

A Youth Center for Butte / Silver Bow MT

By Chuck Kestle

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A YOUTH CENTER FOR BUTTE/SILVER BOW, MT.

by

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A professional paper submitted in partial
fulfillment of the requirements for the degree

of

BACHELOR OF ARCHITECTURE

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CREDITS

photos - Al Hooper, Butte Historical Society

site maps - Butte/Silver Bow Planning Office

Howard, Needles, Tammen & Bergendoff, Dept. of
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Thesis

An architecture of new technology, form and people's needs can harmoniously coexist in an older context of technology, form and people's needs.

The importance of this thesis statement stems from a basic philosophical assumption that the underlying form of all things is understood in terms of intuitive and rational knowledge. By rational it is meant knowledge in the Platonic and scientific senses derived from means such as logic, reason, empiricism and experimentation. By the intuitive it is meant knowledge in the artistic or romantic senses derived from means such as emotion, intuition, imagination, inspiration and vision. This understanding is the central contention made by Robert Pirsig in his book, Zen and the Art of Motorcycle Maintenance.¹ It was Pirsig's intention to define the central determinant for all values, a determinant to which all people aspire and of which all things partake to a certain degree. Pirsig calls this determinant quality. Quality is the product of intuition and reason. Quality is not inherent in the object or in the viewer of that object, but rather, according to Pirsig, quality is in the event between viewer and object. Thus, quality cannot be scientifically measured in the object or psychologically measured in the viewer. Quality transcends both intuition and reason by being a product of both. This definition has tremendous significance for the architect. All too often architects fall prey to a common societal condition wherein people align themselves with either an intuitive or rational world view. For an architect this polarity is an especially dangerous bias for he must be particularly concerned with quality like no other individual. Every project the architect designs must show an

understanding of the technological and the artistic issues if true quality is to be achieved.

By accepting Pirsig's definition of quality as the underlying premise, the terms of the thesis statement can now be defined. Essentially the purpose of the thesis project is to fit a new architecture into an older context. Three major issues thus come into play -- technology, form and people's needs. Technology, while normally the province of the engineer, takes on special significance in the search for quality. If an architecture is to have quality, it must work. High energy costs and potential resource shortages have become global concerns. The architect has a responsibility to incorporate energy conservation in the design of his buildings. However, on the intuitive side of the coin, energy saving devices or systems must be appropriately employed; energy must be subservient to the architecture.

Form is the language of the architect, but the personal notions of the architect must be tempered with the very reasonable concerns as to how the user and the site shall react to formal configurations. If new and old are to coexist, harmony must prevail between the corresponding forms.

The needs of people are at the heart of creative problem solving. The architect, as a sensitive and perceptive individual, must be trusted to innovate, but there are also some very specific standards in terms of planning and programming with which the architect must intelligently and responsibly deal.

Thus in the creation of a new architecture (a youth center) in an older context (uptown Butte, Montana) the pursuit of quality is engaged on very specific levels. However, this pursuit can also be seen on a more general level. The context

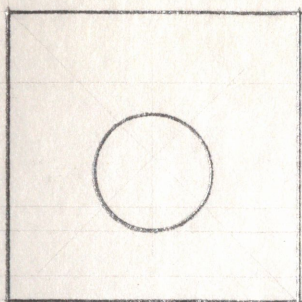
of Butte, for example, is a product of intuitive and rational forces. The forces of technology and capitalism built Butte in its early years. The towering mining head frames and the ornate commercial buildings remain as symbols of that very rational past. However, these symbols have taken on new meaning with age. Today, uptown Butte is valued by many for its romantic connotations. Those who seek to save the old buildings do so for the sake of aesthetics and history. While this preservation is noble, it must be coupled with very rational advantages, such as economic growth, in order to be effective.

The concept of a youth center in a context such as uptown Butte is an unusual study in contrasts. Youth are in search of direction and identity. One of the processes by which this searching is done is known as social interaction². Making social interaction a quality experience is the purpose of a youth center. In an area of high youth unemployment, this purpose becomes critical. In a wider sphere, the notion of a new building in an older context provides for a great architectural opportunity the specifics of which will be discussed in the next section.

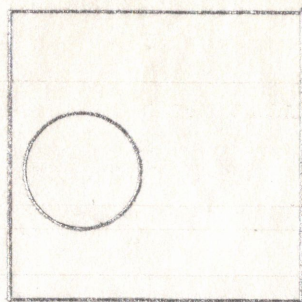
While this thesis deals with very specific issues and is not intended to produce a general definition of architecture, it is important to examine current trends in design to form a basis for applying these thesis concerns. For nearly a decade the forces of modernism and post-modernism have done battle in lecture halls and paper exhibits across the country. Basically post-modernism is a reaction to the modern movement, a movement which many architects and architectural critics believe has failed. But beyond this distinction it is hard to come to terms with these "styles" for many "modern" buildings are quite fine architecturally and many so-called "post-modern" buildings are quite modern in appearance and process.

A much more useful distinction must be found. Charles Gwathmey, a leading New York architect, has proposed that the two trends be thought of in terms of abstraction and representation.³ These words are especially helpful for they are more than names; they are definitions. As definitions, such words peel away the veneer of the modern/post-modern dilemma to reveal the true nature of a work of architecture (for, in fact, many post-modern works are quite abstract and many modern works are quite representational). The notion of representation has been used to describe art for centuries. The artists of history created representation as an act of copying. One can copy something not only to reproduce it, but to derive any symbolic connotations the original may have. Abstraction, on the other hand, can be best described in terms of formalism. Formalists believe that the composition of design elements (point, line, massing, volume, etc.) produces in the viewer an aesthetic experience. In other words, the manipulation of visible physical forms produces "significant forms" through the non-

physical (but experienced) dynamic forces created by the visible forms.⁴ The following example illustrates this point.



a.



b.

In figure (a) the physical forms are a circle within a square. To most people the circle would appear to be at rest. The composition is static. In figure (b) the same forms are present, but a change in juxtaposition creates the feeling of movement. This movement is a dynamic force. Such a force is not a physical element of the composition, but is a significant form created by the composition. This example is a simple form of aesthetic experience. More sophisticated and more complex compositions yield more sophisticated aesthetic experiences, and in fact, the same theory is also relevant to music and literature. According to formalists the most important component of a work of art is its design. Thus the 20th century witnessed a great deal of abstraction in the works of many artists who explored the underlying elements of design which could combine to create aesthetic experiences. These explorations had a tremendous influence on architecture and spawned the modern movement.

harmony

Architecture is a design profession. As such the principles of formalism and abstractionism are more applicable to the profession than representation for design is the essence of these principles. Gwathmey goes further and points out that the symbolism of representation is fairly constant and, thus,

limited whereas the symbolism of abstraction is much freer and more thought provoking⁵. However, when accepting the contention that the essence of architecture is design, what does one do with a heavily turn-of-the-century context such as Butte, Montana, particularly when many of the old buildings surrounding the site are well designed as well as highly representational? Does one contrast with the site so completely as to ignore it as many modern architects have done? Does one repeat detail for detail, form for form, the existing context until no distinction remains between new and old? The architect who is truly interested in the coexistence of new with old will be influenced by context that is well designed and will reject that which is purely representational. Thus borrowing a bay window as a design element is acceptable whereas using a bay window as repeated ornament is not. The key word is neither contrast or repetition, but harmony.

To achieve harmony between parts of a whole without erasing all distinctions and individuality (and hence, all interest), one must relate the essentials of the parts rather than the superficialities. Harmony must not merely be paid lip service. Yet, every building houses its own special function and responds to its own time. The building is also a product of particular technology. If the excess of anonymous skyscrapers in the inner cities has shown anything, it is that sameness is dull, and even a danger to the senses. Variety in the built environment, however, is interesting and stimulating. Hence the central questions of this thesis continue to be important. How does the new fit with the old; how do the forces of technology mesh with the forces of emotional well being? How does reason and intuition combine to form quality? For the architect the

answer is design.

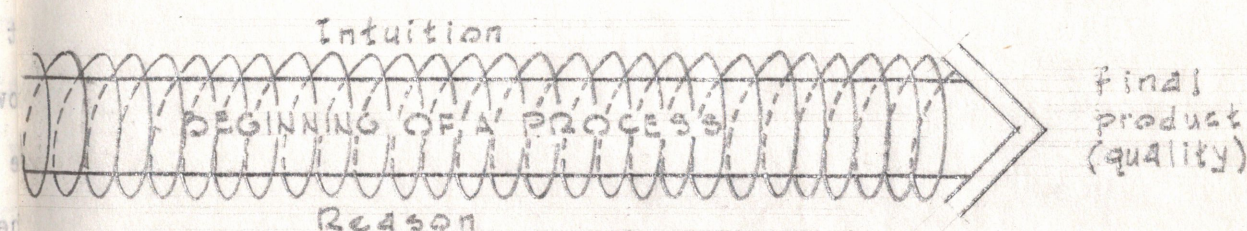
Conceptualization

The next step in the process of achieving harmony (quality) through architecture is the search for concepts. From the concepts come architecture. It would do well, then, to examine the sources of conceptualization.

A distinction must be made between concept and preconception. A preconception is a concept which the designer brings with him into the project. Often a preconception can be dangerous when it blinds the designer to significant facts about the project. However, preconceptions based on a designer's experience can also be valuable. For example, a designer collects a vocabulary of the human reactions to the environment which he perceives. Since many aspects of human nature are relatively constant, this vocabulary can be used for more than one project. A collection of ideas concerning the environment, collected over the years, and the architect's response to that environment are also potentially applicable to a project within that environment or similar environment. In all cases, preconceptions must not only apply to the project, they must also allow open minded analysis of the site and the program.

Aside from preconceptions, concepts come from the analysis of the project. The site, for example, offers clues to the designer. Elements such as existing land forms, existing buildings, and view axes can all suggest spatial and visual concepts. Historical elements on the site can also be used for their aesthetic symbolisms. The concept of youth can provide a variety of architectural concepts. The many sources of ideas may be compared for commonalities and for incompatibilities. Such is the process of reason. The process of intuition comes in when

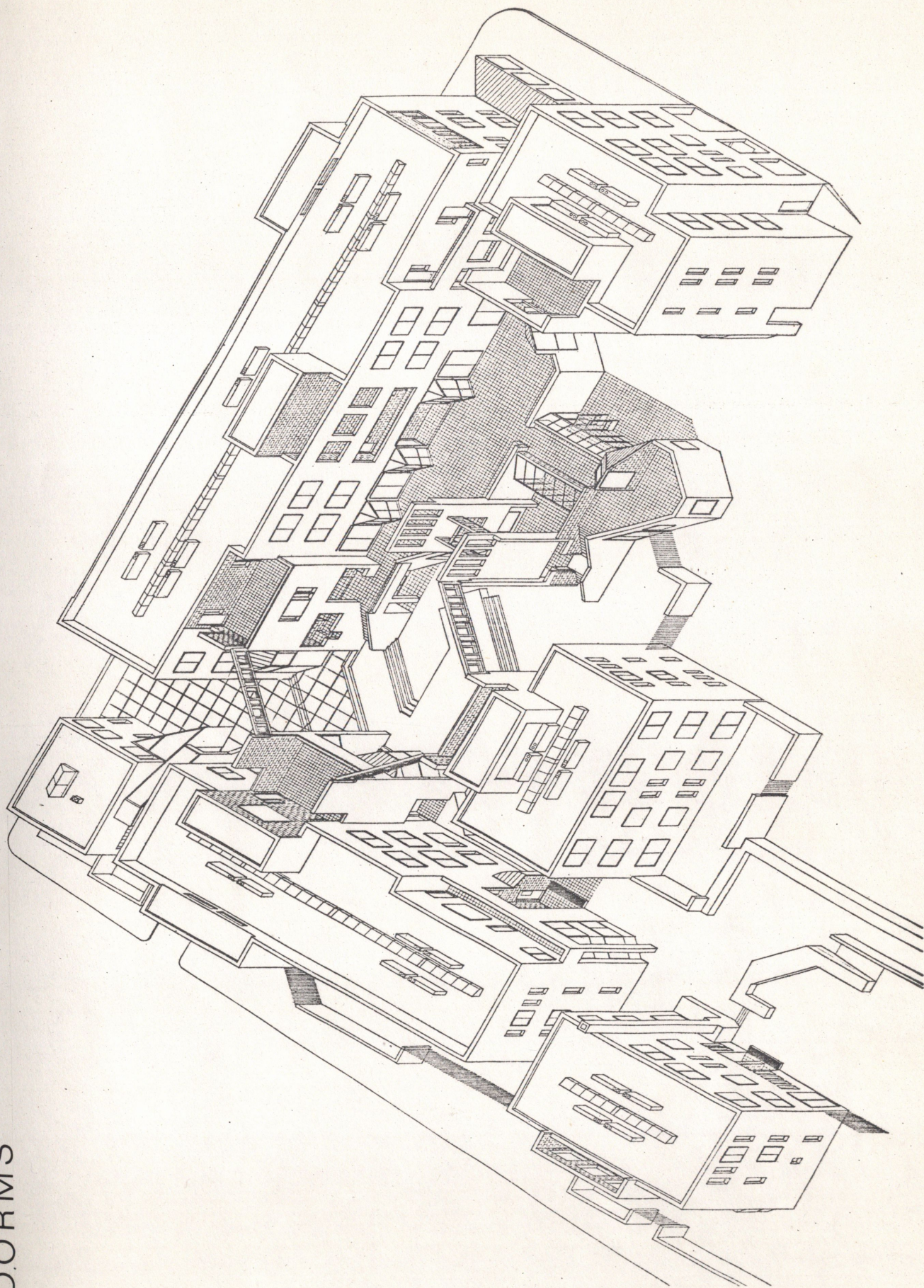
the designer finally chooses from the many possibilities what he judges to be the most fruitful concepts for development. These concepts are further developed and explored and researched until, again, the designer must make the final choice. Thus the cyclical process of reason-intuition is established. A choice is made (intuition), it is tested and examined (reason) and either retained, changed or discarded wherein other choices are made (intuition) and the cycle begins anew.



From this point designing from the concept leads to development, refinement, and presentation. Within this linear process the cyclical process of intuition and reason continues. Tools such as plan, elevation, section and model are incorporated into this structure. This is a common method for design and, hopefully, the very rich result of harmony shall be achieved. As a further resource the designer can look to the experience of others, whose concerns parallel his own, for inspiration and ideation. To this end, the Pembroke dormitory in Brown University, designed by the firm of Moore, Lyndon, Turnbull and Whitaker, is presented as an example. The intention of this design was to integrate a new building into a highly varied older context by allowing each facade to respond, using the tools of design, to the context it faced while uniting the entire building into a complete whole. The project won the 1970 Progressive Architecture design award. The jury's comments are enclosed. This building is one successful exploration of the

central contentions of the thesis.

PEMBROKE
DORMS



Project: Pembroke College Dormitories, Brown University, Providence, RI

Site: Bounded on one side by Thayer Street, which is characterized by a string of small-scale college-oriented shops, and on the other by Bowen Street distinguished by large, amply-spaced 19th-Century houses. The complex attempts to acknowledge each of these conditions, while adding its own distinctively structured place.

Design: The ground floor along Thayer has been given over to rental shops in order to reinforce and extend the linear college shopping street, which is paralleled above by the three-story entry units, abutted continuously. Along Bowen, three entry units are broken into two buildings to establish a scale more consistent with the domestically paced street. A faculty house stands separately on the corner. Internal movement to any particular room is predominantly vertical, reminiscent of domestic architecture.

Comments

Venturi: A good deal of what we see is latter-day, form-givers, heroic, "original" architecture. Every building is an adventure, full of interesting articulations. The more "interesting" these buildings get the more boring they get. I think that the first winner, in this context, is particularly significant because, to put it negatively, it is a reaction to all that. It is an architecture that is not distorting itself and making the whole building ornamental. I think we have had a tendency recently to get our architectural meaning through these pure architectural elements of space, form, and structure via articulation, which is the god. But it is a false articulation, a false emphasis on structure and program. We also get a false complexity. Symbolically, I think this building has some quality because, in a way, it is anti-symbolic - a kind of neutral recessive building. In one sense it is symbolic because it is ordinary architecture and is symbolic in being ordinary. But in another sense, it is anonymous and fits in very beautifully with the programmatic way of living of college students who really want to do their own thing in this building and there's no reason why the architect should be doing his personal thing.

Graham: One of the things that seems good to me about the winner is that for some time we've been searching for a way to build cities in which we have a degree of individuality in the buildings and at the same time a sort of mutual respect between them - buildings that talk to one another in a quiet way so that the chaos and disorder of the cities can at least be quieted down. In that sense, this search for the new form and the individual super-structure that's going to do the whole city is the wrong path. As individualistic as it becomes, it will not talk, therefore, to another individual. It becomes very introspective - a micro part of the city - and is meaningless. In that sense, the winner has a kind of language that does talk to the other buildings and is very quiet and respectful. Maybe that is the way we should go. We shouldn't be so damned individualistic as architects - we should be

civilized.

Vreeland: There was an earlier idea about buildings relating to each other that had to do with keeping a common cornice height or a common material. This was accomplished in this case in quite another way.

Graham: We are talking here not about controls but about the search for a democratic architecture through which buildings can still converse with one another. The cornice height limitations, etc. were autocratic in that they didn't respond to the democratic process. This kind of architecture is symbolic of the democratic process.

Brubaker: I like it because it is a sublunar composition, an anthropocentric design. Human need seems to be the principal form-generator (not an unusual site, not systems, not a desire for drama or innovation). When completed, this cluster will remain incomplete, permitting and encouraging further growth and change. Contrast the many formal, axial, and even double axial, over-organized, and finished buildings we experience every day. This design has an unsophisticated aboriginal quality. Therefore the forms will probably not be readily copied (as silos, diagonals, and Palladian arches are copied.)

Vreeland: Yes, there is a kind of accidental quality about the relations of these buildings that, in a sense, prepares you for future accidents. This scheme has the virtue of using very modest and ordinary means (an assortment of odd-sized and somewhat ordinary buildings) to create a strong feeling of "timelessness" and "place" quickly and when needed. I am reading between the lines, of course, because I don't know the actual situation at Pembroke, but every college, by means of happy, often unplanned, accidents, in time acquires just such a juxtaposition of buildings which provides the strong, needed sense of identity for the institution. Here, precisely by avoiding a consistent style throughout - a modularly repetative structural theme, or proportionately clear relation of parts, the architect has achieved this quality, so to speak, "overnight". The solution is the antithesis of Eero Saarinen's Morse and Styles Colleges at Yale, to which, alas, nothing can be added (or subtracted), and is, therefore, inorganic. This scheme can be added to and can age and imperceptibly merge into the growing campus yet still retain its sense of place.

Venturi: I think that, unlike Mies, there's a kind of irony in this building. In the Miesian generation there was a kind of heroic quality and, in the simplicity, a kind of harmony that I think is not a part of this architecture. This architecture is using conventional, non-heroic elements in a somewhat unconventional way. It is on one hand dumb and ordinary, and on the other hand, very sophisticated; sensitively and unusually done. It has these kinds of contradictions within it.

This is the kind of architecture that, in its anonymity, marks the stage before the symbolic applique comes back. Architecture is now in between - the architecture itself is the decoration - and this project is doing all that it can to be commonplace and undecorative and can thus take the decoration.

Conditions Creating A Need

The primary function of architecture is the solution of problems, not in the sense of functionalist programming or engineering, but rather in the larger sense of interpreting social and environmental concerns and human needs seeking to provide for these needs through the built environment. Such problem solving requires intuition as well as rational analysis. It is impossible for a quality solution to be reached without these two components. For the architect who serves the people, faith in design leads to innovation in problem solving.

The following statement by a former thesis student attests to the credibility of the creed of the architect as solver of human problems:

...intuition is that tool which allows the architect to rely on those decisions he makes instinctively about man and his reactions to the stimulus of architecture. The architectural-aesthetician does not require advice from the behavioral sciences as to what stimuli generate which reactions in the human beings who live in his work. This is because he is a man, and hopefully by the nature of his profession -- the most sensitive type. 7

Before a problem can be solved, it must be understood. The following sections deal with that understanding.

Youth in Society

Since the 1960's and early 1970's, a new structure has permeated modern industrial society. The heavily restrictive social structure of the past has been replaced by a new, open, highly permissive social structure. Volumes have been written explaining this change dealing with cultural explosions, the generation gaps, the technological advances. For this thesis it is sufficient to simply recognize that the change is here. Due, in part, to the new social structures (or rather, lack of them) these are uncertain times. This uncertainty is philosophical,

economic, and political as well as social in nature.

Such uncertainty can be cause for great excitement and also great anxiety, and no where are these emotions more mixed and more intense than in the minds of youth. This conclusion stands to reason for it is the youth who are most dependent upon the future, and who stand to gain or lose the most from an uncertain future. The freedom which young people fought for in the 1960's is not without its price. We cannot return to the security of the past. Nothing is sacred anymore. Like never before, college campuses have become states of flux. Certainly scepticism can be healthy, but when that scepticism leads to hopelessness what then can be said about the future? Does talk of national malaise signal a new beginning or an old ending?

As the social values of our society continue in a state of flux, the young face tremendous pressures. The future is uncertain economically; a huge amount of freedom has been placed in the hands of youth and a great many decisions must be made as to life styles, careers and vocations. Perhaps the breaking down of the rigidity of the past has been a blessing, but now the young must play the game of life without any rules. Often youth seek new rules which can often lead to tragic results. The latest proliferation of religious cults is a case in point. Growing up without rules in a world of uncertainty -- this is what the 1960's has left the country. For the young, this terrible freedom can be a great opportunity or a frightening trauma.

It would be well to understand what the architect's role is in the scheme of things. It is most important to realize what the architect cannot do. The architect cannot invent a whole new social structure, nor can he solve the major dilemmas facing

youth today. He is neither a philosopher nor a social scientist. But the architect can design an environment which provides an atmosphere for youth to discover the facts about themselves, about ideas, and about other people. The discovery of these facts could provide the special knowledge necessary to make intelligent choices about the future. The word "knowledge" is prefaced with the word "special" for a reason. Traditionally, the word knowledge is associated with the word education, and when most people think of education they think of two other words - school and family. Certainly it cannot be denied that the school and the family are primary sources of education, but in this day and age these are not enough.

Specifically, the special knowledge is that which leads to positive social interaction, a crucial aspect of personality development. Ironically, the school (public or private) is not an adequate place for this social interaction to occur. Patricia Sexton, professor of sociology and education at New York University, has written that our schools have become so structured that conformity is really the only goal offered to the student. These structures of conformity do little to prepare one for the very unstructured, uncertain world of college or business.⁸ Even extra-curricular activities in the schools offer the student little freedom or responsibility for his actions. Thus, while the students who succeed in school are those who conform, the real world of flux and uncertainty offers nothing with which to conform.

The family is a source of very fundamental knowledge to a child, but as with the school, the world of the family is far different from society as a whole. In fact, the family itself is undergoing many variations in makeup from the single parent to

the multi-family arrangements. Such variation signals the need for the provision of opportunities outside the family structure for the young person in order to learn and make his/her own life-style decisions.

In the final analysis, social interaction cannot be taught; it must be experienced. The task is to provide a place where that interaction can be a positive experience for the young person. That provision of place is an opportunity for the architect.

Conditions creating a need

Two major sets of conditions, economic and social, have created a need for a youth center in Butte/Silver Bow. The community of Butte has suffered major economic setbacks for the last several years. This financial dilemma was not always the case. There was a span of years from the early 1900's through the 1920's when Butte boasted a population of close to 70,000 people and a commercial district which served well over 100,000 people.⁹ Even these statistics are deceptively low in describing the character of the community. Thanks to the power of the copper kings, chiefly William Clark, Butte thrived culturally as well as economically. However, the benevolence of Clark could not last forever. Ironically, the big booming mining industry which created Butte and its colorful past has inflicted the deepest economic wounds. With the creation of the Berkley pit in the mid 1950's the labor intensive underground mining operations soon became obsolete. Layoffs have thus become common place and the population has dwindled. Today the entire county has approximately 40,000 people. In the 1970's Butte's famed recreation area, the Columbia Gardens, another gift from Clark, was closed by the Anaconda Mining Company for the purpose of expanding mining operations. The tragedy of this event is that while the Gardens were destroyed it was subsequently discovered that the potential ore bodies were not worth mining; the operation was abandoned. In addition, the central business district has faced potential destruction under mining's claim. While this threat has subsided, the company refuses to divulge long term plans. Thus the atmosphere is uncertainty resulting in a pronounced lack in large scale economic growth in the last several years. Furthermore, the strong tradition of unionism in the area

has discouraged some economic ventures and has drastically prohibited potential youth employment.

In such an atmosphere of non-growth it is the young who suffer most for youth is the very stuff of growth and change. Only a growing economy can give the young a sense of financial responsibility through part time jobs and the like. In Butte, the oft heard remark among teenagers is, "There's never anything to do here!" This complaint is, in part, true, but only in part. What might account for this condition? At present, teenagers account for only 13% of the community's population. This compares to 17% of the population who are senior citizens.¹⁰ The elderly can also vote in elections while the teenagers cannot. Thus, government spending has naturally favored solving the problems of the elderly. However, the community has tried as best as it can to provide activities for the young. Historically, Butte has always been a sports-crazy town. As such, the provision of recreational facilities has been a top priority in the community. The local YMCA offers major indoor sports facilities at reasonable admissions as do the two high schools and two junior high schools. There are a total of 15 relatively new tennis courts with more under way. Small scale parks and playgrounds have been built in several neighborhoods and more are planned. In addition, the town has three bowling alleys and two golf courses. The recreational needs seem to be well in hand.

Social interaction, however, is another story. At present the overwhelming majority of commercial socializing places are devoted to adult clientele by serving alcoholic beverages. This leaves a group of junkfood establishments and movie theaters to fill the social interaction gap for the young - an expensive situation for those who typically are not financially independent.

In fact, most teenagers gather in front of these establishments with no intention of buying anything which discourages potential customers from patronizing the stores. Lack of money and lack of positive social opportunities often leads to boredom which manifests itself in such monotonous activities as "cruising-the-drag" or simply gathering in large parking lots. It is no wonder, then, that alcohol use and vandalism have become problems among the young; there is simply nothing else to do. As a constituency, youth are powerless to encourage the government to address their needs. As a consumer group, the young haven't the resources to interest businesses in providing services strictly for the young. Thus, the social need for positive interaction is the gap which the youth center must fill.

Youth centers have been attempted before in Butte. None have been successful; all of these centers have followed a similar pattern. An old building is rented in some decrepit neighborhood where the rent is low. The building usually consists of a large open space sparsely furnished with a diverse assortment of gym equipment. Virtually no money is spent on the building itself with the exception of a few coats of paint. Add a juke box and this "center", complete with great expectations and good intentions, is then opened to the public. Essentially what is created is another parking lot with a roof on it. The young people gather in groups doing nothing, the equipment goes unused, vandalism abounds. Obviously the creation of a youth center must be formulated from a totally different premise.

The first half of this century saw the creation and development of several youth clubs in response to the teenager's need for positive social development. These organizations, still

in existance today, are known by many names. Nearly all of them are sponsored by adult service clubs or fraternal orders. In Butte these groups have enjoyed mixed and fluxuating success. Certainly such clubs have the potential for filling the social gaps experienced by the young today, for inherent in each of these groups is a committment to the search for personality development and a means of achieving it. However, without the facilities in which to meet, hold activities and socialize, the goals of these youth groups can never become reality. This lack is the current problem in Butte.

Any club is like a family in that it needs a space it can call its own - a space with a sence of place. No group or individual can enjoy this sense unless they become a part of that place and contribute to it. Once again, this concern calls for a change in the built environment and falls under the domain of the architect.

Program

The following program for a youth center has the potential for succeeding in Butte where others have failed due to a radical difference in assumptions. Whereas past centers have relied on programs that were very general at best or ambiguous at worst, this program is specific enough to achieve the purpose of providing for a certain kind of individual. By designing for a core of young people (the existing youth clubs in the community which need the facilities) a more accurate assessment of needs can be made. Furthermore, the existing structures of activities and conduct inherent in these clubs virtually eliminate the problems of boredom and destructive behavior. Through the facilities of a well designed youth center these clubs can prosper, grow and soon enjoin the majority of youth in the community. Thus, while the design must speak to all young people, the successful project must be built upon a structured core - the youth club.

(Programmatic needs and activities from Program for a Teen Center, by Christopher Saxman, Montana State University, 1970, pp. 5-6, 15-25).

III. Program

A. Needs of user

1. Established physical needs
 - a. Hunger and thirst
 - b. Physical activity (development)
 - c. Rest
 - d. Temperature regulation
 - e. Sex
 - f. Evacuation
 - g. Harm avoidance
2. Established psychological needs
 - a. To gain independence
 - b. To become an individual
 - c. To understand themselves
 - d. To be understood
 - e. For security
 - f. For response
 - g. For affection
 - h. To create
 - i. To master
 - j. To satisfy curiosity
 - k. For knowledge
 - l. For new experience
 - m. To establish goals
 - n. To accept physical appearance
 - o. To learn about sex
 - p. For ego
3. Established social needs
 - a. To make friends and be with others
 - b. To learn to relate to others
 - c. To establish a place in a peer group
 - d. To gain attention and recognition
 - e. To gain approval
 - f. To be accepted
 - g. To establish a sex role
 - h. To conform

B. Activities to fulfill needs

1. Talking
 - a. Talking
 - b. Listening to music
 - c. Watching people
 - d. Eating
 - e. Television
 - f. Reading
 - g. Piano
2. Dancing
 - a. Dancing
 - b. Music
 - c. Stage activities
 - d. Watching
3. Games (active)
 - a. Darts
 - b. Pinball (et. al.)

- c. Foosball
- d. Ping pong
- e. Billiards
- 4. Games (passive)
 - a. Cards
 - b. Chess
 - c. Cardtable games
- 5. Telephone
 - a. Talking
 - b. Listening
- 6. Studying
 - a. Homework
 - b. Reading
- 7. Outside activities
 - a. Bike riding
 - b. Dancing
 - c. Basketball
 - d. Football
 - e. Volleyball
 - f. Badminton
 - g. Tennis
 - h. Sunbathing
 - i. Talking
 - j. Eating
 - k. Working on cars
 - l. Music
- 8. Group activities
 - a. Meeting
 - b. Talking
- 9. Miscellaneous
 - a. Restrooms
 - b. Administration
 - c. Maintenance and clean-up
 - d. Information center
 - e. Receiving area
 - f. Kitchen
 - g. Parking
- c. Area requirements of activities
 - 1. Talk area(s)
 - a. Physical
 - Seating for 50-150 in groups of 2-10
 - Tables for eating, reading, games
 - Vending machines- food, drinks, etc.
 - Physical relation to outside
 - Fresh air
 - Air conditioning
 - Lighting should be variable, reading to low for atmosphere
 - Good acoustics
 - b. Psychological
 - A definite "our place" feeling
 - Variety of intimacies, 2-10(fireplace)
 - Young, exciting, lively atmosphere
 - Music

- c. Sociological
 - Groups should be able to meet but not take over
 - Groups should come in contact with each other
 - Teens should be able to see others and other activities
 - It should be easy for teens to meet others
- 2. Dancing area
 - a. Physical
 - 300 spaces (comfortably)
 - Place for a live band
 - Place to watch from
 - Places to sit
 - Air conditioning
 - Air exchange
 - Good acoustics
 - b. Psychological
 - Should promote close relationships
 - Stimulating atmosphere
 - Variable atmosphere (summer, winter, etc.)
 - Should accomodate small dances without seeming too large an area
 - c. Sociological
 - Should keep boys and girls mixed
 - Should be easy to see who is there
 - Should be easy to ask someone to dance
 - Teens should feel like individuals as well as part of the group
- 3. Game areas (active)
 - 4 pool tables
 - 1 foosball table
 - 4 electronic game machines
 - 1 ping pong table
 - Air conditioning
 - Lights
 - Should be open
 - Should be a fun, exciting, involved area
 - Room for 2-4 playing per game and more watching
 - Some interaction with talk area
- 4. Game areas (passive)
 - Tables for 3-6
 - Seating for 30
 - Air conditioning
 - Storage
 - Privacy
 - Should be quiet
 - Should attract quiet individuals
- 5. Telephone areas
 - 4 phone places
 - Place to write
 - Phone book
 - Eating shelf
 - Should allow private conversation
 - Should be comfortable
 - Teens should be able to watch others without being watched
 - Should allow for more than one talking with others sitting around

6. Study areas

- Some resources
- Tables for studying
- Lighting
- Seating for 20
- Air conditioning
- Good acoustics
- Psychological and physical separation
- Should adapt to different study habits
- Should allow group study

7. Outside activities areas

- Parking
- Seats
- Tables
- Bike rack
- Grass
- Roof area (open)
- 2 playing courts (also for dancing)
- Lighting for night activities
- Should be involved with and attached to the center
- Shouldn't be objectionable to passers by.

8. Movies

- Screen
- Sound system
- Good acoustics
- Seating for 200
- Light control
- Air exchange
- Air conditioning
- Total involvement of teens
- Optional seating

9. Group activities area

- Private and/or open (optional)
- Tables and chairs
- Chairs (20 conference, 40 lecture)
- Group feeling should be promoted

10. Rest rooms

- Privacy
- Easy access
- Counters
- Mirrors
- Toilets - 6
- Urinals - 3
- Lavatories - 3
- Stalls
- Chairs
- Should be vandal-proof
- Should be easy to clean

11. Administration

- Should be out of the way
- 1-2 offices
- A teen's office
- Coordinator's office

12. Maintenance and clean-up

- Closets for tools

Storage
Sinks

13. Information center

Television

Films

Books

Pamphlets

Should be private but attract teens

Should be easy to find and should be seen often

14. Receiving area

Loading and unloading

Large doorway

15. Kitchen

Sinks

2 stoves

Counter space

Refridgerator

Cupboards

Drawers

Handout counter

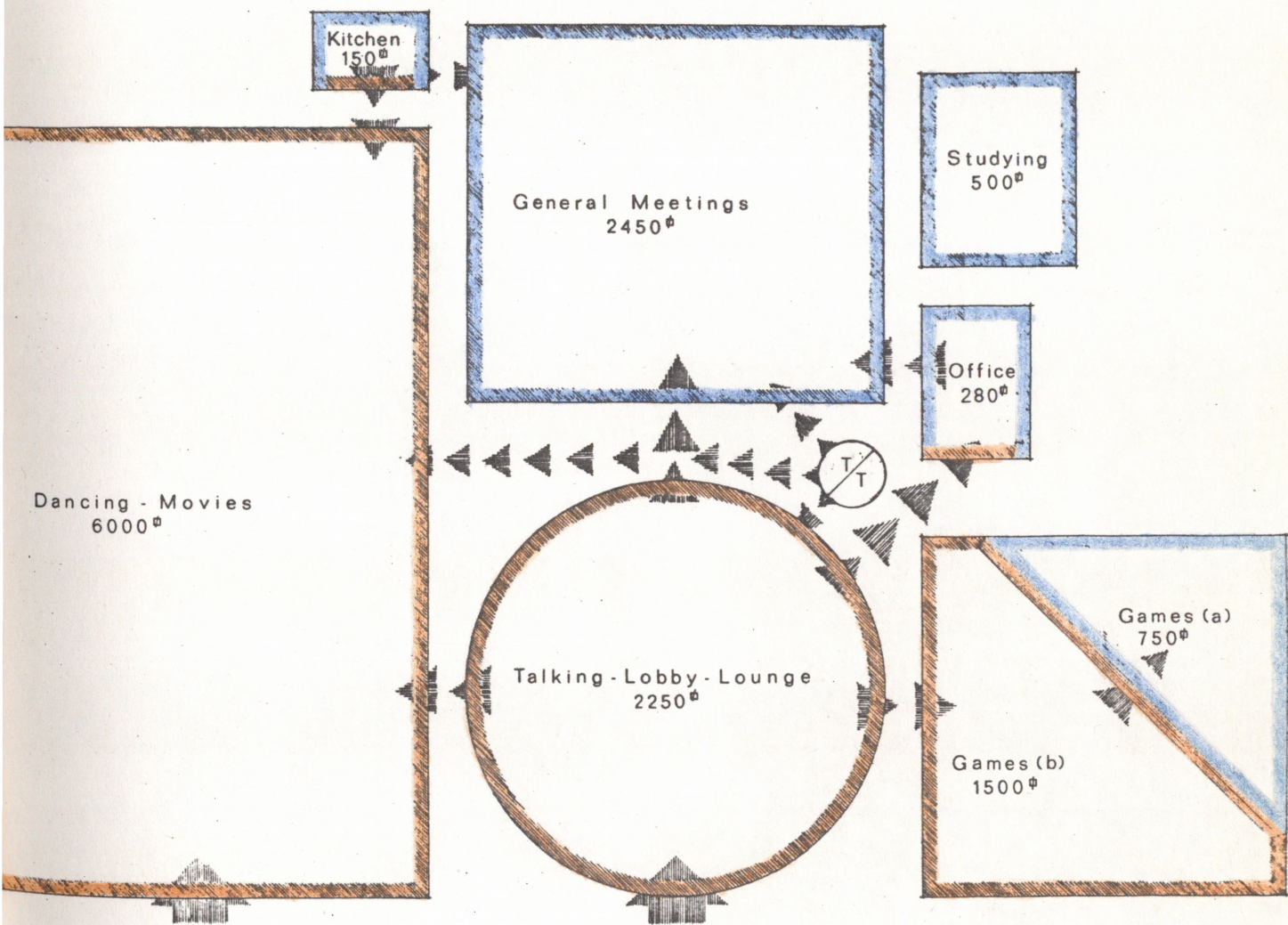
16. Parking

As determined by local codes

Note: Preceding area requirements and subsequent square footages are for a building housing a maximum of 300 people. This figure was determined by taking the number of youth groups who would potentially use this facility (5), assuming a healthy membership for each, and adding a buffer for expansion and large crowds during public events. All space requirements are scaled accordingly using information found in Time Saver Standards.

D. Space requirements of areas

1. Talk area (lounge(s), lobby, etc.) 150 people @ 15 sq. ft. =	2250 sq. ft.
2. Dancing area (plus movies, etc.) 300 spaces @ 20 sq. ft. =	6000 " "
3. Game area (active) 60 people @ 25 sq. ft. =	1500 " "
4. Game area (passive) 30 people @ 25 sq. ft. =	750 " "
5. Study area(s) 20 people @ 25 sq. ft. =	500 " "
6. Meeting rooms (varying sizes)	2450 " "
7. Kitchen	150 " "
8. Offices	280 " "
9. Total base building	13880 " "
10. 25% mech., circulation, support	3470 " "
11. Total building	17350 " "
12. Outside area(s) (minus parking)	1050 " "



PROGRAM

Site Analysis

BUTTE-WALKERVILLE-SILVER BOW CO. PLANNING AREA

SCALE = 1" = 1 MI

SECTORS

BUTTE-SILVER BOW CO.
CITY-COUNTY PLANNING BOARD

HOWARD, NEEDLES, TAMMEN & BERGENCOFF
Department of Urban & Regional Planning
Kansas City City Engineer - Washington D.C.

The preparation of this map was financially aided through a Federal Grant from the Department of Housing and Urban Development, under the Urban Planning Assistance Program, authorized by Section 705 of the Housing Act of 1954, as amended.

THE SITE

1

3

5

2

4

THE SITE

W. COPPER

E. COPPER

W. QUARTZ

E. QUARTZ

W. GRANITE

E. GRANITE

W. BROADWAY

E. BROADWAY

W. PARK

E. PARK

W. GALENA

E. GALENA

W. MERCURY

E. MERCURY

ALASKA

HAMILTON

N. DAKOTA

S. DAKOTA

S. DAKOTA

COLORADO

N. MAIN

S. MAIN

N. WYOMING

S. WYOMING

11

12

16

15

14

23

24

25

30

29

28

37/109

37

38

44

43

42

41

III. ENVIRONMENTAL ANALYSIS

A. Physical aspects of the site

1. Climate conditions

- a. Temperature range +100 to -50 Mean 53 25 F
- b. Prevailing wind conditions
 - 1) Storm (Winter) wind - North to Northeast
 - 2) Chinook (warm) breeze - South to Southwest
- c. Wind velocity - Average 5 to 8mph with gusts to 45mph, occasional 60mph gusts.
- d. Snowfall - Varies, one foot to two feet during average winter. Occasional snow drifting to 4'.
- e. Frost line - Three feet below grade. Four feet in unusually moist soil and drainage.
- f. Earthquake zone - Most severe seismic area, Zone 3.
- g. Unusual local conditions - Proximity to underground mining and open pit mining.
- h. Lightening protection - very applicable.

2. Soil and Ground Conditions

- a. Test bore data.
 - 1) 1'-2' topsoil, sandy loam
 - 2) 6'-7' decomposed granite
- b. Any unusual amount of fill required - No.
- c. Any water problem - Nothing below grade, caution should be exercised to note above grade drainage.
- d. Location of Water Table - First water +43'-0".
- e. Does soil warrant a mat foundation - No.
- f. Does soil warrant use of a pier foundation - No.
- g. Expertise available for soil work.

3. Adjacent Structures

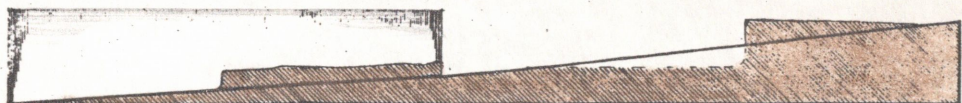
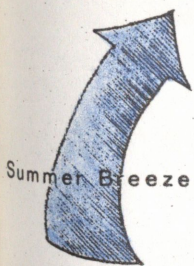
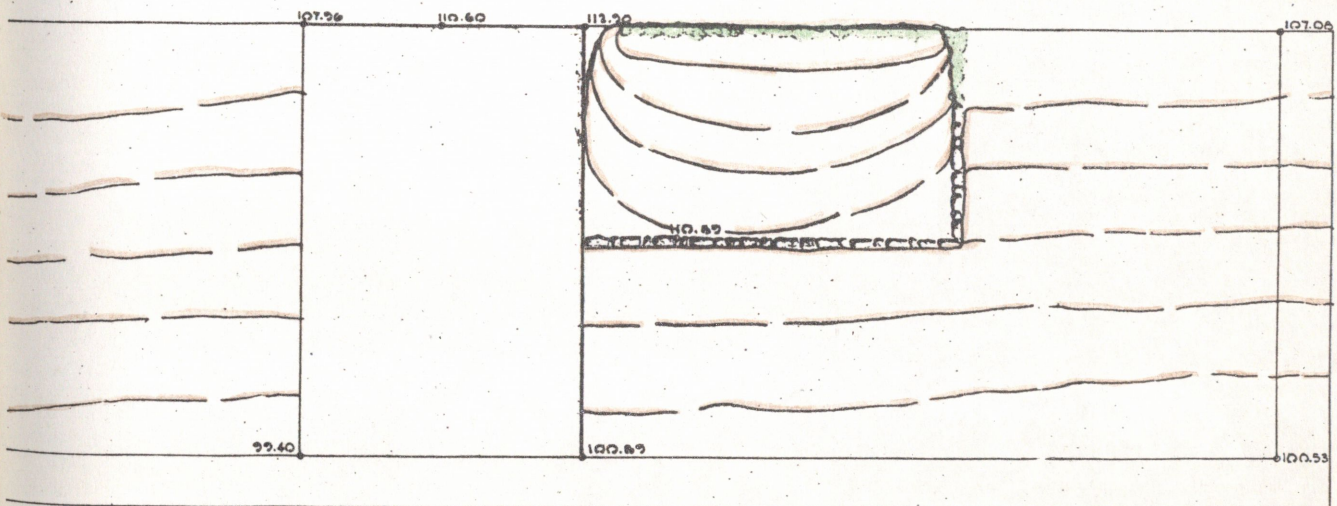
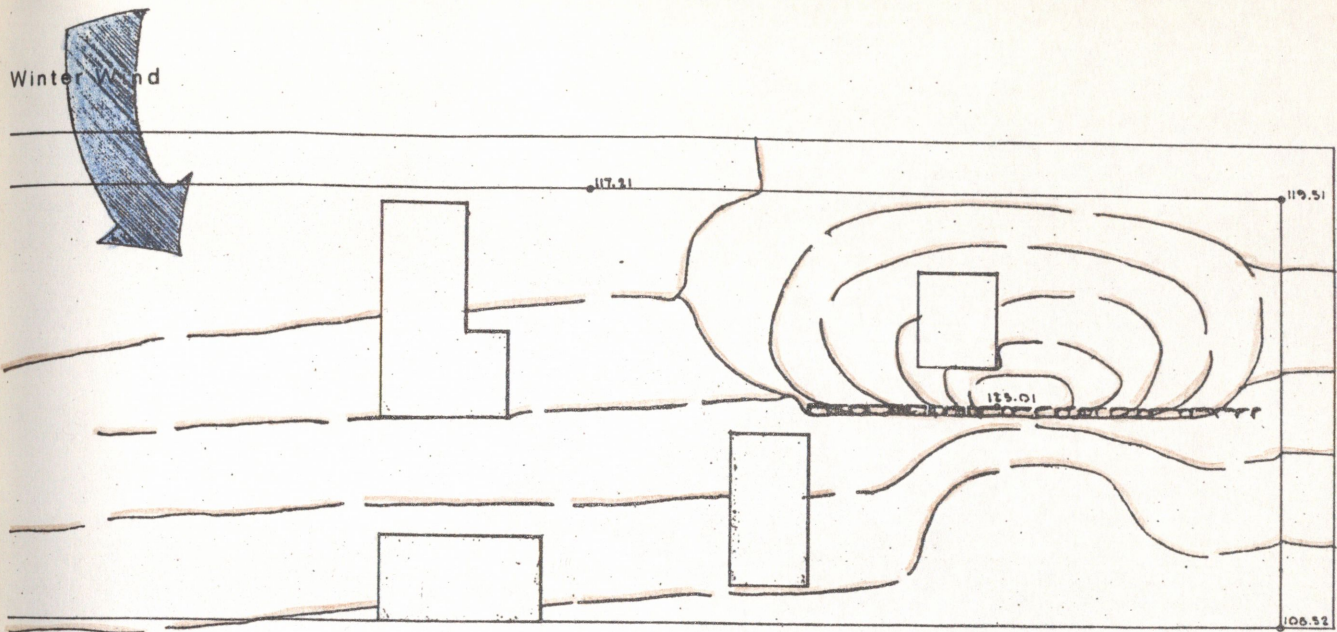
- a. Any basements in existing buildings - Yes.
- b. Any underground structures in area - Yes, underground horizontal branches of mine shafts.
- c. Any tall buildings in the area - Yes.
- d. Will surrounding buildings affect wind loading - possibly.
- e. Noise control necessary - As appropriate for commercial area.

4. Solar Orientation

- a. General direct light exposure - Excellent.
- b. Any structure blocking sunlight to site - Yes in early morning and late afternoon.
- c. General exposure intensities
 - North - Moderate (for daylighting only)
 - South - Excellent
 - East - Good
 - West - Good (see IA2 for detailed analysis)

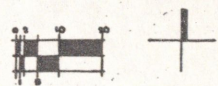
5. Utilities

- a. City will provide hook-up to city metro/sewer.
- b. Availabilities of services.
 - 1) Gas - OK
 - 2) Phone - OK
 - 3) Electricity - OK
 - 4) Water - OK



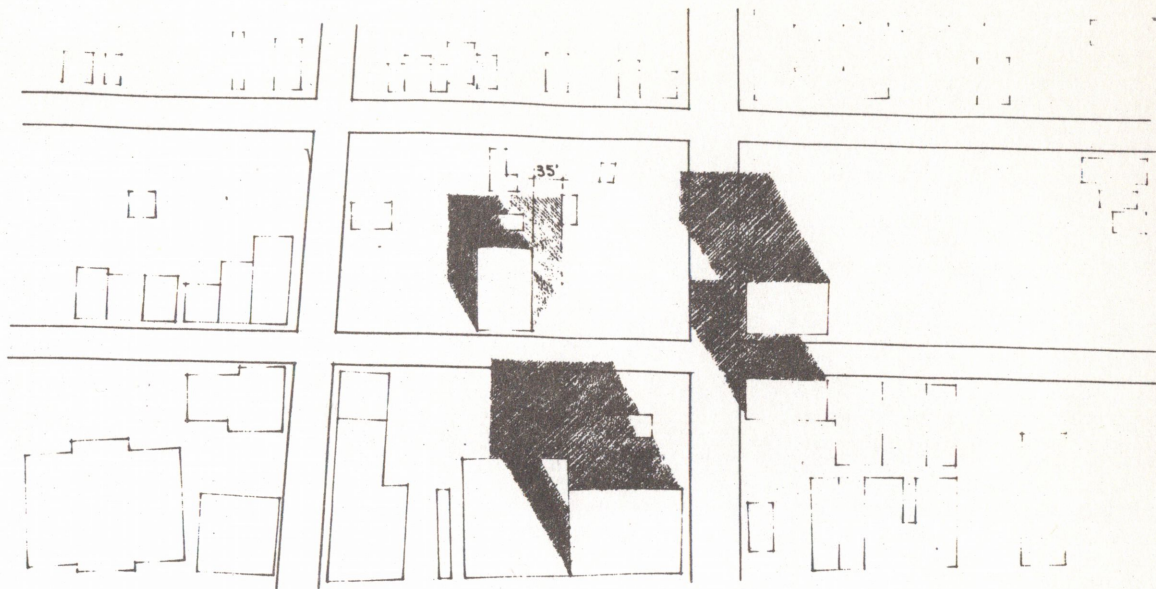
East Elevation

TOPOGRAPHY



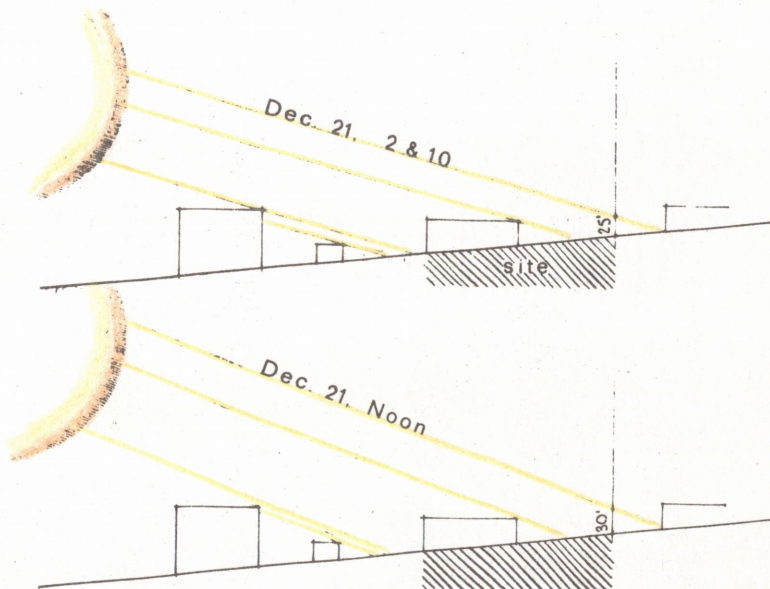
SITE

IA



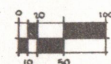
December 21, 10am

" " 2pm



Data: Latitude 46°				
	21 DEC.	21 MAR. SEPT.	21 JUNE	
Time	Az. Al. X	Az. Al. X	Az. Al.	X
7 5	— —	— —	— —	
6 6	— —	90 0	107 17	
5 7	— —	79 10	97 27	
4 8	52 2	67 20	88 37	
3 9	41 10	54 30	74 48	
2 10	28 16	39 37	58 57	
1 11	14 20	21 42	34 65	
12 12	0 21	0 44	0 68	

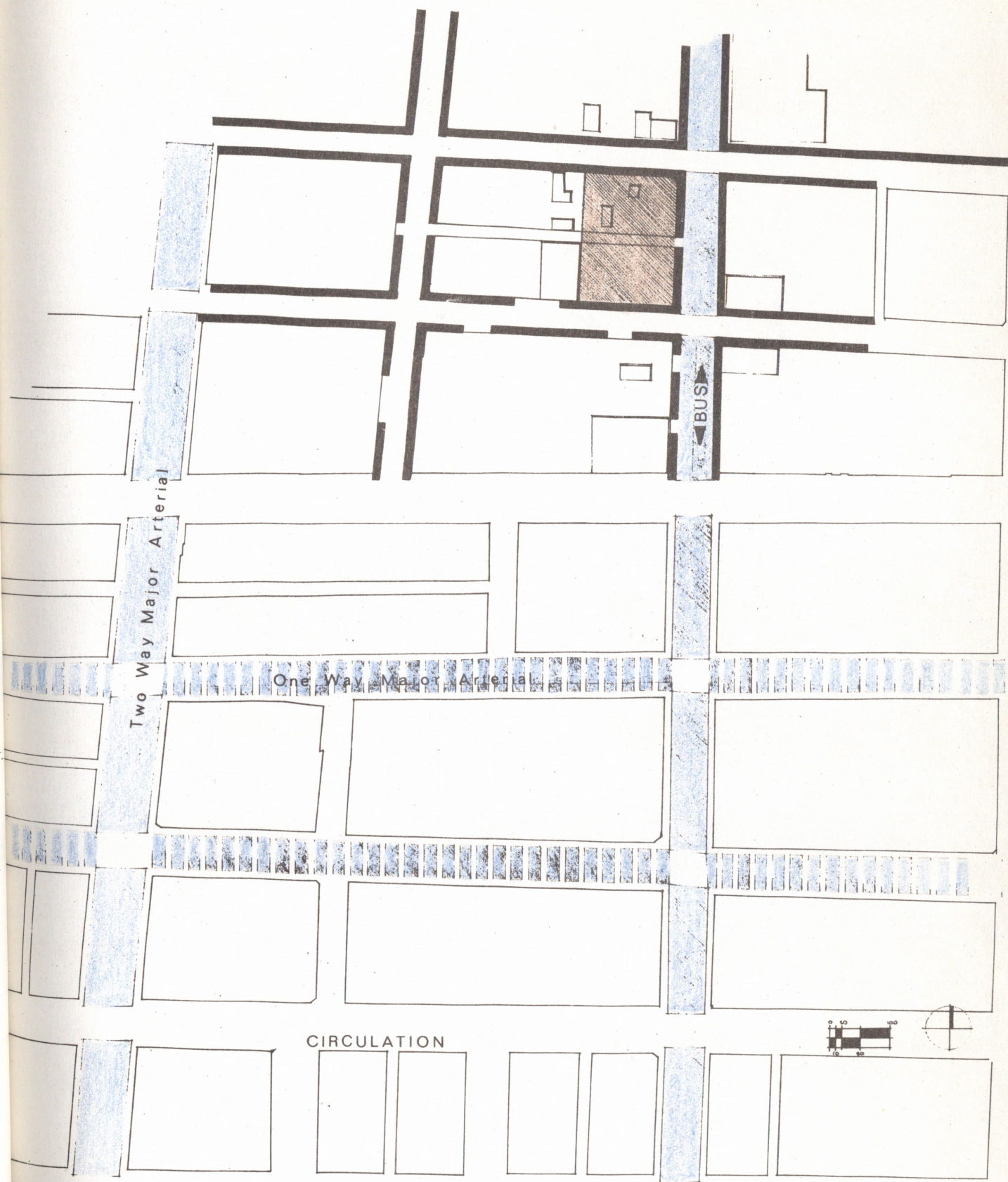
SOLAR



SITE

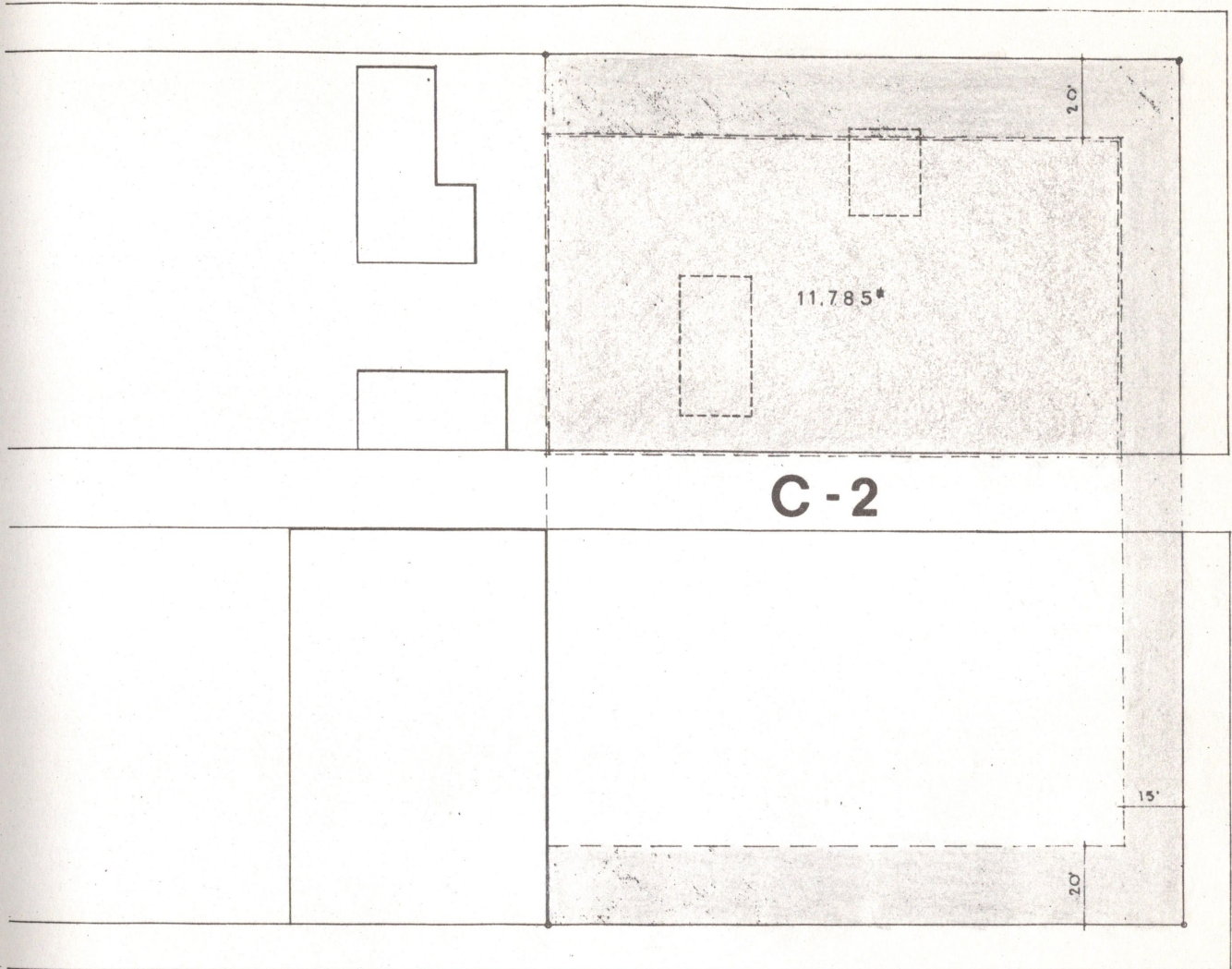
IA

6. Vegetation/landscape
 - a. One grass area with hedge.
 - b. Two granite block walls.
7. Unmentioned Site Considerations
 - a. Copper Street basement level is Quartz Street ground level.
 - b. Latitude is 45 57' N.
- B. Functional requirements of the site.
 1. Site Access from Copper Street, Quartz Street and Main Street.
 2. On site storage limits - none.
 3. Unusual craft vehicle conditions - minor deliveries.
 4. Pedestrian circulation - Alley access to Butte Archives (Old Fire Station).
 5. Vehicular circulation - Two-way traffic on all streets with parallel parking both sides of streets. Two way traffic in alley.
- C. Legal and Political Considerations
 1. Will utilize Uniform Building Code and other locally accepted and/or adopted codes.
 2. What are the zoning requirements - C-2 (commercial)
 3. What are set back requirements - 15' frontyard, 20' sideyard.
 4. Height restriction - 35'
 5. Building area/open space at each lot - 4% to 5% landscape requirement.
 6. Building shape restriction - None.
 7. Building materials restriction - None.
 8. Appearance codes or design criteria approval - None.
 9. "Style"/ character approval - None.
 10. Parking requirements on site - One space/ 200 sq. ft. floor area.
 11. If non conforming variance is possible - cash payments for parking. zoning change is not possible.
 12. Local covenants - None.
- D. Energy Analysis
 1. Worst case shade condition within 60 span of effective solar gain - December 21st, Fire Station casts 35' shadow on site at 2pm.
 2. Building height restriction for surrounding solar access - Nothing under present code restriction of 35'.
 3. Solar heating requirement - Minimal due to potential heat gains from lighting and people in a public building.
 4. Solar lighting requirement - maximize.
 5. Wind energy potential - minimal.
 6. See appendix for solar lighting techniques.
- E. Aesthetic Influences
 1. View axis
 - a. Excellent view of Rocky Mountains and Divide (due East).

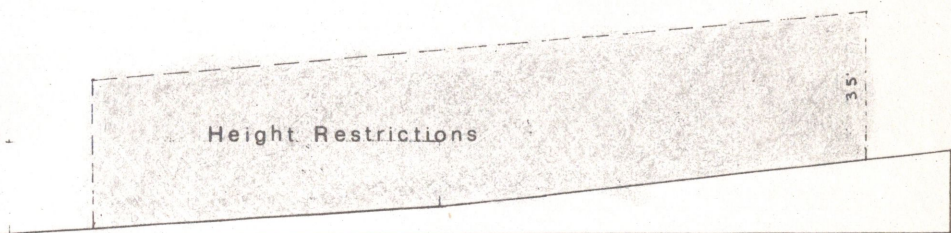


SITE

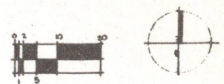
IB



-  Setbacks
-  Allowable Building Area
-  after Parking

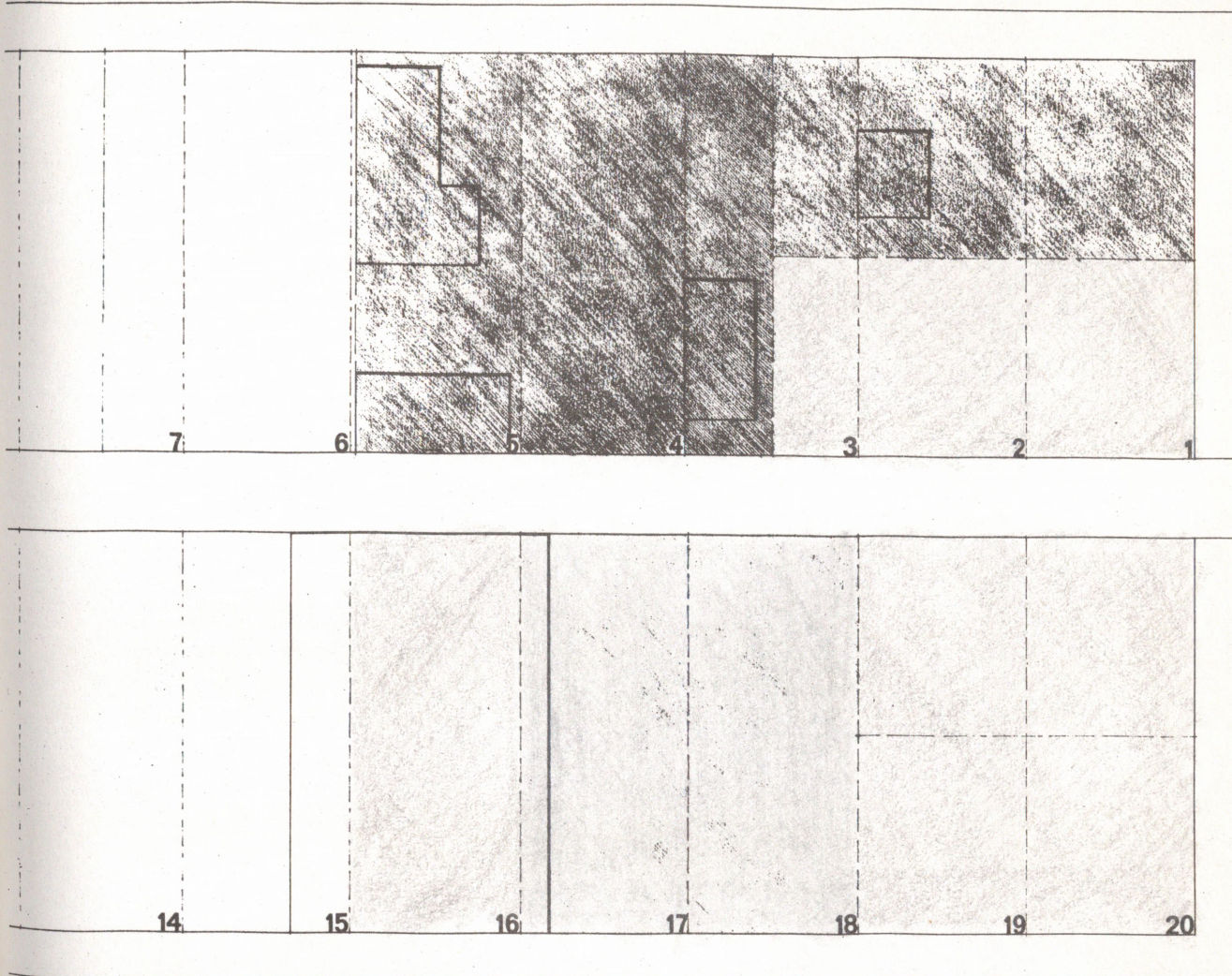


ZONING



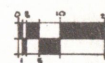
SITE

IC



-  Butte-Silver Bow
-  Anaconda Company
-  Private

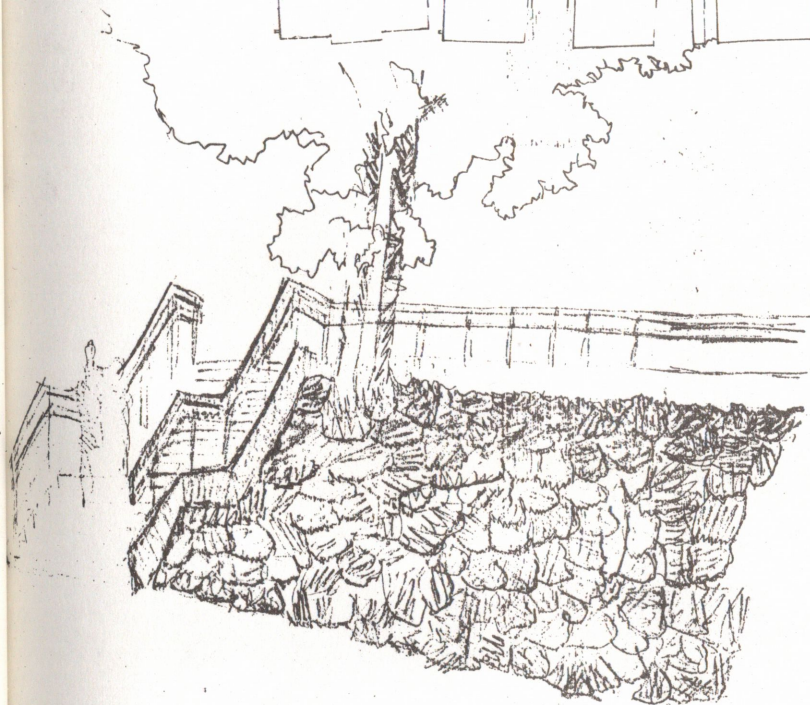
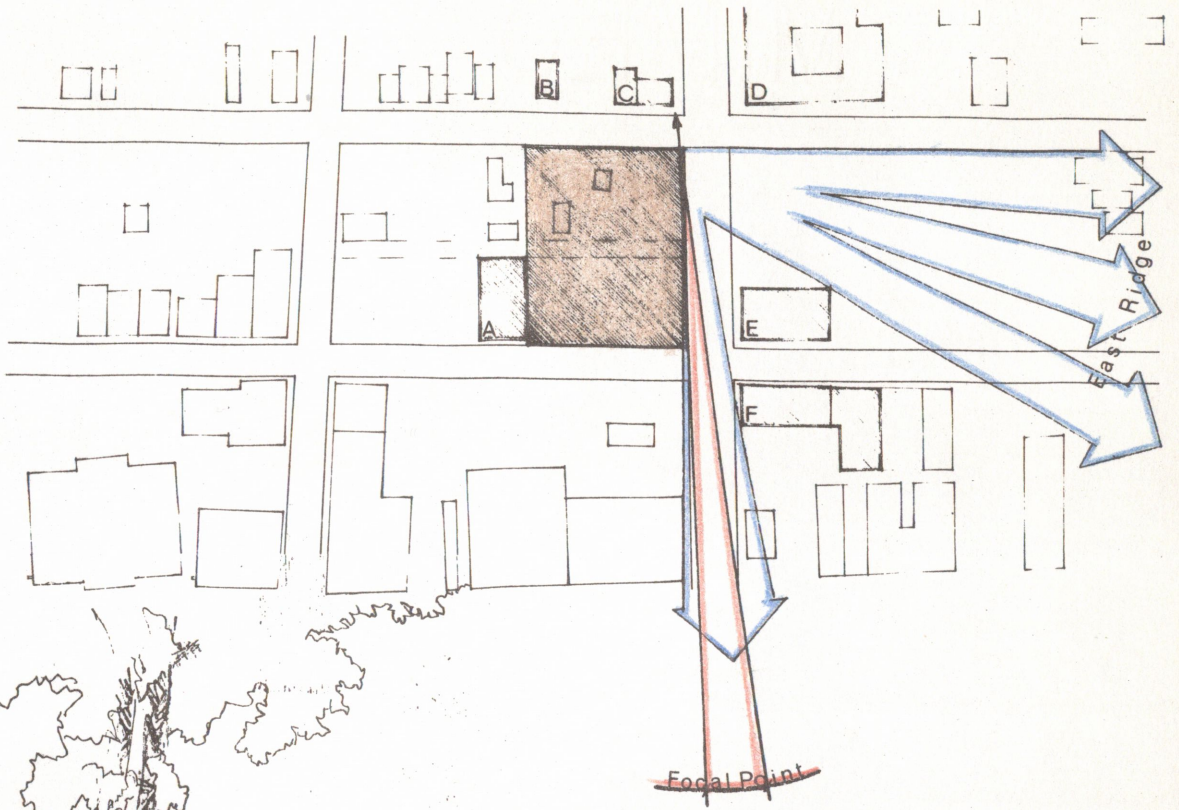
OWNERSHIP



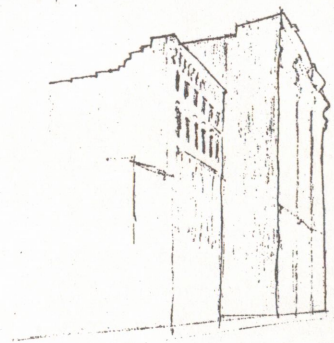
- b. Minor view of highlands, would be better from a 2nd or 3rd story (due South).
- c. Street views to North, East, and South.
- 2. Contextural Features
 - a. Level changes - block stone walls, wooden stairs.
 - b. Frontality of commercial buildings (facade idea).
 - c. Structural interest of old mine head frames.
 - d. Texture of street and alley - granite/brick pavements.
 - e. Solid void relationships of buildings.
 - f. Focal point of old Mortuary created by dome, bay windows and column on NW corner of Copper and Main.

F. Historic Influences

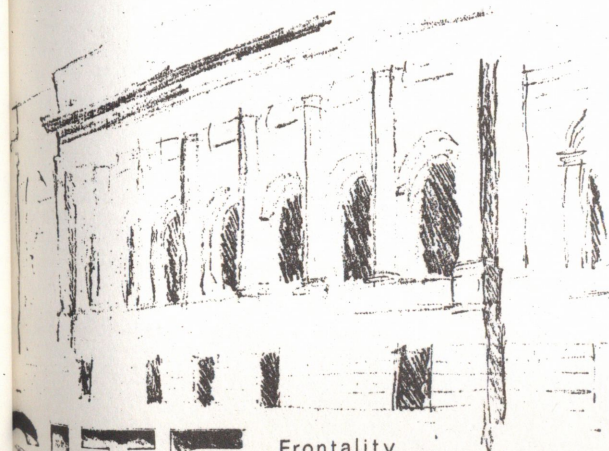
- 1. Prevailing vocabulary - Urban.
 - a. Predominant style - very eclectic and varied.
 - b. Neighborhood style - predominantly 'storefront' structures with strong Midwest facade features.
 - c. Strong design elements - rythmn/proportion/scale/textures/massing/voids/complexity/usualness.
- 2. Selected Influential Buildings
 - a. Old Fire Station
 - b. Scott Building
 - c. Old Mortuary
 - d. Federal Building
 - e. Anaconda Offices
 - f. Old Daly Bank (presently ACM Offices)



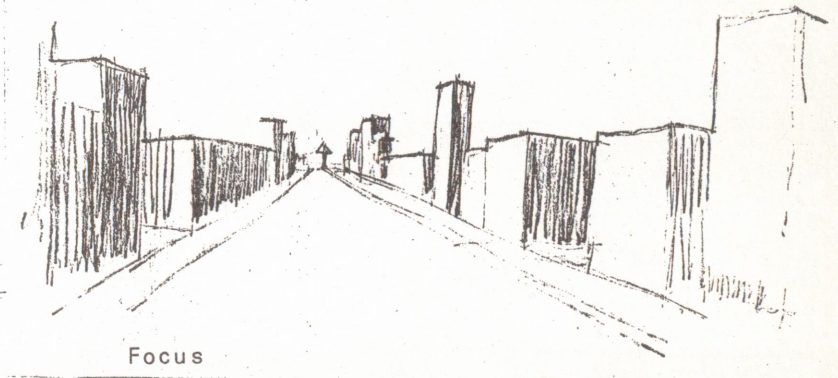
Level change



Solid/Void

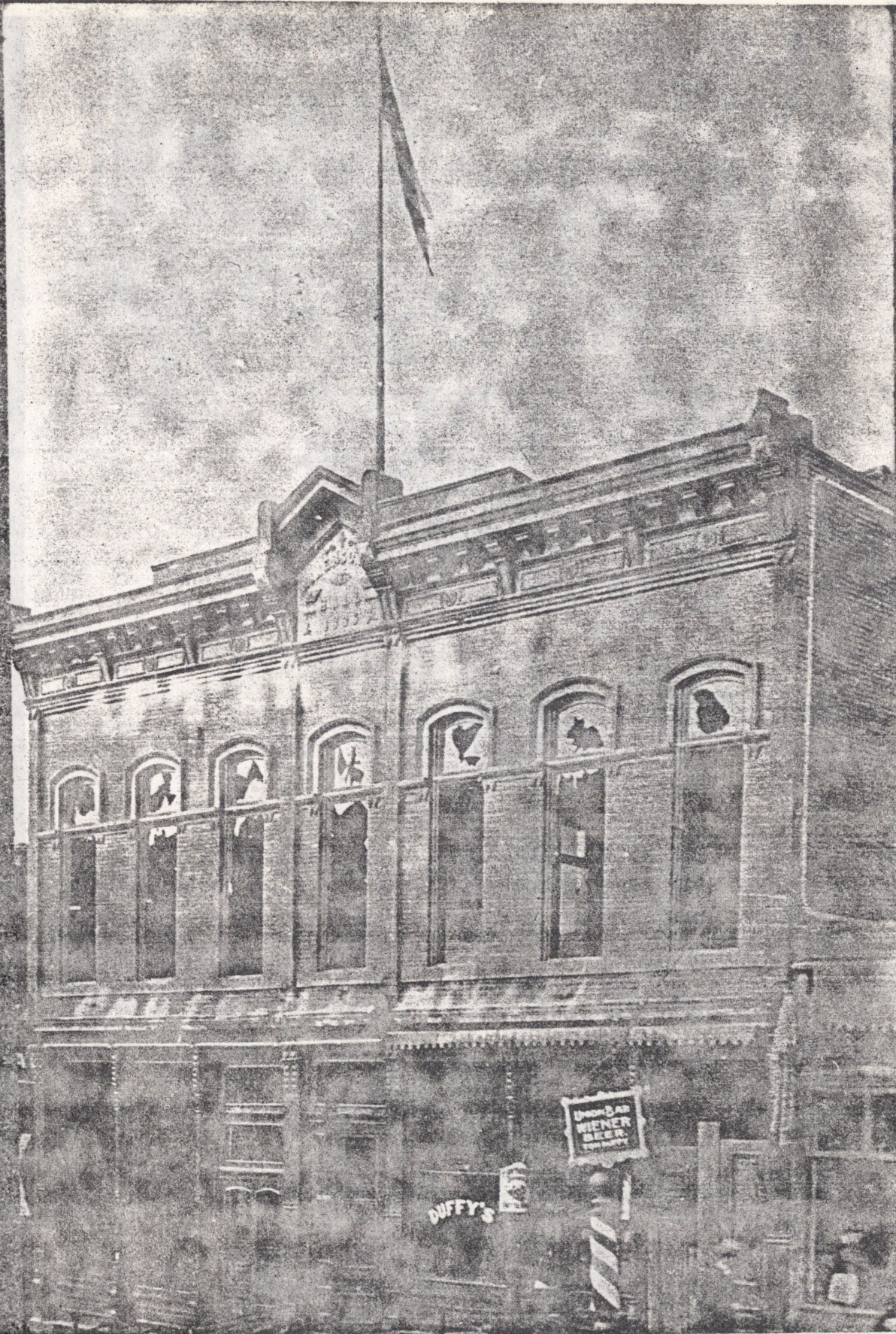


Frontality

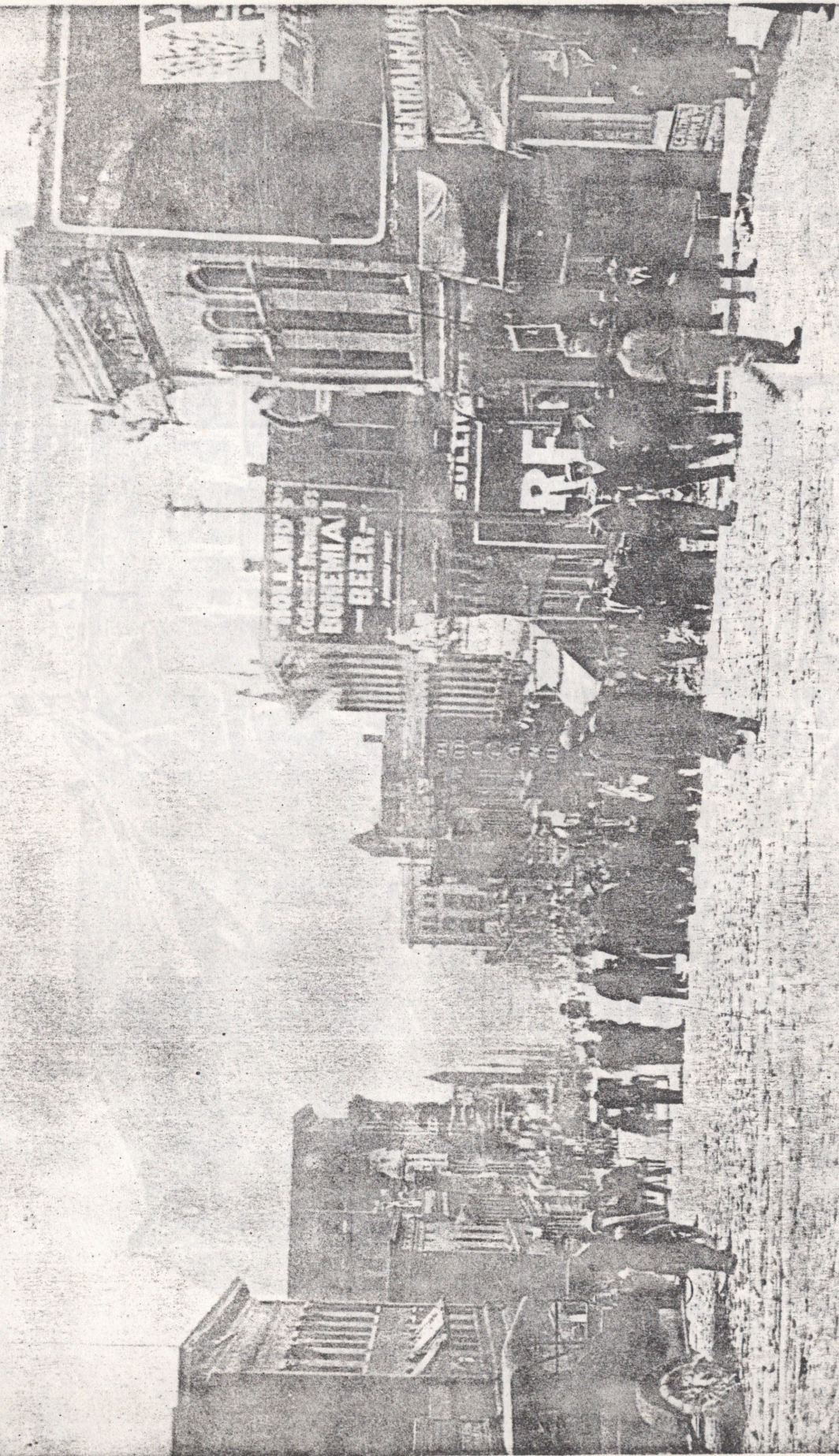


Focus

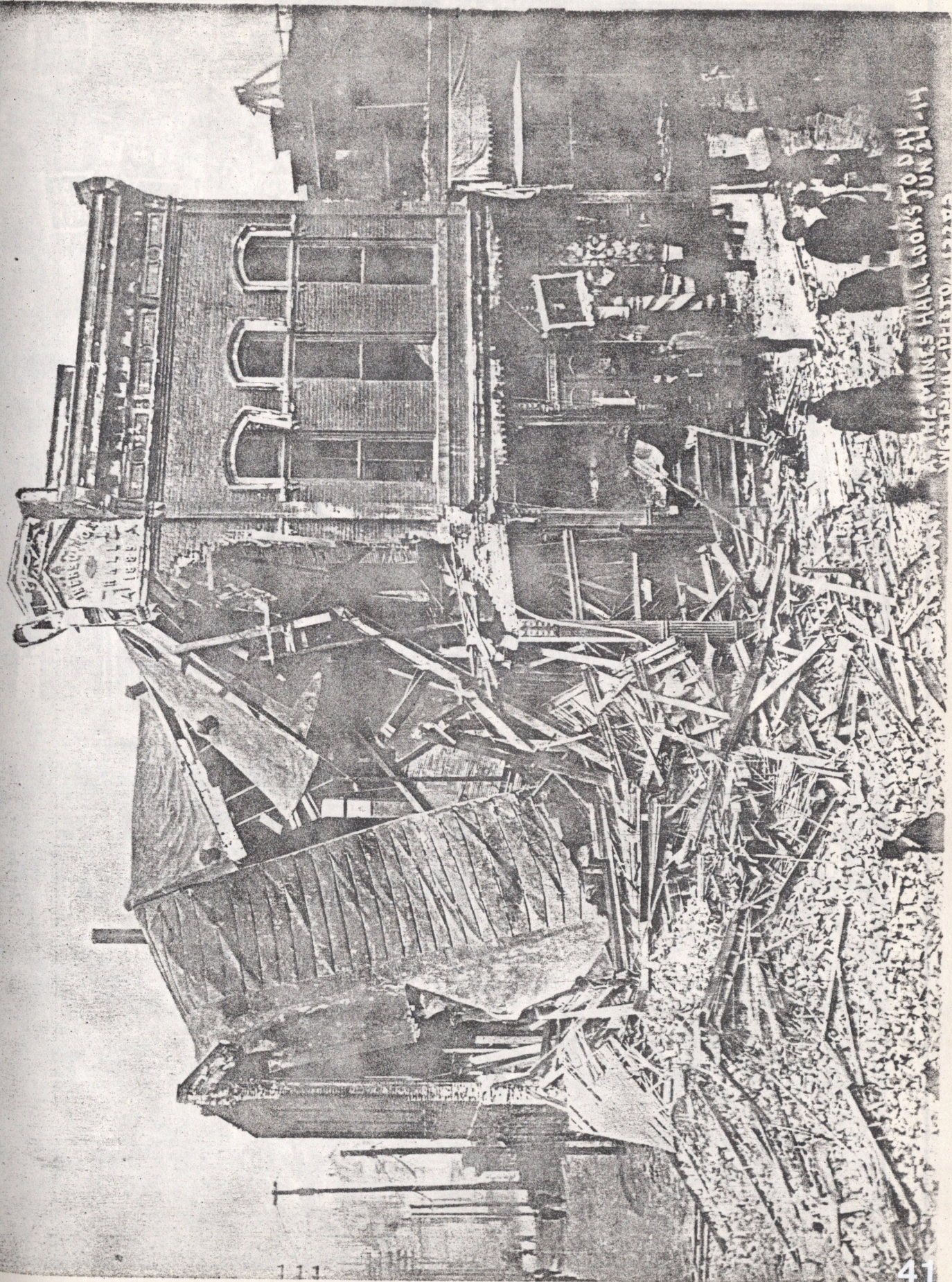
CONTEXT



The Site - SW Cor. Copper & Main, Miners Union Hall built 1885;
torn up June 23, 1914; wreckage finally cleaned up May 1, 1925.



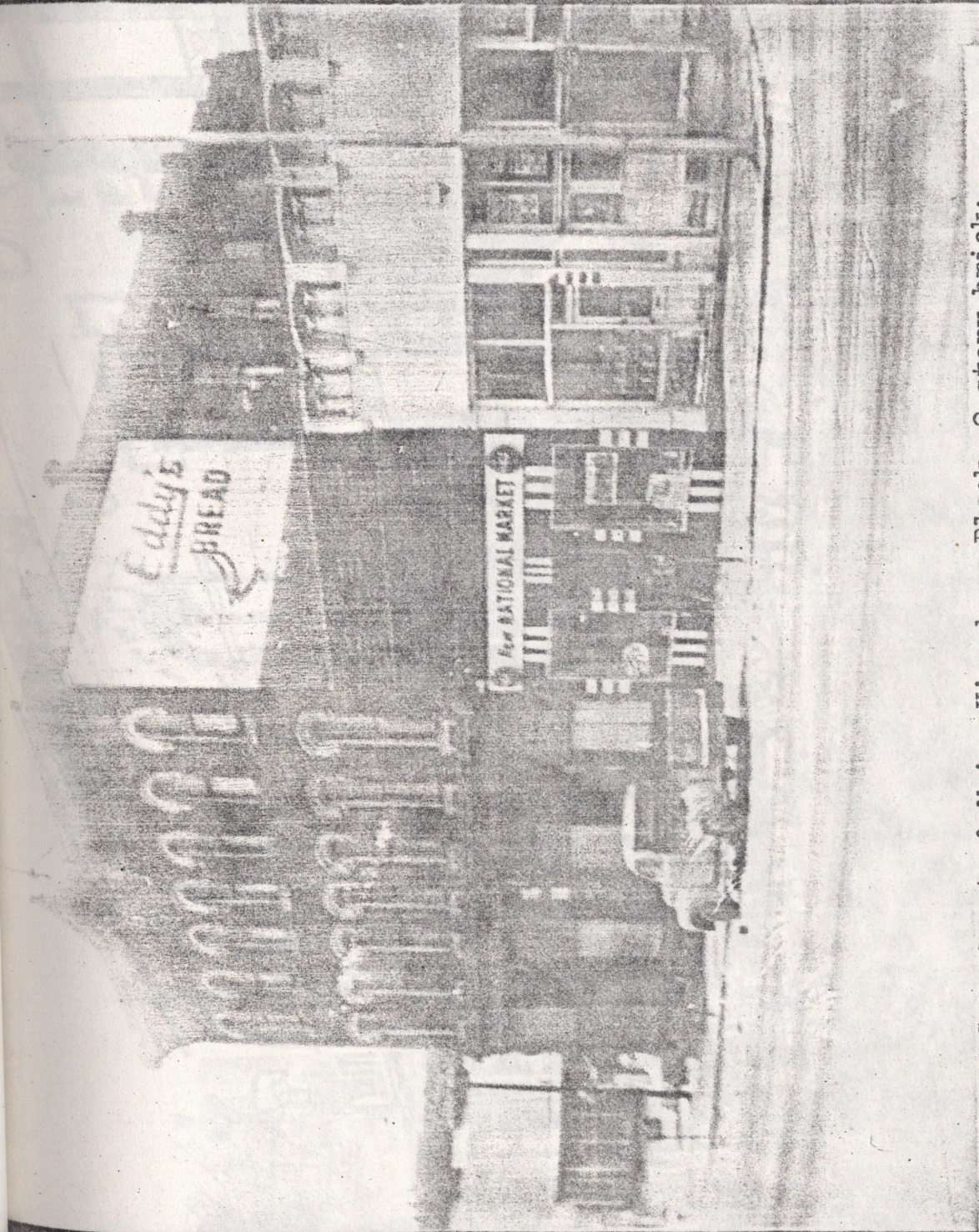
MAIN ST. BUTTE, MONTANA



THE MINES HALL LOOKS TODAY JUN 24-14

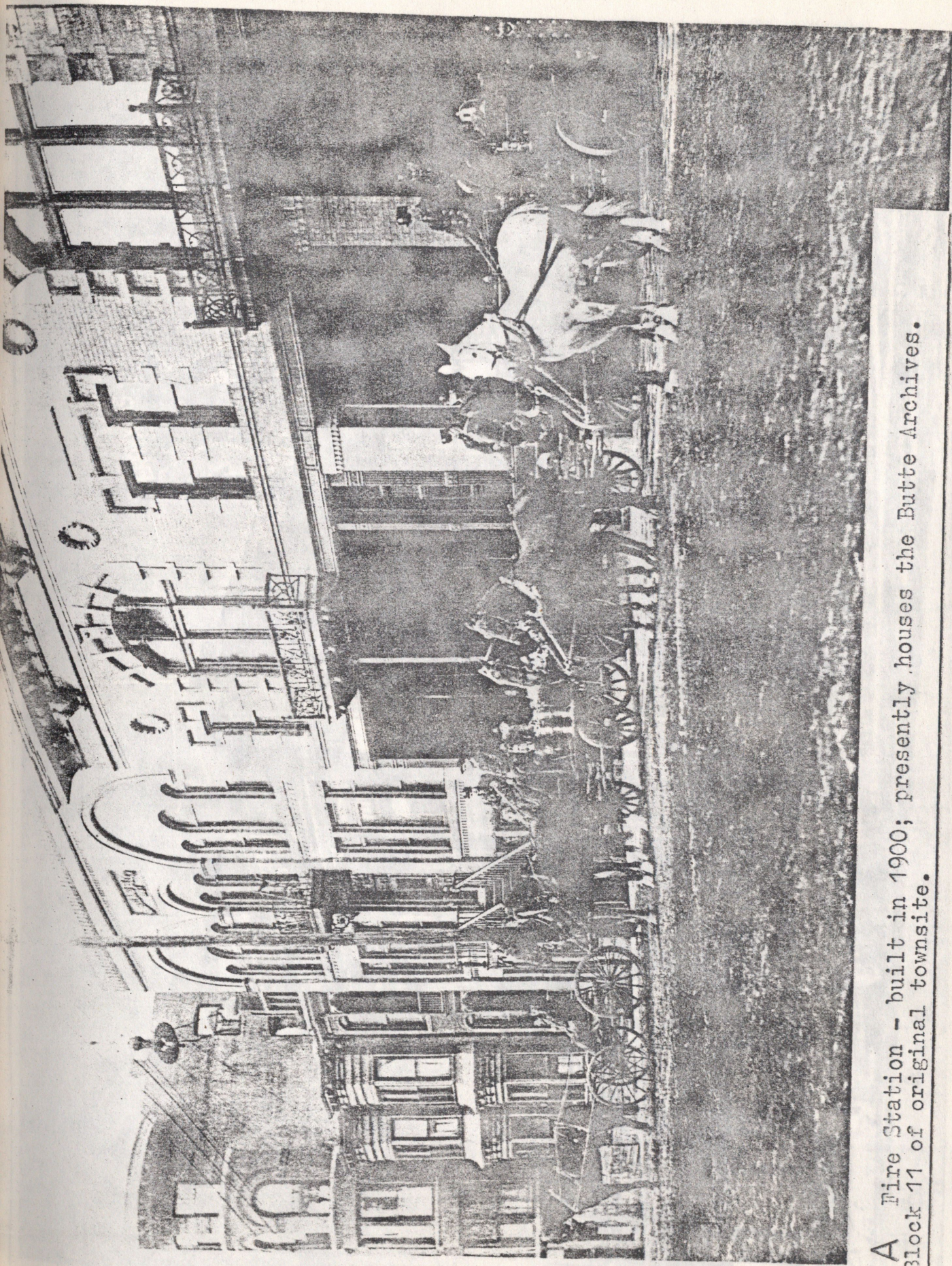


Thousands still existing.

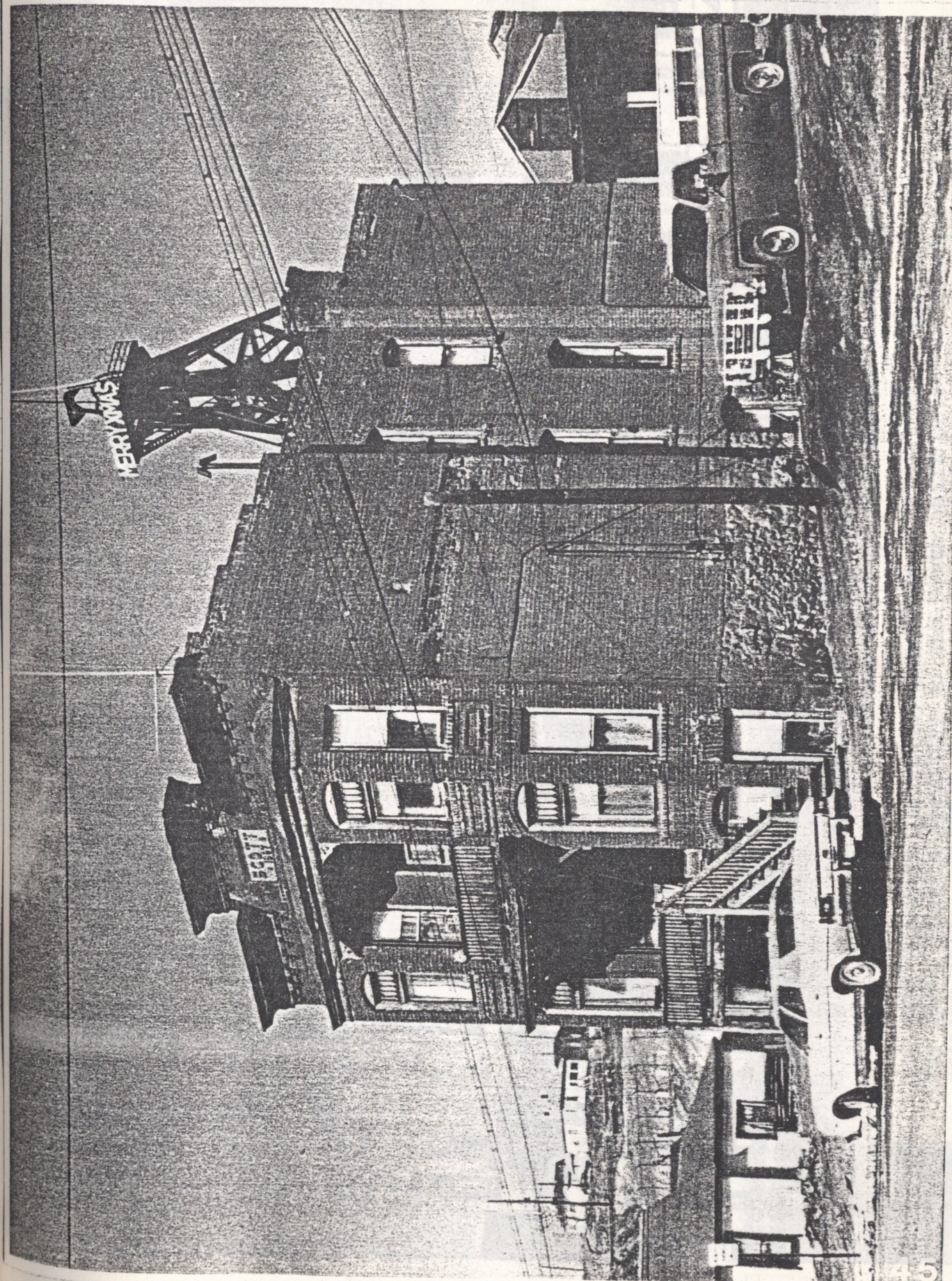


NW Cor. Quartz & Main, Kingsbury Block, 2 story brick; third story added in 1890. Also known as Bonner Block and Realty Block, used for retail shopping and offices. Torn down March 11, 1968.

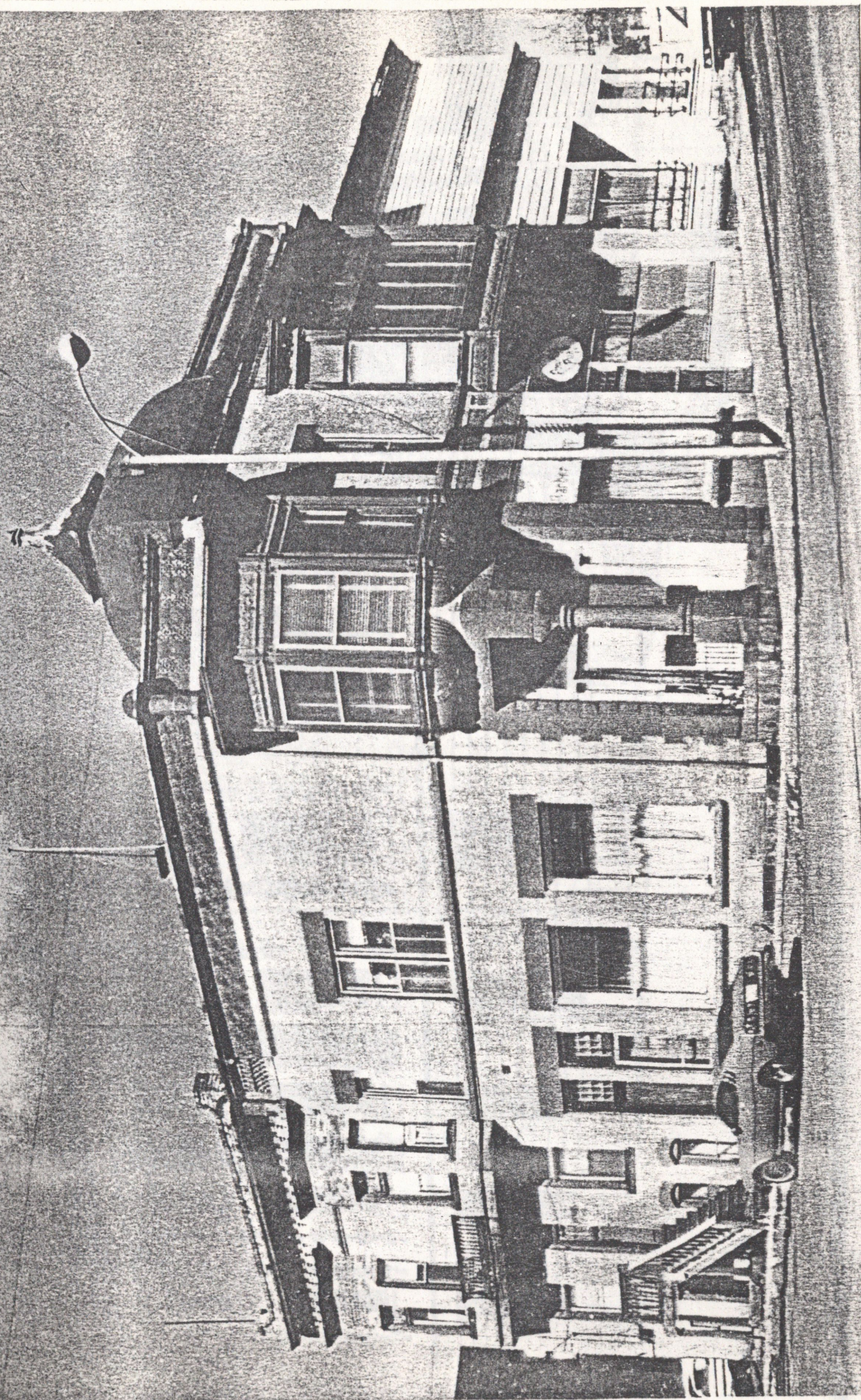
All other small retail buildings on Main torn down Jan. '73.
A one story frame house and a brick flat, both built in 1890 are still existing.



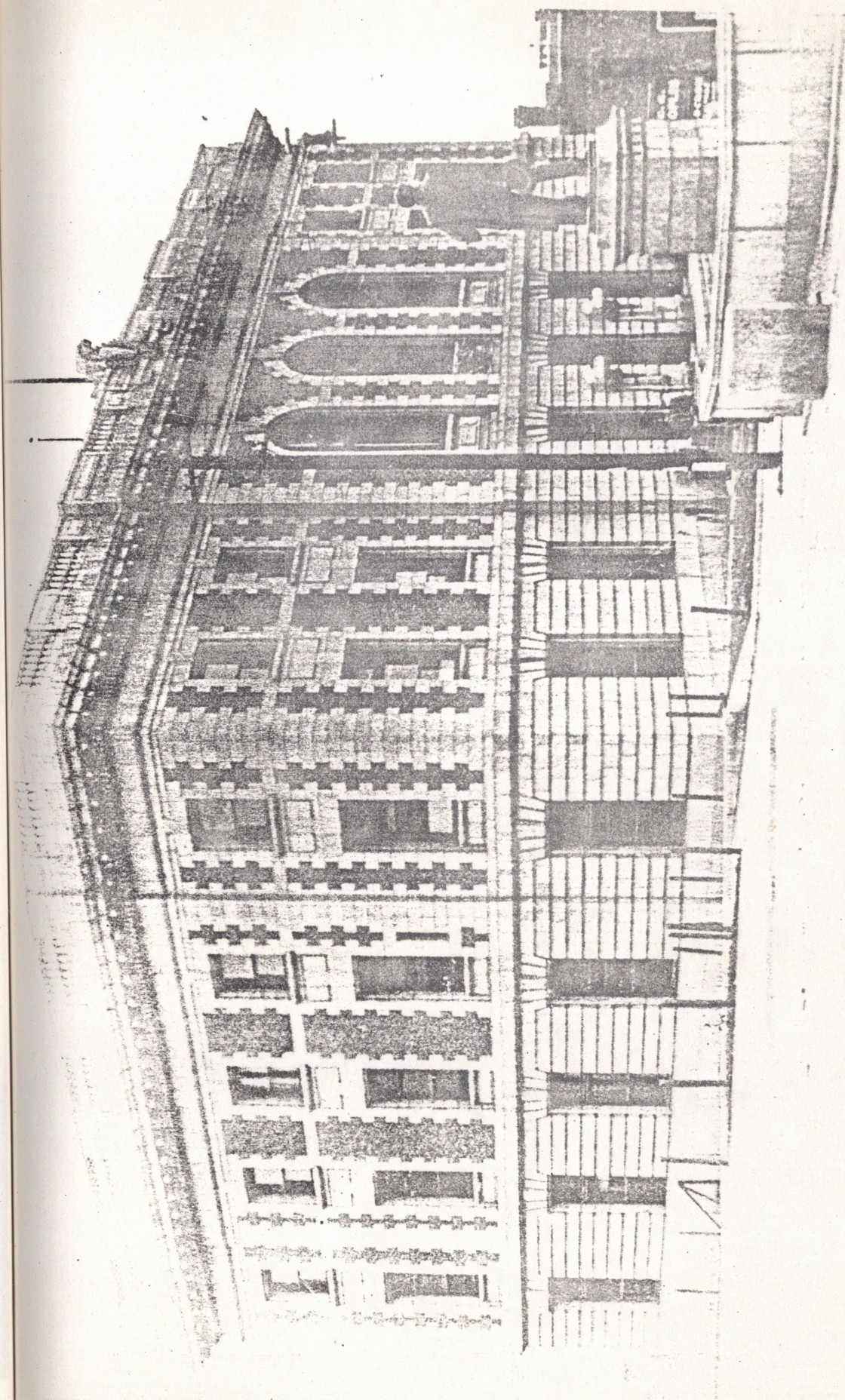
A Fire Station - built in 1900; presently houses the Butte Archives.
Block 11 of original townsite.



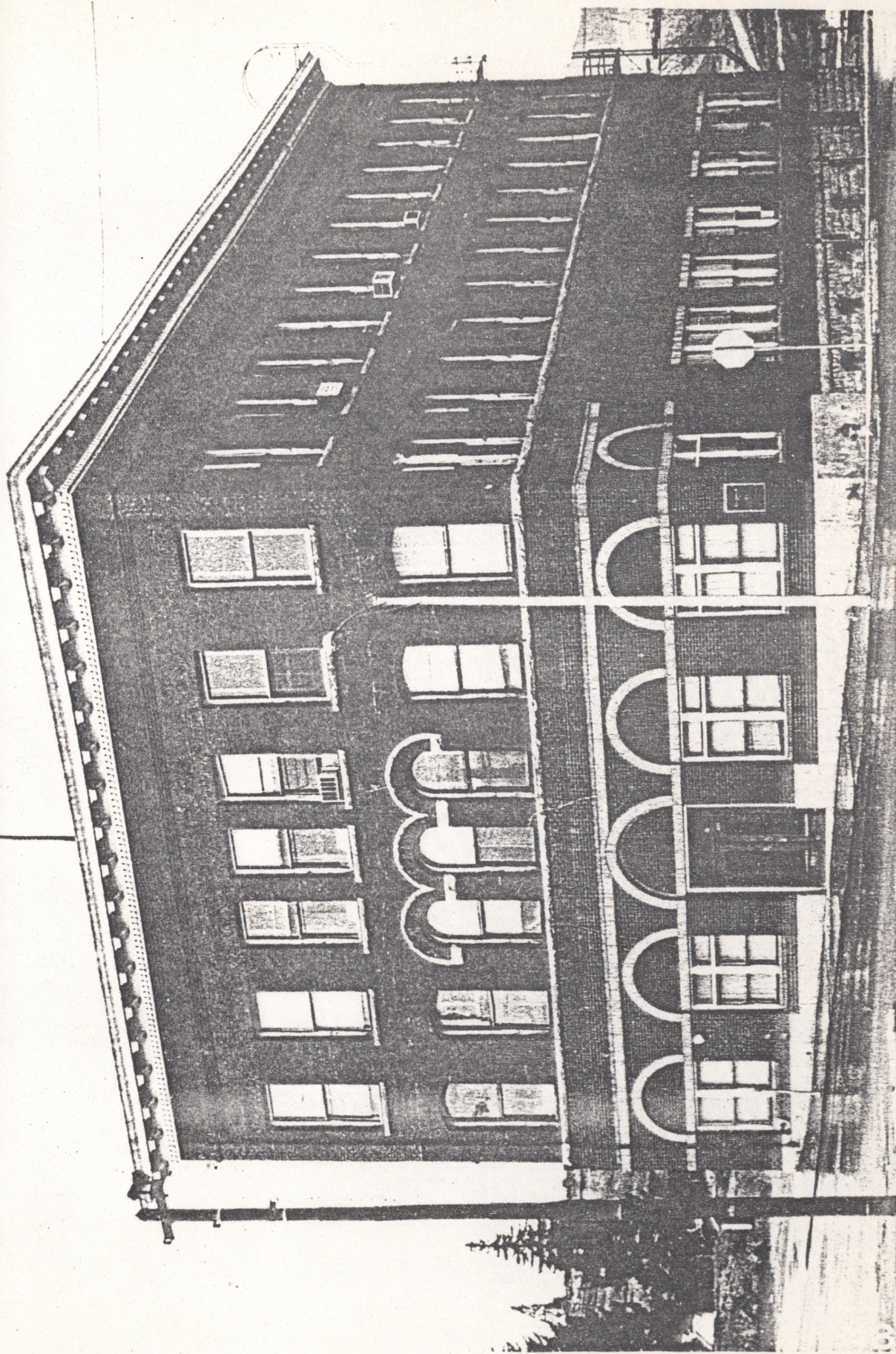
B Scott Block - furnished rooms; building permit issued Aug. 13, 1897
located in block 2 of original townsite



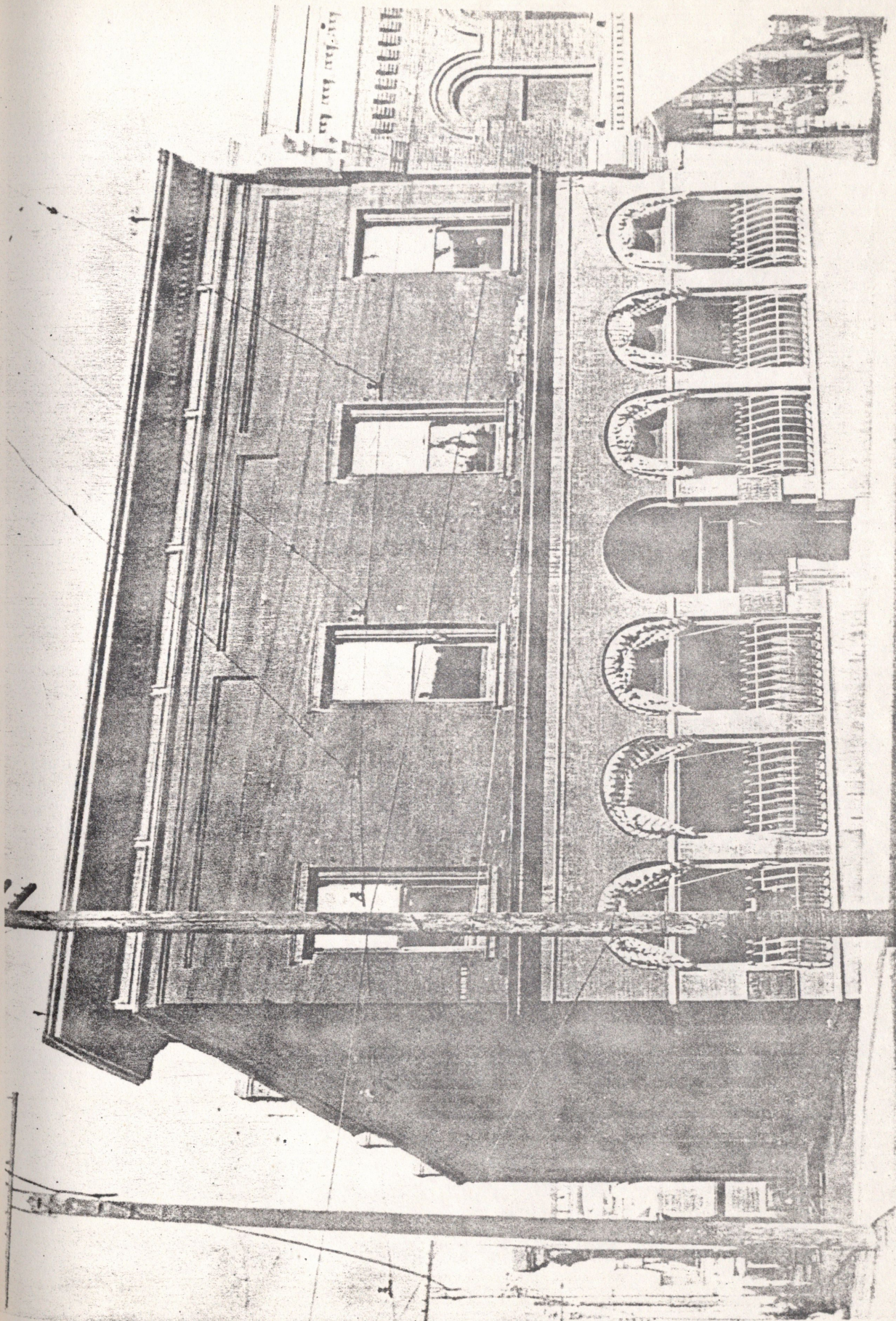
C Old Mortuary - actually 3 buildings; oldest third at the corner built May 1890. Wooden structure to the North built Oct. 1891 and served as grocery store. Furnished rooms in West third. As early as 1926, corner building was used by Dugran, the Undertaker; used as Beauty Salon in 1950s and as apartments today.



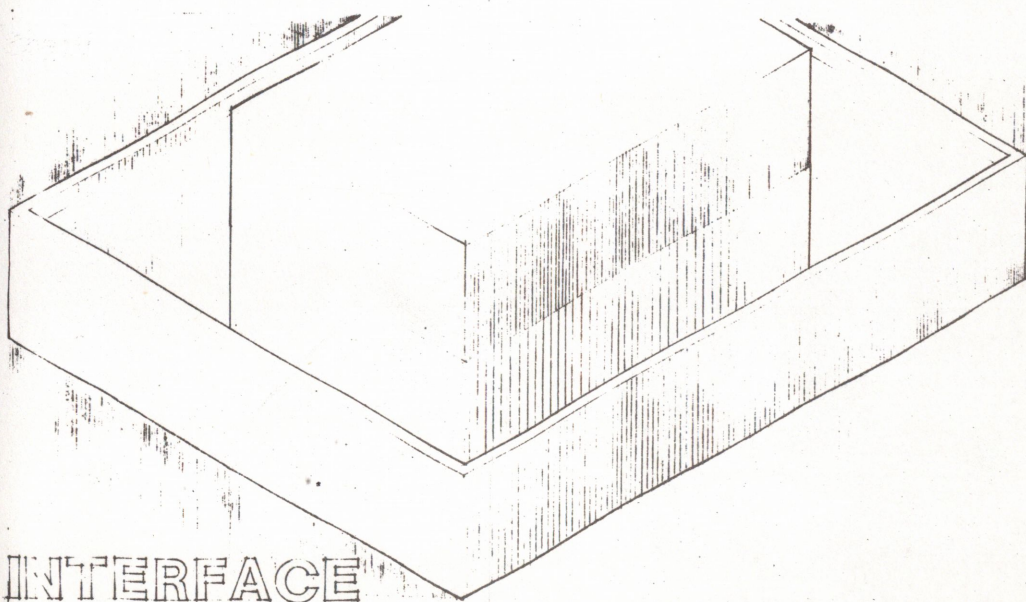
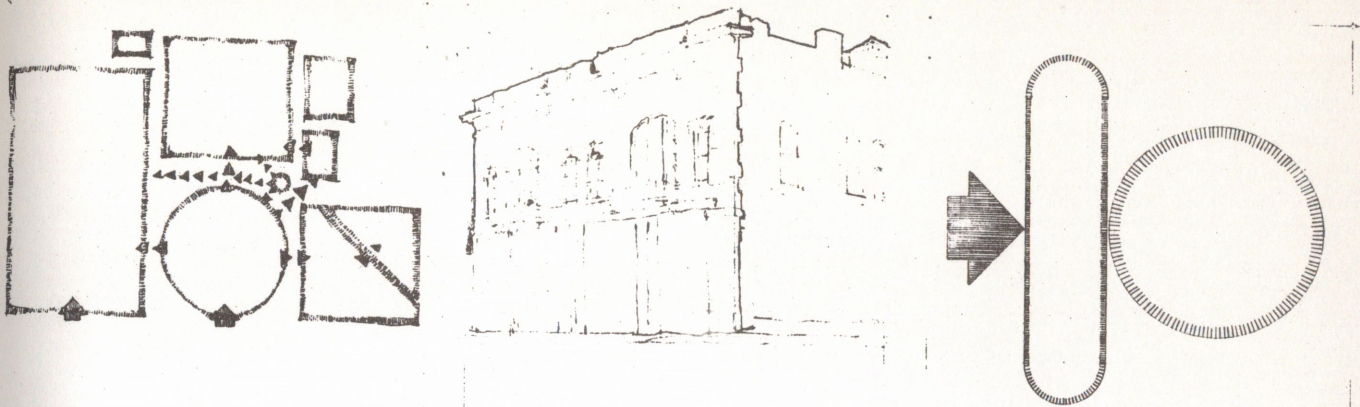
D Federal Building - building permit issued October 1902; ground broken Spring of 1903; official opening December 18, 1904. Addition in 1933. Block 1 of original townsite.



E Two story brick building built in 1900. April 27, 1911 addition by the Anaconda Company created a three story building. Block 12 of original townsite.

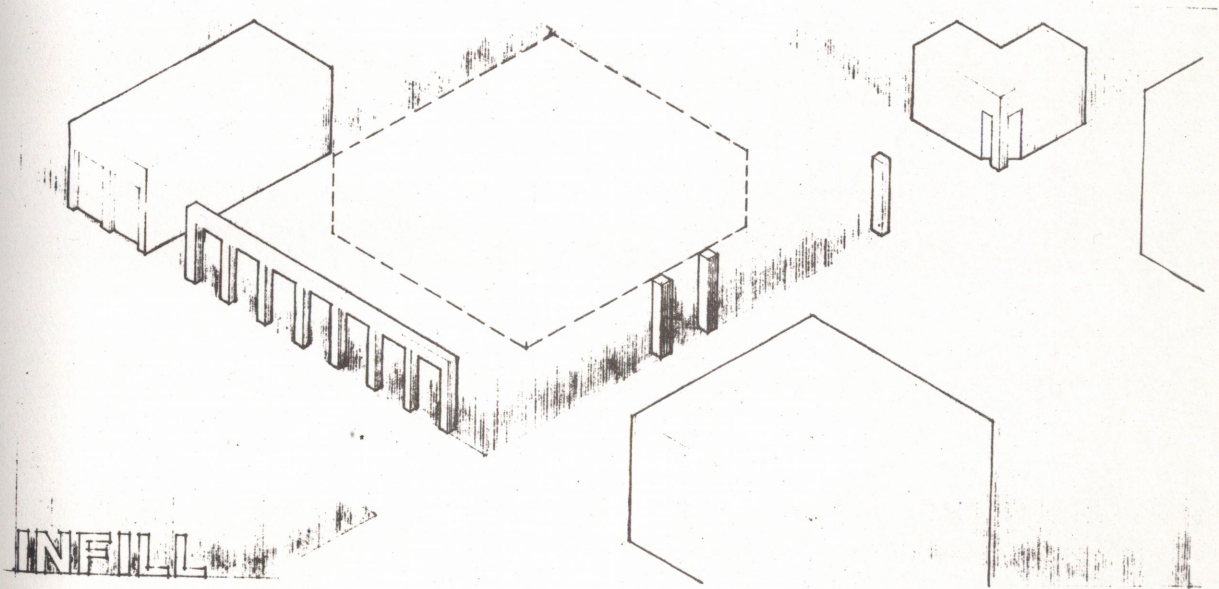
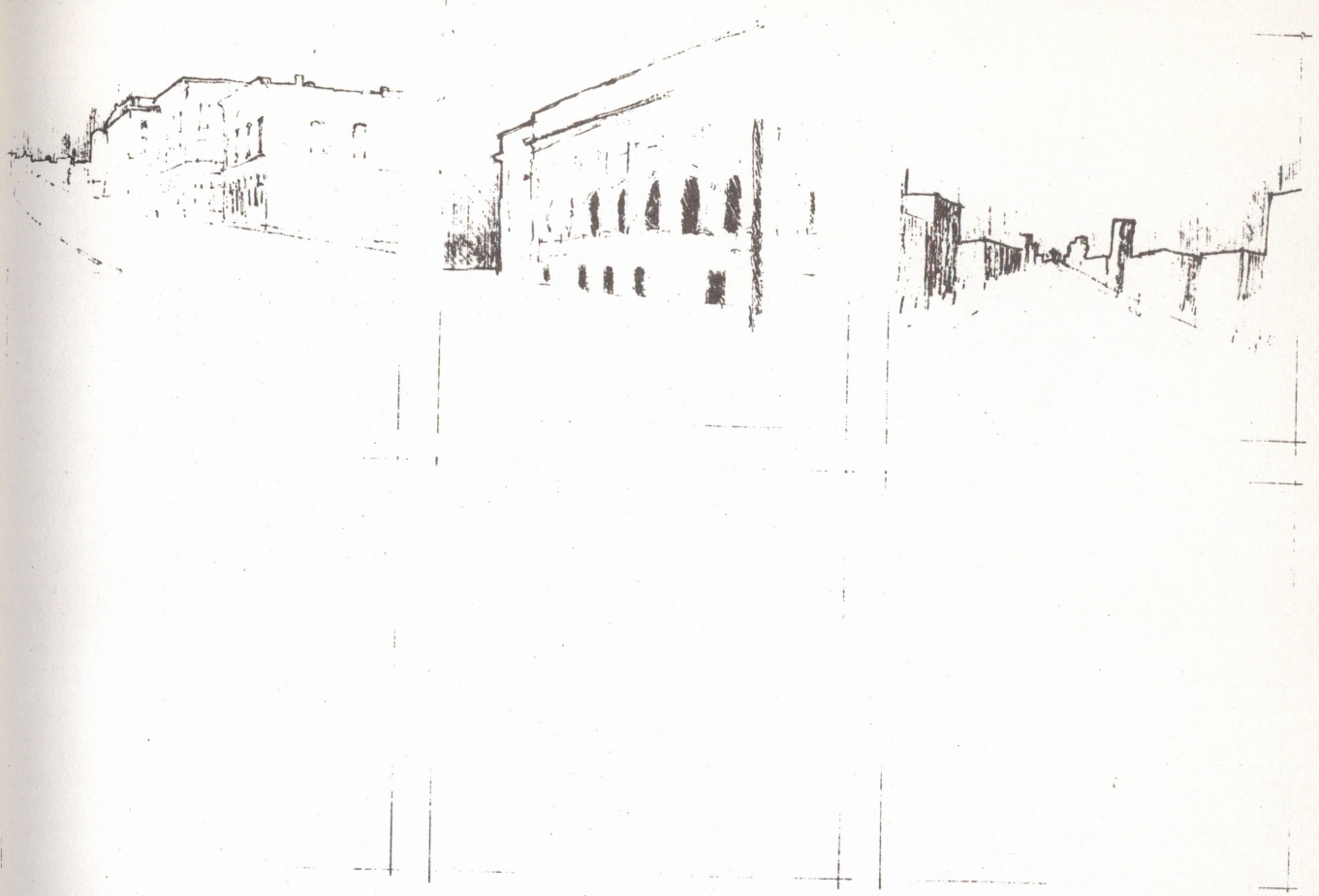


F Daly Bank Building - built in 1891; presently Anaconda Company offices. Block 14 of original townsite.

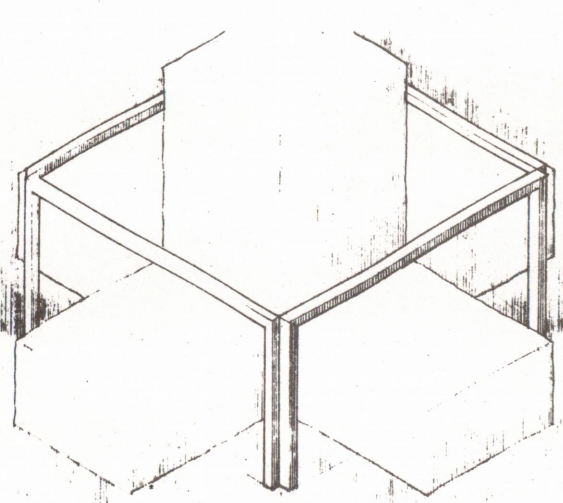
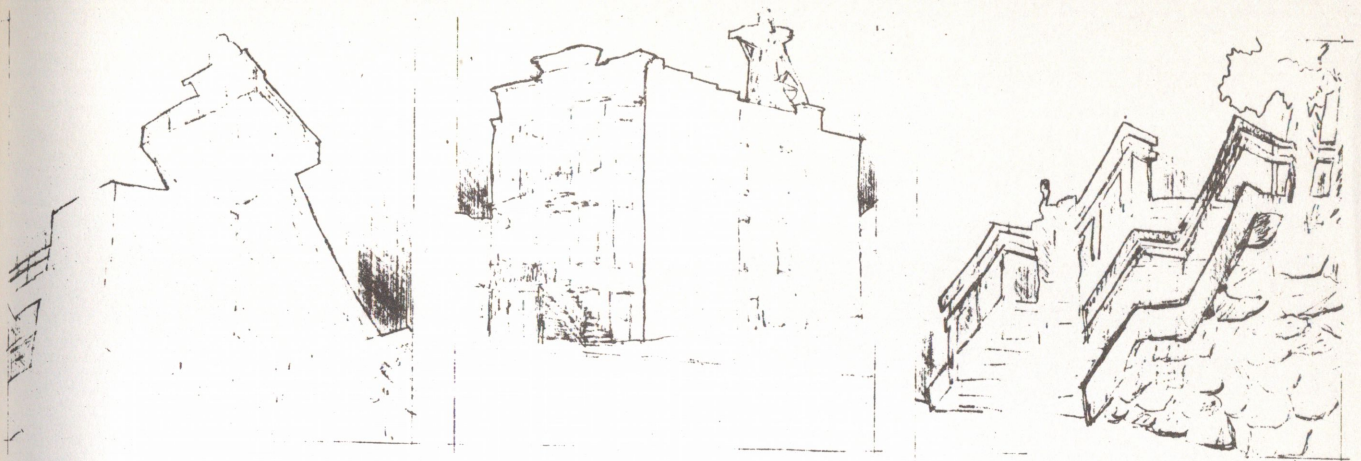


INTERFACE

CONCEPT



INFILL



INSIDE / OUT

CONCEPT

INTERFACE

INFILL

INSIDE/OUT

SCHEMATICS

DESIGN

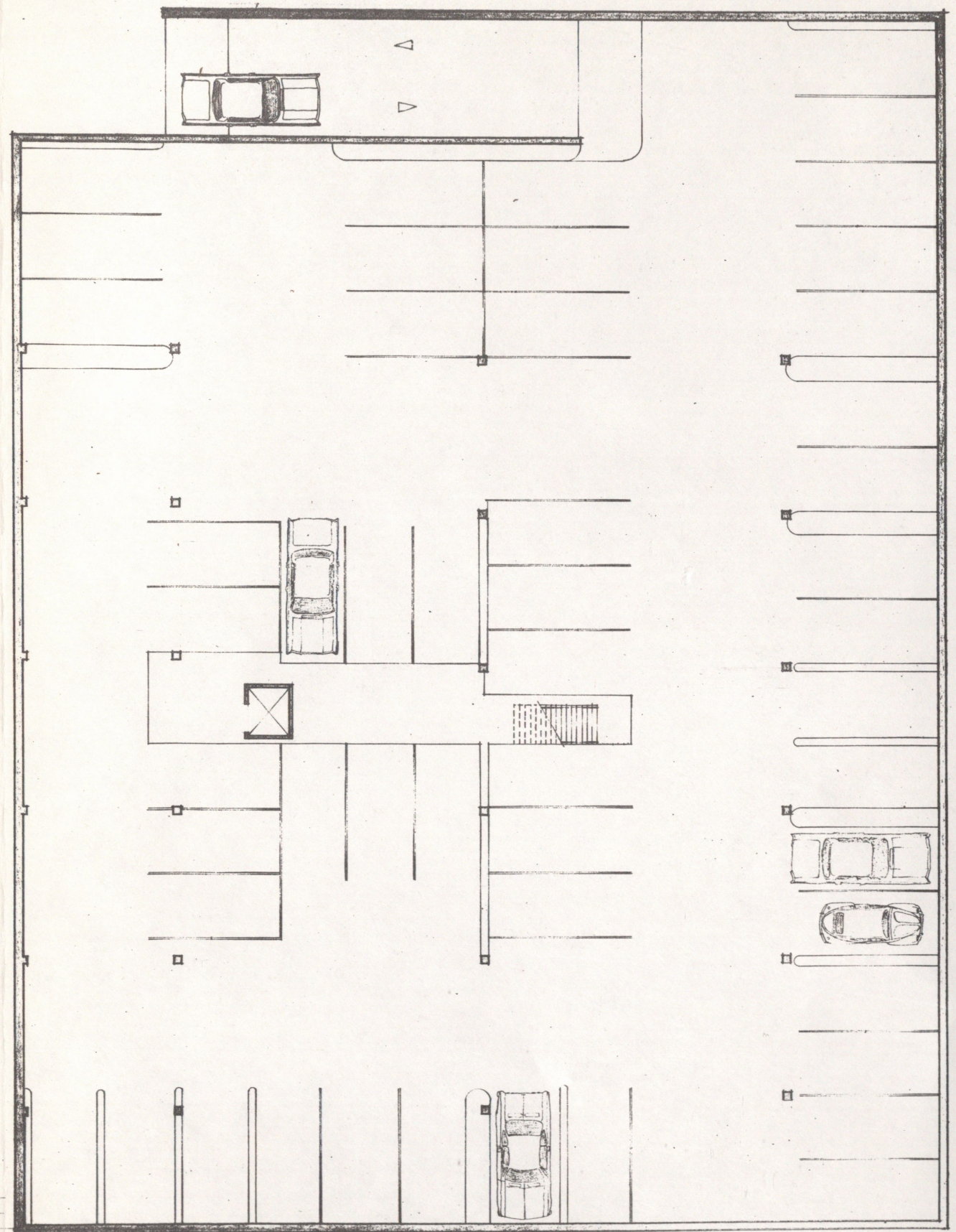
Design

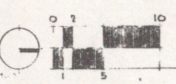
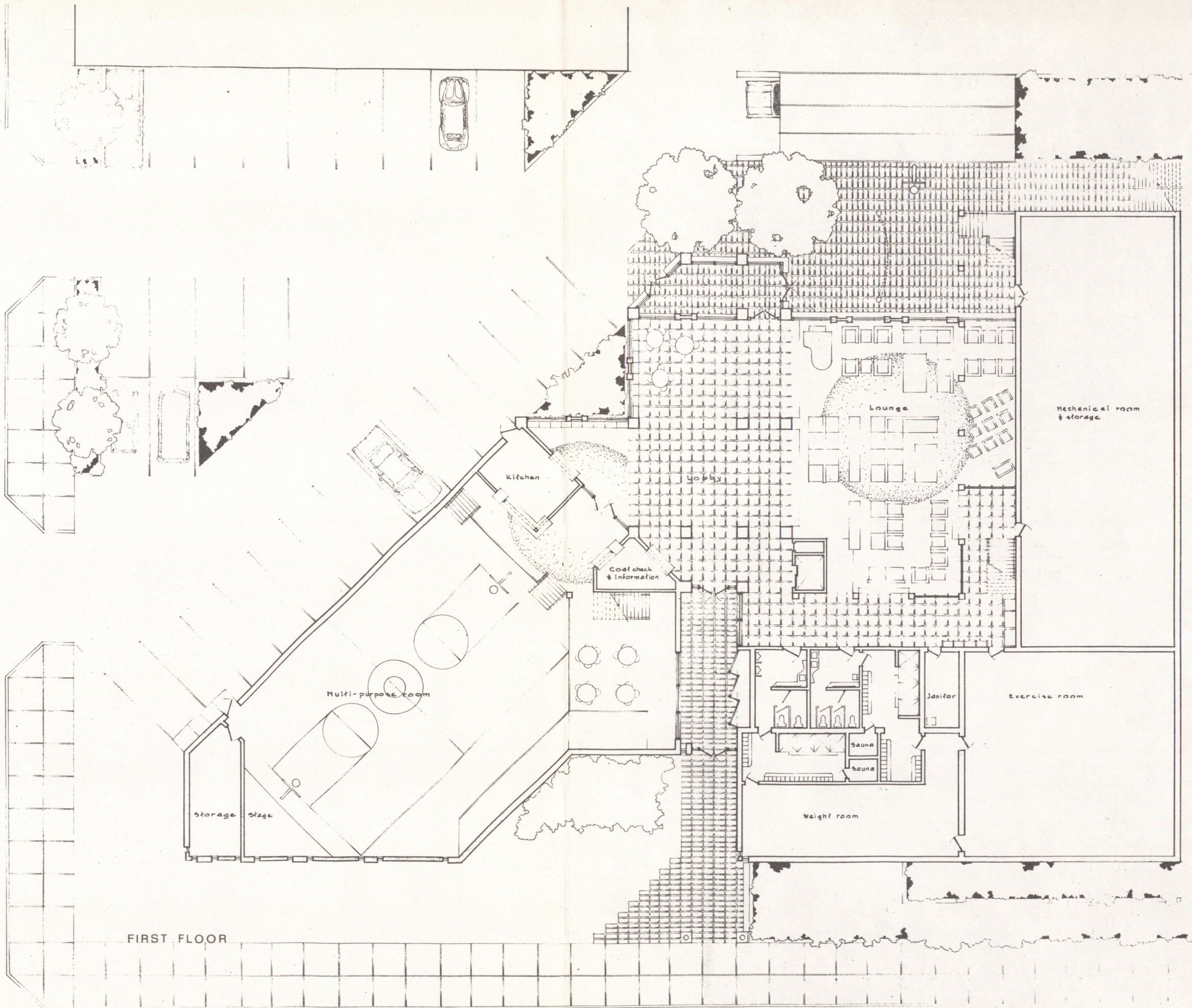
The major concept for the design utilizes the character of youth as a metaphor for the building. As an adolescent, a young person desires to be considered as an adult by the outside world, and yet paradoxically, is filled inwardly by a youthful energy, curiosity, and confusion. The design of a youth center addresses this paradox through establishing exterior elevations which respond to and harmonize with the context. Usage of bay windows which focus on key views from the building and stepping of the structure along Main Street are compatible with Butte's uptown area. On the interior, the various spaces are kept open by distinguishing areas with columns and level changes instead of walls. Balconies from the second level overlook the first floor. A transition from public to private spaces occurs from South to North as the building steps up the hill.

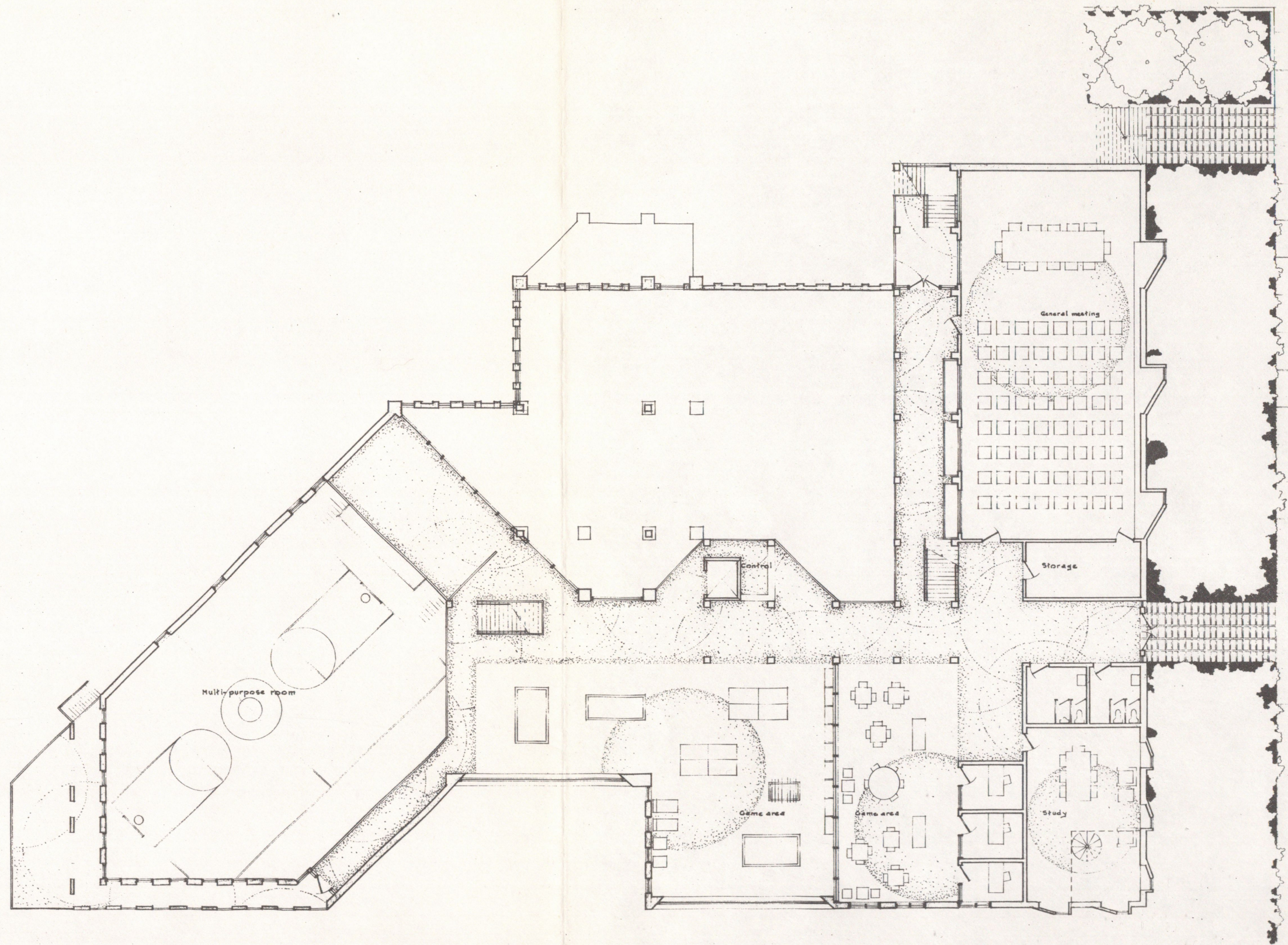
As one approaches the main entrance to the building one is directed along essentially a line created by paving tile, columns and walls broken occasionally by windows revealing various parts of the interior. As one enters the lobby the space widens into a two story area surrounded by columns supporting a skylight. Circulation to the various spaces of the buildings occurs off of this lobby area.

Major materials include brick for the exterior walls and granite stone used for walk ways and retaining walls. Copper roofing is also used in selected places to unify the facade and bring some human scale to the composition. Inside, wood beams and a combination of carpeting and quarry tile for the floor are added to the brick and granite.

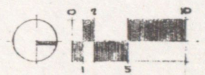
UNDERGROUND PARKING

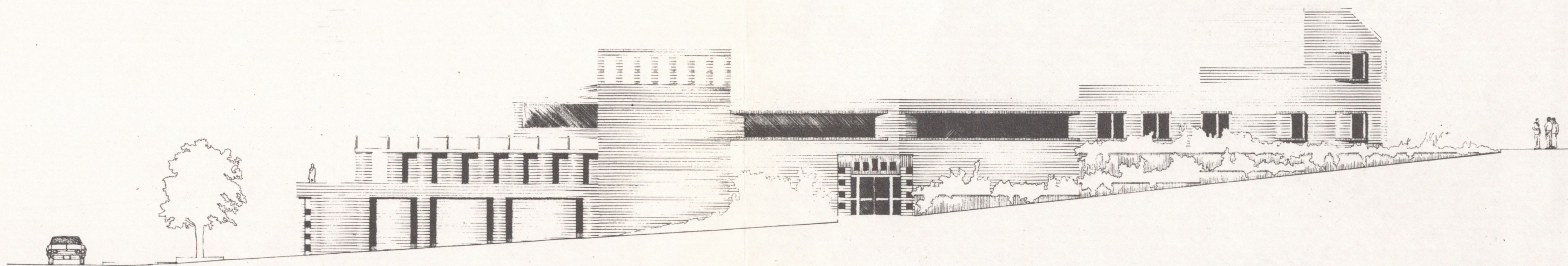




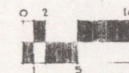


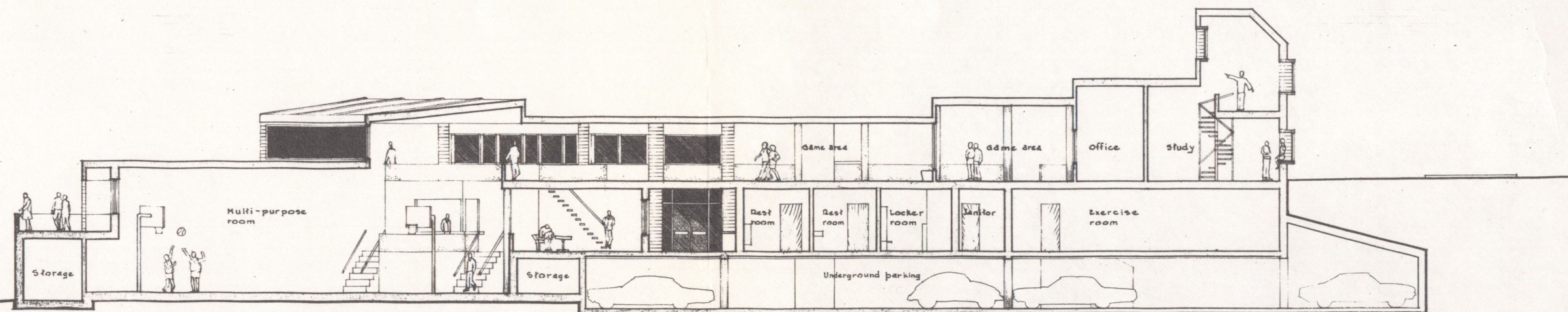
SECOND FLOOR



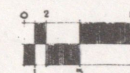


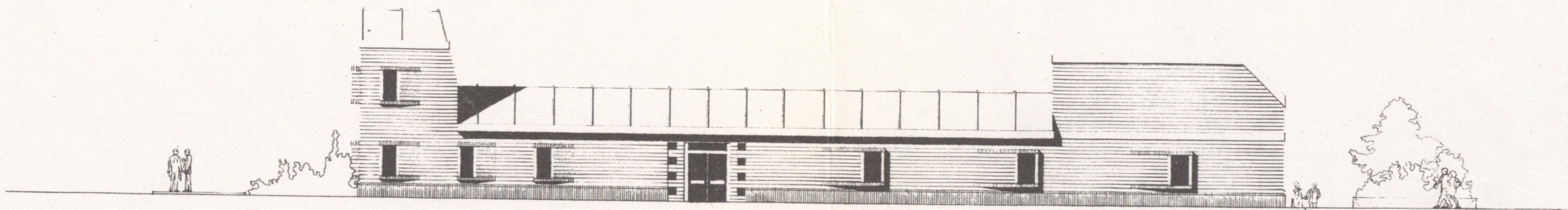
EAST ELEVATION



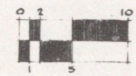


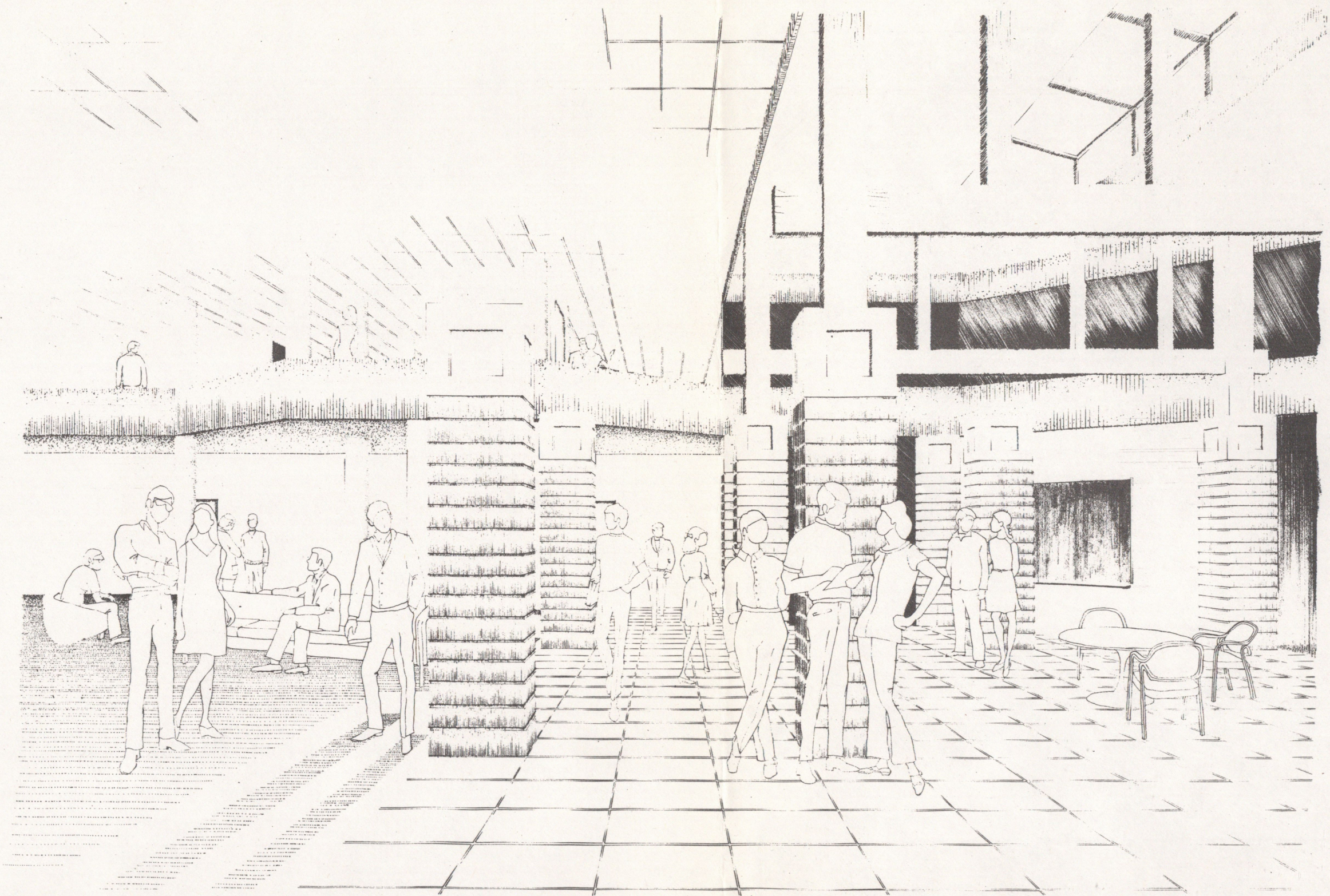
SECTION





NORTH ELEVATION





Appendix

Unlimited Building Code

Description of Occupancy- A3-Any building or portion of a building having an assembly room with an occupant load of less than 300 without a stage.

Fire resistance of exterior walls- 2 hours less than 5', 1 hour elsewhere.

Openings in exterior walls- Not permitted less than 5', protected less than 10'.

Basic allowable floor area for buildings one story in height-

F.R.- Unlimited II F.R.- 29,900 II 1 hour- 13,500
I N- 9,100 III 1 hour- 13,500 III N- 9,100 IV H.T.- 13,500
1 hour- 10,500 V N- 6,000

Maximum height of buildings-

F.R.- Unlimited II F.R.- 12 II 1 hour- 2 II N- 1
II 1 hour- 1 III N- 1 IV H.T.- 2 V 1 hour- 2 V N- 1

Requirements for group A occupancies-

A fire-resistive ceiling shall not be required in one-story buildings of Type II 1 hour, III 1 hour, IV or V 1 hour construction having an open frame roof.

Occupancies located in a basement or above the first story shall be of not less than 1 hour fire resistive construction.

Buildings shall front directly upon or have access to a public street not less than 20' in width. The access to the public street shall be a minimum 20' wide right-of-way, unobstructed and maintained only as access to the public street. The main entrance to the building shall be located on the public street or on the access way.

All enclosed portions customarily used by human beings and all dressing rooms shall be provided with natural light by means of exterior glazed openings with an area not less than one-tenth of the total floor area, and natural ventilation by means of openable exterior openings with an area of not less than one-twentieth of the total floor area or shall be provided with artificial light and a mechanically operated ventilating system. The mechanically operated ventilating system shall supply a minimum of 5 cubic feet per minute of outside air with a total circulated of not less than 15 cubic feet per minute per occupant in all portions of the building and such system shall be kept continuously in operation during such time as the building is occupied. If the velocity of the air at the register exceeds 10' per second, the register shall be placed more than 8' above the floor directly beneath.

Exit lighting in portions of buildings other than the stage shall be on a separate circuit from that of the stage. Such exit lighting shall be controlled from a central control center located in a portion of the building other than the stage. All lights in corridors, exit courts and passage ways shall be protected by a wire cage.

There shall be provided in an approved location at least one lavatory for each two water closets for each sex, and at least one drinking fountain for each floor level.

Flammable liquids shall not be placed or stored in any Group A occupancy.

All exterior openings in a boiler room or room containing central heating equipment if located below openings in another story or if less than 10' from other doors or windows of the same building shall be protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic or self-closing. Every room containing a boiler or central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation.

Exits required-

Every building or usable portion thereof shall have at least one exit and shall have not less than two exits. In all occupancies, floors above the first story having an occupant load of more than 10 shall have not less than two exits.

Each mezzanine used for other than storage purposes, if greater in area than 2000 sq. ft. or if more than 60' in any dimension, shall have not less than two stairways to an adjacent floor.

Basements and occupied roofs shall be provided with exits as required for stories. Floors above the second story and basements shall have not less than two exits except when such floors or basements are used exclusively for the service of the building.

The total width of exits in feet shall be not less than the total occupant load served divided by 50.

If only two exits are required they shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between exits.

The maximum distance of travel from any point to an exterior exit door, horizontal exit, exit passageway or an enclosed stairway in a building not equipped with an automatic sprinkler system throughout shall not exceed 150' or 200' in a building equipped with an automatic sprinkler system throughout. These distances may be increased 100' when the last 150' is within a corridor.

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

Foyers, lobbies and reception rooms constructed as required for corridors shall not be construed as intervening rooms. Main exits from buildings requiring access by the physically handicapped shall be usable by individuals in wheelchairs and be on a level that would make the elevators accessible where provided.

Doors-

Exit doors shall swing in the direction of exit travel when serving any hazardous area or when serving an occupant load of 50 or more.

Exit doors shall be openable from the inside without use of a key or any special knowledge or effort.

Stairways-

Stairways serving an occupant load of more than 50 shall be not less in width than 44 inches. Stairways serving an occupant load of 50 or less may be 36 inches wide. Handrails may project into the required width a distance of $3\frac{1}{2}$ inches from each side of a stairway. Other non-structural projections such as trim and similar decorative features may project into required width $1\frac{1}{2}$ inches on each side.

The rise of every step in a stairway shall be not less than 4 inches nor greater than $7\frac{1}{2}$ inches. The run shall be not less than 10 inches as measured horizontally between the vertical planes of the furthestmost projection of adjacent treads.

Circular stairs may be used as an exit, provided the minimum width of run is not less than 10 inches and the smaller radius is not less than twice the width of the stairway. Every landing shall have a dimension measured in the direction of travel equal to the width of the stairway. Such dimension need not exceed 4' when the stair has a straight run. A door swinging over a landing shall not reduce the width of the landing to less than one-half its required width at any position in its swing nor by more than 7" when fully open.

There shall not be more than 12' vertically between landings.

Stairways shall have handrails on each side, and every stairway required to be more than 88 inches in width shall be provided with not less than one intermediate handrail for each 88 inches of required width.

Handrails shall be placed not less than 30 inches nor more than 34 inches above the nosing of treads. They shall be continuous the full length of the stairs and at least one handrail shall extend not less than 6 inches beyond the top and bottom risers, and ends shall be returned or shall terminate in newel posts or safety terminals.

Handrails projecting from a wall shall have a space of not less than $1\frac{1}{2}$ inches between the wall and the handrail. The hand grip portion of handrails shall be not less than $1\frac{1}{4}$ " nor more than 2 inches in cross-sectional dimension and shall have a smooth surface with no sharp corners.

Every required stairway shall have a headroom clearance of not less than 6'-6".

Ramps-

The width of ramps shall be as required for stairways. Required ramps shall not exceed a slope of one vertical to 12 horizontal. The slope of other ramps shall not exceed one vertical to 8 horizontal. Ramps having slopes greater than one vertical to 15 horizontal shall have landings at the top and bottom and at least one intermediate landing shall be provided for each 5' of rise. Top landings and intermediate landings shall have a dimension measured in the direction of ramp run of not less than 5'. Landings at the bottom of ramps shall have a dimension in the direction of ramp run of not less than 6 feet.

Doors in any position shall not reduce the minimum dimension

of the landing to less than 42 inches and shall not reduce the required width by more than 3½ inches when fully open.

Minimum egress and access requirements-

Minimum of two exits other than elevators are required where number of occupants is over 50

Use 7 and 15 sq. ft. per occupant to determine load.

Access by means of a ramp or an elevator must be provided for the physically handicapped.

Skylights-

All skylights, the glazing of which is set at an angle of less than 45 degrees from the horizontal, shall be mounted at least 4" above the plane of the roof on a curb constructed as required for the frame.

Spacing between supports in one direction for flat wired glass in skylights shall not exceed 25 inches. Corrugated wired glass may have supports 5' apart in the direction of the corrugation.

Elevators-

At least one elevator car shall have a minimum inside car platform of 6'-8" wide by 4'-3" deep with a minimum clear opening width of 42" unless otherwise designed to provide equivalent utility to accommodate an ambulance stretcher (min. size 22" by 78") in its horizontal position.

Energy- general techniques

A public building receives a majority of its heat from artificial lighting and people. Therefore, most of this energy analysis has dealt with means of allowing natural light into the building, and of conserving the energy already produced within the building. Due to site and local code constraints forcing some underground parking, intensive use of underground architecture would not be possible.

DR	RS	NO.	PARAMETER DESCRIPTION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	POR	NO.
12	4383		ABS MAX TMP (F)	54	60	64	79	88	93	100	99	91	83	68	62	100	29	-613
12	4383		MEAN MAX TMP (F)	28	33	39	51	61	68	80	78	68	56	40	33	53	29	-113
12	4382		MEAN MIN TMP (F)	2	6	14	26	34	40	45	43	35	27	15	8	25	29	-113
12	4382		ABS MIN TMP (F)	-48	-52	-36	-13	12	23	29	26	12	-19	-42	-37	-52	29	-613
12	4383		MEAN NO DYS TMP = DR GTR 50(F)	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.9	0.2	0.0	0.0	0.0	2.6	12	4383
12	4383		MEAN NO DYS TMP = DR LES 32(F)	30.3	27.6	30.8	26.7	14.6	3.7	0.6	0.6	12.2	26.1	28.6	30.7	232.5	12	4383
12	4382		MEAN NO DYS TMP = DR LES 0(F)	14.6	9.3	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	8.4	44.3	12	4383
12	4382		MEAN DEW PT TMP (F)	7	12	15	23	32	36	41	38	32	26	18	12	25	12	104662
12	4202		MEAN REL HUM (PCT)	71	71	69	61	60	61	51	51	55	61	68	70	62	12	104640
12	4160		MEAN PRESS ALT (FT)	5366	5379	5459	5494	5538	5535	5532	5530	5492	5466	5387	5365	5462	0	-50
12	4129		MEAN PRECIP (IN)	0.42	0.44	0.64	0.90	1.70	2.47	1.19	1.04	1.03	0.67	0.49	0.48	11.5	29	-113
12	4126		MEAN SNOW FALL (IN)	7.1	7.2	9.2	5.4	4.2	0.4	0.0	0.0	1.1	2.7	6.0	7.6	50.9	29	-113
12	4202		MEAN NO DYS PRCP = DR GTR 0.1 IN	1.5	1.5	1.8	2.5	4.5	4.9	2.8	2.5	2.3	1.8	1.6	1.6	29.3	29	-29
12	4160		MEAN NO DYS SNEL = DR GTR 1.5 IN	1.6	1.6	3.1	1.1	1.1	0.2	0.0	0.0	0.2	0.9	1.4	1.8	13.0	12	4379
12	4129		MEAN NO DYS W/TCUR VSBY LES 1/2 MI	1.2	2.0	1.8	0.2	0.5	0.1	0.0	0.0	0.5	0.6	1.1	1.2	9.2	12	4371
12	4126		MEAN NO DYS TSMTS	0.0	0.0	0.3	1.0	5.4	9.2	10.6	10.1	2.8	0.2	0.1	0.0	39.7	12	4383
12	4383		P FREQ WND SPD = DR GTR 17 KTS	8.1	8.9	9.6	13.9	11.0	9.0	6.2	5.7	6.3	7.8	6.9	6.8	8.4	12	104736
12	4383		P FREQ WND SPD = DR GTR 29 KTS	0.6	0.6	0.6	0.8	0.6	0.4	0.3	0.1	0.2	0.5	0.6	0.4	0.5	12	104736
12	4282		P FREQ LES 5000 FT A/D LES 5 MI	23.8	26.0	25.7	23.0	23.6	18.8	4.5	2.9	12.7	16.2	21.7	20.5	13.3	12	104791
12	4382		P FREQ LES 1500 FT A/D LES 3 MI	3.7	7.8	5.9	5.0	4.5	1.6	0.1	0.4	2.0	3.0	4.3	3.8	3.5	12	13091
12	4383		FDR 00-02 LST	3.0	7.0	7.0	5.4	5.9	2.2	0.4	0.4	3.8	5.0	4.1	5.1	4.2	12	13104
12	4382		03-05 LST	4.2	7.1	8.5	6.0	6.0	2.0	0.4	0.3	3.2	4.8	4.5	4.0	4.3	12	13102
12	4382		06-08 LST	4.7	5.0	5.8	5.2	3.3	1.2	0.4	0.0	2.0	2.1	2.8	3.6	3.0	12	13104
12	4382		09-11 LST	3.3	3.4	5.6	3.3	2.2	0.7	0.3	0.0	1.6	1.8	4.0	2.4	2.4	12	13095
12	4383		12-14 LST	4.2	2.5	5.4	0.6	2.2	0.1	0.0	0.1	1.7	2.5	3.2	2.0	2.0	12	13097
12	4383		15-17 LST	2.8	3.6	5.9	2.4	2.1	0.6	0.1	0.2	1.5	1.9	2.4	2.7	2.2	12	13101
12	4382		18-20 LST	3.4	5.1	5.5	3.2	3.4	1.1	0.0	0.1	1.8	2.0	2.9	3.2	2.6	12	13106
12	4302		21-23 LST															
12	4383		P FREQ LES 300 FT A/D LES 1 MI	0.9	2.9	1.3	1.1	0.6	0.0	0.0	0.1	0.1	0.6	0.8	1.3	0.8	12	13091
12	4383		FDR 00-02 LST	0.5	2.9	2.3	1.2	1.0	0.3	0.2	0.0	0.3	2.2	1.5	1.6	1.2	12	13104
12	4382		03-05 LST	0.8	3.0	2.9	1.2	1.9	0.6	0.1	0.0	1.2	1.6	1.0	1.3	1.3	12	13102
12	4382		06-08 LST	1.0	1.5	1.4	0.9	0.5	0.1	0.0	0.0	0.6	0.1	1.0	0.9	0.7	12	13104
12	4382		09-11 LST	1.2	0.8	1.9	1.0	0.2	0.0	0.0	0.0	0.3	0.3	0.6	0.4	0.6	12	13095
12	4382		12-14 LST	1.1	0.4	1.5	0.0	0.4	0.0	0.0	0.0	0.4	0.4	0.8	0.4	0.5	12	13097
12	4382		15-17 LST	0.8	0.1	1.6	0.3	0.2	0.1	0.0	0.0	0.2	0.0	0.4	0.4	0.3	12	13101
12	4382		18-20 LST	1.0	0.9	1.3	0.5	0.4	0.0	0.0	0.0	0.2	0.0	0.5	1.0	0.5	12	13106
12	4382		21-23 LST															

PARAMETER DESCRIPTION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	POR	NO.
CIG = GTR 1000 FT AND VSBY = GTR 3 MI		17 LST 29.6	27.3	29.5	29.9	30.3	30.0	31.0	31.0	29.7	30.5	29.2	30.3	359.3	12	4372
		23 LST 29.9	26.5	29.4	29.3	30.2	30.0	31.0	31.0	29.6	30.5	29.3	30.0	356.7	12	4372
		05 LST 30.3	26.1	28.7	28.5	29.5	29.8	30.8	30.9	29.3	29.5	29.1	29.6	352.1	12	4371
		11 LST 29.6	25.4	29.2	28.5	30.3	29.9	31.0	29.6	30.4	29.3	29.3	29.9	355.1	12	4371
CIG = GTR 2000 FT AND VSBY = GTR 3 MI W/SFC WND LES 10 KTS		17 LST 19.0	14.9	13.9	9.8	11.7	10.9	12.9	12.2	11.6	12.8	15.3	18.3	163.3	12	4372
		23 LST 24.1	19.8	23.0	20.2	20.4	22.0	23.7	25.0	25.2	25.4	23.3	24.2	276.3	12	4372
		05 LST 23.9	21.4	23.7	23.6	25.1	26.8	29.3	30.3	26.7	20.1	24.2	24.8	306.1	12	4371
		11 LST 23.6	20.0	22.7	17.6	16.9	19.8	23.8	25.6	22.7	22.8	21.7	23.9	261.1	12	4371
SFC WND = GTR 17 KTS AND NO PRECIP.		17 LST 3.8	4.1	6.5	8.1	7.6	5.9	4.8	4.0	4.9	6.1	3.3	3.2	62.5	12	4209
		23 LST 2.0	2.4	1.0	2.4	1.6	0.8	0.6	0.7	0.4	1.1	1.1	1.6	15.7	12	4158
		05 LST 1.6	1.2	1.8	1.3	0.8	0.3	0.0	0.0	0.3	0.3	0.9	1.1	9.6	12	4110
		11 LST 2.1	2.5	2.5	4.4	4.0	2.4	1.3	0.8	2.0	2.4	1.4	2.0	28.8	12	4158
SFC WND 4-10 KTS AND TMP 33-89 DEG F AND NO PRECIP.		17 LST 2.7	4.1	6.8	9.0	11.8	11.0	14.0	13.1	12.0	11.0	9.5	4.3	109.3	12	4209
		23 LST 2.0	1.6	2.9	8.8	18.4	18.7	20.4	20.0	17.6	11.5	4.1	2.2	128.2	12	4158
		05 LST 1.2	1.7	1.7	5.1	11.5	12.5	14.7	16.6	10.0	6.3	2.6	1.5	85.4	12	4110
		11 LST 1.2	2.0	3.8	7.7	13.8	13.9	14.3	14.0	11.3	8.1	5.1	2.0	97.2	12	4158
SKY COVER LES 3/10 AND VSBY = GTR 3 MI		17 LST 4.2	4.3	4.5	4.1	3.7	3.1	8.6	6.9	8.9	8.3	5.3	3.9	65.8	12	4372
		23 LST 8.7	7.8	9.6	9.5	10.2	11.3	19.6	17.4	16.3	14.5	9.5	9.2	143.6	12	4372
		05 LST 8.6	7.4	9.5	9.3	9.8	11.3	20.4	20.9	17.2	13.8	10.0	9.5	147.7	12	4369
		11 LST 5.6	5.3	5.9	6.2	6.1	8.7	18.2	16.5	12.8	10.4	5.7	4.9	106.3	12	4369
CIG = GTR 2500 FT AND VSBY = GTR 3 MI		17 LST 29.4	27.2	28.9	29.4	29.7	29.6	30.9	30.9	29.1	29.8	28.8	30.2	353.9	12	4372
		23 LST 29.0	25.8	28.9	28.2	28.7	29.1	30.9	30.9	28.9	29.4	28.3	29.7	347.8	12	4372
		05 LST 29.6	25.4	27.4	27.7	27.6	28.2	30.3	30.8	28.2	28.6	28.0	28.6	340.6	12	4371
		11 LST 29.2	26.3	29.1	28.1	28.9	28.2	30.8	30.9	28.7	29.2	28.9	29.7	348.0	12	4371
CIG = GTR 6000 FT AND VSBY = GTR 3 MI		17 LST 20.5	18.1	19.3	20.5	21.6	22.9	29.1	29.2	25.5	25.1	21.6	21.1	273.5	12	4372
		23 LST 21.6	18.7	22.6	22.7	22.8	23.6	29.0	29.3	25.8	25.1	21.3	22.3	284.8	12	4372
		05 LST 20.9	16.7	19.2	20.5	21.1	22.3	29.1	30.1	24.8	23.6	21.4	20.7	270.4	12	4371
		11 LST 21.8	19.1	20.3	19.0	20.0	21.2	28.3	30.0	24.5	24.6	21.7	21.5	272.2	12	4371
CIG = GTR 10000 FT AND VSBY = GTR 3 MI		17 LST 15.6	14.2	13.6	14.4	13.5	14.3	22.2	22.9	21.6	21.1	18.2	17.0	208.6	12	4372
		23 LST 18.1	15.6	18.2	19.6	19.2	19.9	27.2	27.4	23.3	22.5	17.6	18.9	247.5	12	4372
		05 LST 15.8	13.5	16.5	16.5	17.1	20.0	27.7	28.6	22.5	21.5	18.8	17.8	236.5	12	4371
		11 LST 18.2	15.8	17.0	16.0	16.6	17.5	26.3	28.0	22.6	21.3	18.8	17.9	236.0	12	4371

P FREQ

CLIMATOLOGICAL DATA FOR

BUTTE

LAT: 46.00

LONG: 112.50

ELEV: 1749(M)

TEMPERATURE AVERAGES BY MONTH

*** DEGREES CELSIUS ***

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

DAILY AVERAGE											
-9.4	-6.2	-3.6	3.2	8.2	12.2	16.8	15.7	10.3	5.1	-2.3	-7.1
DAILY MAXIMUM											
-2.3	.4	3.9	10.5	15.9	19.9	26.7	25.6	19.7	13.5	4.6	.3
DAILY MINIMUM											
-16.9	-14.7	-10.2	-3.5	.8	4.5	7.3	5.8	1.6	-2.9	-9.4	-13.5
EXTREME MAXIMUM											
12.2	15.6	17.8	26.1	31.1	33.9	37.8	37.2	32.8	28.3	20.0	16.7
EXTREME MINIMUM											
-44.4	-46.7	-37.8	-25.0	-11.1	-5.0	-1.7	-3.3	-11.1	-28.3	-41.1	-38.3
HEATING DEGREE DAYS(18C)											
859	686	678	455	313	187	66	92	242	411	618	788

CLIMATOLOGICAL DATA FOR

BUTTE

LAT: 46.00

LONG: 112.50

ELEV: 5755(FT)

TEMPERATURE AVERAGES BY MONTH

*** DEGREES FAHRENHEIT ***

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

DAILY AVERAGE											
15.1	20.9	25.6	37.7	46.8	53.9	62.2	60.3	50.6	41.1	27.9	19.2
DAILY MAXIMUM											
27.8	32.7	39.1	50.9	60.7	67.9	80.0	78.0	67.5	56.3	40.3	32.5
DAILY MINIMUM											
1.5	5.5	13.7	25.7	33.5	40.1	45.1	42.5	34.8	26.8	15.0	7.7
EXTREME MAXIMUM											
54.0	60.0	64.0	79.0	88.0	93.0	100.0	99.0	91.0	83.0	68.0	62.0
EXTREME MINIMUM											
-48.0	-52.0	-36.0	-13.0	12.0	23.0	29.0	26.0	12.0	-19.0	-42.0	-37.0
HEATING DEGREE DAYS(65F)											
1547	1235	1221	819	564	337	119	166	437	741	1113	1420

BUTTE, 1977																
YEAR ROUND(240)									HEATING SEASON(186)							
-----									-----							
CLOUDY DAYS	1	2	3	4	5	6	7	>7	1	2	3	4	5	6	7	>7
-----									-----							
OCCURENCES	16	4	4	0	0	0	0	0	11	3	4	0	0	0	0	0
-----									-----							

BUTTE, 1978																
YEAR ROUND(199)									HEATING SEASON(199)							
CLOUDY DAYS	1	2	3	4	5	6	7	>7	1	2	3	4	5	6	7	>7
OCCURENCES	20	6	3	0	1	0	0	0	20	6	3	0	1	0	0	0

BUTTE, 1979																
YEAR ROUND(302)									HEATING SEASON(225)							
-----									-----							
CLOUDY DAYS	1	2	3	4	5	6	7	>7	1	2	3	4	5	6	7	>7
-----									-----							
OCCURENCES	18	3	0	0	0	1	0	0	18	3	0	0	0	1	0	0
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SOLAR RADIATION DATA for: BUTTE, MONTANA 1977

Montana Department of Natural Resources and Conservation
compiled by: Fowlkes Engineering, Bozeman, Mt.

MONTH	DAILY AVERAGE KWH/SH/DAY	PER CENT TOTAL ENERGY ABOVE THRESHOLD (KW/SH)											
		>.1	>.2	>.3	>.4	>.5	>.6	>.7	>.8	>.9	>1.0	>1.1	>1.2
JAN	(4.57)	98	95	88	83	69	53	40	24	15	1	0	0
FEB	3.87	94	82	74	64	55	48	40	30	16	3	0	0
MAR	(3.85)	91	75	65	56	47	38	32	26	17	10	1	0
APR	5.41	97	91	84	74	66	59	50	41	25	2	0	0
MAY	(3.41)	89	70	57	43	31	24	18	13	4	0	0	0
JUN	(4.30)	91	84	76	64	55	43	31	11	1	0	0	0
JUL													
AUG													
SEP	(3.77)	90	75	66	53	48	39	33	24	14	4	0	0
OCT	4.47	95	87	80	71	63	53	44	32	20	3	1	0
NOV	(3.76)	96	88	80	70	62	50	39	28	16	4	0	0
DEC	2.08	70	46	40	37	34	29	24	17	11	1	0	0

SOLAR RADIATION DATA for: BUTTE, MONTANA 1978

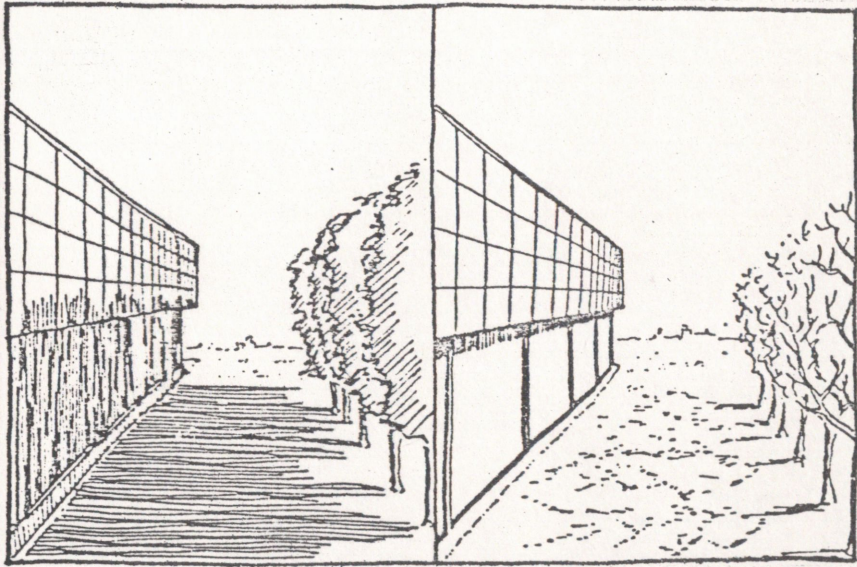
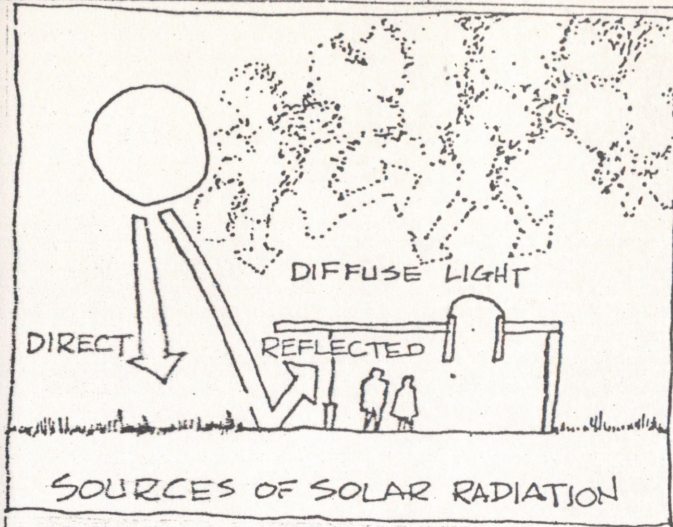
Montana Department of Natural Resources and Conservation
compiled by: Fowlkes Engineering, Bozeman, Mt.

MONTH	DAILY AVERAGE KWH/SM/DAY	PER CENT TOTAL ENERGY ABOVE THRESHOLD (KW/SM)											
		>.1	>.2	>.3	>.4	>.5	>.6	>.7	>.8	>.9	>1.0	>1.1	>1.2
JAN	(2.43)	87	59	45	38	34	27	22	17	11	2	0	0
FEB	3.67	93	76	67	60	53	43	37	28	19	8	1	0
MAR	(4.92)	96	88	81	71	64	56	49	40	28	9	1	0
APR	4.15	94	82	70	60	50	40	30	22	12	6	1	0
MAY	(3.36)	90	70	52	41	34	27	21	13	5	0	0	0
JUN													
JUL													
AUG													
SEP													
OCT	(4.21)	90	73	65	60	51	50	45	36	30	3	0	0
NOV	2.84	83	64	56	51	44	38	29	22	13	2	0	0
DEC	2.69	84	64	56	51	45	37	31	24	16	2	0	0

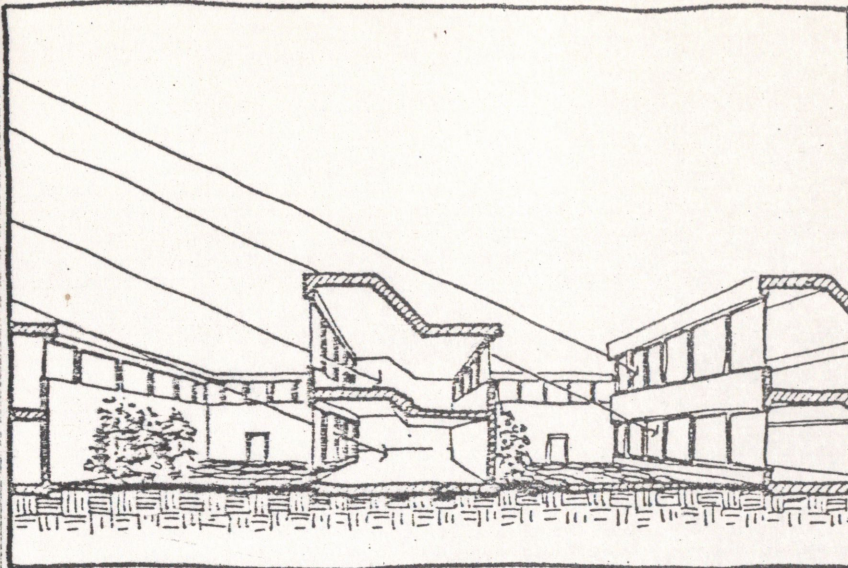
SOLAR RADIATION DATA for: BUTTE, MONTANA 1979

Montana Department of Natural Resources and Conservation
compiled by: Fowlkes Engineering, Bozeman, Mt.

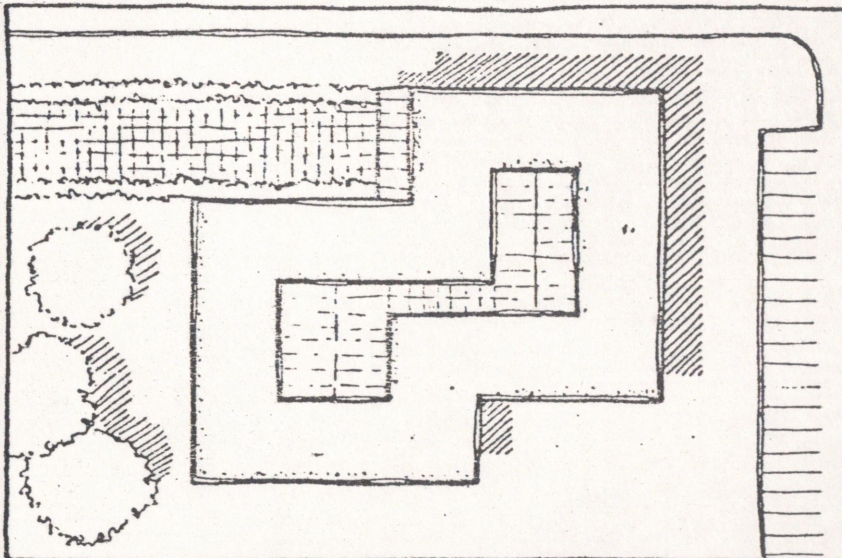
MONTH	DAILY AVERAGE KWH/SM/DAY	PER CENT TOTAL ENERGY ABOVE THRESHOLD (KW/SM)											
		>.1	>.2	>.3	>.4	>.5	>.6	>.7	>.8	>.9	>1.0	>1.1	>1.2
JAN	3.63	89	74	66	58	51	46	40	34	24	6	0	0
FEB	3.37	93	77	67	57	48	40	30	23	17	10	2	0
MAR	4.56	93	78	65	58	51	44	39	32	26	15	0	0
APR	(3.96)	94	85	71	57	43	31	22	16	9	1	0	0
MAY	(4.22)	92	80	69	57	49	41	30	19	7	0	0	0
JUN	4.22	91	84	74	63	54	41	26	12	2	0	0	0
JUL	(4.57)	93	87	81	75	65	51	36	19	0	0	0	0
AUG													
SEP	(6.01)	98	95	90	85	78	70	62	51	33	3	0	0
OCT	3.87	89	78	71	63	57	51	39	30	18	3	0	0
NOV	3.91	89	79	75	67	60	53	46	36	21	2	0	0
DEC	2.69	88	74	67	58	49	39	32	19	9	1	0	0



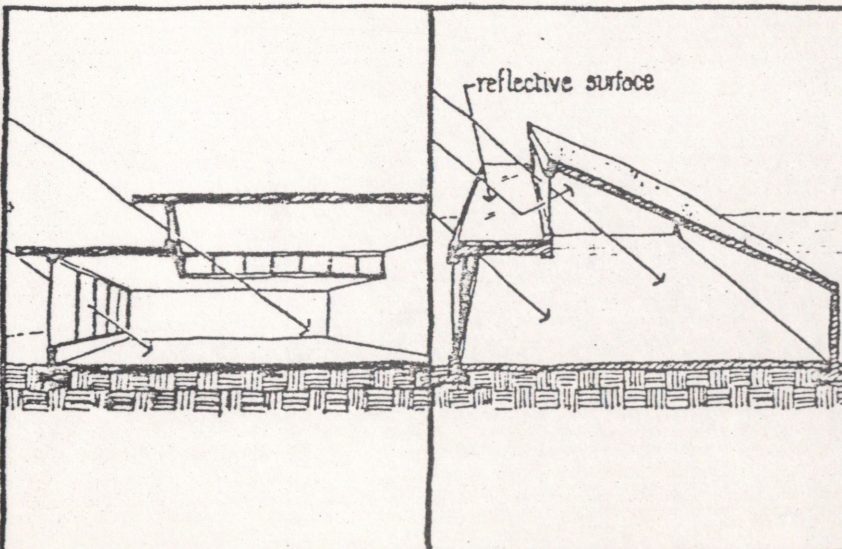
Deciduous trees will filter light and sun in summer, then drop their foliage in winter to allow light and sun when heating is desirable. Plant cover shades the ground in summer, cooling the air near a building. This strategy is useful for low-rise buildings with windows and walls that are lower than the height of the trees.



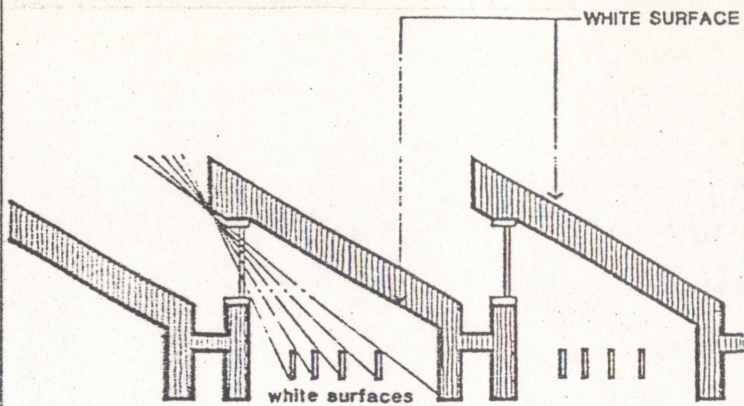
Narrow building (or wing) widths (25'-30') allow daylight to supply almost all lighting for daytime operations. This configuration also allows insolation to reach most of the interior if solar heating is desired. If a corridor or circulation space is in the center of a building or wing, the effective width could be increased to 35', with the corridor lighted by transoms from two sides.



An atrium allows light, heat, and air to reach all sections of a deep-plan building. If heat gain is desired, maximize south-facing openings, and provide ventilation. Consider also night insulation. If the atrium is to be a buffer zone, consider it an exterior space and insulate the walls that face it.

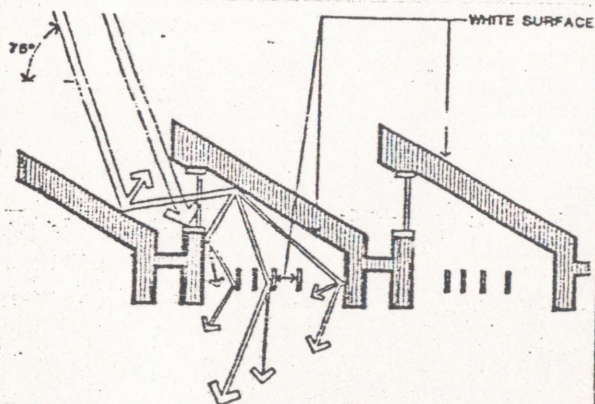


Clerestories can bring light into a building high enough that glare will not be a problem. Even directly-admitted sunlight will wash the ceiling rather than shining directly on the occupants. This configuration is useful for admitting low-level winter sun while excluding summer sun.



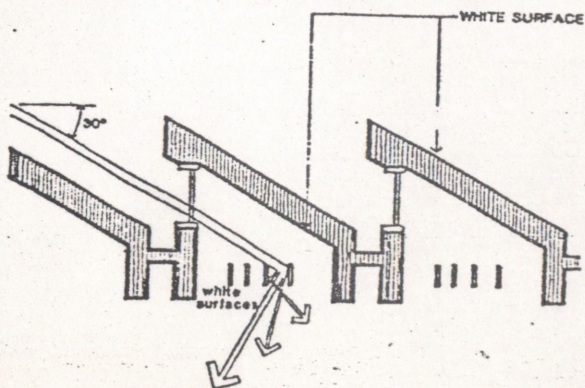
BAFFLE DESIGN

typical clerestory

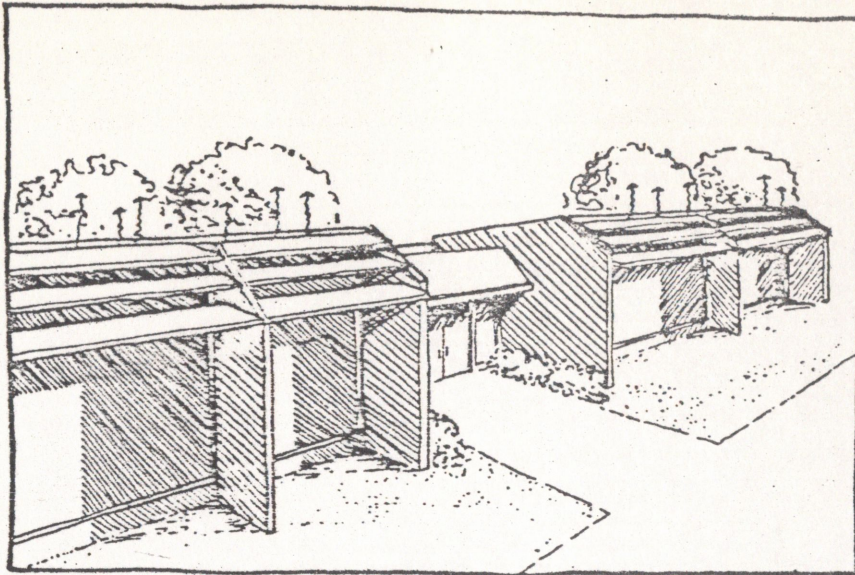


Clerestories - Clerestories admit daylight into spaces not located along the south face of the building. A louver system, integrated into each clerestory roof opening, baffles all direct beam sunlight to provide non-directional, diffused ceiling daylight.

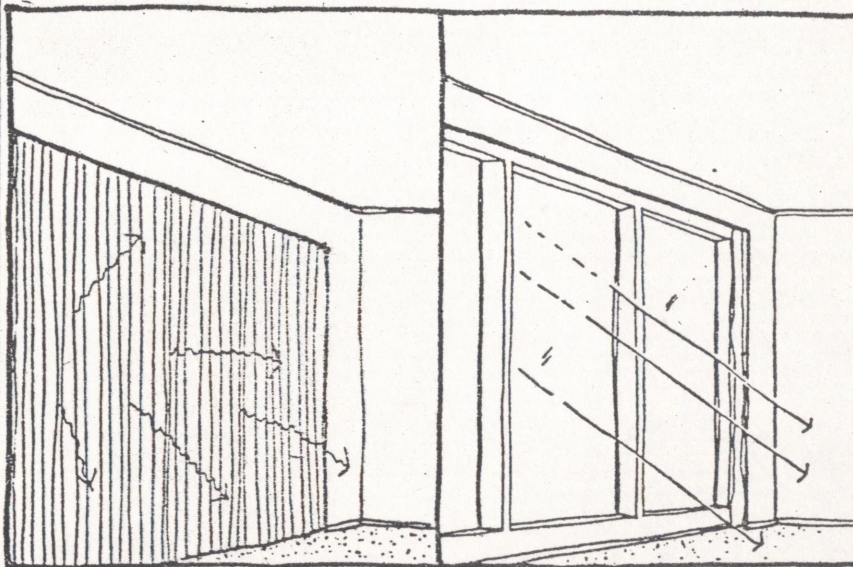
SUMMER clear day typical clerestory



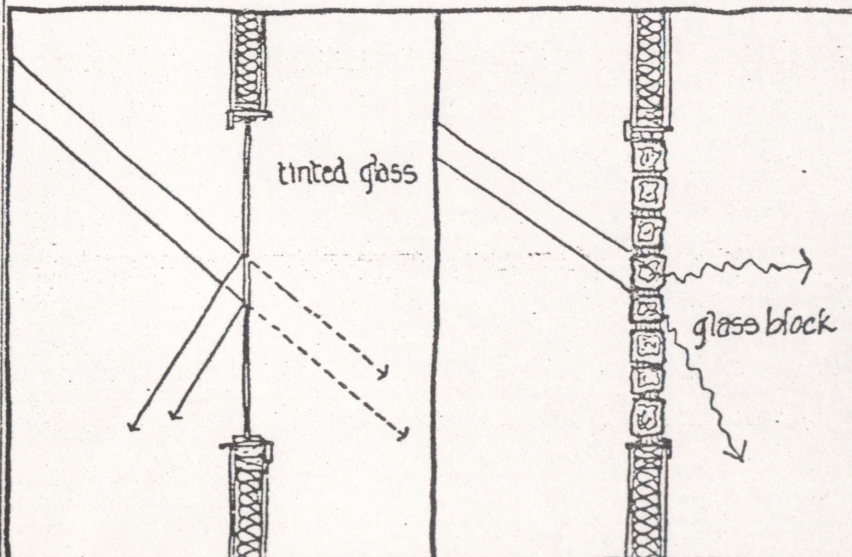
WINTER clear day typical clerestory



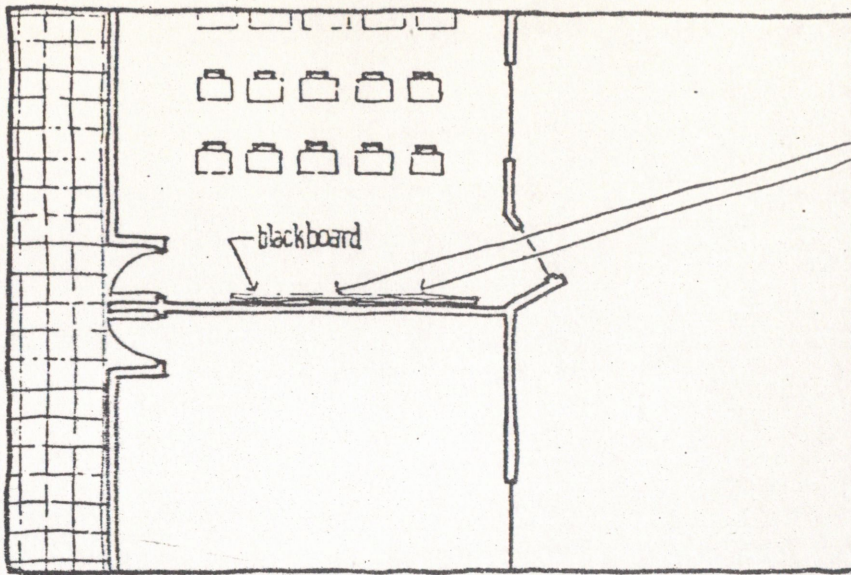
Horizontal shading devices can be formed so that they diffuse light rather than block it completely. They are particularly useful when they have a light-colored finish. Open patterns do not block air flow.



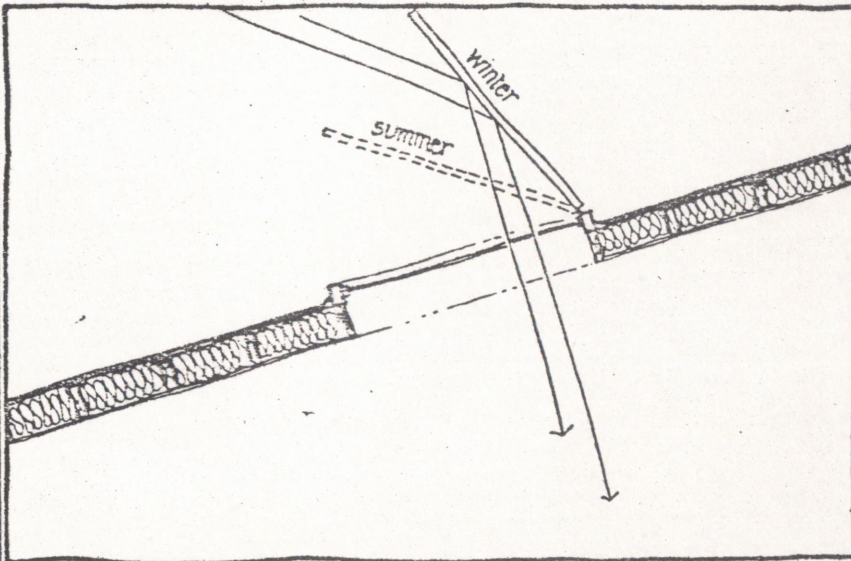
Vertical shading devices can be oriented to let in some diffuse light while eliminating glare. If they are operable, they can be opened to let in more light when glare is no problem and solar heating is desirable.



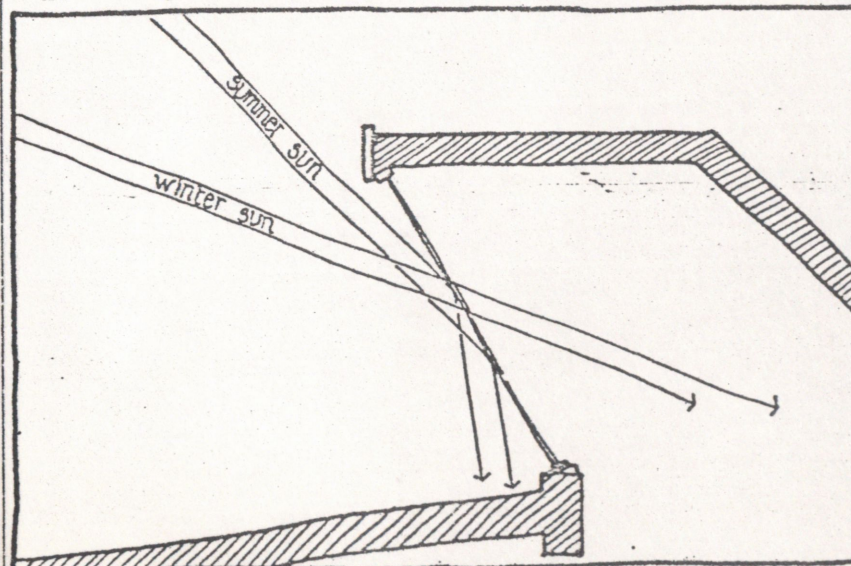
Glass block both insulates well and allows diffuse light to enter a space. It is especially useful when privacy is required but natural lighting still desirable. Commercially-available tinted glass can also be used to diffuse or reflect light.



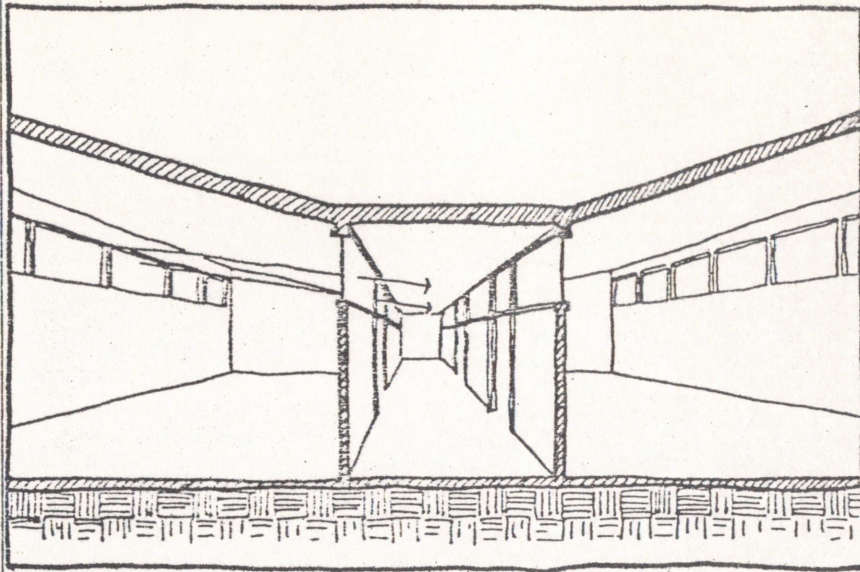
A sawtooth window configuration can direct light to the interior. This configuration can also screen early morning and late afternoon sun in the summer, while still admitting winter sun. It may be advisable to provide a conventional window on another wall for view.



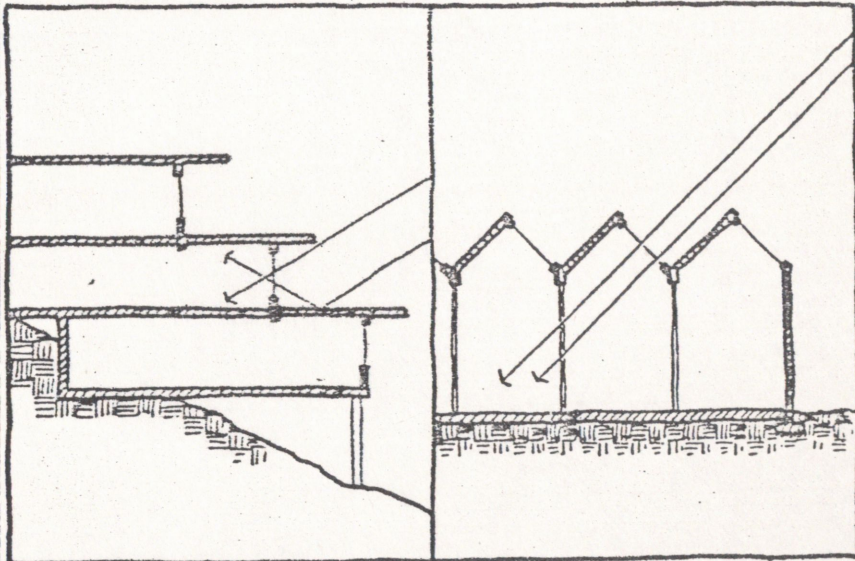
Rooflights allow large amounts of light to enter the interior. Great care must be taken to prevent direct sunlight from falling on occupants.



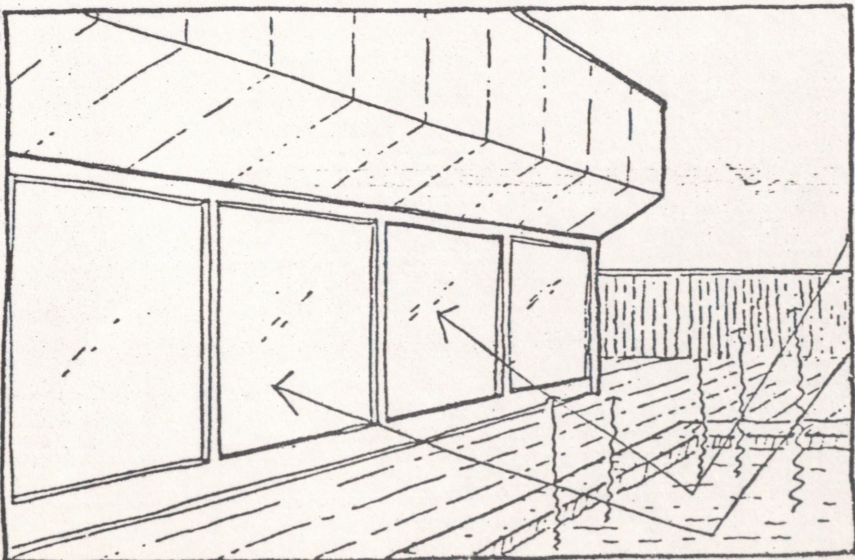
glazing tilted inward at the bottom provides less exposure to the summer sun without adversely affecting winter heat and light gain. This strategy should be used only on the south side of the building.



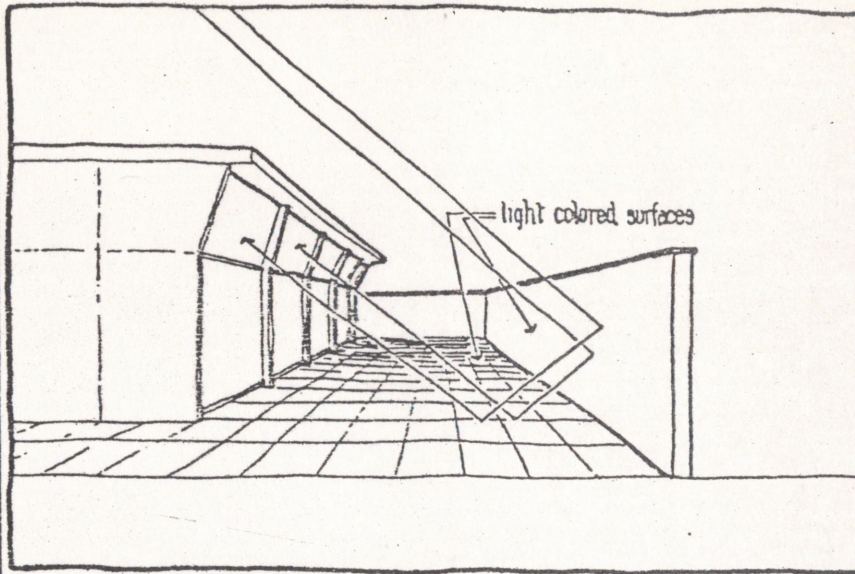
Interior partitions, or parts of partitions (especially near the ceiling) can transmit light to interior rooms if they are transparent or translucent. Enough light can be to areas where low illumination is tolerable, such as corridors, to eliminate electric lighting there during daylight hours. Affected light fixtures must be switched separately so they actually can be turned off. If glazed sections are operable, cross-ventilation can be facilitated.



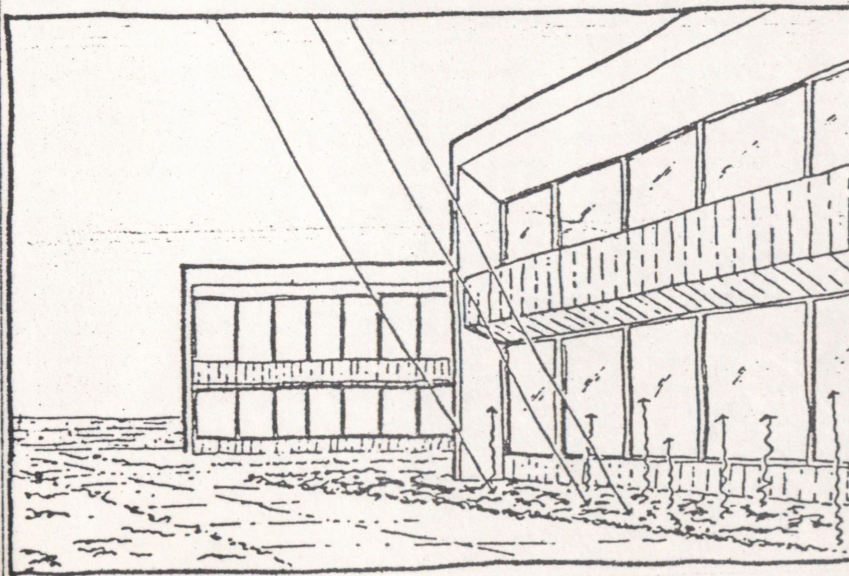
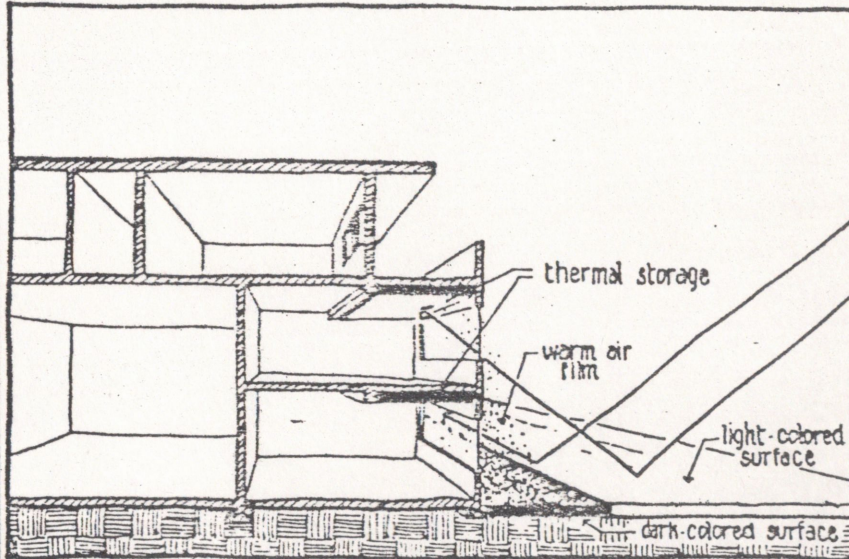
A stepped roof, combined with a reflective surface can bring light inside.

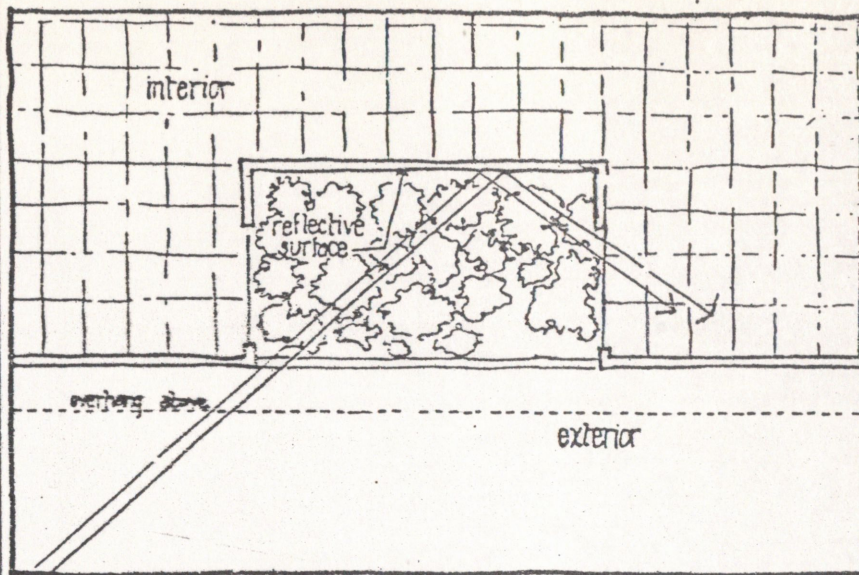


Bodies of water near windows reflect light inside. The reflected light has a dynamic quality from the movement of the water. Summer winds blowing across the water can help cool the building.

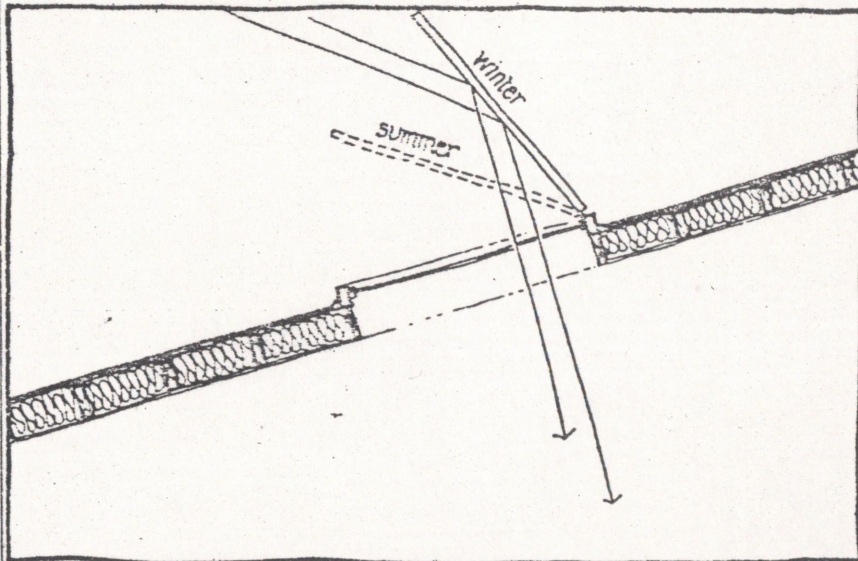


Light-colored surfaces adjacent to a building reflect light inside, increasing daylight illumination levels. Exterior walls and fences can also block wind infiltration. Light colored pavement near a building, combined with a dark surface immediately adjacent can help provide passive heating. Planted groundcover can reflect light inside while providing evaporative cooling.

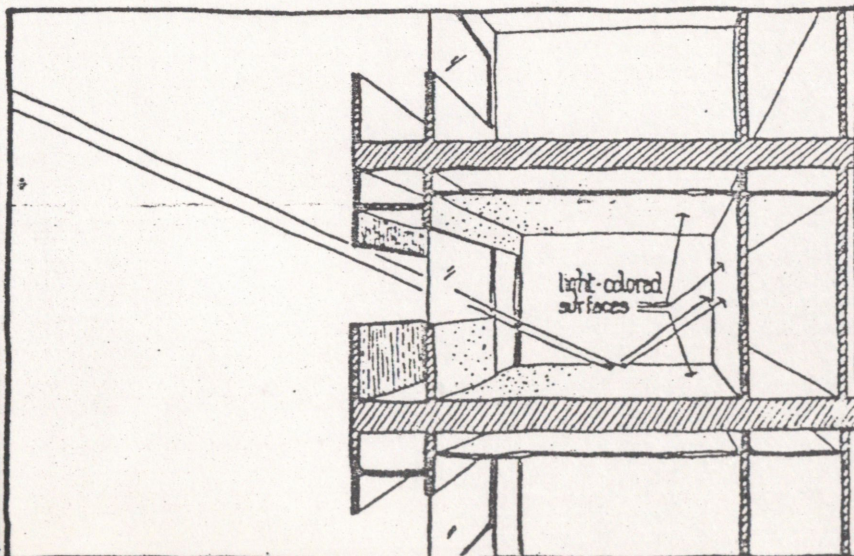




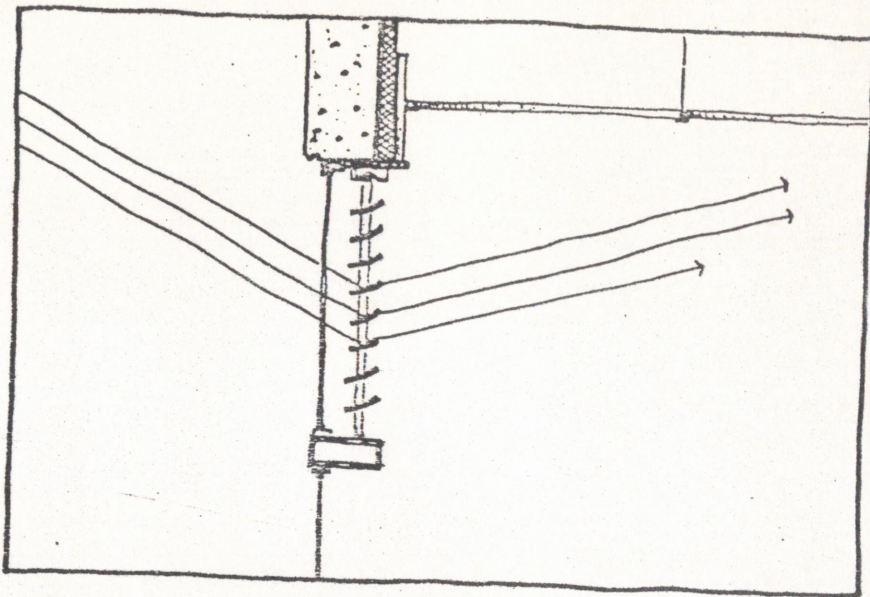
A deep opening with a reflective surface can direct light inside to walls, while blocking direct rays. This form also breaks up wind flow around the building edge, resulting in reduced heat loss.



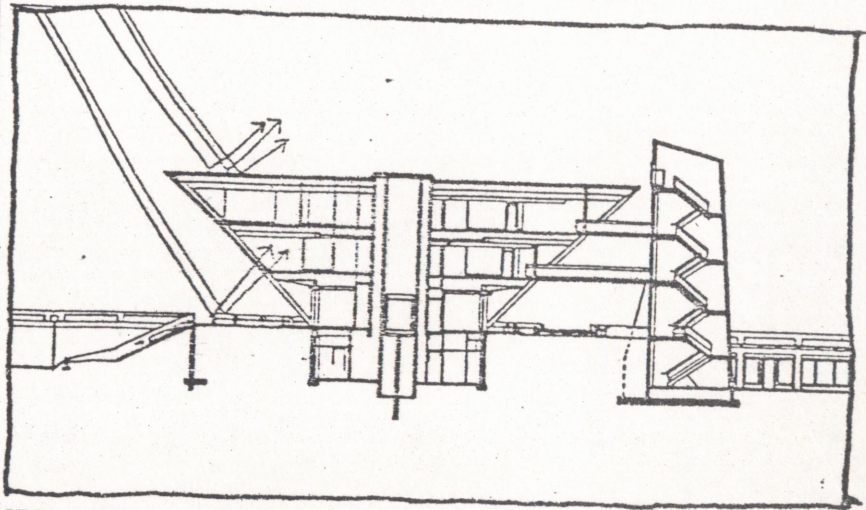
Reflective devices can be used with skylights to re-direct winter sun. The same devices are even more useful if they can also provide summer shading when heat gain through skylights is a problem.



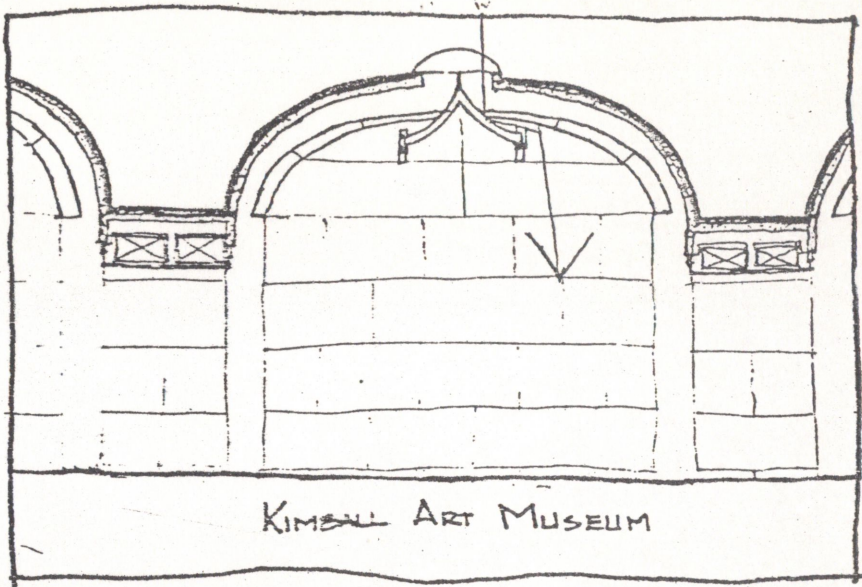
Light-colored interiors reflect and re-reflect light admitted from outside, and help create an even quality.



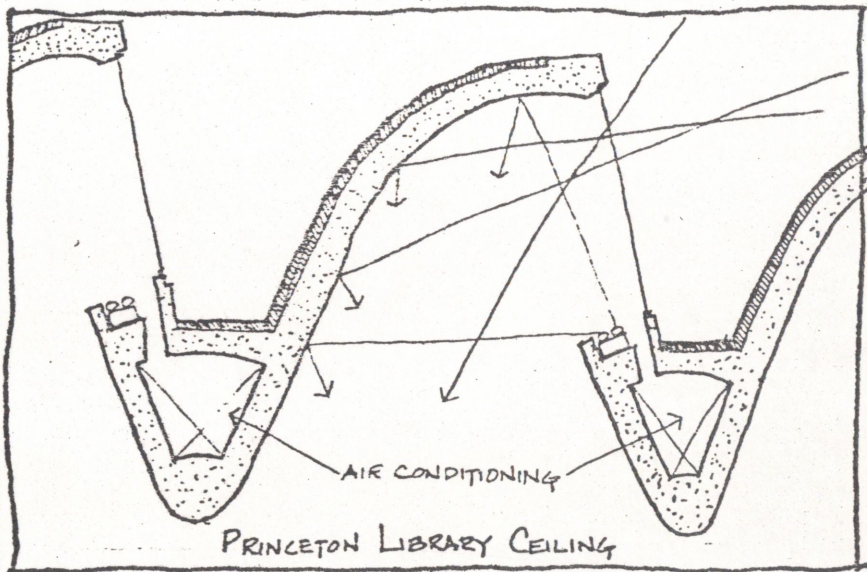
Interior shading devices can be oriented to reflect outside light onto the ceiling, providing a wash over the ceiling while eliminating direct glare.



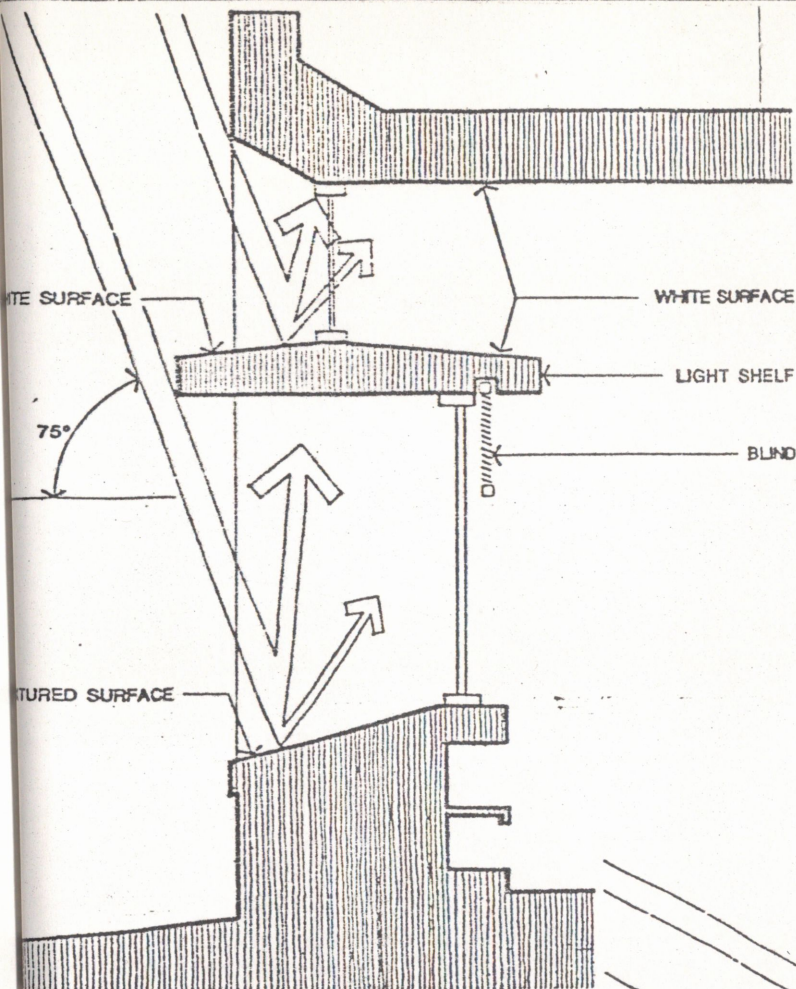
The municipal building in Tempe, AZ (Michael & Kemper Goodwin Ltd.) uses the building form to minimize heat and glare without sacrificing natural light. The overhanging form of the building blocks the direct sun, and the light-colored pavement of the plaza reflects light inside the building.



The Kimbell Art Museum in Ft. Worth, TX (L. Kahn; Pollechio & Meyers) uses a system of rooflights combined with curved reflectors to create a ceiling wash for background lighting. The scheme provides pleasant overall lighting in a climate in which un-baffled rooflights would give too much heat and glare for the sensitive interior spaces. The curved reflectors are pierced with tiny holes to admit scattered direct light in very small amounts.

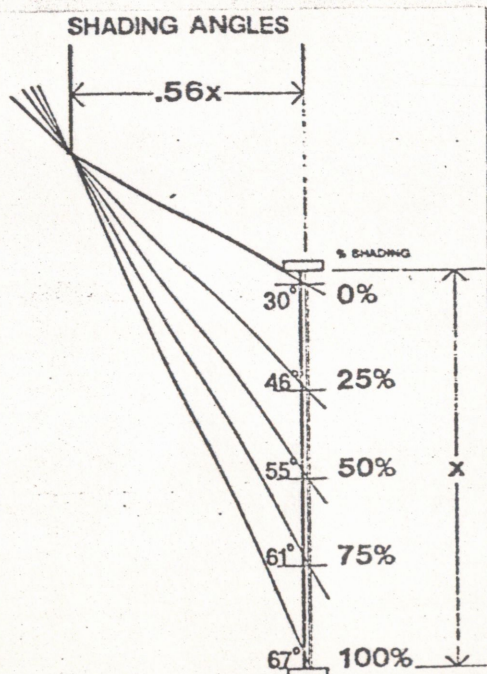


Princeton University Library, (Harrison & Abramovitz) uses a roof form that incorporates systems for direct, diffuse, and artificial light, as well as HVAC.



UMMER

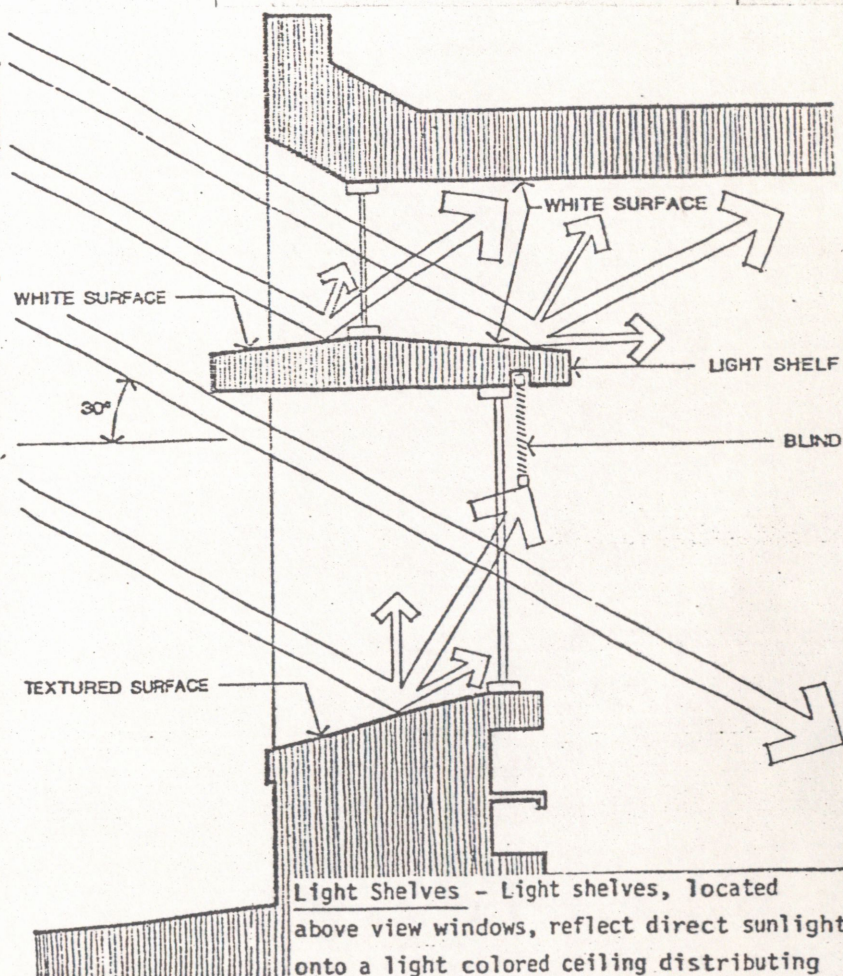
south glazing:



Solar Glazing Shading Strategy

The south overhang is designed to admit full sunlight in the winter and provide complete shading throughout the summer. The shading mask plotted for all south glazing is used as an overlay with the 36°NL sun chart to predict the percentage of glazing shaded at any moment in time.* The glazing is fully shaded on April 21 through August 21 and in full sun on December 21.

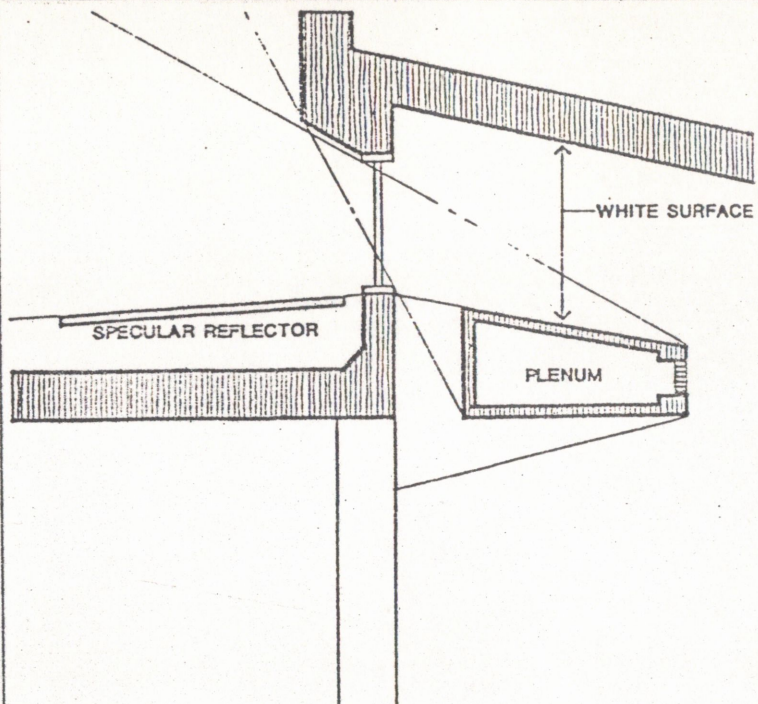
* See The Passive Solar Energy Book by Edward Mazria, published by Rodale Press, Emmaus, Pennsylvania, 1979.



WINTER

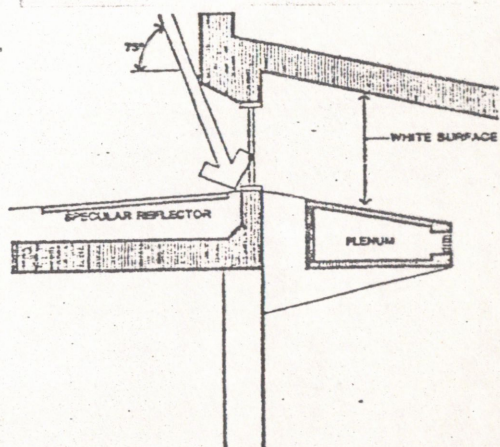
south glazing:

Light Shelves - Light shelves, located above view windows, reflect direct sunlight onto a light colored ceiling distributing it throughout the space. The light shelf prevents any direct beam sunlight from penetrating deep into the building.



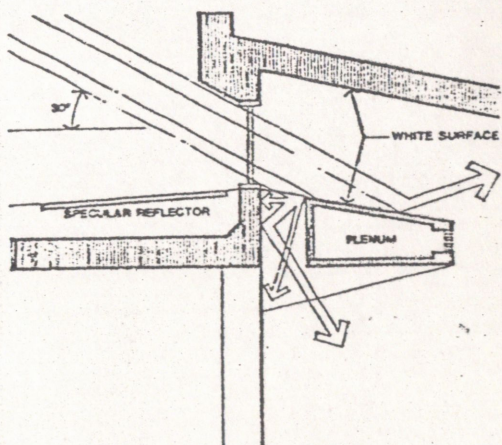
LIGHT SHELF DESIGN south glazing:

Reflectors - Reflectors located in front of clerestory glazing in the stack area enhance both solar gain in winter and interior daylighting levels. The exterior surface of the light shelf is reflective and also functions as a reflector for the upper south glazing strip.



SUMMER

south glazing: stacks



WINTER

south glazing: stacks

END NOTES

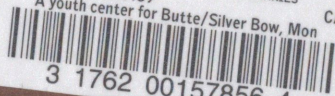
- ¹Pirsig, Robert M., Zen and the Art of Motorcycle Maintenance, (New York, 1974), p. 249.
- ²McCandless, Boyd R., Adolescents: Behavior and Development, (Hindsdale, Ill., 1970), p. 2.
- ³Gwathmey, Charles, lectures given at Montana State University, (Bozeman, Mt., May 1981).
- ⁴Fry, Roger, "The Form-Content Distinction", Vision & Design, 1920.
- ⁵op. cit.
- ⁶"Seventeenth Annual P/A Design Awards Program", Progressive Architecture, Vol. LI, No. 1, (Stanford, Conn., Jan. 1970), pp. 130-135.
- ⁷Kommers, Peter C., A City Hall for Butte, Montana, (Bozeman, Mt., 1967), p. 47.
- ⁸Sexton, Patricia Cayo, The Feminized Male, (New York, 1969), pp. 29-39.
- ⁹Howard, Needles, Tammen and Bergendoff, Butte-Silver Bow, Montana, Population and Economic Inventory Analysis, (Kansas City, Mo., June 1971), p. 5.4.
- ⁰Ibid.

BIBLIOGRAPHY

- Alexander, Christopher, A Pattern Language, New York: Oxford University Press, 1977.
- Architectural Record, Vol. 162, No. 3, New York: McGraw-Hill, Inc., August 1977, pp. 80-81, 108-113.
- Architectural Record, Vol. 166, No. 3, New York: McGraw-Hill, Inc., August 1979, pp. 102-105.
- Bell, Clive, "Aesthetic Hypothesis", Art, London: Chatto & Windus, 1914.
- Butte Historical Society, Al Hooper, Pres.
- Butte/Silver Bow Planning Office.
- Callender, John H., "Daylighting", Time Saver Standards, 5th ed., New York: McGraw-Hill, Inc., 1966.
- Daly, Christopher, Phd., Director Butte Public Archives, Butte, Montana, March 1981.
- DeHaas, John N., Jr., Historic Uptown Butte, Bozeman, Montana, 1977.
- Fowlkes, Charless W., Montana Solar Data Manual, Helena, Montana: Department of Natural Resources and Conservation, June 1979.
- Freeman, Harry Campbell, Butte Above and Below Ground: A Brief History of Butte, Montana, Chicago, Ill.: The H. O. Shepard Co., 1900.
- Fry, Roger, "The Form-Content Distinction", Vision & Design, London: Chatto & Windus, 1929.
- Gwathmey, Charles, lectures given at Montana State University, Bozeman, Montana, May 1981.
- Howard, Needles, Tammen & Bergendoff, Butte-Silver Bow, Montana, Population and Economic Inventory Analysis, Kansas City, Mo.: Department of Urban and Regional Planning, June 1971.
- James, Don, Butte's Memory Book, Caldwell, Idaho: The Caxton Printers, 1975.
- Kommers, Peter C., A City Hall for Butte, Montana, Bozeman, Montana: Montana State University, 1967.
- Lawrence Berkeley Laboratory, Daylighting Window Design Resource Package, June 1980.
- Lynch, Kevin, Site Planning, Cambridge, Mass.: MIT Press, 1971.
- Mazria, Edward, The Passive Solar Energy Book, Emmaus, Pa.: Rodale Press, 1979.

- McCandless, Boyd R., Adolescents: Behavior & Development, Hinsdale, Ill.: Dryden Press, 1970.
- Murphy, Mary & Bill Walker, Butte, Montana, A Select Bibliography, Butte, Mt.: Natl. Endowment for the Humanities, August 1980.
- Ostberg, J.H., Sketches of Old Butte, Butte, Montana, 1972.
- Pirsig, Robert, M., Zen and the Art of Motorcycle Maintenance, New York: William Morrow & Co., 1974.
- Progressive Architecture (entire issue), vol. LX, No. 4, Stamford, Conn.: Reinhold Publishers, April 1979.
- Pyfer, Julene Marta (Newland), "A Study of Butte Teenagers: Orientation to Adult Goals and to Trouble," M.A. Thesis, University of Montana, 1971.
- Regional/Urban Design Assistance Team, Summary Report on Butte, Montana, Butte, Montana: Butte-Silver Bow City-County Planning Board, June 1972.
- Saxman, Christopher, Program for a Teen Center, Bozeman, Montana: Montana State University, 1970.
- Seventeenth Annual P/A Design Awards Program, "Progressive Architecture, Vol. LI, No. 1, Stamford, Conn.: Reinhold Publishers, Jan. 1970, pp. 130-135.
- Sexton, Patricia Cayo, The Feminized Male, New York: Random House, 1969.
- United Building Code, Whittier, Calif.: International Conference of Building Officials, 1979.
- Senturi, Robert, Complexity and Contradiction in Architecture, New York: Museum of Modern Art, 1977.
- Satson, Donald, "Insolutions," Progressive Architecture, vol. LX, No. 11, Stamford, Conn.: Reinhold Publishers, Nov. 1979, pp. 102-107.
- Seitz, Morris, Problems in Aesthetics, New York: Russell & Russell, 1959.

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