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ABSTRACT

This report on planning and developing facilities for community-junior colleges includes papers presented at a conference for state-level facility planners. The meeting covered the following areas: (1) development of physical facilities responsive to educational programs and community needs; (2) efficient use of existing facilities through effective management systems; (3) utilization of community resources; (4) construction of facilities to meet civil defense requirements; and (5) planning for community-junior colleges to assist civil defense agencies by providing communications centers, storage areas, and education and training centers. Careful planning with an emphasis on the community dimension and use of existing buildings was particularly noted. Also included in this publication are the conference program and the list of participants. (MN)

FACILITIES PLANNING CONFERENCE

FOR

COMMUNITY-JUNIOR COLLEGE STATE-LEVEL PERSONNEL

Sept. 29-30, Oct. 1, 1971
Chicago, Illinois

American Association of Junior Colleges
and
National Council of State Directors
of Community-Junior Colleges
and
Institute of Higher Education
at the
University of Florida

Contract OEC-0-71-3764

U. S. Office of Education
U. S. Office of Civil Defense

Preface

This report on planning and developing facilities for community-junior colleges includes papers presented at a conference for state-level facility planners of community-junior colleges. The conference was held at the Bismarck Hotel in Chicago, Illinois on September 29-30 and October 1, 1971.

The conference was co-sponsored by the American Association of Junior Colleges, the National Council of State Directors of Community-Junior Colleges, and the Institute of Higher Education. The conference was funded jointly by the U.S. Office of Education and U.S. Office of Civil Defense under Contract OEC-0-71-3764.

The conference provided an opportunity for state-level personnel responsible for the development of facilities in community-junior colleges to learn about recent developments in the following areas:

1. The development of physical master plans and new facilities that will be more responsive to the educational programs and community missions of the colleges

2. The effective and efficient utilization of existing facilities through the use of better educational facilities management systems

3. The utilization of community resources to meet the demands of educational programs

4. The development and construction of college facilities that can be used to meet the civil defense requirements of a community, and

5. The utilization of community-junior colleges to assist civil defense agencies by providing communications centers, storage areas, and education and training opportunities.

The conference aided in the preparation of a cadre of capable state-level facilities planners who can give leadership and guidance to community-junior colleges in the development of their physical plants. Careful planning was encouraged throughout the conference and emphasis was placed on the community dimension. The importance of facilities planning beyond the narrow boundaries of the campus was demonstrated and the potentialities of community-junior colleges for civil defense were examined in detail.

Included in this publication are the program of the conference and the list of participants. Unfortunately it was not possible to obtain all papers at the time of publication, but the selections in this report accurately summarize the main themes and direction of the conference.

PROGRAM

Facilities Planning Conference
Council of State Directors - Community Junior Colleges
American Association of Junior Colleges

September 29, 30, October 1, 1971
Bismarck Hotel, Chicago, Illinois

Sponsored by
The U. S. Office of Education
The U. S. Office of Civil Defense
The Center for State and Regional Leadership
(University of Florida - Florida State University)

Wednesday, September 29	9:00 a.m.	<u>Introduction and Overview</u> Dr. Richard E. Wilson
		Presiding: Thomas A. Hooker
	9:30-10:30 a.m.	<u>Civil Defense Aspects in Planning</u> James Roembke
	10:30-11:00 a.m.	Coffee Break
	11:00-12:00 a.m.	<u>Utilization of Community Resources</u> James L. Wattenbarger
	12:30- 1:30 p.m.	Lunch
		Presiding: Thomas A. Hooker
	1:30- 2:30 p.m.	<u>The College Campus and Community Civil Defense</u> William Ensign-Delbert Ward
	2:30- 3:30 p.m.	Group 1. Leaders: Roembke-Hooker Group 2. Leaders: Wattenbarger-Ensign-Ward
	3:30- 4:00 p.m.	Refreshment Break
	4:00- 5:00 p.m.	Group 1. Leaders: Wattenbarger-Ensign-Ward Group 2. Leaders: Roembke-Hooker Group 3. Special group to meet with Dr. Wattenbarger and Dr. Bender

6:00 p.m.	Hospitality Hour Host: The Center for State and Regional Leadership

Thursday, September 30

Presiding: James L. Wattenbarger

9:00-10:15 a.m.	Conversion, Remodeling, and Joint Occupancy Evans Clinchy
10:15-10:45 a.m.	Coffee Break
10:45-12:00 a.m.	Systems Planning and Construction- Charles B. Thomsen
12:00- 1:30 p.m.	Lunch

Presiding: William W. Chase

1:30- 2:30 p.m.	Pre-Fab and Temporary Facilities David Haviland
2:30- 3:30 p.m.	Group 1. Leaders: Hooker-Clinchy Group 2. Leaders: Haviland-Thomsen
3:30- 4:00 p.m.	Refreshment Break
4:00- 5:00 p.m.	Group 1. Leaders: Haviland-Thomsen Group 2. Leaders: Hooker-Clinchy Group 3. Special group Leaders: Wattenbarger-Bender

Friday, October 1

Presiding: Thomas A. Hooker

9:00-10:30 a.m.	Facilities Management and Projection Systems Tod Herring-Gus Akselrod
10:30-10:45 a.m.	Coffee Break
10:45-12:00 a.m.	Informal discussion and further elaboration with speakers
12:00-12:30 p.m.	Summary William W. Chase
12:30 p.m.	Adjournment

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CIVIL DEFENSE ASPECTS IN PLANNING

By: James E. Roembke
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About a year ago -- in the fall of 1970 -- John Cameron of the Office of Education, Tom Hooker, then with the American Association of Junior Colleges, and I had a rap session on facilities development for community junior colleges and the problems facing those who are responsible for their design and construction.

As you can tell from my title, I am an advocate of safety in buildings -- particularly with respect to nuclear defense. The shelter problem was recognized by both John and Tom but they also recognized another problem.

It's sort of like telling someone who is struggling to keep from drowning that if they don't have a fallout shelter they may lose their life in case of nuclear attack. The poor guy has his mind on the immediate problem of staying afloat and he could care less about the future threat.

On the other hand, if you can show him how to whip his immediate problem, and at the same time solve his long-range problem -- you've got a convert. Especially if it doesn't cost anything or can even save him money.

One thing we public officials are accused of doing is watching the private enterprise segment. I plead guilty with respect to buildings and their design and construction. We watch the smart money men build and think we can learn from them. They don't invest in frills, but they are interested in employee safety and consistent long-range profits. I've always been pleased that corporation management of the major oil companies, and of such firms as AT&T and IBM, is specifying fallout protection in their buildings. Anyone smart enough to design computers and stay out in front of the competition like IBM does, is smart enough to know that protection pays.

The main thrust of my opening presentation is -- don't plan in isolation. Think about total community needs and (1) be sure your new facility doesn't complicate the problem and (2) be sure that your new facility alleviates existing problems in so far as possible.

I believe that facilities planners and facilities designers face one of the most challenging tasks in history. The constraints are unending and almost staggering. Building users have a Rolls Royce appetite and Volkswagen budget. Gone are the days of simple utilization for a single purpose. Dr. Harold Gores stated flatly at the last Building Research Institute conference that educational facilities designed solely for educational purposes are obsolete the day they are built.

You know that a building or a complex of facilities must be integrated into community, regional, state, and inter-state planing. They must not upset transportation, overtax the capabilities of utility systems. They must not be ugly, they must be accessible to the handicapped, and they must not contribute to the pollution of the environment. You know all these things, so I'll not dwell on them. You also know that there is a requirement for safety, security, and serenity in educational buildings which are open to the public. I don't have to tell you these things either. You have codes, ordinances, inspections, and all kinds of regulations that tell you "thou shalt not" do this or that.

Let's look at a building as a man-made object and think about it in relation to our environment. It must not contribute to existing problems, and it should protect its occupants from externally generated pollutants. The codes and ordinances have done a fair job on the former and they are getting better. I doubt if anyone can erect a college building these days and get away with polluting the air and water. I also imagine it is fairly safe to assume the air will be filtered and the water treated before the occupants can consume these elements that are vital to our existence. But what about other threats that are just as dangerous, just as obnoxious, and often just as prevalent as pollutants? Let's examine one that is often overlooked -- Noise.

Noise is defined as unwanted and intrusive sound. What about the disastrous effects of sound which has escaped its shackles and now threatens to do irreversible damage while disguised as fun and recreation. Perhaps this is one of the best disguises, since we tend to forget the side effects of throbbing horsepower as we insistently call for more.

The most successfully of all disguises for this pollutant called noise is to surround it with a veil of activity and label it just plain progress.

Dr. Samuel Rosen, an audiologist at New York City's Mt. Sinai Hospital, explored the quiet life of a tribe of stone age primitives in a remote pocket of land near the border between Sudan and Ethiopia. He found that their hearing was the sharpest ever recorded. They beat no drums, fire no guns, speak softly, and their background is about one-tenth as loud as the hum of a refrigerator. Dr. Rosen tested the hearing of 500 tribesmen and found that almost every one of them could hear a soft murmur across a clearing the size of a football field.

It is believed that, given the special conditions of these aborigines, civilized ears could perform with as much sensitivity. But what are our chances of approximating those special conditions?

The magazine U.S. News and World Report states that noise, in most of America, is twice as loud as it was fifteen years ago. Fifteen years from now it may be twice as loud again. Noise, says physicist Dr. Knudsen of the University of California, is like smog: It is a slow agent of death. His theory is that if noise continues to increase at present rate it could be lethal for human beings. In both urban and suburban areas, where more and more people are living, noise-producing agents such as planes, buses cars, trucks, motorcycles, demolition machines, and earth-moving equipment are increasing in use.

The Medical World News magazine reported that many psychiatrists and psychologists believe that in the deprived areas of our cities where we often encounter unusually high noise levels such as traffic, sirens, police whistles, noisy children, blaring radios, and television sets, just one extra startling sound may often trigger violence.

Even the man who lives in the so-called quiet suburbia who returns to his home at the end of a stressful day in a noisy environment can find himself first ignoring the loud television set or the blaring radio. Then a simple drop of a child's toy, the ring of a telephone, or the sound of a wife suddenly yelling at the child can bring forth his most wrathful response.

The increased use of tranquilizers and sleeping pills, it has been suggested, is due, in part to the constant exposure of nerve-racking, sleep-destroying noise. Unlike the human eye, the ear has no lid, it has no means of discriminating between the pleasant and damaging sound until it has first heard it. And it is hearing the wrong sound -- "noise" -- that can cause deafness, through the deterioration of the microscopic hair cells that transmit sounds from the ear to the brain.

Sound can be measured in units called decibels. Noise cannot be so easily measured since it depends, to a great degree, on the person hearing it. There is no nationally accepted scale for measuring noise. But it is generally agreed that prolonged exposure to sound levels of 85 decibels or more is certain to lead to hearing loss.

There is one popular misconception about decibel ratings that should be cleared up. The increase in decibels is not simply an arithmetical progression, but a logarithmic one. Eighty decibels, for example, is not four times as loud as 20 decibels but is one million times as powerful. A sound ten times as powerful as another is said to be 10 decibels more intensive, and each tenfold increase in intensity adds another 10 decibels to the level of sound.

Now, let's see a few decibel readings for some everyday items.

Rustling leaves -- 20 DB

Window Air-Conditioners -- 55 DB

Conversational Speech -- 60 DB

Beginning of Hearing Damage if Prolonged -- 85 DB

Heavy City Traffic -- 90 DB

Home Lawnmower -- 98 DB

150-Cubic-Foot Air Compressor -- 100 DB

Jet Airliner (500 feet Overhead) -- 115 DB

Human Pain Threshold -- 120 DB

It has been determined that prolonged exposure to 85 decibels can cause hearing loss. It might be surprising to learn that outboard motors, train whistles, kitchen blenders, pneumatic jackhammers, and woodworking shops, to name only a few, all produce 85 or more decibels.

You can add to this list 89 million cars producing up to 70 DB each, 18 million trucks producing up to 90 DB, and the 700,000 snowmobiles added to the winter playground last year, which also fall in this category. Hard rock music ranks high in decibels. As exciting as it may be to some listeners, according to psychologists, it has a narcotic effect since when it reaches about 130 DB, it causes the listener to blot out and provides a means of escape.

Industrial noise costs American industries 4 billion dollars a year in accidents, absenteeism, inefficiency, and compensation claims. The cost to humans is beyond measure. There are sleepless nights, family squabbles, psychological stress, and overall damage to health. Doctors believe that noise, by stimulating reactions of fear or rage may actually cause high blood pressure and ulcers. Doctor Rosen explains the reaction to noise this way: Adrenalin is injected into the blood stream, the heart rate increases, blood vessels constrict. Reactions in the intestines take place and acute symptoms persist. You may forget the noise -- but your body never will.

Experiments to determine the prolonged effects of noise on animals has produced astounding results: rats lost their fertility, turned homosexual, and ate their young. When the sound level reached 150 decibels, it eventually caused heart failure and death.

In response to the problem of airport noise, the FAA has established new regulations aimed at hushing jet aircraft, helicopters, and propeller-powered aircraft. The regulations establish a noise limit for most commercial airlines between 102 and 108 decibels. At present, the Boeing 707 and the Douglas DC-8 measure between 110 and 120 decibels.

Meanwhile, the architects, engineers, planners, contractors and builders are being credited with the creation of "noise slums" full of cardboard dollhouses called apartments and homes. We are accused of paying too much attention to appearance and too little to acoustical quality. The finger is pointed at the total profession when apartment dwellers and classroom teachers demand that the sound transmission through the walls, floors, and ceilings be reduced. The apartment building owner soon discovers that it costs $1,500 to $2,000 to soundproof a bedroom or study effectively. He also discovers that this cost could be reduced considerably if noise is given its due consideration in the early design stages, when site studies are being developed, and materials are being considered.

As we attempt to solve the problems of noise, we often confuse the issue of sound transmission with sound absorption. Sound absorbing materials such as acoustical tile, carpeting, and draperies play an indispensable part in controlling noise generated within a room or in reverberant areas such as lobbies, corridors, and staircases. Although such materials are highly effective as sound absorbers, they are relatively poor sound insulators because of their soft, porous, and lightweight construction. In short, they transmit noise very easily. To illustrate this point, imagine a wall constructed solely of acoustical tile, carpeting or drapery material. Such a wall would provide virtually no resistance to the passage of sound through it.

Thus, acoustical materials are not the answer to sound insulation. This, of course, contradicts building practices and the mistaken belief that acoustical tile is the panacea for any and all building noise problems. Unfortunately, this sort of thinking still persists in the building industry and is largely responsible for many acoustically inferior, noisy buildings existing today.

The Department of Housing and Urban Development, in its guide to architects and engineers on the control of airborne, impact, and structure borne noise, states that for any given type of construction, the heavier or more massive the wall or floor structure, the better its sound insulation. Generally speaking, as the mass increases so does the quality of sound insulation. Composite construction is effective in reducing sound transmission. However, composite construction generally requires more floor space or headroom with special attention to resilient connections.

If you have ever incorporated radiation shielding in the design of buildings, you will recall that the use of materials of substantial mass is most helpful in that process as well as in the sound insulating process.

Those who are quick to say that sound insulating construction will add to building cost should remember that the expenses of correcting acoustical mistakes usually are the real threat to overall cost. In some instances, there may be no solution short of major, costly overhaul of the building. One point which cannot be overemphasized is that a substantial degree of sound insulation can be purchased at relatively little cost through good planning and design and through engineering. Failure to attend to these "now" problems results in a higher price being paid by the architect, engineer, builder, investor, or owner in terms of loss of reputation and public confidence and loss of profit for all parties concerned.

The parties holding the purse strings are constantly being asked to re-evaluate their priorities and to reassess their spending. This makes even the phrase "little or no cost" a monumental barrier. This is especially true with our many school officials around the country.

The school board knows, for example, that material and labor costs have combined to escalate over 50 per cent in the last two decades. In fact, the increase in the last five years has been over 25 per cent. The cost bind has practically stopped the growth in rate of construction in private schools, placing a greater burden on public investment. Still, teachers are asking for a better environment for learning. They and their pupils are bothered by noise and needless distractions, they are annoyed to the point of frustration when the overpowering sun rays blanket the room, causing teacher and pupil alike to yearn for the ringing of the bell. They are most disturbed when they report to the classroom only to find that vandals have conducted their own brand of class the night before.

One of the greatest contributions we can make as professionals when designing our schools is to show the school boards how they can solve a multiplicity of problems and how to satisfy many established priorities with the same tax dollar, all under the heading of total design.

For example, a school in Tulsa, Oklahoma had a serious problem with noise near the selected site. The noise offender -- jet aircraft from a nearby large airport. This school was designed to solve that problem. In the process, in the field of emergency preparedness, they created, at no extra cost, 5,000 fallout shelter spaces. They improved the internal environment and reduced the outside solar influence by a substantial reduction in apertures in the exterior wall. An architect in Tulsa recently reported that the Tulsa school system expects to employ windowless construction to a large extent on other new school projects. The reason for this decision brings up another kind of problem and is one with which you and I often find ourselves disassociated as we design schools -- long-range maintenance and replacement cost resulting from vandalism. Glass breakage alone costs approximately $1 per student per year in Tulsa. Do you think this is an isolated case? Do you feel that Tulsa is alone?

My files are filled with reports of glass breakage and the high cost of replacement. Below is the 1968 score card for a few cities scattered across the continent. These figures haven't peaked yet! Listen to these 1969 costs:

	1968	1969
San Diego, Calif.	$ 46,000	92,800
Dayton, Ohio	46,000	?
Washington, D.C.	195,000	477,000
Baltimore, Md.	357,000	314,000

	1968	1969
Los Angeles, Calif.	$850,000	$ 653,000
Chicago, Illinois	$1 million +	2,070,000
New York City	Also $1 million +	1,373,000

The $195,000 figure for Washington, D. C., was just $40,000 ten years ago. In 1969, Washington, D. C., budgeted a quarter of a million dollars for glass breakage and ran out of money before the end of the year. To make their problem worse, they were 30 to 40 schools behind in their repairs even when they had the money. On top of that, the teachers, parents, and students demonstrated because the system was moving too slowly replacing the broken windows.

This is what the District of Columbia School officials have had to do with their valuable funds over the years. Costs have risen from $1.30 per pane in 1949 to $4.42 per pane in 1968. The District spent another 2.5 million dollars for a new unbreakable plastic in lieu of normal glass. Rocks will bounce off, but a cigarette lighter or propane torch can be used to write on the plastic. We can no longer afford to design this type of school.

One of our architects talked with the District of Columbia School Planning Department recently and learned that they are now requiring that all the new schools be designed with limited apertures. They list three very important reasons:

1. To reduce both initial and operating cost of heating and air-conditioning equipment

2. To reduce maintenance cost

3. To reduce rising costs due to vandalism.

A very interesting by-product of such a move, on the part of school officials, is the realization of a more favorable insurance rating which is extremely important.

Last year, vandals burned out the Lorton elementary school in Fairfax County causing over $300,000 worth of damage. Insurance available through ordinary insurance sources was cancelled. High risk agencies agreed to carry our schools -- at an increase in premium of $46,000!

Is this limited to elementary and secondary schools? Ask any university administration.

Stanford University -- $1,000 deductible - $500,000

University of California, Berkeley, Calif. - $1 million

University of Wisconsin -- carries own -- It had about $1 million in escrow; bomb damage last September -- around $3 million; $2 million assessment on taxpayers!

Again, let's look at commercial and profit-making organizations for a clue.

A typical shopping center, with which we are all familiar, is highly vulnerable. The shopkeeper here realizes a more secure place of business; the shopper is willing to spend more time shopping in the type of environment shown in this slide. He is not confronted with the shock treatment created by leaving the conditioned air of one store and walking through the summer's heat only to be shocked again upon entering another store. In buildings like this, where the client has decided, for many important reasons, to focus his attention on a central core, measures to increase the emergency preparedness whether it be in response to hurricanes, tornadoes, or radioactive fallout, can easily be incorporated into the design. Naturally, the best time to accomplish this, so that dollars would not be wasted, is in the design concept stage. But of course, this is known by you for I am certain that there are those among us, who, based upon their geographical location, instinctively consider emergency preparedness when it comes to two natural emergencies -- tornadoes and earthquakes.

A school designed for tornado protection was an award winner designed by Caudill, Rowlett & Scott. It has inherent fallout protection in it. It uses glass -- but wisely.

Some schools have adopted part of the shopping center concept. Windowless exterior. Windows opening into a courtyard. Shelter from fallout, noise reduction, vandalism proofing. This is a controlled environment for learning.

I have highlighted a concept of achieving multiple goals with common sense. The same dollar used for safety can reduce maintenance and operations costs and virtually eliminate noise and vandalism problems. It may also mean your buildings will be insurable.

UTILIZATION OF COMMUNITY RESOURCES

By: James L. Wattenbarger
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We have all heard a great deal about the crisis in higher education during the 1970's. A new report -- one of the Carnegie Commission's series -- is entitled the New Depression in Higher Education.

Each of you has in some measure felt the pinch. Some have even experienced cutbacks in personnel, salaries, resources, and everything but students. Although a number of states have noted slowdowns in the rate of increase of first graders and of high school graduates, other states have been able to see an actual decline in numbers of first graders and a static level or even some decline in numbers of high school graduates. This has happened even though there has been some increase in holding power between the fifth grade and high school seniors.

The cost of education has mounted at every level. Costs of facilities have certainly been no exception to this. Not only is brick and mortar more expensive, but labor, interest, and fees have increased at the same time. And with all of this, almost every state has seen an increase in college attendance.

Arnold Toynbee has pointed to:

1. Development of science - experimental - during the 15th and 16th centuries

2. Appreciation of science to technology

3. Guaranteed jobs of knowledge

4. Primary education

5. Recognition of worth and dignity of individual.

The junior college was born as an extension of high school.

1. Formulation period - 1850-1910

2. Expansion period - 1911-1947

3. Community college, universalized - 1948-1970

4. 1971- Where to?

They have escaped some of the rocks tossed at higher education generally.

The emphasis upon "accountability" has been an important watchword carrying different meanings to most people, save one meaning which seems common to all: save money. Do a better job of educating with less money than has been previously available! Or, if you cannot do that, do an adequate job with less money, or if that is not possible, get by with what is available no matter what! Accountability takes many forms:

Cost/benefit analyses

Input/output relationships

Measurement of inputs since outputs are not defined

Descriptions of educational consequences

We who are responsible have not done too well in these auditing techniques.

We have not always defined our goals.

We have not clearly designated objectives.

We have no way of telling when a goal is reached.

We often do not know what the student's goals may be. We have never offered him an opportunity to tell us.

When we described our building requirements, we were equally vague and often equally uninformed. Formulas have been developed to help us become somewhat more objective, but there are many white elephants standing around with 25 per cent or even 15 per cent utilization because of unforgivable mistakes in this construction. Not structural or even design mistakes, but far more difficult to conceal than they may be -- mistakes of location, mistakes of size, mistakes of curriculum projections. These kinds of mistakes would seem to be almost unforgivable.

We cannot meet needs in new buildings. Take a trip with me:

1. High school wing
2. Elementary school - old
3. Old junior high school building
4. Portable buildings - trailers
5. Church school building
6. Old hotel
7. An airbase, runways cracked and broken
8. A street in a town
9. A department store downtown
10. Temporary building
11. Abandoned airport terminal.

These are the community colleges.

Guidelines for junior college facilities:

1. A place where students are recognized as important. What can we do?

a. Welcome them, invite them

b. Eliminate as far as possible the difficulties of registration

c. Consider transportation needs, encourage use of public transportation, provide parking areas

d. Classrooms and laboratories which encourage human communication

e. Use beauty of decoration and paint if not design

f. Who are the students? Youth, middle range, older.

2. Accessibility - may be more important than any other factor, in urban and rural areas. Location of existing resources may not be appropriate.

3. Service to the community as the college becomes a part of the community as described by Hans B.C. Speigel in the Junior College Journal ("College Relating to Community: Service to Symbiosis," 41:30-34, September, 1970.). How? Dispersion of college activities - recruiting activities in mobile units - technical assistance where needed.

4. Quality of education. Students learn, we cannot teach! Planning a non-campus: useful in an urban setting.

a. Assist community development boards

b. Design and support the creation of new community-based institutions

c. Provide training for decentralized municipal service

d. Develop new ghetto enterprises.

The problems of such an operation are staggering.

A procedure:

1. Identify community resources which have potential use and know where they are

2. Define the college-community needs

3. Examine alternatives in terms of:

   a. Cost/benefit

   b. Adequacy to do the job

   c. Accessibility

   d. Transportation

   e. Refurbishment required

   f. Length of availability

   g. Projected long-range need.

4. Take action.

   a. Arrange for lease/purchase

   b. Carry out refurbishing

   c. Do the job.

Some examples:

1. Stores in the shopping center

2. Educational buildings

3. The prison or the jail

4. Theatres

5. City recreation facilities

6. Church school buildings

7. Apartment houses and hotels.

Warnings:

1. These are not to be selected for their permanent value or location

2. Planning activities must be carefully worked out as for a permanent campus

3. Needs of students must be paramount

4. Careful legal procedures must be followed

5. Professional advice (architects and engineers) must be had

6. Faculty involvement is required

7. A community-wide master plan is required

8. Long range consideration cannot be ignored

9. Work with community leadership; community acceptance is required

10. Temporary factor must be recognized; permanent facilities will be needed.

THE COLLEGE CAMPUS AND COMMUNITY CIVIL DEFENSE

By: William L. Ensign
McLeod, Ferrara & Ensign
Washington, D. C.

Even the most cursory examination of our country's history reveals that public education was conceived, born, and nurtured in response to community needs and desires. Originally organized, constructed, staffed, operated, and maintained through cooperative community effort, those schools were traditionally regarded in the true sense of the word as community centers. At the moment, I am serving on a commission of the American Association of School Administrators which is putting out a book on New Forms for Community Education. We met recently in Washington, and were discussing this very subject, and we noted how the early ideals for public education have gradually changed over the years.

The schoolhouse in early America served as the civic, social, cultural, and recreational center. It was there that dramatic and musical presentations were made; pie suppers, folk dances, and other social events were held; political meetings and elections took place. Such schoolhouses often provided shelter for fraternal orders, veterans organizations, and churches. The schoolmaster or schoolmarm was usually the most literate around, and acted as community consultant and arbitrator. The schoolhouse in our rural societies has served many added functions. During times of disaster, emergency, and alarm, schools have been pressed into service as emergency shelters, temporary hospitals and even morgues, and as mobilization centers for recovery actions. During times of economic depression they have been used as distribution centers for food and clothing, as public health clinics, and as food canning centers.

The type of school just referred to was common throughout rural America well into the twentieth century. But, as the demands for more universal and uniform public education increased, the consolidated district type of school organization evolved, first in the urban areas as city-wide systems, and later in the forms of country and state systems.

As the control of the school became less and less a community matter; as formal education became more specialized; as teaching and administration became more formal and "professional," the educational programs became more structured and compartmentalized in nature. The philosophy of universalism prevailed and the schools tended to become less and less responsive to the individual needs of the communities in which they were located. In other words, it seems that as direct control passes from the people to a larger bureaucracy, education becomes introverted and less responsive to the people. The nature of the book the commission is writing is to explore ways to reverse this tragic trend.

The brightest spot on the horizon within this dismal picture of community education is the community college -- and it should be with a name like that. But it really is more so than the average university with its "gown and town" image, or the schools which close their doors, even to their own students, for more than five-sixths of the time. The community college movement, for all its ups and downs, has seemed to recognize its role within its own community -- and its place in America today attests to that fact. If I may have the privilege, as an outsider, to raise one small flag of caution, however, I might say that I have been disturbed recently that the community college may also suffer the fate of its early model if unifying regulations and standards are imparted on it without regard for the needs for individuality, and even eccentricity.

Jim Roembke talked briefly about the role of the physical college in the total environment and I hope we can all agree on his two points. A college does have the responsibility to provide the best possible atmosphere for learning and at the same time to enhance the quality of its neighborhood. It has the responsibility to minimize pollution -- pollution of all kinds, water, air, noise, or visual. It must conserve natural resources and energy, provide spaces, vistas, and physical experiences which are varied, exciting, and uplifting (in other words good architecture). And it should ensure that what is provided is safe, convenient, efficient, and in the long run meets its fiscal responsibility to the taxpayers. Not necessarily in first costs, but in long term economy. Of course, since communities differ, colleges should differ.

I think there should be a greater return to regional architecture. Nevertheless, there must be elements which remain somewhat universal. Individual space requirements for example. These may vary in number but basically a media lecture room in Chicago need not be different from one in Florida.

Foothills Junior College in California. We are all familiar with the rolling sweep of its campus. Its berned landscape, the intimate small courtyards contrasting with its wider public spaces and the warmth and character of the architecture.

Foothills, I would say, has been one of the most influential designs for community college planners in the last quarter century. Examples of similar types of master plans are common everywhere -- as shown by some of our own projects. The basic philosophy behind these plans was the concept that Phase I facilities should be planned in small units, each a nucleus for expansion. Thus, expansion would be outward spreading from a central core. This example of a campus plan is, as I have said, very common everywhere -- and, in fact, is being used in the Foothills District again at the De Anza campus, although this plan is in a somewhat more compact form.

More recently, however, we have seen new forms emerging -- a turn away from the mini university character of buildings separate and individual, each the symbol of a particular discipline and only loosely related to each other.

Significant examples of these are scattered in many parts of the world -- Canada, England, Germany and in some of the state university systems in California and New York.

The philosophy behind this type of plan recognizes that institutions dedicated to the advancement and dissemination of knowledge are constantly changing. Subject disciplines combine contract, disappear and emerge again, often many times in the life of a building designed for them, and often in defiance of the most thoughtful forecast available. We have all seen recent buildings that are already outdated and in fact are so inflexible that changes are virtually not feasible except at great expense.

These new plans attempt to overcome such problems by creating what we might call "continuous teaching environments." Basically they are megastructures, allowing maximum communication among the parts and permitting reasonable expansion outward and internal changes through renovation. This is a very definite trend that we are finding today -- and there is historic precedence. The designs of the University of Virginia by Thomas Jefferson in 1818, and of MIT in 1912, both followed this philosophy.

CIVIL DEFENSE AND SAFE BUILDINGS

By: Delbert B. Ward
Associate Professor of Architecture
The University of Utah

Introductory Comments

I was pleased to accept this invitation to address the American Association of Junior Colleges Workshop on Facilities Planning largely because it provides for me an opportunity to discuss an aspect of building design which too often has received inadequate attention. At the outset I should clarify that my background does not qualify me to speak directly to the issues of junior college facilities design. Rather, the design of school facilities is my area. I would not have that comment on lack of knowledge in college facilities design be understood as an apology for my presence here, however. The topic safe buildings, which happens to be my "bag" in school facilities design, is of general concern and has appropriate application to junior college facilities, school plants, and most other building types, new or old.

Because of my acknowledged absence of expertise in the junior college scene, I have asked Bill Ensign of the architectural firm of McLeod, Ferrara and Ensign of Washington, D.C., to join with me in this presentation. Bill's firm has done a large amount of work in the design of junior colleges. His background is less intense than mine in the area of civil defense planning and building design to protect from environmental hazards. But between the two of us we hope that we can offer a presentation pertinent to your interests and valuable to your purposes for being here.

(Note: A sudden death in Bill Ensign's immediate family caused his sudden departure from the workshop. His presentation was ably assumed by Tom Hooker to whom I am indebted for his assistance.)

Scope of Presentation

The focus of this presentation is on safe buildings. My interpretation of safety, however, goes beyond the usual building design concerns of fire safety and health safety though these are no less important. It also goes beyond the usually applied structural safety standards.

By safety, I mean the protection of the people who occupy and use the buildings from known hazards and the protection of others who may be affected by the building when it is placed into its surroundings.

Let me elaborate for a moment. Buildings typically are erected to serve as shelter for human activities. The purpose of that shelter is protection from environmental hazards. We often narrowly think of these environmental hazards in terms of weather phenomena which includes heat, cold, rain, snow. As everyone knows, protection often entails more than that. It is protection from excessive noise for some buildings. It is protection from extreme weather conditions (tornados and hurricanes) in other situations; and in some historical situations it has been protection from man-made hazards such as war, civil strife, or vandalism. Safe buildings mean protection from a number of hazards.

Equally important to any building's design is that it contribute to the safety of people without itself becoming a hazard to the people. A building constructed in the "tornado belt" of this nation ought to be rigid enough to protect its occupants and also rigid enough that it does not become a hazard to someone down the road, i.e., not so flimsy that gale-force winds would demolish the structure and scatter the pieces in directions which could be injurious to others outside the building. In other words, buildings must become a part of the solution to environmental hazards rather than a part of the problem.

My discussion will cover three distinct areas of the design of safe buildings.

1. Some thoughts on building programming to include broader consideration of several environmental hazards

2. An overview of some hazards and their implications on building design

3. Some design techniques leading to safer buildings.

Programming for Shelter

We design buildings to meet program requirements. These program requirements typically are conceived in advance of the erection of our buildings, although occasionally the building program is prepared for an existing structure which is to be rehabilitated.

The building program usually identifies the functions which are to occur within the structure and identifies the spaces and their relationships necessary to satisfy those functions. The program often will suggest performance criteria for the building in lieu of specific construction details. For example, a program may specify that the building design should satisfy certain noise reduction criteria, wind loadings, or earthquake forces rather than specifying the way it is to be done.

The program clearly is an accounting of activities which are to be housed and the manner of accommodating those activities, including considerations of safety for the users. This degree of safety may be translated into requirements for structural resistance or performance of building materials, but whatever its form, the relationship finally is with respect to user needs.

The building program has a particularly important purpose in so far as the designer is concerned. It provides the designer that criteria for which he is accountable in establishing the building form. It identifies the relationships of spaces which are to be achieved in the design; it identifies the expectations which users will have for the space. The program, whether its form is written or verbalized, is the basis of the building design.

We architects and engineers like to believe that once it has been stated the building program can be satisfied in the design. This, of course, is where the skills of the designer and his consultant engineers are tested. Spaces are created and functionally related; structural systems are selected and integrated to work with the space requirements; and building equipment is incorporated compatibly with the functional and structural arrangements. The resulting building more or less satisfies the previously prepared program.

From the point of view of building safety, the sequence of steps followed in the design of a building as cited above is particularly significant. We know that buildings can be designed to satisfy most performance criteria. The ability to do so lies within the skills and abilities of most architects and their consultant engineers. The critical aspect then of this sequence, it seems to me, is an adequate and comprehensive program statement of the performance requirements of the building.

If the decision is made that a building is to provide safety for occupants from extreme natural hazards, tornados, or high winds, then it is within the realm of feasibility that this can be accomplished in its design. If these factors are not specified in the building program, then they cannot be expected to be satisfied in the performance of the structure beyond the minimum requirements of building codes. And, remember, building codes always establish minimums. The building program, in my view, is the beginning point for establishing building safety.

If you can accept the comments just made: (1) that buildings can be designed to satisfy most of the safety criteria which we can establish and (2) that the identification of the performance criteria with respect to safety from environmental hazards are necessary first steps, then you are duty bound to acknowledge that the responsibility for the preparation of adequate building programs falls upon you junior college administrators who prepare the programs for your facilities. As you proceed in planning facilities for junior colleges your acknowledgement of the many hazards in building performance and your specification of building performance against these hazards are considerations no less important than the functional space needs of your colleges.

My greatest assistance today will be in identifying for you some of these hazards (my attention will be on extreme natural and man-made hazards) and their influence upon building form. Later in the presentation I will show you slides of several examples of buildings whose programs included consideration for these environmental hazards. I hasten to note that none of the examples which I show you are junior colleges. Most of the examples which I have accumulated are schoolhouses. However, the lessons to be learned from these examples seem to me to be equally applicable to college buildings and, for that matter, to a large number of other building types.

Some Environmental Hazards

A beginning point in examining my expanded concept of safe buildings is an identification of some of the environmental hazards which we face today. I have divided these into two groups, mostly to facilitate my talking about them. In the grouping of natural hazards are those threats to life and property associated with intense weather, other natural phenomena, and their after-effects. Hurricanes, tornados, earthquakes, tsunami, floods, and landslides are among these.

In man-made hazards I have grouped those threats to life and property which are caused directly by man and his implements. Included are civil strife, vandalism, noise pollution, air pollution, and war (nuclear and conventional).

That nuclear war should be included here as a possibility can be readily justified. We know that nuclear weapons exist and that they are in the hands of potential enemies. We also know that the means of delivering these weapons exist (missiles). We further know that presently this nation has no counter force to these missiles (an ABM system). The obvious conclusion is that this threat must be considered a hazard. That we can design our buildings with this as a consideration in achieving safety remains to be shown.

The creation of building forms to provide protection against these hazards seems to me to follow a rather obvious sequence:

1. Identification of the possible hazards, their probability and their severity

2. Detailed examination of the physical phenomena associated with these hazards

3. Schematic development of solutions for building design which provide protection against the hazards

4. Incorporation of these schematic solutions into building designs in ways compatible with other functional purposes

5. Actual erection of the buildings.

The sequence is nothing new, nothing profound. Yet, it provides an orderly way to approach any topic and an orderly way to arrive at logical results.

In my work through programs of the Office of Civil Defense I have observed that adequate solutions to these natural and man-made hazards correlate closely with adequate definition of the problems.

Here is one observation of that kind. In previous years the Office of Civil Defense has given much attention to the development of an adequate national defensive (protective) posture against nuclear warfare. A number of people, mostly working with inadequate or erroneous information, have suggested that the design of buildings and of cities cannot be accomplished to resist the awesome forces created by nuclear explosions. A great deal has been learned about the physical phenomena associated with nuclear explosions through considerable research in recent years. These findings will refute arguments that nothing can be done.

Research of weather phenomena has provided for us similar insights to aid in understanding the behavior of tornados and hurricanes in recent years. Meteorologists have been aided considerably with weather satellites which have helped to pinpoint and track these storms. The greatest assistance to date has been in adding to the weather forecaster's abilities to provide storm warnings for the gulf coast states (hurricanes) and the midwest (tornados). The time may come when the scientists will provide adequate information which allows accurate prediction of storm intensity and possibly even of storm control. The great assistance of weather research in building construction has been the data related to intensities of the physical forces generated (winds, pressure differential, likely direction, etc.).

Similar kinds of information is being accumulated with increased abundance on earthquakes. Indeed, scientists have furnished us with information about regionalized earthquake activities from which zones of earthquake probability have been developed as an aid in the design of buildings. Unfortunately, their research has not gone far enough to allow us to predict earthquake disasters. So, we design our buildings in the high probability zones for the extreme possibility that an earthquake may occur tomorrow. We have more than enough information to suggest the probability of earthquakes in various zones of the nation and a lot of data about the intensity of forces on buildings generated by these quakes.

A not so obvious fact to be derived from information known about the building loading forces created by these several environmental hazards is that there are a number of similarities. Tornados and hurricanes are essentially tremendous wind forces. Earthquakes and blasts associated with nuclear explosions cause considerable vibration or dynamic loadings on structures. Further, it is of interest to note that the design of buildings to resist wind forces and dynamic forces is in many ways the same. Admittedly the design approaches for all physical phenomena are not the same when translated into building safety, yet the similarities of solutions when finally integrated into building form should be acknowledged.

As a nontechnical summary of this observation, I suggest to you one premise of which time does not allow full exploration: The design of a building to provide occupant safety from one of the mentioned hazards also provides a good amount of protection from other hazards.

I further believe that continued exploration into the subject of building safety will reveal additional benefits achievable through design which will lead to more comprehensive solutions for the protection of life and property.

Examples

During the past five years I have spent considerable time traveling throughout the nation looking at buildings which have been programmed and designed to protect against fallout radiation, one of the hazards which has been identified. More recently my work has been expanded to include buildings designed to resist tornados and to protect the occupants from this natural hazard. In addition to this effort I have spent considerable time exploring construction techniques which satisfy the protection criteria that have been identified for the fallout radiation and tornado hazards. It is from these experiences that the examples have been drawn.

Several examples are shown in subsequent slides which illustrate design approaches to include safety for occupants from these two hazards. My examples are drawn mostly from schools since that building type has been the focus of my attention and experience.

Obviously, the examples selected for viewing are the more successful in terms of the compatibility achieved in the designs between functionality and occupant safety. The success of these buildings in meeting the safety considerations reflects serious attention by owners and architects as they sought to incorporate the protection features.

Several features of these example buildings are worth noting at the outset:

1. Protection and occupant safety are integrated design criteria for the buildings. The functional, everyday purposes of the building spaces have not been compromised even though sanctuaries within the buildings were designed as shelters from the hazards of tornados and/or fallout radiation. In other words, I am neither recommending nor illustrating the design of single-purpose shelters. That was an older concept which was abandoned some time ago.

2. The protection features have been incorporated without obvious effect upon building appearance. Indeed, I expect that only the trained eye would be able to identify the existence of protection. For the most part the safety features caused only minor modifications and a beefing-up of standard construction.

3. In the examples the additional occupant safety has been achieved with relatively modest cost increase. Very often the accommodation of occupant protection features in the design will increase slightly the cost of construction. The cost increase is minimized largely by skillful design coupled with adequate understanding of the hazard. It should be noted, however, that there are additional benefits to be gained from this increased initial capital outlay. The most important benefit, of course, is the additional protection for life and for property. Other benefits include lower insurance rates for more substantial buildings, lower long-term maintenance costs, and often, better building performance, e.g., improved sound reduction across interior partitions.

4. More than half of the examples provide protection of occupants against both the fallout and tornado hazards. In some cases this is a result of deliberate design consideration; in other cases the design for tornado protection also gave fallout protection as a bonus; and in other cases vice-versa.

(The remainder of this presentation was made with slides.)

CONVERSION, REMODELING, AND JOINT OCCUPANCY

By: Evans Clinchy
Education Planning
Associates, Inc.
Boston, Massachusetts

I do not pretend to be an expert on higher education or junior and community colleges. As I understand it, most, or at least many, community and junior colleges start their lives in rented space that is considered temporary quarters at best.

This is especially true of public urban colleges where land and money may be hard to find.

Yet it appears to me that in most cases, these colleges are looking forward to the day when they can design and build their own elaborate campuses. Preferably, the designs are based upon the standard university model -- a college located essentially all in one place, occupying if possible one or two blocks. This campus will be primarily, if not completely, devoted to the college. It will have classrooms, lecture halls, faculty offices arranged according to disciplinary departments, laboratories, physical education facilities, dormitories, a student union, etc. These will either be spread around a 100-acre suburban area, or, in cities, often bunched into a single or a collection of high-rise buildings.

In either case, they are designed to be cut off from their surroundings -- urban or suburban. The attempt appears to be to create a collegiate world unto itself, an academic oasis (or ghetto).

Reasons Against Conventional Approach

1. Excessive use of land - difficult in suburbs, impossible in cities

2. Too costly - no one can afford to buy land and use it solely for educational purposes

3. Municipalities, especially cities, cannot and will not allow large pieces of potentially revenue-producing land to be used for tax-exempt purposes; Boston is considering taxing educational institutions, at least for services, or contributions in lieu of taxes

4. Students resist it - they feel ghettoized, disconnected, especially from urban life around them, not only physically

5. Colleges themselves can no longer afford to build costly new structures, raise the money and pay for them by themselves, at a time when operating costs are going to have to be cut drastically.

In short, higher education is going to have to become much more economical in every way. Limiting ourselves to facilities, here are four obvious ways to reduce cost:

1. Joint occupancy, found space
2. Joint occupancy, new buildings
3. Found space, old buildings
4. Using facilities better - year-round, extended day.

THE CONSTRUCTION MANAGEMENT CONCEPT: A NEW CONTRACTUAL STRUCTURE FOR BUILDING

By: Charles B. Thomsen
President, CRS/CM
Houston, Texas

The construction manager is a professional rather than an entrepreneurial builder. He brings proven management tools of schedule, cost, and quality control to the construction industry where, for the most part, they are long overdue. He works directly for the owner. Like a doctor, lawyer, or architect, he makes no guarantees. Rather he is paid a fee to use his special knowledge for his client's benefit.

His job is to save time and money on building projects. He offers construction expertise during the development of design concepts, provides cost and schedule control during design and construction, and coordinates construction contracts.

He is not a contractor and does not compete with bidding prime contractors or subcontractors, nor does he take the architect's place as construction administrator. He is part of the project delivery team, which includes both designer and builder. His job is to "run the project" and see it through from start to finish. It is clear that the traditional relationship between owner/architect/contractor and subcontractor, where each is to some extent an adversary of the other, is giving way to the concept of the team with a construction manager as the coordinator of the complex construction process.

The construction manager provides all the management functions of a general contractor -- and most projects which use comprehensive construction management services do not have general contractors working on them. There are, however, two essential differences distinguishing the construction management approach. The construction manager is usually selected as early as the architect so that he can provide construction counsel during the design phase. The nature of his contract precludes his profiting from cost increases on the project. He sits on the owner's side of the table as the owner's agent.

Construction management services may be put into three general categories:

Schedule Control: planning, scheduling and reporting, combined with initiative to expedite a project through both design and construction.

Cost Control: budgeting, cost analysis, cost estimating and accounting, plus management, to control cost through design and construction.

Contract Management: coordinating and organizing clients, architects, builders, and suppliers into an effective working team.

These new management techniques for project delivery have proved effective in dealing with problems of construction cost escalation, project delays, and widely varying quality.

Who Should be the Construction Manager?

There is much argument about who ought to be the construction manager. Many general contractors point out that they have the expertise, qualifications, and experience and, therefore, only they can be construction managers. Most construction managers today come from the ranks of the general contracting business and are doing an excellent job, lending a great deal of credibility to this point of view.

Some mechanical contractors say they do more construction work in dollar volume on an average job than the general contractor does and that the mechanical contractor ought to manage construction.

Some architectural engineering firms are saying that they are professionals, that this is a professional service, and furthermore, this is what architects used to do anyway. They point out, in support of this claim, that this is precisely the way architects practice in most countries in the world.

Other professional organizations who have had special experience in cost, schedule, or management consulting are now calling themselves construction managers.

This competition for control is just another expression of the fragmentation in the construction industry. All of these levels of expertise are needed; it is time to get the team together. A successful construction manager will not be an individual, but an organization with expertise in design, construction, and management.

CRS/CM is the construction management subsidiary of Caudill, Rowlett, Scott Design Associates, a family of companies active in environmental design. Consequently CRS/CM is able to focus the efforts and expertise of the total CRS DA group on construction problems and opportunities.

How Does Construction Management Improve on The Traditional Contractor-Client Relationship?

Since the construction manager makes no guarantees, some risk shifts to the client. Some clients, particularly public clients, are reluctant to accept this risk. However, most of the risk in a project arises from the very nature of the traditional relationship between the contractor and the owner.

A contractor guarantees to build a complex and custom project within a time limit for a specific cost. But this -- combined with the low-bid selection process -- tends to place the contractor in an adversary relationship with the client and the architect. He is not treated as a helpful ally. Rather, since he can only increase his profit by reducing the cost and quality of his work, he is often regarded with suspicion and his work subjected to constant scrutiny by architect and owner alike. This adversary relationship generates its own risks and risk cost which ultimately must be paid by the owner. In fact, the desire to eliminate risk by assigning it to the contractor is the very force that causes it. To protect himself, the contractor builds contingency costs into his bid price, often forcing it to an unnecessary high. On the other hand, if genuine economies are realized along the way, the benefit accrues to the contractor and not the owner.

The low bid basis for selecting the contractor on public work discourages the contractor's incentive to build up a reputation for excellence. His good work on one job does not help him get the next one. He has to be the low bidder all over again. Yet owners have quality and time objectives as well as budgets to respect. The traditional low bid process meets only one of these objectives.

The construction manager is selected on the basis of his past performance and his management ability. His fee and profit are stipulated at the time he is hired. A public client can hire him because he is selling professional services -- like a lawyer, architect, or engineer. A construction manager is precluded from bidding any construction work; he is the agent of the owner and manages the project on his behalf. By virtue of this, he is in a position to generate mutual trust and respect for individual expertise and to encourage the team to work together for the good of the project -- to get the best possible building within the limitations of time and budget. An effective construction manager gives contractors and manufacturers a more creative role by allowing them to apply their specialized knowledge and experience to influence decisions affecting the design and progress of the job.

The primary difference between a construction management and a general contracting approach is the contractual structure. In the construction management approach, all the actual building work is done by the same people who, in the conventional situation, subcontract to a general contractor. On public work, however, because the building must be purchased by competitive bidding, these subcontractors bid directly to the owner. Their role thus changes and they each become one of 20 or 30 prime contractors working on a job and being coordinated by the construction manager. As the agent of the owner, the construction manager controls the purse strings and has the same financial control as he would if he were the general contractor. On private work, the contractors contract with the construction manager and the owner reimburses the construction manager the face amount of the individual contracts.

The construction management concept buys the building in smaller, far more definable pieces. The work is bid right before it is to be done so that unpredictable labor and product escalation are not part of the bid. Each contractor is directly responsible to the owner for the work he himself will put in place. There is no third party responsibility. Risk and therefore risk costs are minimized. Everything is more carefully managed and therefore less of a risk. The efforts of every member of the team are focused on the project rather than on protecting themselves from risk or realizing additional profits.

What are the Specific Functions of CRS/CM?

1. Cost Control. Cost Control is estimating plus management. It begins before the first line is drawn and continues throughout the project. The construction manager predicts costs, interprets estimates, suggests alternative building systems, and seeks to uncover and investigate economies in construction.

The budget is established, based chiefly on anticipated systems, building type, location, and schedule. This is called the "Program Estimate" and is the first cost estimating procedure in a project. Each succeeding estimate includes an increasing level of detail.

Design Estimates are prepared during the initial design phases. Costs are analyzed via "take-off" by sub-system.

Detail quantity take-offs of all building systems, the third cost procedure in the project, are made when the design crystallizes.

During the construction documents phase, a fourth estimate is made by updating and including additional detail.

Throughout these processes, costs are compared to benefits, and alternate building processes are studied to find the best solution.

At CRS/CM estimates are run on a computer. The current cost program contains values for 10,000 cost items. Adjustments are automatically made for overhead, contractor's profit, location, and cost escalation. These estimates are often rerun through the computer and modified to test alternate design approaches and to keep a running account of project decisions.

In the five years that this system has been in use, we have estimated over one billion dollars of work. On a per project basis, we have been averaging a spread of 4 per cent on either side of the actual bid price. 90 per cent of bids have been within 6 per cent, 98 per cent within 10 per cent. The automated system gives a quick answer to the cost implication of design thinking. It has allowed architects and their clients to test many alternatives in a search for economy in their buildings.

2. Schedule Control. Schedule Control consists of modern management tools for planning, scheduling, and monitoring -- plus initiative.

The growing complexity of buildings and the use of innovative design and construction techniques such as systems building, phased design and construction, and multiple prime bids, require equally sophisticated techniques of schedule planning and control. There are three major phases of schedule control.

Planning Projects. We use network diagramming and analysis techniques. They are tools which help the team members to communicate with each other, to describe the scope of the work, and to plan project "strategy." By these means we can assign responsibilities, anticipate problems, and study alternate tactics.

Scheduling Projects. We use the Critical Path Method (CPM). After we create a network diagram the computer analyzes it and generates a schedule with start and finish dates for every activity identified. The computer identifies the "critical" activities. The sum of these activities (called the "critical path") is the shortest possible duration of the project.

The network diagram and the CPM schedule are analysis tools. We use them to study alternative project plans -- often with builders who are potential bidders -- and to adjust the critical path so as to forge the lines of a project plan and schedule that are most appropriate to the job.

Program Monitoring. The schedule is a management tool. We periodically compare actual job progress with the original schedule -- then run a new schedule. Any slip in the projected target date is a signal for corrective action, which is, in effect, schedule control.

We also use the CPM schedule as a means to enforce contract provisions on construction time and to evaluate progress payment requests. Most importantly, however, it is a tool to help the client and contractor complete the project on time.

3. Contract Management. Many projects have more than one architect or contractor. This usually occurs on three increasingly common types of projects.

"Super" Projects: New campuses, new towns, and other very large projects, often through sheer need for manpower, have several architects and contractors working simultaneously. Long-range cost and time schedules need to be formed, communication procedures established and carried out, methods to aggregate purchasing power developed, and the activities of the several architects, engineers, consultants, and contractors must be coordinated effectively.

"Fast-Tack" Projects: Starting construction before the design is complete reduces the building delivery schedule and makes the most out of valuable design and construction time. In order to bid construction before all drawings are complete, jobs must be packaged into several separate contracts. Often a preliminary package including foundations and site development will be bid long before design is complete. Other packages, such as the structure, exterior wall and interior systems, may be bid later, each with its own prime contractor. These multiple prime contractors must be coordinated when all are at work.

"Systems" Projects: National corporations are mass producing complete building systems (such as structure, ceiling/lighting, or interior partitions) which may be purchased and assembled with greater speed and economy than conventional construction. To save additional money and time, contracts are often written with the manufacturer of these products before the conventional portion of the construction is bid. Manufacture and delivery of these systems need to be coordinated with the residual conventional construction.

An overall view of both the design and construction process is needed to manage these three kinds of projects. Modern management tools of schedule and cost control are necessary, as is an understanding of new methods of purchasing and contracting. Enlightened Contract Management methods are essential if we are to realize the full benefits of modern technology in its application to the complex building projects of today.

PRE-FAB AND TEMPORARY FACILITIES

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In the fall of 1970, the American Institute of Architects (through its Committee on Architecture for Education), the Association of University Architects, and the American Association of Junior Colleges conducted a survey on "Temporary Facilities for Higher Education."

The objective of the survey was to develop information about "temporary" facilities on college campuses: what kinds of facilities are used, why they are used, what they house, how long it took to secure them, construction methods, acquisition method, financing, projected life, and probable disposition.

200 colleges responded to a questionnaire instrument developed by Robert Ensoroff and the sponsors mentioned, and 110 of these respondents indicated some temporary facilities in use on their campuses. (Figure 1)

The questionnaire asked that "temporary facilities" be classified into one or more of five major categories:

new temporary buildings
remodelled facilities on campus
remodelled existing facilities purchased throughout the community ("off campus")
leased space in the community
rent-free facilities throughout the community

By far, the clearest response came in the first category: new temporary buildings. Forty-four of the 110 respondents reported nearly 500 separate buildings in this category. (Figure 2)

To provide an analysis of this data, and to attempt some interpretation of what it may mean for the college community, the AIA, AAJC, the Council of Education Facility Planners, and Educational Facilities, Inc. asked David S. Haviland, Director of the Center for Architectural Research at Rensselaer Polytechnic Institute to look at the questionnaire and report findings.

At the 30 September meeting of AAJC's State Facilities Directors in Chicago, Professor Haviland summarized some of the findings in the new temporary facilities area.

New Temporary Buildings: Junior Colleges

There is undoubtedly a problem of definition as to just what a "new temporary" building is, but 38 of the responding junior colleges reported some 196 specific buildings in this category. (Fig. 3)

Number of Buildings. As might be expected, there is a tendency to acquire these temporary buildings in groups. About one-third of the respondents reported just one building, nearly half had placed from 2 to 8 of these buildings, and the remaining colleges indicated from 10 to 17 buildings on campus. (Figure 4)

Area of Buildings. In terms of floor area, these buildings range from 600 to 45,000 square feet. They are not randomly distributed over this spectrum, though. Of 128 buildings whose area was reported,

35 were in the 600-1, 800 square feet category -- probably including standard portable classrooms and other small-module units

using these structures to accommodate what might be called "bread and butter" activities: group meetings, offices, library, and, occasionally, laboratories. Evidently, the colleges are looking for rather general high-quality space which can be put to a variety of non-specialized uses involving people.

Planning Time. The listed planning time for 80% of the projects for which this information is known was 2 months. (Figure 7)

This is a hard number to pin down. Who knows how long many of these projects were "in the works"? How much "selling" had to be undertaken before serious planning could begin? How many of these colleges had their backs to the wall and had to get the job done in 2 months?

Even with these imponderables, one might suspect that greatly shortened time for planning for growth and change is a fact of life for many of these colleges, and the 2-month time frame was a real requirement.

Construction Time. Fifty-nine per cent of the buildings were constructed in 3 or 4 months; if we expand the time frame to 2-5 months, the number grows to 79 per cent. Looking at the specific months confirms our obvious suspicion that a good deal of this construction was accomplished from June to September, when many of these colleges are closed or in reduced sessions.

There appears to be no significant correlation between project size and planning and construction time. As projects go up in size, there is a "drift" to longer plan and construction times, but it is hardly noticeable. Since many of these projects utilized pre-packaged buildings, it is apparently as easy to procure a larger building as it is a smaller one. (Figure 8)

Type of Construction. Nearly half of the buildings are listed by the respondents as being "pre-fabricated," and another 19 per cent as some combination of site-constructed or pre-fabricated. Three buildings were specifically listed as "trailers." (Figure 9)

This break-out is probably not very useful. The questionnaire did not attempt to define the difference between pre-fabricated and site-constructed, and many pre-engineered packages do indeed involve significant site construction (erection). From the span of construction times noted, it is clear that a very high percentage of these facilities is industrialized to some extent.

Just as a sidelight, most of these structures, in spite of their location, are air conditioned. In many cases, it is probably an easy part of the package, so it is acquired without too much consideration.

Method of Acquisition. From responses to these questions, it appears that 80 per cent of the buildings were purchased; and about one-third of these were specifically tagged as "bid-negotiated." Fifteen per cent were leased, and five per cent were identified as being leased-purchased. (Figure 10)

Projected Life. The respondents "project" the life of their temporary buildings from 5 to 60 years! It is clear, though, that a very high proportion (74 per cent) are targeted for 10 to 20 years; in fact, many of these will probably last longer. For this reason, it is probably safe to say that the adjective "temporary" applies more to the use and role of the facility (and, if it is moveable, perhaps its location) than the quality of its construction. (Figure 12)

Disposition. There seems to be very little consensus as to what will be done with the facilities when the current use has past. It was suggested, though, that 42 per cent of the buildings may be "moved." The remainder will be re-used, sold, returned to their owner (if leased with no option to purchase), destroyed, or some combination of these! (Figure 11)

Cost. The cost data are most inconclusive. They are available for 63 of the buildings (just less than one-third of all recorded buildings), and run the gamut from $3.09 to $23.17 per square foot. There is a large clustering of projects in the $9-10 range, and another smaller one in the $14-15 range. (Figure 13)

Since there is no way to know just what has been considered "in" and "out" of these cost figures, though, one cannot lend a good deal of credence to them.

One sees some rationale for the cost spectrum when it is correlated to the stated projected life of the facilities: there is some tendency for facilities with lower projected lives to cost less per square foot. The limited and inaccurate nature of both pieces of information, however, make drawing any conclusions from this correlation very risky. (Figure 14)

Relocatability. Although there is no specific question testing relocatability of these facilities, it was just pointed out that over 40 per cent of the buildings may be "moved" when their current use has past. This should provide a minimal measure of relocatability.

New Temporary Buildings: Junior and Senior Colleges

In addition to the colleges and buildings just discussed, the questionnaire brought back some 295 new temporary buildings on 27 senior college campuses. (Figure 3) Of these, 125 buildings are very much cast in the mold of their junior college counterparts. While the motivation for use may be somewhat different (additional, or "buffer" facilities rather than initial facilities awaiting completion of a new campus), the sizes, activities, planning and construction times, construction type, acquisition method, cost, projected life, and disposition information parallels that developed for the junior college buildings. (Figures 16 and 17)

Of special interest, though, are some 170 student residential units classified by their respondents as new temporary buildings. One university (Stanford) placed 117 four-student units in mobile homes, in 63 days from firm order to delivery, and at an in-place cost of $12,265 per unit (including site development, community facilities, fees, and furnishings). It plans to use the units for 5 years and then sell them. Two other universities placed 43 and 10 units in this category as well.

There was one air-supported structure -- a 2,000 square foot installation at Harvard University for the athletics program.

Finally, there is some evidence of system-wide utilization of relocatable facilities to fill needs as they arise. Wisconsin State, for example, reported 42 units of small size (720 square feet) on three campuses and a number of field stations. Units may be relocated elsewhere in the system when needs are past.

New Temporary Buildings: Conclusions

Many colleges are turning to pre-fabricated new "temporary" facilities to play a number of roles as they seek to provide physical accommodations for their programs:

1. As initial space, when starting a college from scratch, while waiting to build or renovate permanent facilities

2. As interim space for new or growing programs, while waiting for more permanently-assigned facilities

3. As "buffer" space, allowing a college to house shifting programs, making more permanent commitments only when they appear to be justified

4. As "crisis" space, when enrollments suddenly exceed estimates or when other facilities are suddenly taken from service.

Many colleges, in placing this kind of space, acquire many separate buildings at one time. This is probably due to two factors:

1. The college needs a series of smaller "increments" of space, perhaps placing them close to existing facilities (for expansion) and often doing this on limited sites.

2. Many of the commercially-available, pre-engineered facilities which meet other performance needs are manufactured and erected as small, separate buildings, forcing the college to acquire several at once.

Generally speaking, though, these colleges are seeking "increments" of space -- not large, elaborate new facilities, but smaller chunks. As suggested, many of these chunks are in the 5,000 to 6,000 square foot category.

The colleges are seeking space to house rather general activities: teaching, working, offices, administration. Environmentally, this would appear to be just "good" space -- of high quality, and flexible enough to house many activities instead of being highly specialized, single-purpose space.

Much of this space is rather simple mechanically: no special plumbing, ventilating, distribution or electric services. Most is air conditioned, though.

One exception to this "general space" concept is the interest shown in shorter-term student housing at some colleges. As student housing grows up from cell-like dormitories to more apartment-like situations, and as student lifestyles and interests become even more unpredictable, one can foresee growing interest in less-permanent accommodations -- where the economics work out.

Colleges want this space quickly. Reality often forces fast planning and, once the decision is made, fast construction. Industrialized products -- and a process which can deliver them quickly -- are clearly called for in many cases.

Most of these facilities are "temporary" in use, or possibly location, only. They display 20-year qualities and, in fact, may be used longer than that. Many are relocatable.

In summary, it would appear that many of the colleges surveyed are looking for relatively small increments, of permanent-quality space, for general uses, and they want it fast.

New Temporary Buildings: Directions and Concerns

To accommodate the need for this type of space, several directions are being established, and several are emerging.

An industry capable of providing this kind of space within the time, quality and cost parameters being sought, is now emerging. Beginning with some of the pre-engineered and modular procedures, a variety of industries both in and out of the building industry, appear to be eyeing this market. These producers are looking to market a product of acceptable environmental quality (many past attempts can be successfully attacked on these grounds) which fill the need.

Other studies indicate that a similar "market" for this kind of space exists at elementary and secondary school levels. As we become more concerned about commiting scarce resources to large, elaborate, and isolated facilities (often standing in open fields at the edge of town), more and more public school districts are looking at smaller increments of high-quality but flexible-use (or just plain open) space.

The need for this space, though, has not been well articulated by education. In part, this is probably due to our traditional reliance on "new buildings" and our abhorrence of low-quality, temporary, industrial-style buildings. Marketing must begin at home.

Some educational instituions are finding it difficult to procure this kind of space within conventional plan-design-construct processes. Where institutions using public money cannot negotiate package design/ construct contracts for this kind of space, they are turning to performance bidding, rent-purchase, and other arrangements.

Probably one of our biggest problems is that of "client acceptance" -- particularly, acceptance of the fact that we are often really seeking this kind of space as a solution to our problem -- and not just, as we so often state, as a bothersome "interim" condition to be borne until better things are worked out.

Leased Facilities in the Community

A number of respondents indicated that they were leasing facilities in the community -- either as the full space complement for the college (one college is leasing 250,000 square feet), or as interim or "buffer" space for some activities.

Sixteen junior colleges and one senior college indicated that their only temporary space was leased space; sixteen more junior colleges, and thirteen additional senior colleges responding indicated leased space in conjunction with other forms of temporary space. (Figure 3)

One again, this space is used to house all forms of activities, and may be leased with or without remodelling.

Colleges leased everything from relatively small structures and small chunks of space to larger areas. Philadelphia Community College was able to lease a large department store, while Montgomery County Community College reported leasing "a former high school, four office buildings, a church and two private residences" as its "campus" before the construction of new facilities. (Figures 17 and 18)

From the data offered in the questionnaires, it is nearly impossible to offer any conclusions about leasing costs. (Figure 19) As might be expected, expected leasing time is relatively short. Most colleges are pointing toward new campuses, or at least more permanent accommodations of activities. In the case of larger, more complex colleges leased space in the community is probably a more permanent fact of life. Fourteen of 34 responding senior colleges (42 per cent) reported leased space as part of their mix; and one larger university noted that "...leased space in the community represents 63 per cent of [its temporary] space," with a later notation that "the University for the past 15 years has been in need of interim space, and it would appear will continue to have this need for the next 15-year period." (Figure 20)

Figure 1. Names and Addresses of Responding Colleges

JUNIOR COLLEGES

1 Amundsen-Mayfair Campus, City College of Chicago, Chicago, Illinois
2 Alpena Community College, Alpena, Michigan
3 Community College of Beaver County, Freedom, Pennsylvania
4 Bergen Community College, Paramus, New Jersey
5 Black Hawk College, Moline, Illinois

6 Burlington County College, Pemberton, New Jersey
7 Camden County College, Blackwood, New Jersey
8 Cape Fear Technical Institute, Wilmington, North Carolina
9 Catawba Valley Technical Institute, Hickory, North Carolina
10 Cecil Community College, North East, Maryland

11 Clinton Community College, Clinton, Iowa
12 Cuyahoga Community College, Cleveland, Ohio
13 Community College of Delaware County, Concordville, Pennsylvania
14 Delta College, University Center, Michigan
15 Essex Community College, Baltimore County, Maryland

16 Federal City College, Washington, D. C.
17 Flathead Valley Community College, Kalispell, Montana
18 Florida Junior College at Jacksonville, Jacksonville, Florida
19 Fulton-Montgomery Community College, Johnstown, New York
20 Greenfield Community College, Greenfield, Massachusetts

21 Halifax County Technical Institute, Weldon, North Carolina
22 Harford Junior College, Bel Air, Maryland
23 Henderson Community College, Henderson, Kentucky
24 Housatonic Community College, Stratford, Connecticut
25 Indiana Vocational-Technical College, Indianapolis, Indiana

26 Jefferson State Junior College, Birmingham, Alabama
27 Joliet Junior College, Joliet, Illinois
28 Kishwaukee College, Malta, Illinois
29 Lake City Junior College and Forest Ranger School, Lake City, Florida
30 College of Lake County, Grayslake, Illinois

31 Dabney S. Lancaster Community College, Clifton Forge, Virginia
32 Lehigh County Community College, Allentown, Pennsylvania
33 Lewis and Clark Community College, Godfrey, Illinois
34 Lincoln Trail College, Illinois Eastern Jr. Colleges, Robinson, Illinois
35 College of the Mainland, Texas City, Texas

36 Massachusetts Bay Community College, Watertown, Massachusetts
37 McHenry County College, McHenry, Illinois
38 Metropolitan State Junior College, Minneapolis, Minnesota
39 Middlesex Community College, Middletown, Connecticut
40 Middlesex County College, Edison, New Jersey

41 University of Minnesota Tech, Crookston, Minnesota
42 Montcalm Community College, Sidney, Michigan
43 Montgomery College, Rockville and Tacoma Park, Maryland
44 Montgomery County Community College, Conshohocken, Pennsylvania
45 Moraine Valley Community, Palos Hills, Illinois

46 Morrisville A & T, SUNY, Morrisville, New York
47 Mt. Wachusett Community, Gardner, Massachusetts
48 Niagara County Community, College, Niagara Falls, New York
49 North Dakota State School of Science, Wahpeton, North Dakota
50 Northern Virginia Community, Bailey's Crossroads, Vriginia

51 North Shore Community College, Beverly, Massachusetts
52 Olive-Harvey College, City Colleges of Chicago, Illinois
53 Olney Central College, Illinois Eastern Jr. Colleges, Olney, Illinois
54 Palm Beach Junior College, Lake Worth, Florida
55 Philadelphia Community College, Philadelphia, Pennsylvania

56 Piedmont Technical Education Center, Greenwood, South Carolina
57 Pitt Technical Institute, Greenville, North Carolina
58 Prairie State College, Chicago Heights, Illinois
59 Prince Geroge's Community College, Largo, Maryland
60 Rock Valley College, Rockford, Illinois

61 Sampson Technical Institute, Clinton, North Carolina
62 Schoolcraft College, Livonia, Michigan
63 Southern Seminary Junior College, Buena Vista, Virginia
64 Southwest College, City Colleges of Chicago, Illinois
65 Spoon River College, Canton, Illinois

66 Springfield Tech, Springfield, Massachusetts
67 Sullivan County Community College, South Fallsburgh, New York
68 Tunxis Community College, Farmington, Connecticut
69 Vincennes University, Vincennes, Indiana
70 Virginia Western Community College, Roanoke, Virginia

71 Wabash Valley College, Illinois Eastern Jr. College, Mt. Carmel, Illinois
72 Wallace State Junior College, Andalusia, Alabama
73 Walters State Community College, Morristown, Tennessee
74 Washington Technical Institute, Washington, D. C.
75 Waubonsee Community College, Sugar Grove, Illinois

76 West Shore Community College, Scottsville, Maryland

Figure 2. General Information and Options Selected

JUNIOR COLLEGES

College	Year	Affiliation	Size	New Temporary	Remodeled On-Campus	Remodeled Community	Leased Community	Rent-Free Community
1. Amundsen-Mayfair College	1911	M	30,880	X				
2. Alpena Community College	1952	C	1,030				X	
3. Community College of Beaver County	1966	S	750				X	X
4. Bergen Community College	1965	C	3,200	X				
5. Black Hawk College	1946	M	2,550	X			X	
6. Burlington County College				X				
7. Camden County College	1966	C	2,900	X				
8. Cape Fear Technical Institute	1963	S	400					X
9. Catawba Valley Technical Institute	1960	S	3,500	X				
10. Cecil Community College								X
11. Clinton Community College	1966	S	262	X				
12. Cuyahoga Community College	1963	C, S	15,263		X			
13. Community College of Delaware County	1966	S	1,418	X				
14. Delta College	1958	C	4,700	X				
15. Essex Community College	1957	C, S	2,967	X				
16. Federal City College						X	X	X
17. Flathead Valley Community College	1967	Di	969			X	X	X
18. Florida Junior College at Jacksonville	1965	Di	14,858	X				
19. Fulton-Montgomery Community College	1963	S	1,587				X	X
20. Greenfield Community College	1962	S	1,072				X	X
21. Halifax County Technical Institute	1967	S	200		X			
22. Harford Junior College	1957	C	1,648	X	X			
23. Henderson Community College	1946	C	1,145	X				
24. Housatonic Community College	1966	S	1,563				X	
25. Indiana Vocational-Technical College							X	

College	Year	Affiliation	Size	New Temporary	Remodeled On-Campus	Remodeled Community	Leased Community	Rent-Free Community
26. Jefferson State Junior College	1965	S	3,481	X			X	X
27. Joliet Junior College	1901	M	3,419	X				
28. Kishwaukee College	1967	S, Di	1,340	X			X	
29. Lake City Junior College	1962	S	1,343	X				
30. College of Lake County	1967	S	2,947	X				
31. Dabney S. Lancaster Community College				X				
32. Lehigh County Community College	1966	S, Di	1,559				X	
33. Lewis and Clark Community College								
34. Lincoln Trail College								
35. College of the Mainland	1966	Di	636	X				
36. Massachusetts Bay Community College	1961	S	2,518	X				
37. McHenry County College	1968	C	1,644	X				
38. Metropolitan State Junior College	1965	S	1,090		X			
39. Middlesex Community College	1966	C	4,962				X	X
40. Middlesex County College	1964	C	4,226		X			
41. U. of Minnesota Tech				X				
42. Montcalm Community College	1965	C	670	X				
43. Montgomery College	1946	C	6,773		X			
44. Montgomery County Community College	1966	S	1,582				X	
45. Moraine Valley Community College	1968	Di	2,353	X		X	X	
46. Morrisville A & T, SUNY	1908	S	1,961				X	
47. Mt. Wachusett Community College	1963	S	1,277				X	
48. Niagara County Community College	1963	S	3,039		X		X	
49. North Dakota State School of Science	1903	S	2,396		X	X		
50. Northern Virginia Community College							X	

College	Year	Affiliation	Size	New Temporary	Remodeled On-Campus	Remodeled Community	Leased Community	Rent-Free Community
51. North Shore Community College	1965	S	2,743				X	X
52. Olive-Harvey College	1911	M	30,880	X				
53. Olney Central College	1963	S	929	X				
54. Palm Beach Junior College	1933	S	2,379				X	
55. Philadelphia Community College	1965	Di	5,300				X	
56. Piedmont Technical Education Center	1966	S	322				X	
57. Pitt Technical Institute	1961	S, C	1,300				X	X
58. Prairie State College	1958	Di	2,916	X				
59. Prince George's Community College	1958	S	4,900	X				
60. Rock Valley College	1965	Di	2,898	X				
61. Sampson Technical Institute				X	X	X	X	
62. Schoolcraft College	1961	Di	4,763	X				
63. Southern Seminary Junior College				X				
64. Southwest College	1911	M	30,880	X				
65. Spoon River College	1959	Di	1,000				X	
66. Springfield Tech					X			
67. Sullivan County Community College	1963	S	1,175	X	X	X	X	
68. Tunxis Community College							X	
69. Vincennes University	1801	S	2,244		X			
70. Virginia Western Community College							X	
71. Wabash Valley	1960	S	800	X				
72. Wallace State Junior College							X	
73. Walters State Community College								
74. Washington Technical Institute					X			
75. Waubonsee Community College	1966	S	2,291	X	X		X	
76. West Shore Community College	1967	C	291	X				

SENIOR COLLEGES

College	Year	Affiliation	Size	New Temporary	Remodeled On-Campus	Remodeled Community	Leased Community	Rent-Free Community
77. Boston College	1863	D	6,268	X				
78. California State College, Bakersfield				X				
79. California State College, Hayward				X				
80. California State College, Los Angeles				X				
81. University of California, San Francisco	1899	S	18,300		X			
82. University of California, San Diego	1903	S	3,383		X			
83. Central Washington State College	1890	S	6,603		X			
84. Chicago State College	1869	S	3,470	X			X	
85. University of Colorado	1861	S	14,835				X	
86. Columbia University	1764	P	6,225			X		
87. Creighton University	1878	D	2,328	X			X	
88. University of Georgia	1785	S	12,159	X	X		X	
89. Harvard University	1638	P	4,779	X	X		X	
90. University of Iowa	1847	S	14,204	X				
91. Indiana University, Bloomington	1820	S	21,363	X	X		X	
92. Indiana University, Ft. Wayne	1917	S	1,389	X				
93. Indiana University, Gary	1948	S	1,631	X				
94. Indiana University, Indianapolis	1946	S	12,700		X	X	X	
95. Indiana University, South Bend	1940	S	1,574		X			
96. Indiana University, Southeast	1941	S	872	X			X	
97. University of Lethbridge				X				
98. University of Michigan	1817	S		X				
99. SUNY at Buffalo	1846	S	23,764	X	X	X	X	
100. Northeastern Illinois State College	1869	S	2,906	X	X		X	

College	Year	Affiliation	Size	New Temporary	Remodeled On-Campus	Remodeled Community	Leased Community	Rent-Free Comm.
101. Oakland University,	1959	S	5,176		X			
102. Sonoma State College	1960	S	3,067	X				
103. Stanford University	1885	P	6,221	X				
104. Stanislaus State College	1957	S	1,650	X				
105. Wayne State College	1868	S	16,702	X				
106. Weber State College	1899	S	7,773		X		X	
107. West Washington State College	1893	S	7,426	X	X	X	X	
108. University of West Florida	1967	S	2,850	X				
109. Wisconsin State University (system)				X				
110. Wisconsin State University, Menomonie							X	

Key: "Affiliation"

C - County

Di - District

M - Municipal

P - Private

S - State

D - Religious denomination

Figure 3. Summary of Options Selected

Total Appearances	
62	New temporary
19	Remodeled On-campus
10	Remodeled Community
46	Leased space in community
11	Rent-Free in community

New temporary	Remodeled On-campus	Remodeled Community	Leased space in community	Rent-Free in community	JUNIOR COLLEGES	SENIOR COLLEGES	TOTAL RESPONSES
●					30	14	44
	●				10	5	15
		●			0	1	1
			●		16	1	17
				●	2	0	2
●	●				1	1	2
●	●		●		1	3	4
●		●	●		1	0	1
●	●	●	●		2	2	4
●			●		2	4	6
●			●	●	1	0	1
	●	●			1	0	1
	●		●		1	2	3
	●	●	●		0	1	1
		●	●	●	2	0	2
			●	●	6	0	6
					76	34	110

Figure 4. Number of Buildings per Project
New Temporary Buildings, Junior Colleges
(total: 38 projects)

bldgs	projects	bldgs	project	bldgs	project
1	13	7	2	13	1
2	2	8	3	14	1
3	1	9	0	15	1
4	3	10	1	16	0
5	2	11	1	17	1
6	4	12	1	no answer	1

Figure 5. Building Area, in Square Feet
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

Area	bldgs	area	bldgs	area	bldgs
600 sq.ft.	1	5,760 sq.ft.	23	400 to	
768	12	6,000	28	19,000 sq.ft.	8
912	6	7,100	1	670 to	
1,000	1	8,000	8	1,630	3
1,010	1	8,160	1	1,150 to	
1,200	8	9,020	1	4,540	4
1,440	1	9,600	6	1,420 to	
1,500	4	12,000	6	33,546	10
1,800	1	25,000	1	1,440 to	
3,200	7	28,700	1	4,320	11
3,730	1	30,000	1	1,565 to	
5,000	1	45,000	1	12,254	14
5,100	6	no answer	18		

total buildings for which an area or area range is known 178

Figure 6. Building Area, by Class
New Temporary Buildings, Junior College
(total: 178 buildings)

Area Class A, 600 to 2,000 square feet	35 buildings
Area Class B, 2,100 to 4,000 square feet	8 buildings
Area Class C, 4,100 to 6,000 square feet	58 buildings
Area Class D, 6,100 to 10,000 square feet	17 buildings
Area Class E, 10,100 to 20,000 square feet	6 buildings
Area Class F, 20,100 and more square feet	4 buildings
Area Class R, for which an area range is given	50 buildings

Figure 7. Planning and Construction Time Reported
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

time	bldgs planned	bldgs constructed	time	bldgs planned	bldgs constructed
1 mo	9	3	7 mo	1	0
2 mo	78	14	8 mo	0	1
3 mo	56	41	9 mo	0	15
4 mo	1	58	12 mo	7	7
5 mo	0	20	18 mo	8	8
6 mo	8	2	no answer	28	27

Figure 8. Correlation Between Area Class and
Planning and Construction Time,
New Temporary Buildings, Junior Colleges

months	area Class A	area Class B	area Class C	area Class D	area Class E	area Class F
PLANNING TIME REPORTED (117 buildings correlated)						
1 mo	2	1	3	2		
2 mo	22		44	1		2
3 mo	1		5	14	6	
4 mo						1
6 mo			5			
7 mo						1
12 mo		7				
CONSTRUCTION TIME REPORTED (112 buildings correlated)						
1 mo	1			1		
2 mo	13		1			
3 mo		1	38			1
4 mo	5		19	1		
5 mo				6		
6 mo				1		1
8 mo						1
9 mo				8	6	1
12 mo		7				

Figure 9 Method of Construction Reported
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

pre-fabricated	96	site-constructed	59
pre-fabricated and site-constructed	37	tilt-up construction*	1
		trailers*	3

(*) a category added by the respondent and not on the original questionnaire

Figure 10 Method of Acquisition Reported
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

purchased	96	leased	27
bid-negotiated	45	no answer given	19
rented and purchased	9		

Figure 11 Method of Disposition Reported
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

sell	16	destroy	35
move	82	not sure what to do	43
re-model and re-use	6	no answer given	14

Figure 12 Projected Life Reported
New Temporary Buildings, Junior Colleges
(total: 196 buildings)

5 years	2	15-20 years	14
6 years	1	20 years	63
7 years	5	25-30 years	1
5-10 years	17	30 years	1
10 years	43	55 years	6
10-15 years	7	60 years	1
15 years	14	no answer given	17
10-20 years	4		

Figure 13. Summary of Square Foot Costs
New Temporary Buildings, Junior Colleges

(total: 196 buildings)

$ 3.00-.99	6	$ 10.00-.99	1
$ 4.00-.99	1	$ 11.00-.99	1
$ 6.00-.99	2	$ 14.00-.99	14
$ 7.00-.99	4	$ 15.00-.99	1
$ 8.00-.99	5	$ 20.00-.99	2
$ 9.00-.99	25	$ 23.00-.99	1

no cost information given on 133 buildings

Figure 14. Correlation of Square Foot Cost and Projected Life
New Temporary Buildings, Junior Colleges

(57 buildings correlated)

Cost per square foot	5-10 yrs	10 yrs	15 yrs	10-15 yrs	10-20 yrs	15-20 yrs	20 yrs	25+ yrs
$ 3.00-.99								
$ 4.00-.99			1					
$ 6.00-.99				2				
$ 7.00-.99	1			3				
$ 8.00-.99		5						
$ 9.00-.99	17	7						1
$ 10.00-.99					1			
$ 11.00-.99								1
$ 14.00-.99						14		
$ 15.00-.99			1					
$ 20.00-.99							1	1
$ 23.00-.99							1	

Figure 15. Number of Buildings per Project
New Temporary Buildings, Senior Colleges

(total: 24 projects)

bldgs	projects	bldgs	projects	bldgs	projects
1	10	6	2	42**	1
2	3	10*	2	43*	1
5	2	11	1	117*	1
		24	1		

(*) represent student residence projects
(**) represents system-wide use of buildings, on 3 campuses and a number of field stations

Figure 16. Building Area, in Square Feet
New Temporary Buildings, Senior Colleges

(total: 295 buildings)

area	bldgs
300 sq.ft	10*
500	42**
750	1
800	117*
1,000	1
1,800	2
2,000	1
2,400	1
2,496	43*
3,500	1
3,600	2
4,240	1
4,560	1
5,084	1
11,860	1
13,000	1
14,321	1

area range	bldgs
400 - 8,000 sq.ft.	11
838 - 5,653 sq.ft	6
947 - 2,064 sq.ft.	6
1,040 - 3,200 sq.ft.	10
1,264 - 12,896 sq.ft.	24
1,302 - 2,604 sq.ft.	5
4,000 - 10,000 sq.ft.	5
no answer given	1

(*) represents student residence projects
(**) represents system-wide use of buildings, on 3 campuses and a number of field stations.

NOTE ON SENIOR COLLEGE ANALYSIS: Other analyses on these data are not illuminative. Many of the buildings are located on a few campuses: 257 of them in just 7 locations, with the remaining scattered among 17 campuses. In addition to this bias, many campuses include a wide range of buildings, and since the questionnaire respondents make no differentiation within the spectrum on their campuses, there is little meaningful data.

Figure 17. Number of Leased Buildings per College
Leased Facilities in the Community, Junior Colleges

(total: 15 campuses, reporting leased space only)

bldgs	colleges	bldgs	colleges	bldgs	colleges
1	6	3	2	7	2
2	1	5	1	25	1
		6	2		

Figure 18. Leased Area, in Square Feet
Leased Facilities in the Community-Junior Colleges

(total: 70 buildings leased)

area	bldgs	area range	bldgs
5,000 sq.ft.	1	1,350 - 12,305	3
5,400	1	1,800 and up	25
10,000	7	3,000 - 9,500	6
25,000	1	3,450 - 46,100	7
250,000	1	3,600 - 18,900	7
no answer	3	4,000 - 25,000	5
		5,600 - 26,000	3

Figure 19. Leasing Cost, per Square Foot, per Year
Leased Facilities in the Community-Junior Colleges

(total: 9 campuses reporting leasing cost)

Cost	sq.ft.	Cost	sq.ft.	Cost	Sq.ft.
.23	14,025	.60	3,000	1.64	46,990
.36	5,000	1.46	117,000	3.20	250,000
.48	75,000	1.50	60,000	$1/yr	1 campus

Figure 20. Projected Life of Leased Facilities Reported
Leased Facilities in the Community-Junior Colleges

(total: 70 buildings leased)

3 years	1	6 years	7	indefinite	34
5 years	2	10 years	1	no answer	19
		12 years	6		

SUMMARIZING STATEMENTS

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In terms of and in keeping with the stated purposes of the conference, the speakers selected were highly qualified with many years of successful experience in their fields, and their topics were presented in factual, practical, and meaningful ways that can be applied "back home at my institution." The entire conference was arranged in such a way that there were opportunities for the attendees to share with the speakers and each other their experiences, questions, and problems. The informal but completely professional dedication to the task at hand was impressive.

The following concepts were particularly noted:

1. Planning, design and utilization of community college facilities are becoming much more inter-related and more disciplines are rapidly becoming more involved in those processes.

2. There is probably less concern presently about bricks and mortar per se in community college planning than in the use and involvement of spaces already available.

3. While it was recognized that a building is one of the very essential tools of the educational process and program, it is

far from the governing or controlling factor as evidenced by the discussion of portables, temporaries, found space, etc.

4. In terms of building design and new construction, attention has been focused on "systems" building. This is a process of carefully organized planning through thorough description of educational requirements and the development of performance specifications, and heavy use of prefabricated components that fit together at the building site. It saves money chiefly by saving construction time and cutting down on expensive on-site labor. The process can be further enhanced through "fast-track" scheduling which permits actual construction to start during the design stages.

5. There was much emphasis on the importance and value of identification and identity of the community college in a community, as opposed to its being in random buildings of a less permanent nature.

6. Just as program functions have been combined to make spaces serve multi-purposes, buildings must now be designed to protect from several hazards: earthquakes, tornadoes, hurricanes, noise, vandalism, fire, and radiation fallout. Designing for one hazard will very often give some protection from other hazards as well. In terms of radiation fallout, this can be done at little or no extra cost.

7. In developing guidelines for determining facilities uses and needs, consideration should be given students' needs and interests; the service the college can render to the community, and, in this

respect, the need for training rather than a strictly academic approach to obtaining advanced degrees.

8. Accurate, up-to-date inventories of all buildings, and spaces in the buildings, are essential to assure proper utilization and to provide back-up data for immediate and long-range program and building projections.