Arch
Theatre
4
2189
.252
1975
.R63
In 1973 the largest fire in the history of downtown Indianapolis roared through the first block of East Washington Street. Flames soared hundreds of feet into the air and buildings in a large radius were damaged. Due to the quick and professional actions of Indianapolis' emergency agencies there were no injuries. The City should well be proud of its fire fighters and police but it should, at the same time, recognize that, with announcements of growth an almost daily occurrence, they can not expect to continue this service without a corresponding commitment to the training of the fire fighters.

Indianapolis is the eleventh largest city in the United States. It has a population of almost one million people, yet they have only the barest minimum in training facilities. The departments do a tremendous job with what they do have, but this is shamefully lacking and inadequate.

Major growth in most western countries has occurred primarily in the cities. With this growth communities must, among other things, prepare themselves for an increased fire problem. Growth has taken place both in city suburbs and city centers. While fire danger is certainly not restricted to the inner city, this is where the dangers seem compounded. Problems of overcrowding, poor health, dilapidated buildings, alcohol, crime etc. all contribute to the fact that the inner city dweller is more likely to experience the ravages of fire than his suburban counterpart.

Fire training facilities should be equipped to allow trainees to experience a wide variety of hazards and learn how to correctly and safely respond to them. They should be a training ground and a proving ground, providing a challenge and at the same time teaching a skill that may save his life and others' during a fire.

The following is a proposal for the Regional Fire Training Academy to serve the city of Indianapolis' Fire Department and the eight township fire organizations. This program is the product of study and research of fire training facilities in England and The United States. It is the compilation of information which has been drawn from text references, site visits, and personal interviews of those involved in fire training. This is a set of criteria which one should consider in the design of such a facility. It will attempt to give guidelines and, at the same time, offer a base for criticism and new ideas of the subject of fire training architecture.
The academy will serve Marion County regular and volunteer fire fighting organizations as well as the Indianapolis Fire Department. The potential exists, in dealing with such extensive facilities, for even more far-reaching programs, perhaps of a national scope, to take advantage of the academy.

The Indianapolis department, with 782 men will be the initial primary user of the facility with the various township organizations (Wayne Township being the largest with 350 men and women.) The level of experience ranges from new recruits to experienced officers. Senior will probably, initially, function as drill instructors and administrators until training programs are adequately funded and firmly established.
THE SITE

The site of the proposed academy is Stout Field in Indianapolis. It is centrally located for county-wide access but yet isolated so as not to interfere detrimentally with the local community.

The site is presently occupied in its' entirety by the Indiana National Guard. This project suggests a double use of the site with areas now used for vehicle storage to function for the training academy. The National Guard would continue to maintain most of its operations without interruption or interference from the academy. This would be possible due to planned ING expansion to a large site directed north of Stout Field.

Probably the strongest one determinate for the selection of Stout Field was the obvious benefit of the re-use of the existing runways as training surfaces. Trainees may attack fired buildings situated on these runways from any angle and virtually any distance. The additional re-use of the hanger building on the southwest corner of the site for maintenance, shop, and vehicle storage was certainly a positive consideration.

The siting of the fire training center was a rather complex task. While it is centrally located within easy access of the companies training there, isolation is desireable so that its' intrinsic problems of smoke and noise (and, indeed, aesthetics) affect as few surrounding activities as possible. This was accomplished by careful site design, building placement, planting, berming, etc. The distance from site boundaries to certain practical training buildings is maximized.

The direction of the prevailing wind is a primary consideration in the site selection. Many activities of the center involve the use of smoke. While some are harmless, some may be, at best, malodorous and, at worst, toxic. So the direction of their travel must be planned for. Various on-site functions require the use of clean air; such as the breathing apparatus facilities and the education/administration sections. The siting of the academy was done in such a way as to minimize smoke interference and maximize smoke movement.
Security is another factor which is vital. It is necessary to secure all drill buildings, open pits, equipment, gear and supplies. This is done not only to preserve equipment and apparatus but primarily for the safety of those unauthorized persons entering the facility. This was accomplished in a number of ways. Fencing, planting, grading and combinations of each are used.

Lighting of the site was done in moderation due to the need to conserve energy. Only enough lighting to provide security, satisfy its functional needs and identify the center are used. Besides providing the necessary parking and driveway lighting, the drill field contains power supplies for portable flood lights. Additional facilities for spot lighting and "normal" street lighting should be provided. These, with site vocal communications will be maintained from the centrally located, visually strategic, control tower.

Zoning of the site considered the three primary activities; educational/administrative, practical training, and support facilities. While these activities do not necessarily require absolute segregation, certain arrangements were avoided in which proximity would be undesirable. A heliport was necessary. Its' training uses are limited but it is a good way to evacuate injured students quickly to a hospital. Persons coming to the site by air would also find a heliport necessary. This heliport will have regulation lighting facilities.

One major aspect of a fireman's training is that of apparatus driving. Driver training courses simulate as many common hazards as possible such as sharp turns, narrow streets, backing up etc. This is a hard surfaced area.

TRAFFIC
There are four types of traffic on the project; public, staff, trainees, and fire apparatus. The design should reflect the need to separate some of these. The public zone is for those vehicles not involved in the training process. Visitors and some staff would lie in this category. Persons should not be permitted to drive from this zone in the training zone without security screening. Apparatus, fire fighters and staff will use the
training zone. This area will be secured for safety. Public parking should be able to accommodate group visits, buses, etc.

Trash and waste collection can be made without interference in the training activity. The refuse area is located outside the training pattern. All activities of the center are directly visible from the control tower. Bleachers may be installed for public viewing of training but the landscape design will provide the same function. The entire academy design is an attempt at creating a positive visual experience.

The apron is defined as a hard surfaced area surrounding the drill and practice buildings. It should be large enough to accommodate parked apparatus and have enough room to allow moving vehicles to pass by. The apron includes some hazards and obstacles which firemen would find in the street. Steps were taken to drain great amounts of water from the apron without polluting and congesting the draft pond or any public utility system. This is accomplished by an on-site pollution control system. There is access from the apron to maintenance, driver training areas and control/administration operations.

A visually secluded area of the site is programmed to store the larger equipment such as cars for burning, aircraft fuselages and tanker for burning and the refuse and waste of these operations. This area is also accommodating the waste and trash from the rest of the center. (An estimated three truck loads/day)

The site will have hydrants for water supply as well as feed tanks just below the apron surface. These serve not only for training activity but also as the actual fire fighting supply for the center.

All site planning took into account the growth potential of such a facility. This is particularly important in dealing with the education/administration building. The potential exists to expand this facility if programs in public education and fire investigation become operational. All growth of the practical training program is accommodated in the space on the runway apron surface. As need change or training programs expand training
buildings are built for these activities between Phase I development buildings and do not interfere with there operation.

\[
\begin{array}{ll}
\text{Academy Parking Requirements} & \\
20 \text{ spaces} . & \text{parked apparatus} \\
50 \text{ spaces} . & \text{staff/trainees vehicles} \\
100 \text{ spaces} . & \text{visitors} \\
3 \text{ spaces} . & \text{school buses} \\
2 \text{ spaces} . & \text{mobile lab units} \\
\end{array}
\]

Ample parking in the maintenance/storage area must be provided.

\[
\begin{array}{ll}
\text{6 spaces} . & \text{apparatus} \\
10 \text{ spaces} . & \text{staff parking} \\
\end{array}
\]
E D U C A T I O N - A D M I N I S T R A T I O N  B U I L D I N G

The U.S. National Commission of Fire Prevention has determined that 70% of all fires are caused by human carelessness. At the same time it states that only 5% of the national fire fighting budget is allotted for the education of the public. In light of this paradox, the education/administration functions take on a new added meaning. While the primary function of such a facility is now and will probably always be the classroom instruction of fire fighters and the administration of their training programs, the building and its' support functions offer an excellent opportunity for enlightening and instructing the public in fire prevention programs. Both children and adults could benefit from the center. It could well become a source of community pride and involvement. The possibility exists here of kindling better community-fire fighter relationships. (The need is there: 20-30% of all service calls in the United States in 1971 were false alarms.)

Firemen remain the primary users of the building. They come here to be assigned to their particular task. This may require "suiting up" or just going to a classroom for a lecture or demonstration. Administration of the center is quartered here. Kept here are the records and logs of the training programs. Administrators and instructors meet here for conferences. Facilities should be provided for such meetings and these facilities would have audio-visual capability. Visitors to the center are received here. Administrators have some non-public areas for meetings, discussions, etc.

Description of Spaces
Administrative Area- Administrators and instructors have office areas with storage and a view of the practical training areas.
Classrooms- Classrooms are provided for smaller lecture/demonstration situations. Each classroom shall have tack space, blackboards, and doors large enough to bring in small gear for demonstration. Capability to secure light from the classroom is necessary. To allow changes in program, acoustically adequate flexible partitions are provided.
Lecture Room - This is the primary instruction space for large groups. With the possibility of community participation in the building zoning allows the separation of this space and its supporting functions
from the rest of the facility. Because it is vital that each man have
a clear and complete view of what is presented a tiered seating
arrangement seems necessary. This room is equipped with blackboards,
audio-visual equipment, movie screens, projector space, television-
hook-up. Grading and floor levels are designed to accommodate the
entry of full-size apparatus into the demonstration area of the room.
Audio-Visual: In a technical school of this nature, instructors rely
heavily on visual aids. All classrooms, discussions rooms, lecture
rooms should be equipped for the showing of slides, films, the use of
overhead projectors and have television capabilities for closed circuit
use of video-taping. A dark room is also provided.
Models Lab: A model room with a large central theater for models can be
and effective way of bringing home a point to trainees. This room
has storage areas for models and map boards which are to be placed
on the floor.
Resource Center: The necessity of a resource center is obvious. It should
be equipped to handle not only large amounts of fire related books,
and magazines but also films, micro-films, video-tapes and other electronic
media which are becoming more and more a part of educational libraries.
A studio is provided for the taping of lectures and demonstrations.
Shop demonstration areas are desireable to give the student first-hand
knowledge of the equipment he will depend upon later. In this area a
graphics lab is provided to produce the visual aids required by the
instructors.
Reception Area: The reception area is the initial point of entry for
visitors to the center. This area will probably link itself to the
public observation area of the center. This area also serves as a
public corridor. Here smaller apparatus, displays and historic
memorabilia may be exhibited. A door large enough to accommodate
these is provided.
Locker Rooms: Locker rooms with direct access to training aprons are provided.
Here men come to "suit up" and down in preparation for drills and
lectures. This space should have drying facilities for uniforms and
boots. These locker rooms have rest rooms and showers adjoining.

The growth potential of the education/administration facilities is of
major importance. The scheme should have the ability to expand itself
without destroying the functional design. This requires a higher order of planning to accommodate change due to increased training activity or changed training technology.

Control Tower: The control tower is the nerve center of the academy. Supervision of drills and practice is done here. Controls of training related mechanical systems are here. The lives of the trainees may depend on these systems. Consequently, the tower should be able to monitor every training activity. This tower also has devices to measure such things as the amount of extinguishant used and the complete atmospheric make-up of the training buildings. Some present systems, operated by a computer in the tower give readings on oxygen, CO₂, CO, and hexane content as well as temperature in every space in the training buildings. Lighting and voice communications with the apron are handled from here with communications to local emergency agencies. Due to the towers' central location, the center's first aid station is placed in close proximity. This should have room enough for stretchers, a medical or paramedical crew. It should have accessibility to ambulance pick-up. There should be limited public access to these areas during training sessions but they could be opened to the public when not in use. The tower has direct access to the apron and the rest of the education/administration building.

Demonstration Lab: A demonstration/investigation lab is provided. In this students learn analysis of fire causes, progression and mechanical control procedures.

Docking is provided for mobile learning lab units.
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<td>2.</td>
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<td>4.</td>
<td>Vending Lounge</td>
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<td>6.</td>
<td>Observation</td>
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<td>Archives</td>
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<td>8.</td>
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<td>Library/Studio/Resources Center</td>
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<td>15.</td>
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<td>16.</td>
<td>Fire Investigations Lab</td>
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<td>17.</td>
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</table>
TRAINING FACILITIES

Drill Towers
Structural Fire Buildings
Forcible Entry Buildings
Breathing Apparatus Buildings
Pit Fire Areas
Chauffer Training Areas

These facilities are the most vital in the center. It is here that practical experience is gained by simulating fire conditions and teaching firemen to respond to these prior to finding themselves with the weight of life or death on their shoulders. A system of components will be designed for these training buildings. These will be a series of parts which would either burn, go wet or break during use. They should be small enough for one or two men to handle and should be made very simply by craftsmen with limited skill. The panels will be modular and serve as many purposes as possible. The units should be easily repaired or cheaply replaced.
POSSIBLE TRAINING SCENARIO
FIRE CONDITION:
- Gas
- Hot Wires
- Heat Furnace
- Smoke Making
- Free Combustables
- Burning Partitions
- Sprinklers
- Standpipes
- Natural Ventilation
- Mechanical Removal

FIRE HANDLING:
- Control Room
- Find Source
- Erect Ladders
- Erect Ropes
- Use Stairs
- Remove Victim

CLEAN UP
- Secure Building
DRILL PROCEDURE

FIND VICTIM

REMOVE FROM DANGER IS HE MOBILE?

- CARRY
- STRETCHER
- WINDOW
- FLOOR
- DOOR
- ROOF

GUIDE TO SAFETY

- STAIRS
- FIRE ESCAPE
- LADDER
- JUMP
- ROPE

REMOVE VICTIM

STAIRS/LADDER/ROPE/FIRE ESCAPE/JUMP

MORE VICTIMS?

YES
- RETURN TO START

NO
- FIGHT FIRE
- CLEAN UP/SECURE BLOG.
PRIMARY DRILL TOWER

The primary drill tower is perhaps the most dominant practice building and the most common in these types of facilities. The primary purpose of this building is to give the fire fighters experience with ladders, ropes, stairs, elevator shafts and generally those aspects of fire fighting and rescue which may present themselves in multi-level construction.

Site Considerations: The tower is sited in the center of the south runway with ten foot sidewalks and drains. There is a water supply near by. Power lines and poles may be located in the area adjacent to the building to give trainees practice with such obstacles. These lines may be "activated" from the control tower to simulate hot wire conditions. These same poles and wires should have the ability to be placed elsewhere on the site for drill by themselves. Similarly, marquis', fire hydrant, trees and other situations are used. By placing barriers on the side of the drill tower close to an adjacent building, narrow alleys could be simulated.

The building should contain a variety of tall building hazards: an interior stairwell, and exterior open stair, enclosed "fire stairs" and an elevator. Each floor of the building presents a different challenge. Two floors of the building are sprinkled to give trainees experience with sprinklers and salvage work. The building is divided into two basic parts; ladder, rope and climbing one on one side with the more sophisticated environmental drills on the other. This multiplicity of uses would seem to be a reasonable objective in all training buildings.

Some physical connection to accommodate rope drill is placed at the exterior openings and at roof parapets. Sills on the tower are to be of heavy wood to accommodate hook ladder drill.

The drill tower is a low heat and smoke building. Smoke bombs and gas fired heaters will provide the fire conditions for the building. Each floor is served by dry risers. It is necessary that the tower should attain a height of approximately 75 ft., sufficient to surpass a ladders reach. This is useful in demonstrating techniques of roof rescue (optional heliport) ropes, nets, etc. There should be openings in at least two floors for passage of stretchers. These are covered when not in use.
New code requirements demand all "high rise buildings" to contain a central control station.

"...a central control station for fire department operations shall be provided in a location approved by the fire department. It shall contain voice communications, a building systems panel, fire detection and alarm systems panel, status indicators and controls for elevators and air handling systems, a public telephone and sprinkler valve and water flow detectors and standby power controls..."

As many of these facilities as possible are provided in the control room of the tower.

Heat and smoke are also pumped in and evacuated from this building by mechanical means with controls in both control room and the control tower.

The majority of high rise buildings today have been constructed with fixed glass curtain wall skins. While these are functional in some ways they tend to create problems for the firmen and building occupants. (Witness: tower fires in Indianapolis, New York, Sao Paulo) Two floors of the high rise are to be constructed to simulate enclosed tower conditions. The use of replaceable "glass" panels, sprinklers, elevator lobbies are proposed. A small demonstration classroom is located in the base of the tower.

The lighting of the drill tower should be of three types, "normal" street lighting, no lighting, and apron flood lighting, these being controled from both the control tower and the control room. Lighting and evacuation of smoke and heat is critical in all buildings. A fail-safe system is a must for rescuing trainees in trouble. The building is drained throughout to for removal of water and foam from hoses, sprinklers, standpipes etc. and to prevent ice damage. Hose drying rigs may be attached to the building or built separately.
STRUCTURAL FIRE BUILDINGS

These are the buildings in which trainees get their most extensive experience in combatting fire. The academy has two basic types of these facilities; residential and commercial/industrial.

Site Considerations: The buildings are situated centered on the runways. This siting allows for a 360° attack of fire situations. The buildings will be constructed of primarily non-combustable materials such as concrete, fire-proof clay products, and concrete masonry. Due to the fact that these materials seem to break down after repeated periods of high heat and rapid cooling, all areas exposed to fires shall be covered with "refactory fire-proof and heat resistant tile."

The house contains some flammable walls, roof and floor sections. These will be part of the replaceable panel system. This house has an attic space, a basement space, and a variety of simulated living spaces. The purpose of these is to duplicate, as nearly as possible, as many as possible real life or death situations which the men will encounter in the line of duty. There are stairs leading into the building on the second floor. Both fire resistive and combustable doors are needed. The entire building will be drained of water and chemicals. (Chemicals may be used in fighting oil fires from the kitchen stove or the furnace.)

The Commercial/Industrial Building: This building is perhaps the most sophisticated of the training buildings. It must simulate conditions of an office to a factory to a warehouse. It is generally accepted that these are housed on different floors. The building contains the same methods of escape and smoke movement that a real building would have. e.g. an enclosed fire stair, an exterior fire escape, dry standpipes, high ceilings, etc. The building would be constructed of the same non-combustable materials as the residential building and would be drained throughout. Glass in this building would be protected by a window drencher system. There is a simulated office space within the structure with a suspended acoustical
ceiling. Mechanical systems shall work within this ceiling in such a way as to use this as a plenum for fire spread. Doors in the industrial/warehouse area should be fire resistive with magnetic catches so as to avoid damage during entry and fires. In order to simulate large building fires the commercial/industrial building has smoke and heat escape hatches which are operated remotely or manually, through which firemen could battle blazes which could not be fought from the street.

The buildings should have the ability to burn free combustables or have smoke and heat pumped in. Measures to insure the safety of trapped or otherwise trainees should be taken. The entire building is drained. Natural ventilation with the option of sealing the building would be desirable. This building is a major source of smoke problems so steps were taken to minimize this by siting, planting and building configuration.
## COMMERCIAL/INDUSTRIAL BUILDING

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<th>Description</th>
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<td>Chem Lab</td>
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<td>8</td>
<td>Apartment/Hotel</td>
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<td>14</td>
<td>Stairs/Elevators</td>
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<td></td>
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**Total:** 1490
Forcible Entry/Warehouse Building: The purpose of the building is to give the trainee the greatest variety of safe experience getting into burning buildings as possible. This with the commercial/industrial building give the trainee primary training in variable access.

List of Possible Openings

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<th>Roof-</th>
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<td>Metal Hatch</td>
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<tr>
<td>Wood</td>
<td>Awning</td>
<td>Hatch</td>
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<td>Folding</td>
<td>Plate Glass</td>
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<td>Boarded Up</td>
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<tr>
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<td>Double Hung</td>
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</table>

Openings are at a variety of levels to duplicate many difficult entry situations.
Breathing Apparatus Building: This building is one in which conditions of darkness, heat and smoke are produced and fire fighters are asked to go through mazes, over pitfalls, through tunnels, through doors etc. The maze consists of a "kit of parts" which may be changed and re-arranged to prevent trainees from becoming too familiar with the course. Storage for kit parts is provided and a demonstration area as well.

This building as well as the drill tower, structural fire buildings make use of central heat/smoke producing equipment. Smoke should be controlled from both the breathing apparatus building and the control tower. In case of equipment failure there are means of emergency escape throughout. A system to show instructors where students are within the maze and complete two-way voice communication is necessary. Proximity to the Breathing Apparatus shop is necessary. This shop along with classrooms, storage, lockers and offices are housed in an adjacent area.

This shop with compressors and large amount of storage space is located away from the fumes and smoke of training and apparatus.
Maintenance and Storage Building

The operation of a fire training facility requires a rather extensive crew of workers. All fire materials must be prepared, stored and processed. This requires a facility of some size with a variety of tools and equipment. These men need shops, lockers, restrooms and storage facilities for materials and equipment. Many fire training centers have on-site storage of apparatus which are usually used for training purposes.

A hose table should be provided for hose maintenance. Drains and high pressure water supply are also needed. Facilities to accommodate hose drying equipment and storage are necessary.

These activities are to be housed in an existing hanger on the southwest corner of the site. This facility is large enough to easily house the function of vehicle storage and maintenance also. Outside the building is a large parking apron for apparatus.

Waste and material pick-up and delivery functions feed into this area. A supergraphic is suggested on the south elevation of this building as an attempt at explanation of the facility to travelers on the Raymond Street Expressway.
Pit Fires and Chauffer Training

Pit, in this case, will be defined as an area provided for the open but controlled burning of combustables. The pit fire area is supplied through a series of gutters and pipe lines with fuel. The areas have to have ready access to water and a "clean-up drainage system." Pollutants may not be flushed directly into the ground. The material in this area must be able to withstand extreme heat, then cold, repeatedly. There are several of these "pits" in the center. Wrecked cars, tankers, aircraft fuselages, hot wires may all be used and burned in practice. Large tanks filled with oil will occupy one pit. In short, these pits provide non-building fire experience. The gases and smoke given off here are possibly the most offensive to the surrounding area. These pits may not be used during some atmospheric conditions.

The center contains a draft pond. This supplies a large supply of water for the training process. This pond is also used mechanically for a heat sink for the education/administration building. Scuba training will also take advantage of the water. The source of the water will be surface runoff and cleaned training water. The pit fire area works along with the chauffer training grounds.
PRIMARY DRILL TOWER

6 "Environmental Rooms @ . 1200
Classroom @ .................. 900
Mechanical Room @ ........... 150
Control Room @ ............... 100
Drill Rooms 6 @ 200 .... 1200
Stairs/Ele. ................... 2400
Storage.......................... 250

5200

BREATHING APPARATUS BUILDING

Classrooms 2 @ 900 .... 1800
Shop ......................... 1600
Storage ..................... 1000
Control ..................... 200
Training Maze Area ....... 6300

10900
Two very important, but relatively unexplored, areas of fire training architecture are existing structures and building change.

Indianapolis has a "wealth" of buildings which are marked for one reason or another for demolition. These buildings could become an excellent training resource in areas of fire investigation, flame and smoke behavior. Problems of insurance and safety would have to be overcome.

The other consideration, change, is more crucial. Fire training centers as we know them are necessarily unchanging due to their planning. This does not take into account the fact that buildings and their designs are always changing, thus do fire problems in them. Hence, the challenge is one; to solve the safety problem and tap the huge reservoir of potential training buildings and two; to design a more open-ended, flexible fire training center.
110-140 clear days/yr

ave. temp. jan 28 July 75

ave. precipitation 15-20"

snowfall 20-30"

natural determinates

wind studies

more efficient windbreak
design development
regional fire training academy
regional fire training academy
regional fire training academy
drill towers

regional fire training academy
respectfully submitted,

[Signature]

20 May 1975