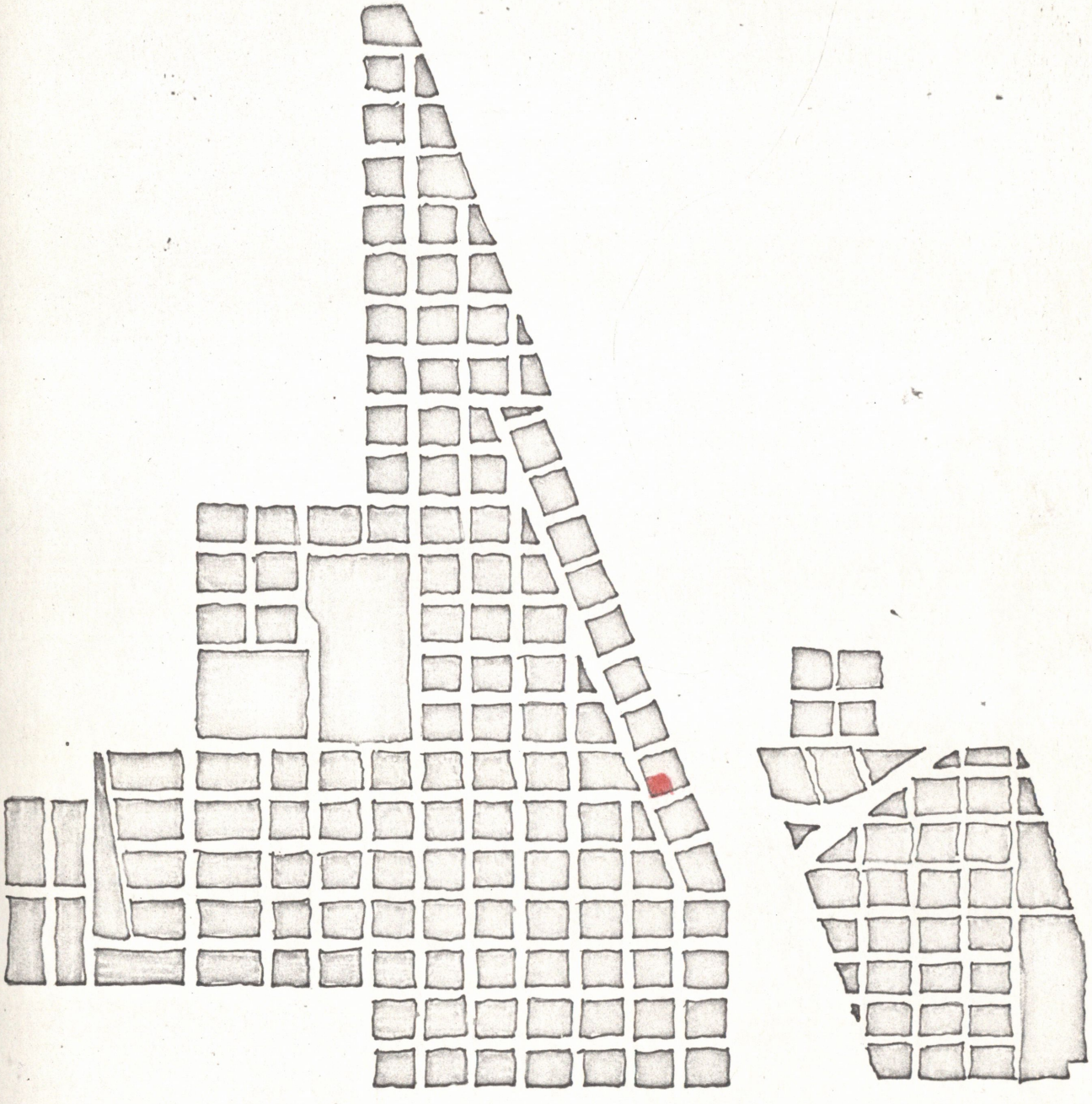
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A POLICE ~ FIRE STATION

LAUREL, MONTANA



richard s. christian

A POLICE - FIRE STATION FOR LAUREL, MONTANA

Part I

Undergraduate Thesis in Architectural Design

By

Richard S. Christian

Submitted to the School of Architecture as partial fulfillment of the requirements for the degree of Bachelor of Architecture.

At

Montana State University

Bozeman, Montana

March 12, 1968

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INTRODUCTION

This written portion, Part I, of an architectural thesis, A Police-Fire Station for Laurel, Montana, has been a great benefit to me in helping to understand some of the various aspects of the problem and to relate and organize some of my thoughts. I am certain that the actual design portion of the thesis will come about much easier as a result of this preliminary investigation.

I have appreciated the assistance of Dr. John Parker of the M.S.U. English Dept. for his criticism of the written material and the comments of Mr. John Dehaas, instructor in the School of Architecture.

PROPOSAL

808 North Rouse
Bozeman, Montana
January 11, 1968

Mr, John P. Parker
Dept. of English, Speech, and Theater Arts
Montana State University
Bozeman, Montana

Dear Mr. Parker:

At your request, I am submitting this explanation of why I chose my thesis topic, A Police-Fire Station for Laurel, Montana, and what objective I hope to achieve.

First, the thesis selection committee of the School of Architecture recommends- "...that the scope of the problem selected be small enough to allow for a final presentation of considerable depth and completeness."

The problem which I have selected will not be large in physical size; yet, it is complex, serving a unique variety of functions, such as; a large garage area, an adninistration office, and a police security section. Therefore, the problem should pose an interesting challenge to me as a fifth-year design student to relate and organize this variety of functions into a workable solution.

Secondly, the objective I hope to achieve, is a somewhat modest building, befitting to the small community of Laurel, which will also be a strong architectural statement expressing the role of the institution it will house. Since this is only a proposed project, I feel it is important that my solution should stress the purely achitectonic aspects, such as; pleasant - ample spaces, and the most durable materials. This, I feel, will make my work be the most beneficial to future considerations of the project if it is not molded into fitting ass the present requirements of the economic situation.

Sincerely yours,

Richard S. Christian

Richard S. Christian

NEED FOR NEW FACILITIES

NEED FOR NEW FACILITIES

Laurel's city hall is a small two-storey building (see plate /) which houses the police station, fire department, city council chamber, city engineer's office, and the city offices.

The polece station consists of one room of about 400 square feet and a cell area of about 150 square feet. Police court is held by arranging chairs aroud the only desk and is disturbed by telephone calls or anyone who may enter. There is no privacy available nor is there any way to separate the different activities which are conducted. The main entrance to the police station is forty feet up an alley from the sidewalk.

The fire station is provided with a garage for two trucks and a multi-purpose room above. The garage has only a front entry which requires that the trucks be backed in. Also, there are inadequate facilities for cleaning hoses and equipment.

Because of Laurel's steady population increase, the city will be reclassified in the 1970 U.S. Census Report and, will then be required to change from a volunteer fire department to at least a partial if not a full-time employed organization.

The new classification of Laurel as a class "B" city will also require additional firefighting equipment which would be impossible to house in the present facilities. An employed fire department means that there will have to be dormitory accomodations for the men on duty who will work twenty-four hour shifts. The multi-purpose room was originally designed to provide this dormitory space; however, if it were used as such there would not be enough room to contain the fire chief's office and lounge which also use the area.

By moving the police station and fire department into the new facility which I am proposing, the area required to house these functions could be remodeled to provide additional office spaces.

LOCAL – NATURAL CONDITIONS

LOCAL - NATURAL CONDITIONS

Laurel's birth and growth are due primarily to railroad interests which centered here about 1900. The city became incorporated in 1908. The period required to develop the railroads allowed sufficient time for Laurel to expand gradually and enjoy a sensible and sane growth. It was not a boom city and did not become subject to an industrial relapse. Continual and prosperous evolution created a city of substantial business in the center of a great trade and industrial area. Distances by rail from Laurel are: 897 miles to Minneapolis, 601 miles to Denver, and 594 miles to Spokane.

Today, the Laurel terminal yards are the largest between St. Paul and Seattle and have the capacity to handle approximately 6,000 cars daily. The Northern Pacific Railway which owns the freight yard has a payroll averaging more than $350,000 per month. Laurel is also served by the Chicago, Burlington, and Quincy Railway from Denver and by a spur line of the Great Northern Railway from Havre.

The Farmers Union Central Exchange operates the second largest oil refinery in Montana on the outskirts of Laurel. Products from this refinery are marketed throughout Montana and in nine other northwest states. It employs approximately 250 people on an annual payroll of over 1.6 million dollars.

Farmers Union Central Exchange is owned by 350,000 shareholders in nine states and serves them through 850 locally-owned cooperatives.

The trucking industry came to Laurel in 1933 and has continued to grow and prosper. Two of Montana's biggest transporters, Great Northern Tank Lines and Convoy Company, operate about 60 trucks and employ 123 people to serve Montana and the Northwest.

An expanding livestock industry thrives on surrounding farms in the form of many small feeder lots and a couple of very large commercial enterprises. Incentives for livestock raising are: nearby livestock commision companies, meatpacking houses, and two privately owned elevators. Both of these elevators have modern feed processing plants and handle wheat, feed grains, fertilizers, seed and other farm and ranch supplies.

Laurel is a market for produce, a transportation terminal, a shopping center, and the source of professional services. It serves farmers, ranchers, and shoppers of the area from Park City, Columbus, and Absorkee to Red Lodge, Belfry, Bridger, Fromberg, Edgar, Rockvale, and Silesia. Laurel is the Junction of U.S. Highway's 10, 310, 312, and Interstate 90 which creats this large trading area and encourages tourist traffic.

Laurel's prosperous commercial industry consists of: a bank, two dairies, three dry-goods stores, three phisicians, two dentists, four chiropractors, three pharmacists, two lawyers, one optometrist, two vetinarians, two feed elevators, ten grocers, four hardware dealers, two hotels, five insurance agents, two jewelers, a taxi service, several labor unions, two lumber dealers, six motels, two trucking concerns, an oil refinery, three railroads, ten bars, and the services of two television networks and five radio stations.

Retail sales exceed 6 million dollars per year. Active organizations such as; Chamber of Commerce, Rotary Club, and Kiwanis Club help to develop resources and enterprises of the area and promote Laurel's growth - industrially, commercially, and civically.

Laurel is a nucleus of the vast Montana vacationland and is less than a day's journey away from: Glacier International Peace Park; Virginia City; Helena, the state capital; Fort Peck, excellent hunting area; Cheyene, Wyoming; Lewis and Clark Caverns; Montana State University at Bozeman; University of Montana at Missoula; vacation dude ranches; famous Madison River and 1959 Earthquake area; and four entrances to Yellowstone National Park.

Tourists to Yellowstone Park are only three hours away via senic Beartooth Pass, elevation 10,940 feet. Custer National Battlefield and the Little Big Horn are but two hours from Laurel. And, excellent trout fishing is just 30 minutes away on the Stillwater River or Rock Creek. Two overnight trailer parks and an excellent campground are provided to accomodate the travelers.

Laurel has ten churches which represent the eight denominations of Assembly of God, Baptist, Catholic, Church of Jesus Christ of Latter Day Saints, Congregational, Luthern, Methodist, and Nazarene.

The City of Laurel provides 32 acres of park which include a football and baseball stadium, modern swimming and wading pools, tennis courts, and playground facilities. A public library maintains 9,806 volumes.

Laurel is a clean city; it is growing and prosperous. The population has increased from 358 in 1910 to 4601 in 1960 following a steady pattern of increase. The munincipal government is very active and progressive. It is interesting to note the 128.9 % increase in the number of professional workers between 1950 and 1960. The current population is estimated at 4700 living in 1601 dwelling units.

Industry of Employed Residents, Laurel 1960

(percent of total)

Industry	
Total	100%
Agriculture, Forestry, Fishery	1.0
Mining	.2
Construction	3.1
Manufacturing	14.5
Transportation, Communication, Utilities	38.1
Trade	16.2
Finance	3.4
Business and Repair Service	1.9
Personal Service	5.4
Public Administration	2.0
Not Reported	2.7

Source: U.S. Census of Population

Occupational Composition of Employed Labor Force in Laurel, 1950-1960

Occupation	1950	1960
Professional	97	222
Farmers	5	72
Managers	148	41
Clerical	169	234
Sales	76	102
Craftsman	313	378
Operatives	271	374
Private Household	11	52
Service	96	154
Laborers	136	106
Not Reported	10	53
Total	1,332	1,788

Source: U.S. Census 1950, 1960

Selected Data on Retail and Services

Laurel, 1963

Retail	Laurel
Total Establishments	55
Total Sales ($1,000)	5,818
Payroll Week, Nov. 1963 (dollars)	12,009
Paid Employees, Nov. 1963	201
Proprietors	50
Services	
Total Establishments	32
Total Receipts ($1,000)	459
Payroll Week, Nov. 1963 (dollars)	2,145
Paid Employees	43
Proprietors	35

Source: U.S. Census of Business

Selected Population Characteristics in Laurel

1940 population	2754
1950 population	3663
1960 population	4601
% increase 1950-1960	25.6
% 65 years and over	8.5
Number of households	1422
Population per household	3.23
Median school years completed	11.8
Non-worker - worker ratio	1.55
% of female 14 years and over	37.6
% of civilian labor force unemployed	4.8
% of employees in manufacturing	14.5
Median income of families (in dollars)	5950

Source: U.S. Census of Population

School Enrollments in District 7

School Year	Elementary	High	Total
1959-1960	1226	417	1643
1960-1961	1273	418	1691
1961-1962	1279	473	1752
1962-1963	1221	506	1727
1963-1964	1182	555	1737
1964-1965	1154	578	1732
1965-1966	1111	564	1675
1966-1967	1088	552	1640

Source: U.S,Census of Population

From: Yellowstone County Economy and Population Study,
Clark, Coleman & Rupeiks, Inc., December, 1967.

SITE CONDITIONS

SITE CONDITIONS

Two objectives determined the selection of a site; it had to be close to the commercial district which has the highest property value and it had to be obtained at a relatively small cost. The site which I have selected, lots 12-15 in block 1 of East Laurel Subdivision, (see map1) is nearly in the exact center of the commercial zone as well as the center of the industrial zone, the second highest in property value. (see map2)

The City of Laurel already owns the four lots which I have selected for my proposed Police-Fire Station and they are directly across the street from the present city hall building and Public Library. By using this site, I will not be separating the existing pattern of centrally-located and closely-grouped munincipal facilities.

The site now contains the City Garage which is used only for truck storage. (see plate 2) This building is a wood-frame structure and could easily be removed at a cost of less than $2500.

A unique feature of the site, the public water hydrant, is used by farmers of the area who must haul their own water. This water hydrant will be incorporated into the design, if possible; but, it may be moved to another location if the building-area requirements demand it.

The site is bounded on two sides by streets and on a third side by an alley. This allows the needed accessibility so the long firetrucks will not be forced to back into the garage. Also, the intersection of major east-west and north-south arterial traffic routes is only one block away. This relationship to main traffic routes is ideal because there will not be congested traffic blocking the exit door to the fire station; yet, during an emergency, the police and fire vehicles have easy and direct access to all parts of the city.

All utilities are readily available: telephone, power, and gas lines are located in the adjacent alley; and, storm sewers, sanitariy sewers, and city water supplies lie beneath both streets which border the proposed site. A separate-reserve water line is now being added which will insure a large water supply at peak consumption periods during the summer.

The only drawback to the site is thw unstable soil conditions. Nearly all the city of Laurel is built on ground which was once swamp; and, though there has not been any soil testing done, it seems logical to assume that the subterrainian conditions of this site are similar. Because of these unstable soil conditions, the foundation of the building will necessarily be designed to accomodate them.

The building codes which govern the site is: Ordinance No. 58, City Zoning Ordinance, Laurel, Montana; May 7, 1957.

"C_1" Commercial District

a. Use:

(1) Fire Stations

(2) Police Stations

b. Height:

No Restrictions

c. Lot Area

Not less that 5,000 square feet

d. Floor Area Ratio:

No restrictions

e. Yard Requirements

No front, side, or rear yards

f. Off-Street Parking:

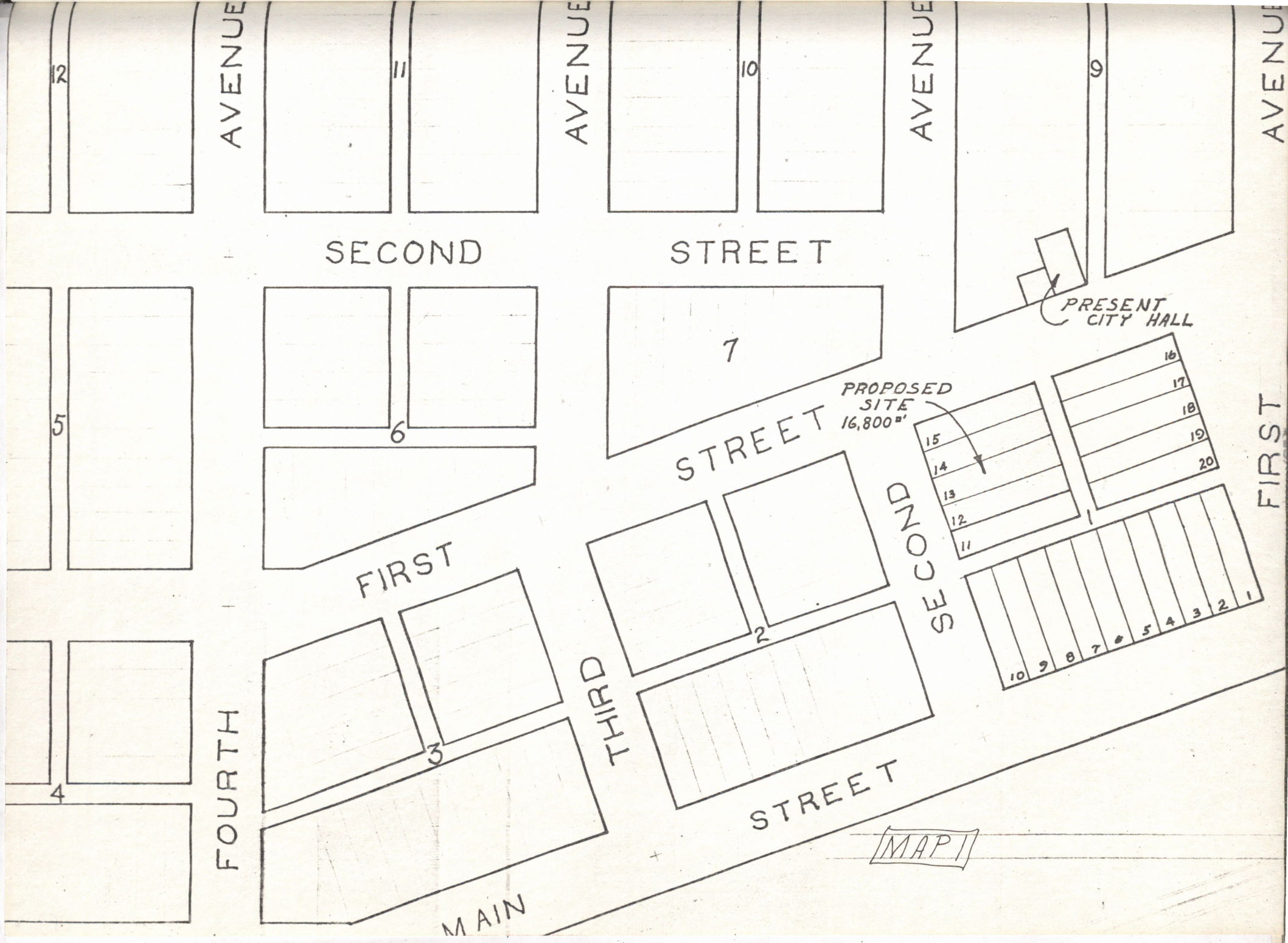
(1) Spaces shall be provided on the lot

(2) Surfaced with durable concrete or bituminous pavement

(3) Minimum space - one space for every three (3) employees.

g. Fence Regulations:

(1) A signed approval statement by the adjacent property owner shall be filed with the Building Inspector


12
AVENUE
11
AVENUE
10
AVENUE
9
AVENUE
SECOND
STREET
PRESENT
CITY HALL
7
PROPOSED
SITE
16,800 ft²
16
17
18
19
20
15
14
13
12
11
5
6
STREET
FIRST
SECOND
FIRST
2
1
10
9
8
7
6
5
4
3
2
1
4
3
FOURTH
THIRD
STREET
MAIN
MAP I

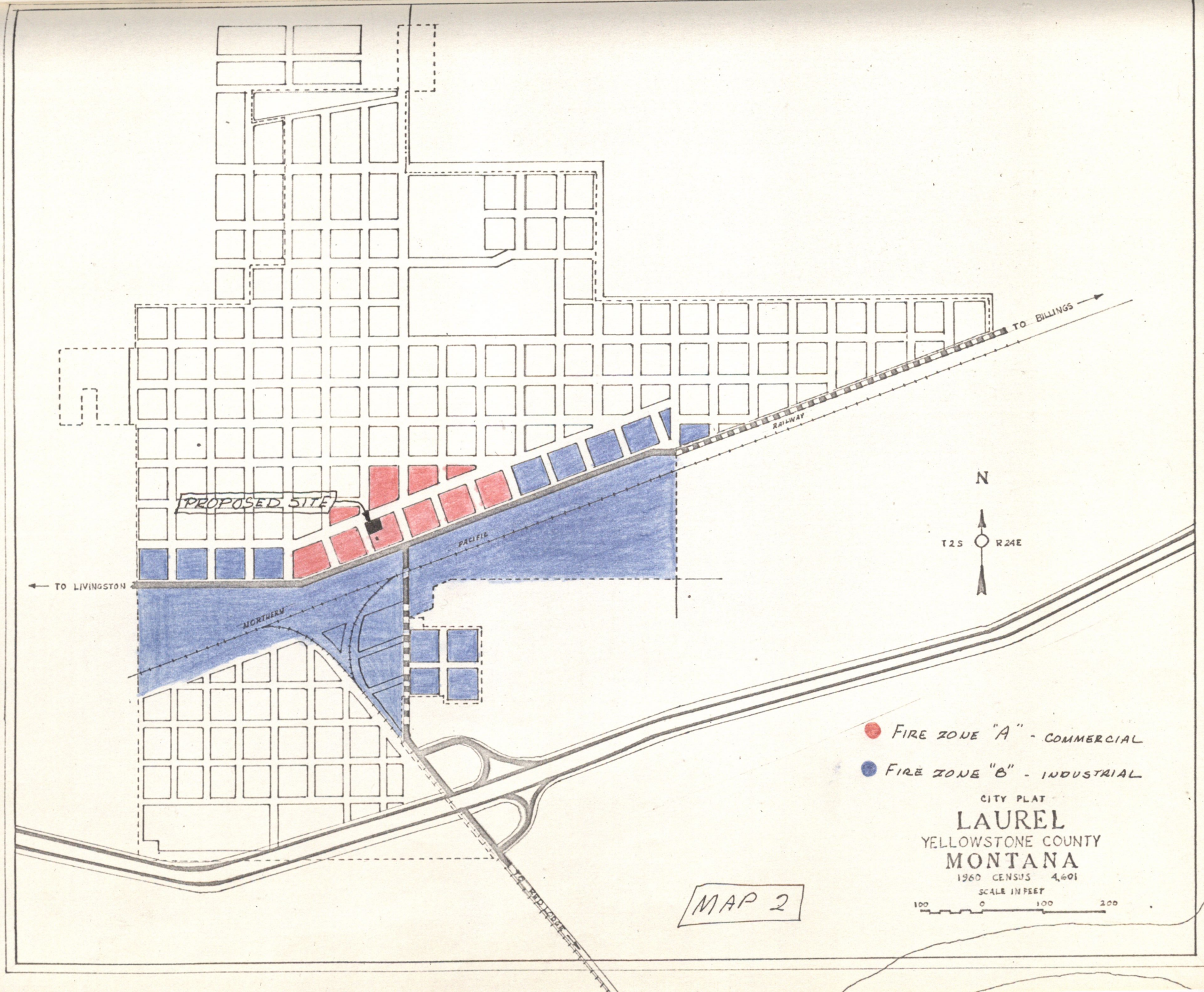

TO BILLINGS
RAILWAY
PROPOSED SITE
PACIFIC
TO LIVINGSTON
NORTHERN
N
T2S R24E
FIRE ZONE "A" - COMMERCIAL
FIRE ZONE "B" - INDUSTRIAL
CITY PLAT
LAUREL
YELLOWSTONE COUNTY
MONTANA
1960 CENSUS 4,601
SCALE IN FEET
100 0 100 200
MAP 2



PLATE 1

PLATE 2



BUILDING REQUIREMENTS

BUILDING REQUIREMENTS

A. Fire Station Wing

1. Engine House
(min. ceiling ht. 15 ft., min length 60 ft.)

a. This area must accomodate two pumper trucks, one hook and ladder truck, one brush-fire truck, an ambulance, and a fire chief's car.

b. An adjacent area must be provided to store mechanical repair and equipment cleaning tools. Tools for minor truck repairs are required and facilities to to clean hoses, clothing, and apparatus are essential.

2. Administration Area

a. A reception and waiting room to accomodate six people and could be common with that of the police station.

b. An office for the fire chief will contain a desk, three charirs, and a file cabinet. And, it must be easily accessible to both the waiting-reception area and the engine house.

c. An office for the dispatcher which is also common with the police station will contain the alarms system and communication equipment.

3. Training Tower

   a. This will be used to practicing building evacuation, ladder work, and simulated smoke conditions.

   b. A utilitarian function of a tower is for hose drying. The minimum height required for this is 55 ft.

4. Dormitory Accomodations

   a. Kitchen - Dining facility will serve the men in the dormitory and also large dinners where all firmen and their wives may be present. This area should be designed for a maximum of 40 persons.

   b. Off - duty area will be provided where the men can relax, watch television, and play cards. It would be desireable to have a handball court and weightlifting room, a pool table, and a small shop for woodworking.

   c. Education and training area must be provided with seating for 30 persons plus a chalkboard and a lecture table. This will be used by outside groups for first - aid training and so must be easily accessible from the public entry. Also, equipment and storage will be furnished here for showing pictures.

d. A restroom facility for both men and women will serve this area as well as a janitors closet and miscellaneous storage.

6. Miscellaneous

a. Janitors closets and storage area for clothing and equipment must be provided to serve all areas.

b. An area to house the heating and mechanical equipment must be centrally located in the building.

c. All areas must relate to the engine house so as to be easily accessible.

B. Police Station Wing

1. Recieving Area

a. A security garage must be provided where prisoners may be transferred from a squad car to a cell incorporating automatic doors controlled from inside the building. This area will also serve as storage for confiscated property such as stolen bicycles. This facility should be easily accessible to the cell area.

b. A booking - interrogation area should be provided where a prisoner may be brought in, isolated from the public area, and processed. This should be accessible to the security entrance, the cell area

and indirectly, to the staff facilities.

2. Cell Area

   a. A tank or overnight cell must be provided to hold drunks (maximum 12) for one night, generally. It needs very little facilities except a toilet and a large floor drain so that it may be hosed - down to clean.

   b. The cell block must provide separate facilities for male and female prisoners. Security of the prisoner is essential so everything must be designed with this in mind; lighting, heating and ventilation, food service, and visitation. Toilet facilities must be accessible to the prisoners but be controlled by a jailor.

3. Reception Area

   a. This area should accomodate six persons waiting and, sufficient area to allow freedom of movement. This area will contain the main desk where most public transactions will take place such as paying traffic fines, reports, or information. The person in charge of the desk will also act as dispatcher for the police and fire departments, on duty 24 hours, and must be in close contact with all communication equipment.

b. This waiting - reception area must be convenient to pedestrian traffic and be easily recognized by strangers as the place to enter.

c. This area will be shared with the fire department so must relate to both areas.

4. Staff Facilities

a. A chief-of-police's office where he may conduct private business and keep records must be provided. It needs to be accessible to the public area but not directly.

b. A squad room should be provided where the officers can store personal items and hold activities or relax. This facility could be in conjunction with the fire departments off-duty area. It needs to have toilet facilities and be served by a private entrance,

c. A records and evidence vault must be provided which affords both fire protection and security. This area should be accessible to the fire chief and police chief but separated from the public areas.

d. A communication area will serve both the fire and police departments. This area will contain a city radio, possibly a state radio, and a teletype machine. This area will be controlled by the dispatcher in the public reception area.

5. Police-Court Room

   a. This area will contain a desk for the police judge, a desk for the court recorder, and seating for 20-30 people.

   b. The area should be easily accessible from the waiting-reception area and indirectly from the cell block area.

6. Miscellaneous

   a. Janitor closets and storage areas must be provided to serve all areas.

   b. A centrally located heating and mechanical equipment area must be provided in conjunction with that of the fire department's.

ECONOMIC CONDITIONS

ECONOMIC CONSIDERATIONS

As mentioned previously, the City of Laurel owns the site I have selected; but, the site contains a garage which would cost approximately $2500 to remove. Also, the site contains a public water hydrant which will incur a debt to the project wether it is incorporated into the design or moved to another location.

Financing of the project will be through the sale of bonds by a mill levy increase. The levy increase will be voted on by the residents of Laurel in a special bond election. The bonds then are sold at public auction to the bidder, usually a bank or financial institution, which offers the lowest interest rates.

When Laurel is reclassified from a class "C" city to a class "B" city in 1970 it will be allowed to increase its mill levy to a maximum of six mills which is a 1.3 mill increase.

Laurel taxable situation - valuation, June, 1967

Assesed value:

Real Estate	$6,684,818
Tax Loss	1,895,123
Personal	1,712,498
Tax Loss	382,995
TOTAL Assesed Value	8,397,316

Laurel, then, can add $503,838 to its tax base by the 1.3 mill levy increase based on the present total assesed value. This tax increase represents the maximum amount of money available in 1970 assuming that future investments will equal depreciation values.

Therefore, it is obvious that Laurel has the capacity to finance a large project if it so desires.

The relative estimated costs of construction from the Marshall-Stevens Valuation Service for a class "C" (brick, block, or concrete walls; small living and administration areas; adequate lighting and plumbing) building are: $16.41 per Sq. Ft. for a fire station; and, $23.52 per Sq. Ft. for an average jail.

Using an approximation of 10,000 Sq. Ft. which allows an area more than twice as large as the present facility and an average of the two cost estimates of $20.00 per Sq. Ft., my proposed project would cost $200,000.

AESTHETICS

AESTHETIC CONSIDERATIONS

GENERAL

Aesthetics is thw very soul of architecture which adds artful expression to building. It is beyond the superficial elements of circulation, building maintenance, or economics. Aesthetics, or beauty, is rooted deep in the psyche of man and is a spiritual experience of the mind. Architecture "expresses" this spirit through truthful and harmonious manifestations of the basic elements, such as; space, light, gravity, cohesion, and rigidity.

The best of architecture reflects all the aspirations of man, containing tradjedy as well as joy and seriousness as well as play.

Architecture's power comes from being immutable, as a presence, like that of a mountain. When in the presence of good architecture, a person can feel a sense of freedom, a liberation of the mind, which is similar to the experience of being in a magnificent natural environment.

The role of the architect is a composer of harmonious spaces and a master craftsman in selecting and manipulating materials to create the space. A great architect, then, is both a "Mozart" in terms of creating a composition and a "Stradivarius" in terms of being a master craftsman.

OBJECTIVE

In designing a Police-Fire Station for Laurel, Montana, I will attempt to discover some meaningful elements which will evoke a sense of architecture. One such element I hope to represent in my design is a feeling of respect and solidarity for the institutions it will house.

Each specific function of the building will be designed to satisfy its own requirements, and also, be related to all the other functions so as to produce a unified composition of spaces. As an example, the garage which houses vehicles must in some way relate to the rest of the areas which are necessarily of a smaller scale in functional space requirements for human activities.

The building will, in general, be subject to comparatively rough use and heavy traffic so the finish materials must be relatively durable. Particularly, the walls in most areas should not be wood or plaster; but, they should be either brick, block, or concrete. Also, because of the nature of the functions housed in the building, the use of decoration or ornamentation is mostly unjustified.

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Personal Interviews

1. J. R. Nutting, Chief-of-Police, Bozeman
2. John Daly, City Engineer, Laurel
3. Gay Easton, Fire-Chief, Laurel
4. Ron Roys, Fireman, Bozeman

Policemen, Firemen are what they must be
so you, so me.

I have made the building you see --
A place for them, for you, for me.

Order,
through concrete and mortar,
Evolved the structure; simple, solid, yet dignified --
Its soul

Spaces,
though more than places,
Must perform their task; but also,
Must relate to the whole

Site,
although somewhat tight,
With trunks all about
Provides the room for a man to stroll.

R. S. Christian
Arch. 490 Thesis
June 6, 1968

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