The original assumption for the Shadowlawn Extension Road was to be located across the North end of the site. Without destroying the large grove of trees at the east boundary, it was to curve southward towards the preferable building area for easy access.

This decision proved to be incorrect because it restricted possible design alternatives.
Scenarios were developed on the basis of priorities of distances and functions that people related to within the hospital. The efficiency and proper functioning of life and death situations was the primary consideration to establish the priorities for design. Those people scenarios were developed for included visitors, patients, doctors, staff, outpatients, emergency patients, and materials. They were used for the evaluation of schematic plans and design development plans.

VISITORS
How does a visitor come through the site to the hospital?
What entrance does he use into the hospital?
Where are the lounges that are specifically designed for him?
How long will he be there?
What areas is he allowed to be in?
What public facilities will he need and use?
Where will he get the initial information that he needs?
Will he go to the cafeteria while there?

PATIENTS
How does a patient come through the site to the hospital?
What entrance does he use into the hospital?
Where is he admitted?
Where does he pay his bills?
Where is his patient room?
Will he go to the cafeteria while there?
Will he visit other patients while there?
Where are the lounges that were specifically designed for him?
Will the patient go to surgery?
Will the patient go to radiology; laboratory, etc.?
Will the patient go to physical therapy, EKG, etc.?
Where is he released?
Where does he go when he is able to walk around?
EMERGENCY

How does an emergency vehicle come through the site to the hospital?
Where do they enter the hospital?
Where do they go to wait treatment?
Where do their relatives stay while waiting?
Where do they go after treatment?
Are they admitted or discharged?

MATERIALS

How do service vehicles come through the site to the hospital?
How do they manipulate to unload?
How long do they stay there?
Where does linen go after unloaded?
How does soiled linen get back to the loading dock?
Where do drugs go after unloaded?
Where does food go after unloaded?
Where do basic materials go after unloaded?
Where is the hospital garbage stored until removal?
Where does a deceased patient go?
DOCTORS

How does a doctor come through the site to the hospital?
How long does he stay there?
What entrance does he use into the hospital?
What are his standard procedures during his stay?
Will he deliver any babies?
Will he visit his patients in the hospital?
Will he perform surgery?
Will he be on-call during that time?
Will he take a break?

STAFF

How does the staff come through the site to the hospital?
What entrance do they use?
Where do they go to punch in and change clothes?
Where do they go during their breaks?
Do they work in a certain department all day or do they go from department to department? Which ones?

OUTPATIENTS

How does an outpatient come through the site to the hospital?
Where do they check in?
Where do they wait treatment and where do their relatives wait?
How does an outpatient get to Laboratory, Radiology, Physical Therapy, EKG, and inhalation therapy?
Where does treatment take place?
Where does an outpatient recover?
How does a doctor get to the treatment spaces?
It was necessary to develop another scenario for the ambulance and emergency entry to assist in the schematic development of this very important part of the hospital.

How does a person drop someone off and then leave?
How does a person drop someone off and then park their car?
How does a person leave their car at the entry to emergency when they are in an extreme hurry?
How do the weather conditions affect the emergency canopy and exit?
Where does a person go when they are waiting for someone in the emergency room?
How does the ambulance maneuver towards the emergency entry?
Where do all non-emergency vehicles go when an ambulance is arriving?
How does a person walk to the hospital after they have parked their car?
<table>
<thead>
<tr>
<th>Department</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Nursing Staff</td>
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<td>Recovery</td>
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<td>Emergency</td>
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<tr>
<td>OB/Nursery</td>
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TOTAL 20
EMPLOYEES 3pm-11pm SHIFT

TOTAL 34

pharmacy         2
nursing staff    8
nursing staff    8
concentrated care 2
emergency        3
recovery         2
ob/nursery       1
nursing admin.   1
business office   1
dietary          1
switchboard      1
radiology        4
housekeeping/linen 1
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<tr>
<td>Nursing Staff</td>
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<tr>
<td>Concentrated Care</td>
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<tr>
<td>Surgery</td>
<td>9</td>
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<td>Emergency</td>
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<td>Sterile Supply</td>
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<td>Maintenance</td>
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<td>Laboratory</td>
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<td>Physical Therapy</td>
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<td>Inhalation Therapy</td>
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<td>Purchasing/Stores</td>
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<td>Pathologist</td>
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<td>Switchboard</td>
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<td>Dietary</td>
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<td>Nursing</td>
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<td>Housekeeping/Linen</td>
<td>10</td>
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<tr>
<td>Part-time</td>
<td>3</td>
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</table>
parking 7 am
parking 11 pm
schematic floor plan

level b1

level b2
concepts 1, 2, and 3 need schematic elevations.
the concepts are actually variations of the same scheme.
good start, more research needed.
long visiting hours are not always welcome. reconsider.
schematics would have benefited from sections considering the varying topo.
study schematics with all spaces in mind.
which schemes function best internally?
look into previously built designs and systems that relate.
would be good to see circulation diagrams for visitors, patients, support, and mechanical.
be able to humanize spaces.
find examples of other hospitals to draw upon.
be extremely careful about placing plant facilities underground.
more realistic if Shadowlawn would become directly east-west.
know the codes.
more sections needed to understand building.
there should be no connection between visitor and emergency traffic.
movement diagrams are good.
circular patient wings provide good circulation, views, and amenities.
where are the parking areas and check the numbers.
good concept for expansion and masterplanning.
good progression of drawings.
look into the childrens hospitals throughout the country.
the entry point is very awkward and the forms seem forced.
clarify your philosophy on what is happening as far as site drainage is concerned.
site response drawing would help justify issues.
the outdoor areas should be developed further.
remember that the staff, too, are subject to the environment that is created.
the yellow on small maps is difficult to read.
flow diagrams are needed.
DESIGN DEVELOPMENT
BED DISTRIBUTION  85 BEDS

Medical
  semi-private (13) ............... 26
  private (8) ....................  8
  isolation (1) ..................  1
  pediatrics (4) .................  4
  pediatric isolation (1) ........  1
                           40 beds

Surgical
  semi-private (12) ............... 24
  private (9) ....................  9
  isolation (1) ..................  1
                           34 beds

Concentrated Care
  private (5) ....................  5
  isolation (1) ..................  1
                           6 beds

Obstetrical
  semi-private (2) ...............  4
  private (1) ....................  1
                           5 beds
                           85 beds
BED DISTRIBUTION  85 BEDS

**Medical**
- semi-private (13)  .............. 26
- private (6)  .................  6
- isolation (1)  ..............  1
- pediatrics (4)  ..............  4
- pediatric isolation (1)  ....  1
  38 beds

**Surgical**
- semi-private (12)  .............. 24
- private (11)  ...............  11
- isolation (1)  ..............  1
  36 beds

**Concentrated Care**
- private (5)  .................  5
- isolation (1)  ..............  1
  6 beds

**Obstetrical**
- semi-private (2)  ..............  4
- private (1)  ...............  1
  5 beds

  85 beds
BED DISTRIBUTION  85 BEDS

Medical
  semi-private (13).................26
  private (5)........................5
  isolation (1)......................1
  pediatrics (2).....................4
  pediatric isolation (1)...........1
   37 beds

Surgical
  semi-private (15)...............30
  private (6).......................6
  isolation (1).....................1
   37 beds

Concentrated Care
  private (5).......................5
  isolation (1).....................1
   6 beds

Obstetrical
  semi-private (2)...............4
  private (1)......................1
   5 beds

   85 beds
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<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Beds</th>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>semi-private (11)</td>
<td>22</td>
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<td>private (18)</td>
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<td>47 beds</td>
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<td><strong>Surgical</strong></td>
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<td></td>
<td>private (19)</td>
<td>19</td>
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<tr>
<td></td>
<td>isolation (2)</td>
<td>2</td>
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<td>43 beds</td>
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<tr>
<td><strong>Concentrated Care</strong></td>
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<tr>
<td></td>
<td>private (5)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>isolation (1)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 beds</td>
</tr>
<tr>
<td><strong>Obstetrical</strong></td>
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</tr>
<tr>
<td></td>
<td>semi-private (2)</td>
<td>4</td>
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<td></td>
<td></td>
<td>4 beds</td>
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<tr>
<td></td>
<td></td>
<td>100 beds</td>
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</table>
site development analysis
northwest entries would be problem with winter winds.
why do the patient rooms step back.
ambulance needs top priority.
is there a hospital that provides balconies.
some patients would want outdoor area while others wouldn't.
certain elements in the patient wings must be standard from floor to floor.
save costs by stacking instead of jogging.
not working with site, watch slopes (cut-fill)
no introduction to building.
too much road.
parking lots when full will be a problem.
connect parking by making a loop to get out.
study emergency entry conflicts.
give ambulance and emergency vehicles unobstructed routes.
is there a staggered structural system.
entrance look like it was attached casually.
atrium needs some activity and excitement.
elevations need to be studied at larger scale.
it's good that the elevations have been evaluated at a larger scale because their problems become evident.

the scale at the three level portion is too massive in that it's all vertical.

in the patient wing try to express the horizontal more.

the entry works well but needs to be a better transition between parking and building.

the site plan is 100% improved and seems to work as you describe its concept.

good development of wall section.

the isometrics represent the building circulation, mechanical distribution, and structural system well.

the balance of indoor to outdoor spaces seems appropriate.

the canopies need to be further examined.

very nice sequence of interior spaces along the main corridor through the nursing wing. develop this further.

the perspectives are good but develop the exterior cafe one further.

present the heat pump and heat exchange concept better in the final presentation.

good level of completeness on drawings.

shouldn't the people be able to get into the open atrium.

cut-fill is better, still strive for a balance.

how does your parking analysis apply to this site plan.

in the final presentation make the building sections easier to understand.
it is essential to understanding your scheme.
FINAL

DRAWINGS
south elevation

north elevation

east elevation

west elevation
isometric
mechanical distribution

- main distribution
- hvac zones
- heat exchanger
- source
this bibliography is the composite of all the resources used on this architectural thesis throughout the year. They range a great deal in topics and served me with valuable information. Included in this listing are those resources in my independent study on medical facilities.


Architectural Graphic Standards.


Beckman, Swenson, and Associates. Putnam County Background For Planning. Fort Wayne, IN, 1969.


Brubaker, Charles W. "When Horizontal Movers Come In, Will Hospital Designs Spread Out?" Modern Hospital, May 1972, Vol. 118, p. 77-84.


Clibbon, Sheila, Sachs, Marvin L. "Creating Consolidated Clinical Techniques Spaces For an Expanding Role In Health Care." Architectural Record, Feb. 1971, p. 105-112.
Colin W. Clipson and Joseph J. Wehrer. *Planning for Cardiac Care.*


Hoffman, Ross E. *Automation of Hospital Sterile Processing.*


Humana, Inc. *Greensboro Hospital - A Summary.* Louisville, KY, 1975


Mann, George J. "Future Hospitals Will Go Where The People Are." Modern Hospital, June 1968, Vol. 110, p. 84-89.


"Octagons Put Hospital In Good Shape For Expansion." Modern Hospital, March 1971, Vol. 116, p. 99-100.


Research

The following medical facility study is a summary of a multi-media presentation made to the College of Architecture and Planning entitled "Hospital Design Today". It is a synopsis of the organization the presentation took and represents the highlights.

This presentation was prepared in partial fulfillment of the requirements for an independent research project on medical facilities design. It involved nine weeks of reading architectural and medical journals' articles on medical facilities. The bibliography presented in this book is derived in part from this study.
Scope of Analysis

1. Introduction
2. Images of Medical Facilities
3. Building Type Analysis
4. Concepts of Medical Facilities
5. The Organization
6. Programming and Functioning
7. Materials Movement
8. Schematic Development
9. Interior and Psychological Aspects
10. Construction of Medical Facilities
11. Codes and Life Safety
12. Post Occupancy Studies
13. Masterplanning (Expansion)
14. Specialization Areas
INTRODUCTION

the organization of this analysis follows the development of the planning process a medical facility would follow.

the health care field is one of the busiest and fastest changing industries in the United States today.

since there has been a tremendous amount of published material on medical facilities in architectural and medical journals and books, a starting point of 1960 and later was established for this analysis.

this analysis is appropriate for an architect in that a current trend in medical facilities design is more humane architecture which responds to patients, staff and visitors needs better.
IMAGES OF MEDICAL FACILITIES

there have been many stereotypes of medical facilities that designers must understand and respond to either negatively or positively.

traditional images include; the parochial school bland (eastern); factory austre; and modern institutional white (white).

Kaplan and McLaughlin images include; primitive (hard, dehumanizing, with emphasis on security and starkness); medical (authoritarian and non-spatial); passive (drab, anonymous, rural, neutral environment); supportive (homey, security, traditional, avoids challenge).

priorities of the possible images must be evaluated in terms of the facilities goals and objectives.

an important consideration is how medical facilities relate to their neighborhood; McMaster has had a negative impact to its surroundings.

urban sites and suburban sites are certainly different fabrics.

regionalism is an aspect that often must be looked at.
BUILDING TYPE ANALYSIS

There are many types and variations in the medical facilities field. Facilities can either be local, regional, state, or national in nature. Some of these building types are:

- Psychiatric Hospitals
- Childrens Hospitals
- Jewish Hospitals
- Catholic Hospitals
- Veterans Hospitals
- Public Hospitals
- Private Hospitals
- Long Term Care Facilities
- Medical Office Buildings
- Teaching Medical Centers
- H.O.M. Neighborhood Centers
- McMaster Medical Center
- Mental Health Facilities
- Medical Research Buildings
- Ambulatory Health Care
- Specialized Facilities
- Hospice
- Multi-Functional Uses.
CONCEPTS

there are many concepts that a medical facility can be based on.

the considerations that must be evaluated are so complex and numerous that a comprehensive listing is impossible.

an interesting note is the difficulty one encounters when trying to introduce a new concept in the medical facility field. It is similarly difficult to revolutionize the health care industry in terms of being different in any aspect.

some important considerations of concepts include: siting, context, priorities, size of facility (100 bed or 200 bed), centralization vs. decentralization, bed need certificate, flexibility and expandability, costs, humane spaces, regionalism, method of payments (medicare or medicaid), and etc., etc.

two important concept differentiations are:
  vertical - core centered hospital - will operate more economically than any other because it permits max utilization of labor saving and automated support systems.
  horizontal - hospital can deliver the best in patient care but sacrifices the operating economies of vertical.
THE ORGANIZATION

the organizational structure must be understood of the medical facility so that the hierarchy of management is apparent.

its financial hierarchy must also be apparent so that budgets can be understood.

the medical facilities role in the community must be evaluated.

the client must be identified so that the architect can work with and understand all of his regulations and problems (public health administration and veterans administration).

the architect must learn to deal with the client on his level and speak with him in his terms.

the administrator's priorities and decisions must be evaluated and his relationship with his superiors.

what is the distribution of private and public money.
PROGRAMMING AND FUNCTIONING

the importance of programming in a medical facility cannot be overemphasized.

many techniques, methods, and concepts must be evaluated to determine their appropriateness (i.e. interstitial).

circulation is very vital in programming.

a medical facility is an absolute case of design for the way people use the spaces, not how architects think they function.

good programming requires good relationships between all professionals.

efficiency and function must be initially considered before any programming decisions are reached.

nursing teams, nursing loads, and efficiency must be considered when the patient wing is programmed.

computers have successfully entered the medical facility programming field.
MATERIALS MOVEMENT

materials movement is basically a circulation problem.

its importance is that it is vital to the proper and efficient functioning of the entire medical facility.

the programming of these systems is necessary in the early stages of the design of a medical facility.

there are many types of systems such as rails, pneumatic, carts, and variations of these.

future automated systems are being seriously considered for potential uses.

Herman Miller systems have entered the health care industry.
SCHEMATIC DEVELOPMENT

Important considerations in the schematics of a medical facility are patient rooms, patient wing configurations, and circulation.

Some of the considerations that must be evaluated for patient rooms are; private vs. single, necessary systems, efficiency, view, comfort, and psychological groupings.

Some of the considerations that must be evaluated for patient wing configurations (morphology) are nursing loads, distances, efficiency, views, patient interaction, and how it connects to the rest of the hospital.

Many spaces of medical facilities are technological in nature and therefore the design is restricted to what has been done before.

A commitment must be made whether circulation is either horizontal or vertical.

Studies need to be evaluated to evaluate how the hospital functions schematically (entry, ambulances, and service vehicles).
INTERIOR AND PSYCHOLOGICAL ASPECTS

the question that must always be considered is to what extent will the medical facility be a tool to recovery.

a primary psychological and emotional factor is how do people really act in these spaces.

issues of the appropriate psychological groupings must be resolved.

psychological responses to needs are very challenging and dynamic.

colors and graphics cause reactions that are both good and bad. Great care must be utilized when using them.

there is an incredible market for health care equipment of which interior furnishings is a part. (ie., chair - who uses it and for how long.)
CONSTRUCTION OF MEDICAL FACILITIES

hospitals are very sought after projects because such big contracts and dollars are involved.

virtually every variable that is connected with the health care field is escalating in cost. (time, borrowing money, labor, materials, hospital room rates).

fast tracking medical facilities is becoming a trend since it saves so much money (ie. Woodhall Medical Center).

construction management also lends itself to hospitals because of the possible savings.

medical facilities provide a good stimulus to the economy of the community.

competent contractors are required for all the trades particularly mechanical systems.

prefabricated designs and plug-in components are being examined as possible future alternatives.
CODES AND LIFE SAFETY

medical facilities represent the toughest building code conditions.

the most critical aspect of codes for medical facilities is that they can be interpreted differently.

it has been proven that by working directly and closely with local officials more meaningful code restrictions can be reached.

there is a movement to make codes more towards saving lives as opposed to the present situation of saving the building.

the Hill Burton programs control medical facility standards with their funding.

another important control is the National Health and Resources Act passed in 1974 that controls financing.

often certificate of need is awarded by the existing facilities code condition.

hazardous waste systems and throw away systems (syringes) must be evaluated.
POST OCCUPANCY STUDIES

there is no better building type that lends itself post occupancy evaluations than medical facilities (the tasks performed are measurable).

these studies are not new but there seems to be an emerging awareness to make them more creditable.

the evaluators are an important aspect to the success of the multi-disciplinary team.

the criteria and techniques used are very important and there are many ways to do it; the entire range of people that use hospitals must be assessed in terms of human behavior and attitudes.

leading firms in this field are CRS and Kaplan McLaughlin and they use these studies to use for future designs.

the funding of post occupancy studies is a problem as the client doesn't understand its value.
MASTERPLANNING (EXPANSION)

this aspect of medical facilities can not be ignored since so many are obsolete so soon after opening.

there are many ways expansion can happen; up, down, obsolescence, hodgepodge, with in a system, into other parts of the hospital.

it is the architects responsibility to masterplan medical facilities so as to give direction for future planning.

expansion normally will take place by physical additions.

parking is a severe problem since it is hard to predict.

there have been many flexibility concepts developed for the expansion of medical facilities. (ie. Quincy Jones has developed a system of a rigid module that can be taken apart and put back together anywhere.

studies have been developed for patient rooms to have wall hung furniture that can be removed and sterilized between occupancy.
SPECIALIZATION AREAS

There are many specialized issues that the medical journals cover and discuss.

Some of these are laminar flow, hazardous wastes, industrial design products, components, code restrictions, and the many systems evident in a medical facility.
UNIFORM BUILDING CODE  1973 EDITION

Building Classification - Group D  Division 2

TYPE I BUILDINGS

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<td>exterior doors and windows</td>
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fire alarm boxes.

compartmentation

horizontal exits dividing a story into 2 or more areas of approximately the same size not exceeding 30,000.

subdividing the building into 5 story compartments by interrupting stair shaft with smoke barriers every fifth floor or through the use of smoke-proof enclosures for all stairways or any other method which will protect against the movement of smoke from one compartment to another.

fire detectors.

voice alarm system.

voice communication system.

central fire department control station.
SMOKE CONTROL

Natural or mechanical ventilation for removal of the products of combustion shall be provided in every story and shall consist of one or more of the following:

panels and windows in exterior wall openable, such venting facilities provided at least 20 square feet per 50 linear feet of exterior wall in each story.

approved tempered glass may be used in lieu of openable panels.

when fire sprinklers installed; the mechanical air handling equipment may be designed to assist smoke removal. Under fire conditions, the return and exhaust are shall be taken directly to the outside without recirculation to other sections of the building.

a shaft through which smoke and heat can be mechanically vented to the outdoors. The size of the shaft shall be uniform throughout and of such dimensions as to provide not less than 60 air changes per hour in the largest compartment. Openings into the shaft shall be protected with an automatic single piece shutter located as high in the room as possible.

any other design which will produce equivalent results.

elevators.

standby power and light, operation within 60 seconds.

sprinkling is alternative to compartmentalization.
EXITS

Distance to exits:

maximum distance of travel from any point to an exterior exit door, horizontal exit, exit passageway or an enclosed stairway in a building not equipped with an automatic fire extinguishing system throughout, shall not exceed 150 feet these distances may be increased 100 feet when the last 150 feet is within a corridor.

exits from a room may open into an adjoining or intervening room or area provided such adjoining room is accessory to the area served and provides a direct means of egress to an exit corridor, stairway, or exit passageway.

dead ends permitted when does not exceed 20 feet in length.

stairways (not less than 44" wide, 7½" maximum rise, 10" maximum run).

a horizontal exit may be considered as a required exit.

SKYLIGHTS

constructed of non-combustible materials.

all skylights, the glazing of which is set at an angle of less than 45 from the horizontal, shall be mounted at least 4" above the plane of the roof on a structural member.

shall not be less than ½" in thickness.