODED	
Source, country of origin		SUPPLY
Method:		
road/rail		
air/sea		
Time constraint:		
order-delivery interval		
Technical advice		SERVICES
Design/layout		
Erection		
Maintenance		
Cost delivered		CONDITIONS OF SALE
Cost erected		
Terms of payment		
Liability		

TECHNICAL MANUAL

SUPPLY SERVICES CONDITIONS OF SALE

KEYCARD LOCATION		TECHNICAL MANUAL DATA CLASS PROPERTIES
		STANDARDS
		STRENGTH
WRITTEN	ENCODED	THERMAL
Testing agencies & evaluation ANSI ASTM U.L. U.S.Bureau of Std's	Fire Rating Sound Transmission class	STANDARDS
Tensile Compressive Torsion Bending Shear Modulus of Elasticity Modulus of Rupture Impact resistance Hardness Fatigue	Span: Planning Module	STRENGTH
Conductivity (k) Transmission Radiation Reflection	Resistance "u" factor	THERMAL

KEYCARD LOCATION		TECHNICAL MANUAL DATA CLASS PROPERTIES
WRITTEN	ENCODED	FIRE RESISTANCE MOISTURE BIO-RESISTANCE SOUND
Combustability	Fire rating, Hours	FIRE RESISTANCE
Flame Spread		
Explosion hazard		
Temperature; softening/yield		
Nat.Bd.of Fire Underwriters		
Vapor permeability		MOISTURE
Absorption		
Moisture content		
Moisture migration		
Shrinkage/expansion	Tolerance inclusive	
Pests	Materials	BIO-RESISTANCE
Insects		
Fungi		

TECHNICAL
MANUAL (cont'd)

Absorption	Sound Transmission Class	SOUND
Reflectivity		
Impact-structure borne		

TECHNICAL MANUAL

DATA CLASS PROPERTIES

KEYCARD LOCATION		
WRITTEN	ENCODED	LIGHT ELECTRICAL CORROSION
Diffusion		LIGHT
Absorption		
Reflectivity		
Resistance		ELECTRICAL
Insulation		
Conductivity		
Electrostatics		
U.L.Approval		
Oil	Materials	CORROSION
Acid		
Alkali		
Salt (atmospheric)		
Sulphers		

KEYCARD LOCATION		TECHNICAL MANUAL DATA CLASS CHARACTERISTICS
WRITTEN	ENCODED	DIMENSIONAL COLOUR FINISH
Height	Modular-module	DIMENSIONAL
Width/length		
Thickness		
Span tolerence		
Fading options/range		COLOUR
Texture		FINISH
Applications		
Degree of pre-finish		
Degree of field-finish		
field-finish skills necessary		

TECHNICAL
MANUAL

DATA CLASS
PERFORMANCE

ASSEMBLY
CHARACTERISTICS
WEATHERING

KEYCARD LOCATION

WRITTEN	ENCODED	
Position	Manipulation	ASSEMBLY
Fixed protection	Compatability	
Storage protection		
Output	Spans	CHARACTERISTICS
	Loading/Capacity	
Air		WEATHERING
Water		
Wind		
Solar		
	Compatability	COMPATABILITY

TECHNICAL MANUAL

DATA CLASS PERFORMANCE

KEYCARD LOCATION — LIFE MAINTENANCE

WRITTEN — ENCODED — REPAIR

Durability: — LIFE

in position

on the shelf

Proccess requirement — MAINTENANCE

When required

By whom?

Methods — REPAIR

Facilities

Spare parts availability

Time

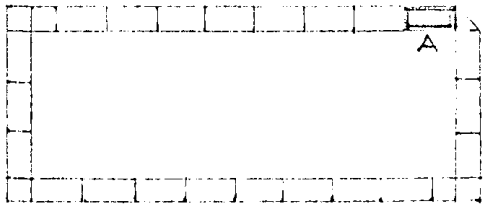
Contractual

A second series follows, entitled:

TECHNICAL
MANUAL

CODE CLASS
XXXXXXXXXX

This series is a description of the encoded information listed in the DATA CLASS above. Standards used to derive a range of ratings, as well as specific reference to performance codes, where they exist, are related to the categories chosen for performance selection.

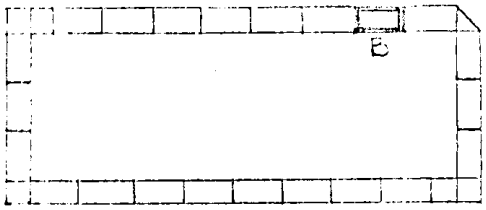


TECHNICAL MANUAL

CODE CLASS FUNCTION A

STRUCTURAL
INTERNAL INFILL
HVAC
CEILING/LIGHTING

KEYCARD LOCATION	UCI REFERENCE	
A-1		STRUCTURAL SUBSYSTEMS
A-2		INTERNAL INFILL SUBSYSTEMS
A-4		HVAC SUBSYSTEMS
A-7		CEILING/LIGHTING SUBSYSTEMS

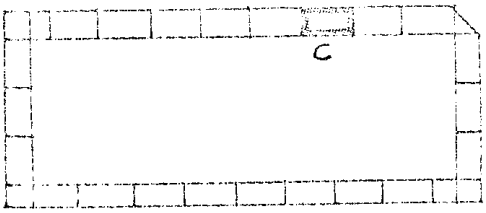


TECHNICAL
MANUAL

CODE CLASS
FUNCTION B

EXTERNAL SKIN
ELECTRICAL
WET SYSTEMS
ENERGY

KEYCARD LOCATION	UCI REFERENCE	
B-1		EXTERNAL SKIN HORIZONTAL
B-1		EXTERNAL SKIN VERTICAL
B-2		ELECTRICAL SUBSYSTEM DISTRIBUTION
B-4		WET SUBSYSTEMS
B-7		ENERGY SUBSYSTEMS GENERATION
B-7		ENERGY SUBSYSTEMS COLLECTION



TECHNICAL MANUAL

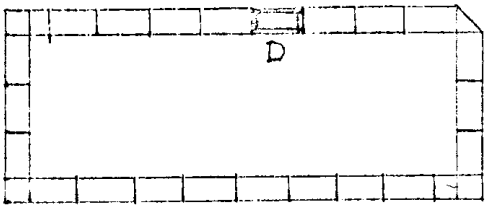
CODE CLASS

KEYCARD LOCATION	STANDARD REFERENCE	PLANNING MODULE
C-1	15M at 4"=10cm=1M	5'-0"/150cm
C-2	12M at 4"=10cm=1M	4'-0"/120cm
C-4	no standard referent	3'-6"/105cm
C-7	9M at 4"=10cm=1M	3'-0"/90cm

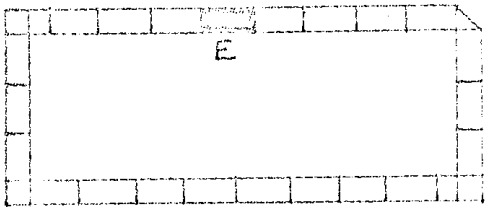
Note:

Other regular planning modules may be comprised of combinations of these modules or may be comprised of smaller components of the numbers above.

Examples would be- a 6'-0" planning module would be considered within the 3'-0" planning module function. To characterize a 7'0" planning module, the 3'-6" function would be used. Likewise a 2'-0" module would be included in the 4'-0" function (C-2) and a 2'-6" module within the 5'-0" function, (C-1).



KEYCARD LOCATION	STANDARD REFERENCE	TECHNICAL MANUAL CODE CLASS DEGREE OF FINISH
D-1	There shall be no finish work required on the job site. Assembly shall entail only gross connections and no product modification.	COMPLETE FACTORY FINISH
D-2	Some finish may be required at the job site, assembly may be more complex, but still simple.	PARTIAL FINISH
D-3	This category entails full painting, application of other surfaces, etc. There shall be no gross product modification.	PRIMER
D-4	All finish applied at the job site. Also required modification of the product on-site.	NONE



KEYCARD LOCATION	STANDARD REFERENCE	TECHNICAL MANUAL CODE CLASS FIRE RATING
E-1	ASTM E119	1 HOUR
E-2	ASTM E119	2 HOUR
E-4	ASTM E119	3 HOUR
E-7	ASTM E84	NONCOMBUSTABLE
	UL 723	
	NFPA 225	

NOTE:

Fire resistance rating means the time in hours that the material or construction will withstand the standard fire exposure as determined by a fire test made in conformity with the "Standard Methods of Fire Tests of Building Construction and Materials," ASTM E119. (E-1,E-2,E-4).

Noncombustable as applied to a building construction material means a material which, in the form in which it is used, falls in one of the three following groups:

a. Materials no part of which will ignite when subjected to fire. Any material which liberates flammable gas when heated to any temperature up to 1380^{0}F. for five minutes shall not be considered combustable....

b. Materials having a structural base of noncombustable material, as defined in a. with a surfacing not over 1/8" thick which has a flame spread rating not higher than 50.

c. Materials in the form and thickness used, other than as described in a. or b., having a flame spread of not higher

TECHNICAL
MANUAL

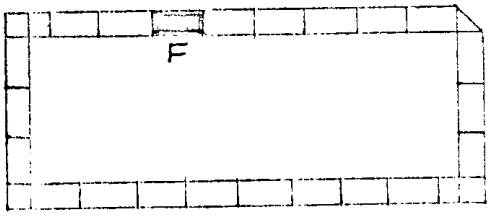
CODE CLASS
FIRE RATING

CONTINUATION:

than 25 without evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material in any way would not have a flame spread rating higher than 25 without evidence of continued progressive combustion.

It does not apply to surface finish materials nor the the determination of whether a material is non-combustable from the standpoint of clearances to heating appliances, flues, or other sources of high temperature. No material shall be classed as noncombustable which is subject to increase in combustability of flame spread rating beyond the limits herein established, through the effects of age, moisture, or other atmospheric condition. Flame spread rating as used herein refers to ratings obtained according to the Standard Test Method for Fire Hazard Classification of Building Materials of Underwriters Laboratories, Inc.,U.L. 723, NFPA 255, ASTM E84.

The above notes relating to Fire resistance ratings and Non-combustable ratings are taken from Section 200 of the National Building Code, recommended by The American Insurance Association successor to the National Board of Fire Underwriters.



TECHNICAL MANUAL

KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS SOUND TRANSMISSION
F-1	FHA Minimum Property Standards-Between living and business areas for floors, ceilings, and walls.	STC 55 and above
F-2	FHA Minimum Property Standards-between living units and other living units, also for walls within living units.	STC 45-55
F-4	Common usage between areas of required sound reduction.	STC 35-45
F-7	Little Sound Transmission Loss, common usage where reduction is insignificant.	STC 35 or lower

NOTE:

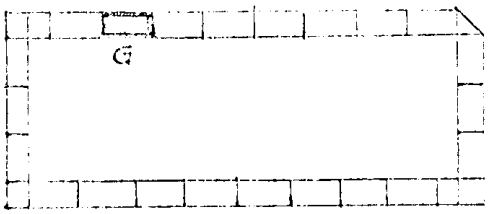
Sound Transmission Class shall be established by approved testing in accordance with ASTM E90 and classes shall be determined through comparison with class contours established by ASTM E90.

TECHNICAL
MANUAL

CODE CLASS
SOUND TRANSMISSION

CONTINUATION

F-1 and F-2 are categorical derivatives of "Minimum Property Standards for Multifamily Housing" by The U.S. Department of Housing and Urban Development, Federal Housing Administration, February 1971.



TECHNICAL MANUAL

KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS ERECTION
G-1	Can be handled, erected, installed by one person. This implies weight and dimensional qualities that would allow a single person of average health to retrieve an element from storage and install it in it's final, fixed location.	MANUAL
G-2	Can be handled, erected, and installed by a work crew of 3-4 persons, with no required reliance upon motorized or mechanical equipment.	GROUP
G-4	Small, non-fixed, materials handling equipment required. This may be for transport on the job site, or for short lifting.	FORKLIFT

CONTINUATION		TECHNICAL MANUAL CODE CLASS ERECTION
G-7	Required utilization of fixed or non-fixed cranes. Large and heavy components. Crane capacities required are noted under written information.	CRANE

TECHNICAL MANUAL

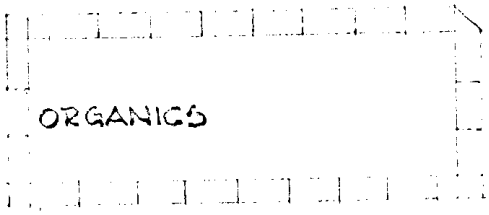
KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS THERMAL
H-1	"U" values .10 or less, low co-efficient of heat transfer. Equivalent of well insulation wood stud wall or better.	HIGH THERMAL RESIST.
H-2	"U" values .10-.20 Equivalent of insulated built-up roof, wood joist.	MODERATE THERMAL RESIST.
H-4	"U" values .20-.40 Equivalent of uninsulated masonry wall, uninsulated stud wall.	LOW THERMAL RESIST.
H-7	"U" values .40 and greater. Equivalent of glass curtain wall.	THERMAL RESIST. NIL

The above are considered to be useful ranges of "U" factors for components entered in this catalogue. If the manufacturer expresses thermal resistance directly, the reciprocal of that expression will be used to determine the "U" value recorded here.

METALS

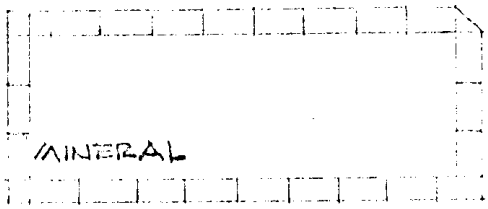
TECHNICAL MANUAL

KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS METALS/MATERIAL
I-1	Gray Cast Iron Malleable Cast Iron Wrought Iron	IRON
I-2	Carbon Steels, ASTM-A373,A7,&A36. High Strength Steels, ASTM-A242,A441,&A440. Stainless Steels, AISI-410,430,&302	STEEL
I-4	Heat-Treatable Alloys Non-Heat-Treatable Alloys Wrought Alloys-Series 1000 to 7000 (Aluminum Association)	ALUMINUM
I-7	All <u>other</u> non-ferrous metals (exception-aluminum), including copper, brass, etc.	MISC. METALS



TECHNICAL MANUAL

KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS ORGANICS/MATERIALS
J-1	Hardwoods-National Hardwood Lumber Assoc. Softwoods-American Softwood Lumber Standard, PS 20-70 Plywoods-U.S. Product Standard PS 1-66, Softwood Plywood - and U.S. Product Standard PS51-71, Hardwood Plywood. All other wood products.	WOOD & WOOD PRODUCTS
J-2	Bituminous Products. Plastics, structural, and fibres. Thermoplastics and Thermosetting plastics. Plastic matrixes (aproxies, etc.)	OIL BASED PRODUCTS
J-4	Natural Fibres, wools, cottons, etc.	NATURAL FIBRES
J-7	Open	OPEN



TECHNICAL MANUAL

KEYCARD LOCATION	STANDARD REFERENCE	CODE CLASS MINERAL/MATERIALS
K-1	Sheet, Plate, and Float process glass,-Glass blocks, and all other products of glass manufacture.	GLASS
K-2	ASTM Standard Specifications for Portland Cement C150-Types I-V. ASTM C31 (Compressive testing). ASTM C33 for aggregates (inclusive). ASTM C175 (Air-Entraining). Concrete Masonry Units-ASTM C150,C175,205,C10, C350,C205 type S, Aggregate, ASTM C33, C331, Admixtures, ASTM C260, D98.	CONCRETE
K-4	Unit Masonry, Clay-ASTM C62 (all grades) C216 (grades SW & MW) Brick. Strut.Clay Tile-ASTM C34, C57. Facing Tile, ASTM C212, C126.	MASONRY-CLAY
K-7	Dimension, Flags, Crushed Rock, and Rubble.	STONE

TECHNICAL
MANUAL

CODE CLASS
U.C.I. REFERENCE

Code classification for Uniform Construction Index reference coding will require two keysorts to obtain a specific division and two keysorts to obtain a specific section within a division. For this reason the standard format for KEYCARD LOCATION will be revised in this section only.

Standary references are omitted, as all standard reference for this section is the U.C.I. Appended will be a copy of the U.C.I. reference code and this will replace the standard reference for this section.

Divisions and sections will be found in the right hand column and the appropriate keysorts necessary for obtaining the divisions and sections will be found at the left.

KEYSORTS	DIVISION
8-00,8-1	1
8-00,8-2	2
8-00,8-3	3
8-00,8-4	4
8-00,8-5	5
8-00,8-6	6
8-00,8-7	7
8-00,8-8	8
8-0 ,8-1	9

CONTINUATION	TECHNICAL MANUAL CODE CLASS U.C.I. REFERENCE
B-0 ,B-2	10
B-0 ,B-3	11
B-0 ,B-4	12
B-0 ,B-5	13
B-0 ,B-6	14
B-0 ,B-7	15
B-0 ,B-8	16

SECTION IV- A Test Model

Part a- Problem

A TEST THROUGH DESIGN APPLICATION

Section IV is a test of the proposed system through the application of the system in a design problem. The problem chosen is a Multiphasic Health Screening Center (MHSC). An MHSC is appropriate for testing this product selection system for several reasons.

Health screening centers are integral elements in the emerging field of preventative medicine. These centers are places in which large numbers of persons are screened at regular intervals in order to detect medical conditions that indicate disease or bodily malfunction. By detecting disease in early stages, treatment is generally less difficult and less costly.

MHSC's would be administered by either government or through the pooled resources of industry and insurance companies. A facility of the type described below in this program could handle a peak of about 35,000 people annually, with a normal load of about 21,000 persons annually. The geographical distribution of MHSC's would be dependent upon population densities with, say, a city the size of Syracuse requiring 8 to 10 MHSC units and a city the size of Oneonta requiring 1 to 2 units. Because MHSC units would be administered centrally (government or insurance companies) a high degree of consistency in the physical attributes and the testing potential of the units would be necessary, although

distribution throughout a region would not be even. This need for consistency in the physical plant of an MHSC coupled with an uneven distribution pattern, makes this building type an ideal test model for this product selection system. Consistency would be obtainable through the use of similar products for all MHSC units, but distribution would not be limited by the transport potential of a single plant turning out identical pre-fabricated units.

A second reason why an MHSC provides a good test of this system is that the physical requirements of such a unit are quite demanding. Surfaces need to be easily decontaminated, and extremely wear resistant. There is a large low voltage electrical access requirement for communications with centralized computer testing facilities. The MHSC unit should be expandable through time, as population densities in many areas will tend to increase. HVAC systems must perform efficiently for very small zones in order to maintain a odor free, germ free, and fresh environment. More detailed performance information is included in part 2 of this section, within the Performance Specifications.

This section will include two main parts. The first is a program for an MHSC which contains the general objectives of an MHSC, the general criteria for a building to house an MHSC, and lastly, a detailed description of the health testing procedures, equipment and recommendations for internal process for an MHSC unit.

The second part will be composed of a performance specification for the principal sub-systems necessary for the building of an MHSC unit.

Objectives- Multi Phasic Health Screening Center

Functional Use:

The primary use of the MHSC will be health evaluation. Normal health care will remain the responsibility of private physicians and hospitals. No treatment of diseases will occur at an MHSC. The target of the MHSC is detection. Principal sponsors for this may be:

Institutions

Industry

Government

Community

A basic group of tests will be used to screen for the majority of chronic diseases. The selection of specific tests reflects maximal effectiveness, available technology, and a minimumization of incurred costs. The testing procedure is designed for uninterrupted flow of screenees through the MHSC unit, with certain test preparations occurring in advance of the actual tests, as required. While no health care is to be administered at an MHSC, an important function of this facility is medical and nutritional education and space should be provided for this non-testing purpose.

General Physical Requirements:

MHSC units should be adaptable to various climatic and other environmental situations. They should be able to respond to

changes in screenee loading, be useable in conjunction with existing facilities when necessary, and have internal flexability to respond to changes in testing procedures.

The MHSC unit should make use of fully factory finished structural and non-structural building components. Components should require a minimum of erection and finishing time, allowing the MHSC to be brought on-line as rapidly as possible. Additionally, the internal components should be demountable and easily moveable, and the structural system may be transportable. Internal sub-systems should be by-passing, or have proprietary inter-connections which allow for easy manipulation by crews employed by the client.

All finished surfaces should be easily cleaned and decontaminated. They should also be resistant to stains normally encountered in health screening facilities.

Part b-Program

Program A-Spatial Utilization

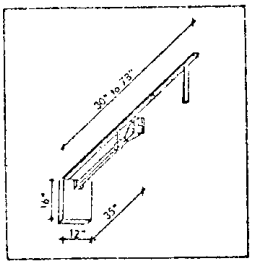
Preliminary Functions:

Registration and History- A semi-enclosed cubicle or private room is desireable for registration in order to obtain an accurate medical history. The screenee may be reluctant to answer personal questions in an area where others may overhear. During return appointments, screenees should fill out an interval medical history. Thus all screenees, both new and return, will be using this space.

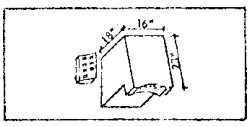
Dressing Area-Dressing areas should be provided for use before and after cardiopulmonary tests, chest X-rays, mammography, thermography, pap smear, and proctoscopy/sigmoidoscopy. The screenee removes all clothing to the waist and puts on a radiolucent disposable gown.

Tests:

Anthropometry- At this station, the height, weight, and temperature of the screenee is measured and recorded. A skinfold thickness test is performed to determine the degree of obesity.



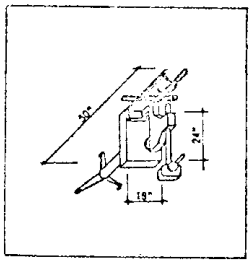
Vision-The screenee may be examined for visual acuity with a snellin chart or a stereoscopic device.

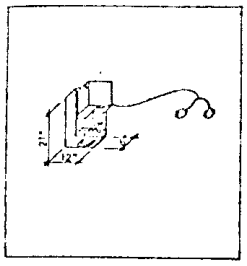


The latter may be used for for testing fusion, acuity, color and binocular vision. After receiving proparicaine HCl eye drops or a similar topical anesthetic, the screenee is tested for glaucoma, by means of a tonometer. If an electric tonometer is used, no drops are required.

The screenee is prepared for retinal photography with phenylephrine HCl or similar drops 20 minutes before the test to dilate the pupil. If photography is not used the screenee may be tested with an ophthalmoscope.

Retinal Photo-A fundus camera is used to take a 35mm photograph 20 minutes after the mydriatic eye drops are instilled, to detect any pathology.

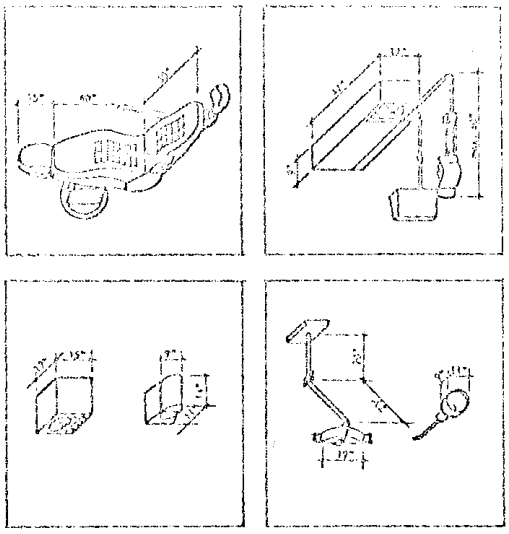




Hearing-Hearing preception is measured through tone thresholds. Various frequencies are tested using increasing and decreasing tone volumes. Audiometric testing may be primarily self-administered by means of a special audiometer. Quality of the earphones is more important than the degree of soundproofing.

Glucose Ingestion-
The screenee is given a 75 cm glucose medium to ingest. This may be dispensed in bottles or in a refrigerated beverage unit. The time of administration is noted on a card. At the end of precisely one hour a blood sample will be drawn and tested for glucose. A urinalysis may also be performed at the end of one hour. It is essential that the screenee not exert himself physically during this period.

Besides diabetes, numerous latent conditions may result in abnormal glucose levels in the blood or urine.



Dental

This section consists of a dental and soft tissue examination. Disposable instruments may be used. Teeth are not cleaned or filled at a screening facility.

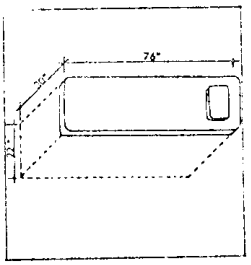
Cardiopulmonary-

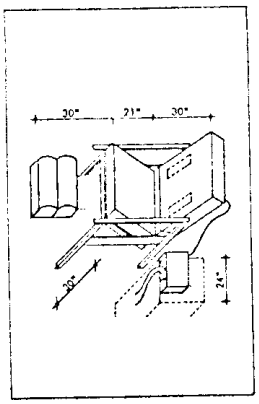
Vital Signs

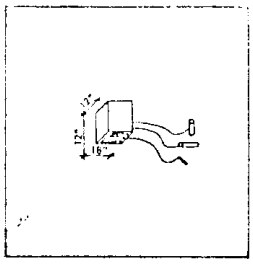
The screenee lies down on an examining table where his pulse, respiratory rate and blood pressure are checked and recorded. Temperatures may also be taken. Modular monitoring equipment is available which meesures and digitally displays vital signs including the respiratory rate.

Electrocardiogram

An electrocardiogram is taken to detect abnormal cardiac rhythm, conduction disturbances, myocardial damage, coronary insufficiency, and other conditions which alter the normal electrical activity of the heart. The most common method of electrocardiography employs twelve leads and a horizontal screenee. An EKG chair has been developed, but is not yet in production.

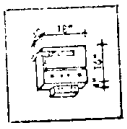






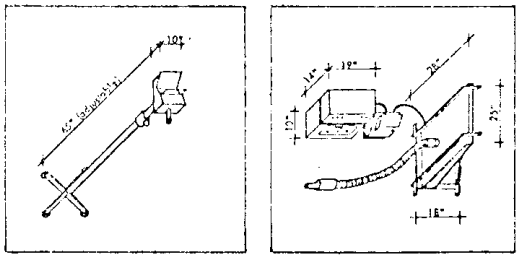
Phonocardiogram

This test is done to record and detect heart murmer and abnormal heart sounds.



Spirometry

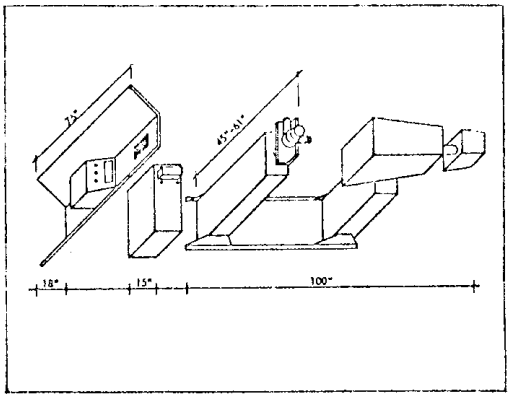
The screenee is shown how to use the spirometer (vitalometer) to determine lung capacity. The screenee exhales into the disposable mouthpiece or tube of the spirometer. The amount of exhaled breath and the flow rate indicate the degree of respiratory impairment.



X-Ray

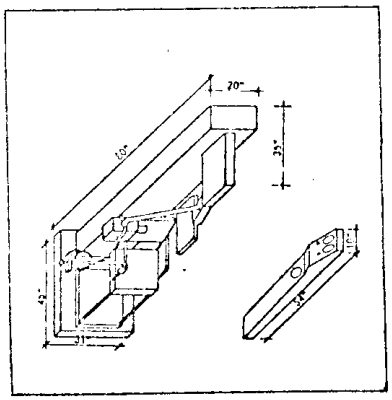
Chest

A 70mm posterior-anterior chest x-ray is performed to determine pulmonary, cardiac, or neoplastic conditions. High speed processors currently available can develop this film in 90 seconds. If this is used a radiologist familiar with these films must be used for interpretation.



Dental

Both panoramic and apical films of the anterior incisors may be taken at this station.

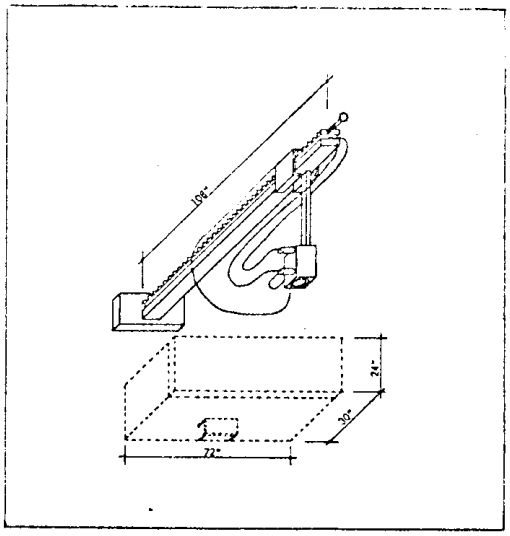


Flat Plate of Abdomen

A flat plate x-ray may be taken to visualize any abdominal pathology.

Mammography

Various x-ray views are taken of each breast to visualize neoplastic conditions in menopausal women.

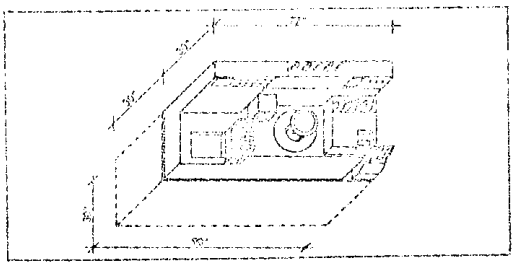


Thermography

This test is performed on menopausal women to determine the presence of breat tumors, which are indicated by an increase in the thermal level at the tumor site. It is more time consuming that a mammogram, since a "cooling down" period of

approximately 10 minutes is required. The screenee then sits on a stool 10 feet from the infra-red scanning camera. Thermal patterns are displayed on a cathode ray tube and may be photographed. Three thermograms and up to five isotherms (superimposed pictures which map thermal levels) may be taken.

Laboratory Tests



Blood

Blood chemistry tests can be performed by means of automated multichannel analyzers using a minimum of sample. All multichannel devices currently available possess the capability of interface with computers either directly or indirectly, and can produce bar charts or printed output.

A CBC (complete blood count) and an STS (serological test for syphilis) should be done with all specimens.

Urinalysis

The urine specimen is obtained in the screening unit. Toilet facilities should be provided near the lab. It should be tested for color, specific gravity, pH, sugar, albumin, acetone and bacteria.

Parasite Detection

Depending on the needs of the screening group and the geographical location, test to detect parasites may be necessary. Gross examinations of the feces may reveal the presence of worms, but a microscopic examination may be necessary to detect parasite eggs and small worms.

Immunization

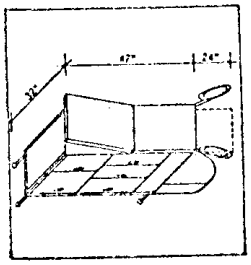
Space may be provided for administering immunizations against communicable diseases such as diptheria, measles, polio, smallpox, typhoid, whooping cough, and tetanus Those which are given depend upon the individual, area needs,and age groups.

Tuberculin Skin-Testing

This method of testing for tuberculosis is better than chest x-rays for preliminary screening in low risk groups. If the screenee develops a positive reaction within 48 hours, a chest x-ray may be used to confirm or rule out pulmonary tuberculosis.

Pap Smear

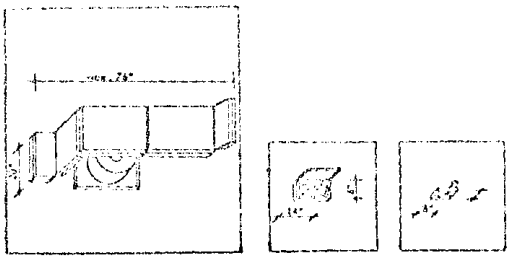
Pap smears to detect cervical cancer may be performed on all women over 21, and those women



who have been pregnant. The exceptions are those women in the last three months of pregnancy.

Proctoscopy, Sigmoidoscopy

Examination of the rectum and the sigmoid by means of a lighted instrument may be done to detect polyps or cancerous lesions. Disposable sigmoidoscopes are available, eliminating the need for autoclaving or sterilizing equipment.



Achilleometry

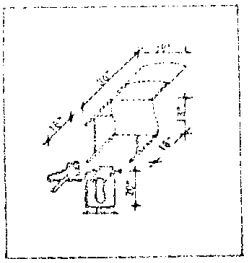
Achilles Reflex

This is a test to detect hypothyroidism. The screenee places one foot over a chair or stool with the foot and ankle extending over the edge. The achilles tendon is struck with a percussion hammer, with a reflex action ensuing that resembles a knee jerk. The

reflex action as exaggerated in upper motor neuron disease and absent in lower neuron disease.

Pressure Tolerance

This test is performed on the achilles tendon to determine the pain threshold of each screenee in order to test for neurological damage.



Psychological Questionnaire

The screenee either fills out a psychological questionnaire or uses pre-punched cards to answer statements. The results may be tabulated by computer.

Health Education

All screenees should receive specific health counseling at each screening station during or after each test. In addition, provision could be made for a special health education

station at the end of the testing procedure. This may be directed towards 1) personal questions which might have arisen, 2) guidance regarding any follow-up process, and 3) General health information.

Visual Aids

At this same station provision could be made for showing health related slides and films.

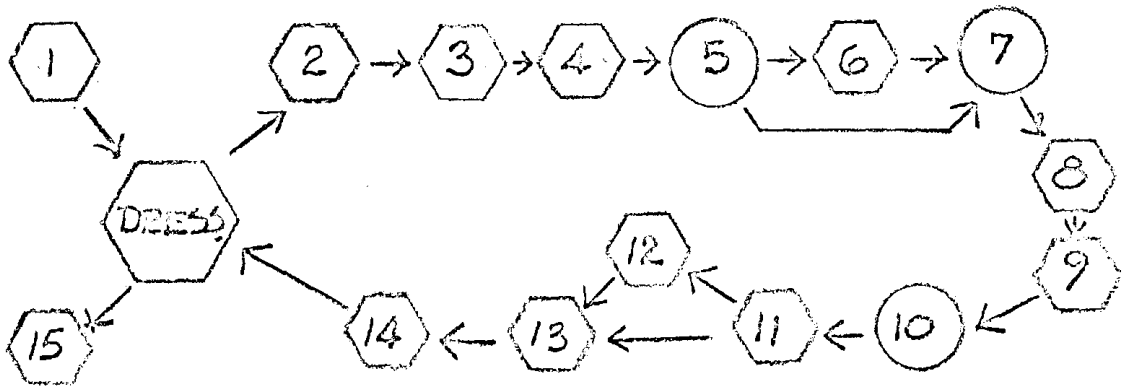
Library

A small library area should be provided in which printed health brochures are made available for screenees to take home. Health related magazines as well as basic books on heath and hygiene should be made available for reading in the unit.

First Aid

Space for this station should be provided for a physician

or RN to handle any emergencies
that might arise during the
screening proceedure.



Procedure and Circulation

Above is a procedural chart which indicates the pattern that a testee would normally take through this multiphasic testing facility. The numbers within the hexagons refer to the test stations indicated on the page following this.

Additionally, on the following page, are indications of the time constraints implied in this testing procedure. Total, elapsed time for the complete group of tests is approximately 2 hours and 17 minutes. This does not include waiting times, dressing times, and time spent in circulation. With a testing facility properly designed, circulation time should not be significant. If the facility is managed efficiently, waiting time both at the preliminary station (1) or before any subsequent stations should also not be significant. Dressing times can vary between 4 and 20 minutes depending upon both the person involved (behavioristic) and whether the activity is undressing and donning a gown (short time) or dressing at the conclusion of the tests (longer

time).

The sequence shown is not inviolable and there can occur a re-arrangement of the sequence. However, several relationships must be maintained. All of the hexagons with a darker circumference are time-critical (i.e. between the instillation of mydriatic drops and the retinal photo) and should bear the same time-frame relationship, regardless of re-arrangement.

# STATION	TEST TYPE ACTIVITY	DURATION MINUTES	ELAPSED TIME	NOTES
0	Entry	0	0	
1	Registration	4-5	5	
1	Medical History	24	29	
1	Waiting	na	na	
2	Height/Weight	3-4	33	
2	Temperature	4	37	
3	Audiometry	5	42	
3	Vision	7	49	
3	Tonometry	2	51	
4	EKG, Pulse	6-8	59	
4	Phonocardiogram	4	63	
4	Spirometry	4	67	
5	X-ray chest	3-4	71	
5	X-ray dental	1-2	73	
5	Glucose Ingestion	2		Men only
6	Thermography	12	85	Women only
6	Glucose Ingestion	2	87	Women only
7	Skinfold	1-2	89	89
7	Mydriatic drops	2	91	instillation
8	Dental Exam	8	99	
9	Achilleometry	4	103	
10	Retinal Photo.	4-5	108	
11	Urine Specimen	2-4	112	
12	Pap Smear	4-5	117	Women only

13	Proctoscopy Sigmoidoscopy	12	129
14	Blood Sample	4	133
14	Immunization	4	137
15	Health Education	-	-
16	Psychological Test	-	-

Part c- Performence Specifications

Division 1- General Requirements

1.1- There shall be a minimum of on-site work required for erection and completion of this health screening facility. As many as possible components shall be factory fabricated and bought from manufacturers in finished condition. Finish trades shall be kept to a minimum.

1.2- Component delivery and the rental of equipment such as cranes, shall be scheduled in appropriate manner, so as to minimize storage of delivered components and to also minimize equipment rental time periods.

Component storage is critical in so far as each component shall be delivered in a finished condition. Storage shall be in enclosed shelters, free from moisture, dirt, and other deleterious substances normally encountered at a construction site. In the event that delivery and erection is the responsibility of the manufacturer, that manufacturer should have space with the above requirements met for storage of components during the period in which he is involved in the erection of his product.

1.3- This health screening facility shall be planned in such a manner as to require specialized site preparation only to the point of beering of the first (ground)

floor. Site preparation will be dependent upon selection of a structural system, and shall be defined specifically when that choice has been made.

The system of components described will be adaptable to a range of terrain and sub-surface situations. Interface with sub-surface or surface load distribution systems will be typical, while the load distribution system may be modified to accomodate individual site conditions.

1.4- The component set chosen for this health screening facility shall exhibit the specific properties listed below. Additionally, all chosen components will be, where possible, reclaimable, and re-useable.

Division 2- Structural System

2.1- General

The structural system chosen for this facility shall be completely factory fabricated, with the exception of jointing. It will be the responsibility of the manufacturer to erect the system, if the chosen system is proprietary and erection by the manufacturer is normal practice.

The system chosen should have the capability of incremental growth, that is, that additions should be possible using the same structural system at a date

later than that of the initial work. This is not meant to imply that the manufacturer is bound to produce this system at any point in the future, simply that it is possible. Incremental growth means the addition or deletion of standarized components.

2.2- Support

The structural system chosen shall be entirely self-supporting and shall not rely upon internal or external skins in so far as transfering compressive or tensile loading. Floors shall be capable of sustaining a Live Load of 100 lbs/psf. Roofs shall be capable of sustaining a Live Load of 40 lbs/psf. Maximum number of stories for this application is two (2).

2.3- Planning Module

The planning module for the structural sub-system should be 4'-0". If, when designed, a bay system is determine that will allow another planning module for structure while maintaining a 4'-0" internal planning grid this requirement may be less restrictive (i.e. a system on a five foot module will produce spans of 20' and 40' - if these spans are indicated through design, a 5' module would be acceptable).

2.4- Vertical Dimensioning

Ceiling heights should be accomodated between 8'-0" and

10'-0", clear dimension. In addition, a minimum of 20" must be allowed for ducts, raceways, etc. although with systems that allow ducting through the structural member the maximum o.d. for ducting must be at least 20".

Division 3- Vertical Skin

3.1- General

The vertical skin subsystem chosen for the facility shall be completely factory fabricated and finished, with the exception of jointing.

The system chosen shall have the capability of incremental growth, if required. This places no obligation upon the manufacturer to continue production of this subsystem at any specific point in the future, simply that it is possible.

3.2- Thermal Requirements

The system chosen shall have a "u" factor of .10 or less, with a 2" to 4" complete panel thickness, o.d. The type and amount of insulation is at the discretion of the manufacturer, as long as the thermal requirement can be sustained throughout an estimated life span of 10 years, and as long as all other requirements of this specification are met.

The "u" factor shall be determined through recognized testing procedures at an approved testing laboratory.

The "u" factor shall not include still air at the interior surface of the wall.

3.3- Fire Resistance/Retardation

All vertical skin components shall have a flame spread rating of 25 or less, fuel contribution of 15 or less, as determined by Underwriters Laboratory testing and specification, or another approved testing laboratory. ASTM E-84.

3.4- Finish-Exterior

The exterior surfaces of the vertical skin subsystem shall be resistant to corrosion, fading and discoloration from elements normally encountered in the environment or from normal maintenance procedures. The exterior surfaces shall be guaranteed for the ten year life span of this facility against cracking, flaking, peeling, spalling, fading or discoloration by the manufacturer. The interior finish surfaces shall be visually compatible with the internal partition system specified, in terms of module, surface finish, and material. The internal surface should be resistant to stains, abrasion, discoloration due to normal wear and normal maintenance. This surface must also be resistant to stains normally encountered in a medical testing facility.

3.5- Openings

The vertical skin subsystem shall accept all window, door, vent, and other openings as indicated on the drawings. It is the responsibility of the manufacturer to provide for openings in the fabrication of the skin; no cutting and patching shall occur on the job site, due to improper or complete lack of openings.

3.6- Erection

Erection and installment of the vertical skin subsystem shall be by a working crew only. Motorized equipment may be required for materials handling, but no specialized equipment should be necessary for installation.

Division 4- Horizontal Skin

4.1- General

This division applies to all horizontal skin subsystems, roofs and floors. If the structural subsystem is inclusive of horizontal skins, then the remarks under this division shall additionally apply to the structural subsystem.

The horizontal skin subsystem shall be completely factory fabricated with the exception of jointing and necessary finish requirements. In addition, if this subsystem is not a part of the structural subsystem,

insulative value is at the discretion of the manufacturer as long as all of the other requirements of this specification are met and the thermal requirement can be sustained throughout an estimated life span of 10 years. The "u" value shall be determined through recognized testing procedures at an approved testing laboratory. Testing shall be performed on a full scale, fully assembled system and not on specific sub-components only.

4.4- Fire Resistance/Retardation

The subsystem chosen shall have a flame spread rating of not more than 25, and a fuel contribution of 0-25. Additionally, it shall be fire rated for at least a two (2) hour rating. Smoke development should be less than 100 and there should be no toxic substances that either burn or are carried by developed smoke.

Flame spread, fuel contribution, and smoke development tests shall be performed by U.L., ASTM, or other approved testing laboratory and shall be performed on full assemblies.

4.5- Sound Absorbtion/Transmission

If this subsystem is used in an exposed interior or exterior situation, and no lighting/ceiling subsystem is used, then the minimum NRC shall be .60. If this

system is used in an assembly with a lighting/ceiling subsystem, the combined STC shall be a minimum of 45.

4.6- Finish-Exterior

Exterior finish shall be that specified by the manufacturer. The finish should allow no moisture penetration and shall be guaranteed against material defects, moisture penetration, cracking, flaking, peeling, spalling, and rot for the ten year life span of this facility by the manufacturer.

Interior surfaces, when unexposed to areas of human use, shall be able to remain unfinished. In areas where the underside of the horizontal skin is exposed finish shall be paint as specified by the manufacturer, in a color chosen by the architect. Painting of the underside of the horizontal skin shall occur in the factory of the manufacturer or at a factory designated by the manufacturer and shall be the sole responsibility of the manufacturer. Color of this paint shall be chosen by the architect, of those specified by the manufacturer. This painted surface shall be guaranteed against peeling, crazing, flaking, and discoloration under normal maintenance conditions by the manufacturer for the ten year life span of this facility.

Interior horizontal surfaces, when used as floors, shall be finished as indicated on the plans in the field. If the horizontal surfaces used as floors are finished in the factory of the manufacturer, they shall be covered with a protective surface in the factory. This protective surface should protect against any and all marring of the finished surface by workers and others prior to the occupation of the building by the client. All floors shall be delivered up to the client at the time of occupancy free and clear of all stains, marks, indentations, and any other defects.

4.7- Erection

Erection and installation of the horizontal skin system shall be by a working crew only. Motorized equipment may be utilized for materials handling, but no heavy equipment may be used for installation.

Division 5- Internal Partitions

5.1- General

This division refers to all internal elements that are used to define, or divide the internal space for this health facility.

The partitioning system(s) chosen will be required to integrate with the ceiling/lighting subsystem, the horizontal skin subsystem when used as flooring, and

with the electronic distribution subsystem. While care has been taken to assure that these subsystems will be capable of integration, it is the responsibility of the manufacturer to insure that such will be the case. Compatibility should be determined through dimensional co-ordination, techniques of joinery, and any or all other criteria which the manufacturer feels necessary to insure adequate compatibility.

Adequate compat bility may be defined by the parameter that no subsystem shall in any way impinge upon the stated performance characteristics of any other subsystem. Additional compatibility may entail matching of finishes and other requirements as stated in these specifications.

The partitioning subsystem(s) chosen shall be completely factory fabricated and finished. The components of this subsystem shall arrive at the building site with a factory applied protective surface. This protective surface should protect against any and all marring of the finished surface during on-site storage and by the work crew or others prior to the occupation of this Facility. Storage shall be the responsibility of the General Contractor and shall adhere to the requirements in Division 1, section 2 (1.2) of this specification.

5.2- Load Sustention

All interior partitions are considered to non-loadbearing, in so far as no other subsystem is allowed to impose loads of any kind on the partitioning subsystem. However, some partitions may be required to support wall hung fixtures, graphics, etc. as indicated in the drawings. For this reason, all partitions shall be capable of supporting a hung load at any position on the partition of at least 250 lbs. with a resulting deformation which does not impair any of the performance criteria noted in these specifications and further will not cause any dimensional instability.

The partitioning subsystem shall also be capable of sustaining loads imposed by doorways, and other mechanically activated components that appear in the drawings. If doors and doorframes are included in the partitioning subsystem, it is the responsibility of the manufacturer to insure that under normal and active use these doors will not cause any deformation or any other loss of performance to the partitioning subsystem.

5.3- Planning Module

The horizontal planning module for all internal partitioning shall be 4'-0". The partitioning subsystem shall be able to accomodate doors and other openings

which may not adhere to this module by means of variable infill panels or other means at the discretion of the manufacturer. Whatever methods are used for accomodating non-modular openings they shall adhere to all conditions of this specification.

The vertical dimension for internal partitioning subsystems shall yield clear ceiling heights of 8'-0" and 10'-0" where indicated on the drawings. Two different height panels may be used, but they must be similar in all other respects and both must adhere to all parts of this specification.

Panel thickness may be from 2" o.d. to 4" o.d., with modular dimensioning determined by the centerline of the partition.

5.4- Fire Resistance/Retardation.

The partitioning subsystem chosen shall obtain a minimum of a 2-hour fire rating, evidenced through testing by an acceptable laboratory. Additionally the finished surfaces shall support a flame spread of not more than 25, and a fuel contribution of not more than 15, as determined through the ASTM E84 Tunnel Test or acceptable equivalent.

5.5- Sound Absorbtion/Transmission

A minimum Sound Transmission Class of 35 will be required of the complete partitioning assembly for most areas in this facility. In and around areas, as indicated on the drawings, an STC of at least 45 may be required.

A Noise Reduction Co-efficient in the range of .65-.75 for the finished surface will be required of all interior partitioning.

Sound Transmission Class will be determined through testing according to ASTM E90-66T by a recognized and approved testing laboratory.

5.6- Finish

The internal partitioning subsystem shall be finished by the manufacturer, in the factory, and delivered to the site with adequate protection (see 5.1 of this specification). The chosen finish shall be resistant to stains, abrasion, discoloration and shall not peel, flake, warp, or crack due to normal wear and normal maintenance. Additionally, where indicated on the drawings, the finish surface must be resistant to stains normally encountered in a medical testing facility.

Colors, textures, and motif shall be chosen by the architect, but it remains the responsibility of the manufacturer to meet the above criteria for finish.

5.7- Erection/Manipulation

Partitioning subsystems must be able to be installed by a work crew without the necessity for heavy equipment. Mechanized materials handling equipment may be used at the discretion of the General Contractor, but should not be required.

Additionally, the partitioning subsystems shall be relocatable at a rate equal to or exceeding 2 lineal feet per man hour. This relocation must be able to be accomplished by a crew hired by the owner or by the regular maintenance staff.

Division 6- Ceiling/Lighting Subsystem

6.1- General

This division refers to the subsystem which shall perform the functions of ceiling, lighting, air diffusion and air return. As a fully integrated subsystem this shall be completely manufactured and finished by the manufacturer and shall arrive at the job site ready for installation. The subsystem chosen will be required to integrate with the partitioning system as regards module. Further the ceiling/lighting sub-

system shall be suspended or directly attached above and shall not impose any loads upon the partition subsystem. If the ceiling/lighting subsystem adheres rigidly to the same planning module as the partition subsystem, partitions may be restricted to the ceiling grid lines only. If this subsystem does not adhere rigidly to the same planning module as the partition system, partitions must be able to be located independantly of the ceiling grid.

Rigid adherence to the planning module is defined as being a total of 1/8" differential along a 20'-0" grid line. If the subsystems deviate from each other in excess of 1/8" within a 20'-0" Bay they shall be considered to not adhere rigidly to the same planning module.

6.2- Support

The lighting/ceiling subsystem shall be supported by hangers from either the roof or the structural members above. Compatibility in so far as the ability of the horizontal skin subsystem or the structural subsystem to carry this load shall be determined by the manufacturer. Additionally, a maximum dead load for this ceiling/lighting subsystem shall be 10 lb/psf and shall include ceiling, coffers, and airhandling equipment averaged.

6.3- Planning Module

The lighting/ceiling subsystem shall be fabricated for utilization on a 4'-0" planning module. Lay-in units for ceiling, or light coffers, or for a luminous ceiling may be of any subset of a 4'-0" planning module. Air supply and return should preferably be located on grid lines so as not to interfere or limit in any way the general lighting of the spaces in this facility.

The ceiling/lighting subsystem shall be capable of accepting specific, or unique, non-modular elements as shown on the drawings. This refers to the possibility of necessary vertical venting of equipment through the ceiling, acceptance of possible electrical distribution elements, and other conditions which may apply.

6.4- Fire Resistance/Retardation

The ceiling/lighting subsystem and the horizontal skin subsystem, shall achieve as a component package, a fire rating of at least 2 hours. If the entire assembly is not rated, then the ceiling lighting subsystem shall have a minimum of a $1^{1/2}$ hour rating.

Additionally, the lighting/ceiling subsystem shall have a Flame Spread Rating of not more than 25 as determined by testing in accord with ASTM E84-66T.

6.5- Sound Transmission/Absorbtion

A minimum Sound Transmission Class of 35 will be required of the complete ceiling/lighting subsystem for most areas in this facility. In and around certain specified areas, as indicated on the drawings, an STC of at least 45 may be required.

A Noise Reduction Co-efficient in the range of .65-.75 for the finished surface of the ceiling/lighting sub-system will also be required.

Sound Transmission Class will be determined through testing according to ASTM E90-66T by a recognized and approved testing laboratory.

6.6- Finish

The finish surface will be as specified by the architect in so far as color, texture, and motif The surfaces will be completely finished in the factory of the manufacturer and delivered to the job site with adequate protection.

Additionally, the finish surface shall be resistant to stains, and discoloration, and shall not peel, flake, warp, or crack due to normal wear and maintenance. Normal maintenance will include the use of disinfectant cleaners and soaps.

6.7- Lighting

Lighting shall be accomplished through luminaires that are integral with the ceiling/lighting system, and shall arrive at the job site with the ceiling/lighting subsystem complete and ready to install. Fluorescent tubes are not required to be part of this subsystem package.

Light output should reach 100 foot candles, at a vertical distance of 6 feet from the ceiling, through the use of 2 fluorescent tubes per luminaire.

6.8- Air Return/Supply

The ceiling/lighting subsystem shall have, fully integrated into it, diffusers for air supply and registers for air return. The air supply and return components of the ceiling/lighting subsystem shall integrate with the air distribution subsystem for duct sizing, velocity and volume capability and methods of interconnection. It shall be the responsibility of this manufacturer to insure the compatibility of this subsystem with the air distribution subsystem.

Additionally, air return shall be through the lighting module and shall perform the function of heat recovery from the lighting module.

6.9- Erection

Erection and installation of the ceiling/lighting subsystem shall be by working crew only. Motorized equipment may be used by the installer for materials handling, but should not be required for handling or installation.

Division 7- Electrical Distribution

7.1- General

The electrical distribution subsystem shall arrive from the manufacturer ready to install. All wiring will be done on the job site, however, no finishing shall be required of any exposed or hidden surface.

This subsystem shall have the capability of handling high and normal voltage service (220 and 110 V.) as well as low voltage service required for telephone, computer linkage, clocks, and other communication devices. Electrical distribution from this subsystem at normal and high voltages shall connect directly with receptacles, lighting fixtures and any other electronically activated building components.

7.2- Support

This subsystem shall be supported independently of the ceiling/lighting subsystem. It may be integrated within the partition subsystem or utilize free standing

elements. In the case of free standing elements the manufacturer shall insure that the erection of such elements does not impair the performance of any other subsystem.

7.3- Approval

The electrical subsystem shall have been inspected and approved by the Underwriters Laboratory, Inc., and shall be acceptable by local codes, and shall conform to the latest National Electric Code.

7.4- Finish

All exposed surfaces of the electrical distribution subsystem shall be finished as indicated on the drawings in the factory of the manufacturer. All punchouts and access openings shall be finished in the same manner as the exposed portion of the distribution subsystem.

EARTH ORG/SYNTH METAL

erection G | sound F | fire E | finish D | module C | B | A

PRODUCT _____

FUNCTION _____

UNIFORM SYSTEM REF. _____

MFGR _____

ADDRESS _____

_____

CONTACT _____

COMMUNICATION _____

SPECIFICATION

_____

_____

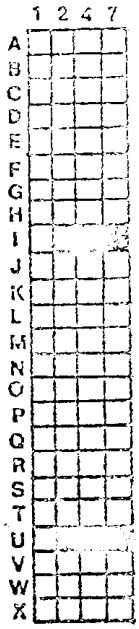
USE EXAMPLES

_____

_____

SUPPLY

_____



EARTH ORG/SYNTH METAL

erection G | sound F | fire E | finish D | module C | B | A

PRODUCT _____

FUNCTION _____

UNIFORM SYSTEM REF. _____

MFGR _____

ADDRESS _____

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CONTACT _____

COMMUNICATION _____

SPECIFICATION

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USE EXAMPLES

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SUPPLY

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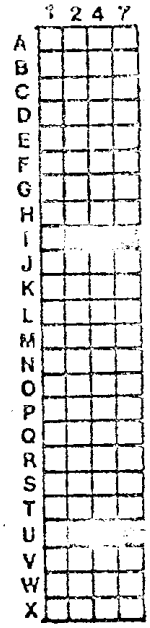

519 Walnut Avenue
Syracuse,New York,13210

10 September 1975

E.F. Hauserman Company
5711 Grant Avenue
Cleveland,Ohio, 44105
attn: Mr. John M. Hauserman
re: factory assembled "Power Column"

Dear Sirs;

I am a graduate student in Architecture at Syracuse University School of Architecture. My thesis requires a compilation of performance data for certain manufactured building components, and I would appreciate information on the product line mentioned above.

Attached to this letter is a sample data sheet which indicates some of the more general information that I am attempting to assess. If the promotional or specification information that you may send does not cover the topics listed on the data sheet, please circle or write-in the appropriate performance charactoristics. This is a general list and it may not cover information that is specific to the type of product you market. If this is the case, additional space is provided at the bottom of the sheet for you to mention performance charactoristics that are unique to your product.

Thank you for your attention, your co-operation on my thesis is greatly appreciated.

Sincerely

Josh Gurlitz

PRODUCT NAME: "Power Column"

PRODUCT DATA:

FUNCTION	structural,interior infill,H.V.AC.,lighting/ceilings, external skin,electrical,wet/plumbing,energy system
PLANNING MODULE	3'-0" , 3'-6" , 4'-0" , 5'-0" , other_____
FIRE RATING	1 hour, 2 hour, 3 hour, incombustable, other_____
DEGREE OF FACTORY FINISH	none, primer only, partial(Field/factory), complete(factory)
SOUND TRANSMISSION CLASS	less than 35 STC, 35-45 STC, 45-55 STC, greater than 55 STC
MANIPULATION/ ERECTION	manual, group(3 men), forklift, crane(specify size_____
MATERIALS	surface_____ internal/structural_____ thermal/sound insulation _____ others_____
STRUCTURAL PROPERTIES	_____ _____
INSULATIVE PROPERTIES	"U" values _____

PLEASE USE THE SPACE BELOW TO LIST ADDITIONAL PERFORMANCE CHARACTORISTICS

_____

_____

_____

_____

_____

_____

STRUCTURE PRODUCT	MANUFACTURER	UCI REFERENT
Componoform	Componoform, Inc.	03420
Dyna-Frame	Stress-Con Industries	
Fab Lok	Steel Fabricators, Inc.	05120
Francon-Ras	Francon Ltd.	
IBG Rigid Frame	Roper-IBG	
Moduspan-4'	Unistrut Corp.	05280 05120
Moduspan-5'	Unistrut Corp.	05280 05120
Solarspan	Lord & Burnham	13600
Space Grid	Butler Mfg. Co.	05280=05120
Streetscape	2001 Inc.	13600
Syncon	Syncon	03420
TJC	TrusJoist Corp.	05200
V-Lok	Macomber Inc.	03420
Contempowall	National Gypsum Co.	10615
Crusader	Donn Products	10610
Divisoflex-300	Moderbfold	10620
Double Wall	E.F.Hauserman Co.	10610
Kwik-zip	Keene Corp.	10610
Penciline	Keene Corp.	10610
Penwall	Keene Corp.	10610
Ready Wall	E.F.Hauserman	10620
Ultra Wall	U.S. Gypsum	10610
Vamguard	Donn Products Inc.	10610
1000	National Ceiling Corp.	13500
3000	National Ceiling Corp.	13500
C-60/30	Armstrong Cork Co.	13500
C-60/60	Armstrong Cork Co.	13500
Coordinator	Donn Products Inc.	13500
Dimensionaire	Owens-Corning Fibreglas Corp.	13500
FL 60	Conwed Corp.	13500
L/C 20	Butler Mfg. Co.	13500
L/C 30	Butler Mfg. Co.	13500

PRODUCT	MANUFACTURER	UCI REFERENT
Spec 30	Keene Corp.	13500
Spec 60	Keene Corp.	13500
Tec III	Luminous Ceilings Inc.	13500
Tech VI	Luminous Ceilings Inc.	13500
Vari-Tec 800	The Celotex Corp.	13500
VN 60	Conwed Corp.	13500
Alply	Alcoa	07420
Arlite Insulated	Architectural Research Corp.	07420
Armor On	Johns Manville Corp.	07420
B-3-B	Architectural Mfg. Co.	07420
Corspan	Johns Manville Corp.	07420
Economy Panel	Alcoa	07420
Foamwall-Custom	Elwin G. Smith Division	07420
Mirawall Panels	Kaiser-Mirawall	07420
Mul 480	Anaconda Aluminum Corp.	07420
Sandwich Wall	Alcoa	07420
V-Beam	Alcoa	07420
Walcon "U" Panels	Walcon Corp.	07420
Adapt-Aire	Mammoth Div.,Lear Siegler	15770
Adapta-Temp	Mammoth Div.,Lear Siegler	15770
Carrier 37 K	Carrier Air Cond. Co.	15740
Carrier 42H	Carrier Air Cond. Co.	15740
Carrier 48 MA	Carrier Air Cond. Co.	15770
Chrysler CMS	Airtemp Div.,Chrysler Corp.	15740
Climate Changer	The Trane Co.	15740
Moduline	Carrier Air Cond. Co.	15740
Multizone	York Div., Borg Warner Corp	15770
RMA 100	ITT Environmental Prod. Div.	15740
RMA 400/600	ITT Environmental Prod. Div.	15740
RTMZ	Dunham Bush Inc.	14740

Energy:		
Solar Energy Collector	Revere Copper and Brass Inc.	15600
Electrical Columns:		
Power Column	Hauserman Inc.	16110
Tele-Power System	Wiremold Co.	16110
Skin Systems,horizontal		
Tectum	Gold Bond Building Products	03520
Perma-Deck	Concrete Products Inc.	03510
Spancrete	Spancrete Northeast	03430
Structural Systems:		
Balency System	Building Systems International	03420,03410,13600
F/P 30/40	Inland Ryerson	05200
Post and Beam Bldgs.	Republic Steel	05200
Versa-Space	Pre-Cast Systems Inc.	03420
Stairs/Internal Infill:		
Pico Pre-Erected Stairs	Pico Safe Stairs Co.	05510

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Vitae

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Problem Solution

The purpose of the problem presentation in the last portion of the thesis above is to test the efficacy of the product information retrieval system proposed in the body of the thesis. To this end the problem solution(or, more properly, a solution) is described below, in two parts. The first part consists of a comparison of the performence specification in outline form and the building products retrieved through use of the system proposed. The second part consists of an expression of the physical nature of the solution described through a model.

Relating the performence specification, in outline form, to the products retrieved through the system is intended to indicate whether the range of information normally carried in a performence specification is exhibited on the product retrieval cards. It is also intended to show whether the information necessary to choose a product from the performence specifications is readily accessable on the cards..It is understood that products entered on the retrieval cards for this thesis were selected to include a wide range of factory finished products, but were not selected to include all possible products in each category. Entering all possible products for each category would be necessary for the use of this system as an office tool (practical), but is not required for the testing of this system. The total number of products entered into the system for this thesis is indicated in thw appendix to the thesis. Information relating to the performence characteristics of each product was derived from product literature(Sweets Catelogue, F.W. Dodge Corporation), published specifications (Spec-Data), and direct solicitation of information directly from the manufacturer (see typical letter and questionaire in the appendix to the thesis).

Division/ Outline Specification	Product/Product Specification
2-Structural System	Space Grid, Butler Mfg. Co.
2.1 -Incremental Growth	Yes
2.2 -Support Roofs-40 p.s.f. Floors-100 p.s.f. Max. Stories- 2	Roof- 63 p/s.f. Floors-170 p.s.f. Max. Stories-4
2.3 -P.M. of 4'-0"	P.M. of 4'-0"
2.4 -Vertical Dimensioning Ceiling heights of 8'-0" or 10'-0"	Ceiling heights of 8',10',12',14'
3-Vertical Skin Subsystem	Mirawall Panels, Kaiser Mirawall
3.1 -Incremental Growth	Yes
3.2 -"u" factor of .10 max. with 2"-4" thickness	"u" factor of .075 with 2" thickness.
3.3 -F.S. of 25 or less, fuel contribution of 15 or less	Non-burning
3.4 -Surface resistance to corrosion fading and discoloration	Porceleanized Enamel Finish inside and outside,
3.5 -Erection by working crew	Yes
4-Horizontal Skin	Tectum Roof Deck, Gold Bond
4.2-Load Sustention, ultimate of 100 psf	Yes
4.3 -"u" factor of .10 max.	.09 to .07 Thickness dependent.
4.4 -Fire Rating of at least 2 Hr.	2 Hr. Fire rating
4.5 -N.R.C. minimum of .60	N.R.C. .60 for 2" thickness
4.7 -Erection by working crew	Group assembly
5-Internal Partitions	Ready Wall, E.F.Hauserman
5.1 -Incremental Growth	Yes

Division/Outline Specification	Product/Product Specification
5.1 - Complete Factory Finish	Yes
5.3 -Planning Module of 4'-0"	Planning Module of 4'-0"
Heights of 8'-0" and 10"-0"	Max height of 12'-0"
5.4 -Minimum of 2 Hr. Fire rating	Incombustable
5.5 -S.T.C. Minimum of 35	S.T.C. of 39
5.7 -Group Erection	Group erection
6-Ceiling/Lighting	C-60/30(Variant),Armstrong
6.1- Integration with partitions	Yes
Integration with air handling	Yes
6.2 -Support	Channels,suspended
6.3 -Planning Module of 4'-0"	Planning Module of 4'-0"
6.4 -Fire rating minimum of 2 hr.	2 hr. fire rating
6.5 -Sound Transmission Class rating of 35 minimum.	S.T.C. of 41
N.R.C. of .65-.75	N.R.C. of .70(±)
6.7 -Light output of 100 fc with max. two flourescent (40W) tubes.	1/2 tube required for 100 fc
6.8 -Integrated air handling	Yes
6.9 -Erection by working crew	Group erection
7-Electrical Distribution	Power Column, E.F.Hauserman
7.1-Service capability for high and low voltage use,including receptacles, and telecommunications.	Yes
7.2 -Supported independently or within the partition subsystem	Independent support and able to integrate with Hauserman partitions.
7.3 -U.L. Approval	Yes