

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILES 8672

2544 SCOMM 111: DEFERRED MAINTENANCE TASK FORCE, 1997 286

E. ARCHITECTURAL

A new soffit or EIFS system on the underside of the walkway ceiling will add insulation and provide a durable, low maintenance finish. If an EIFS finish is selected, spray foam insulation (4 inches thick minimum) could be applied directly to the underside of the steel decking to form an efficient insulative thermal break to reduce cold transmission to the office floor above.

Fire/Life Safety Upgrades

1. **Relocate/renovate/remove A3 occupancies on the third and fourth floors to meet code requirements for the existing building construction type (per 1994 UBC Table 5-B).** The building was originally constructed as a Type II steel frame and concrete structure with fire-resistive components. However, A3 occupancies (assembly rooms with under 300 persons) which include the Superior and District courtrooms on the upper floors, are not allowed above the second floor in Type II construction, unless it is Type II, F.R. (Fire-Resistive).
 - a. Allowing the courtrooms to remain on the third or fourth floor would require **reconstruction** of the building to conform with Type II, F.R. standards, which require:
 - * 4-hour Exterior Bearing Walls
 - * 2-hour Interior Bearing Walls
 - * 4-hour Exterior Nonbearing Walls
 - * 2-hour Structural Frame
 - * 1-hour Permanent Partitions
 - * 2-hour Shaft Enclosures
 - * 2-hour Floors and Floor/Ceilings
 - * 1-hour Roofs and Roof/Ceilings
 - * Noncombustible Exterior Doors, Windows, and Stairways
 - b. **Relocation** of the Superior and District Courtrooms on the third and fourth floors to the first and second floors would require a renovated area equivalent to the present first floor, which would then displace existing first floor programmatic functions: Traffic Court/Accounting, Coroner, Vital Statistics, Transcripts, Jury Assembly Area (also an A3 assembly), Law Library, and Judicial Services (an I3 occupancy requiring first or second floor locations). A complete renovation of the building would be required.
 - c. A third alternative would be **removal** of the upper story Courtrooms to the first or second floor of another facility of suitable construction type.

E. ARCHITECTURAL

2. **Provide 1-hour fire resistive exit corridor system (per 1994 UBC 1005.7).** Current corridor construction does not extend to the underside of the floor deck above without openings, has exposed wood framing above the ceiling and the corridor ceiling does not meet 1-hour requirements.

Combustible materials are not permitted in Type II construction. The existing wood framing is fire retardant treated wood. However, all combustible wood framing must be protected. To achieve this, a layer of $\frac{5}{8}$ inch gypsum board must be applied to both sides of the wall and fire-taped.

At best, this is a difficult task given the lack of unobstructed space above the suspended ceilings. If mechanical and electrical systems were completely removed as part of the renovation, this task could be accomplished.

- a. **Install fire-rated lid at underside of structure, with non-rated ceiling below.** Any new ceiling in the corridors shall not be less than that required for 1-hour fire resistive floor or roof system. The current ceiling system does not meet this code requirement. The upper ceiling will consist of $\frac{5}{8}$ inch gypsum board attached to non combustible framing fastened to the steel floor or roof joists. The lower ceiling can be a suspended acoustic tile ceiling system.
3. **Provide spray fireproofing to all interior beams and columns above the suspended ceiling (per 1994 UBC Table 6A.)** The existing structural system for the building is unprotected. New fireproofing on main structural frame elements will provide required 1-hour fire resistive protection.
4. **Provide seismic bracing for suspended ceiling systems and non-bearing interior partitions (per UBC 1994, Chapter 16).** The existing suspended ceiling system and interior partitions are not seismically braced. As part of the renovation, the existing suspended ceiling system should be completely removed and replaced. Installation of seismic bracing can be accomplished when installing the new suspended ceiling system.
5. **Provide rated doors and frames for all doors opening onto rated corridors (per UBC 1005).** Existing wood doors and frames do not have rated labels. New doors and frames shall be minimum 20-minute rated, self closing and smoke gasketed.

E. ARCHITECTURAL

6. **Remove wood wainscot from rated corridor walls (per UBC Table 8A & 8B).** Several exit corridors have wood paneling which may not meet flame spread requirements. Samples should be examined for compliance with the required ratings. If removed, patch and paint walls as required to match existing wall finish.
7. **Renovate existing stairways to meet current code requirements (per UBC Section 1006 and ADAAG Section 4.9).** The existing stairways have open risers, handrails that do not project beyond the top and bottom risers and doors may restrict landing widths.

In lieu of completely demolishing the existing stair construction, new risers could be fastened to existing steel stair treads and stringers. The existing handrails will need to be removed and replaced with new metal pipe rails which meet code. Door openings onto the stairwell should be relocated to meet landing width and exit width requirements.

8. **Remove and replace non-rated glazing in doors and transoms (per UBC Chapter 24).** A number of corridor doors have plain glass vision panels. New glazing should be ¼ inch thick wire glass or rated glazing system.
9. **Modify existing exit doors from assembly rooms where the occupancy exceeds 50 (per UBC Section 1004).** Vestibule construction and reversed door swing will be required at Jury Assembly (3 doors), Superior Courtroom D (3 doors), Clerk of Court (2 lobby doors), District Courtrooms 1 and 2 (1 door each) and Superior Courtrooms A, B, and C (1 door each).
10. **Remove protrusions from corridors (per UBC Section 1005.4).** Drinking fountains, bench seating, and fixed chairs have been installed in corridors and require recessed installation or complete removal so they do not reduce the required corridor widths.
11. **Provide elevator lobbies or equivalent elevator door protection on Floors 2, 3, and 4 (per UBC Section 1005.10).** No elevator lobbies currently exist. Mechanical ventilation and lighting modifications will be required if lobbies are constructed.
12. **Spiral Stair (per UBC Section 1006.6):** Remove the existing spiral stair from Superior Court Chambers down to the Clerk of Court's office. Provide an alternative means of access if specifically required for judicial privacy.

E. ARCHITECTURAL

Architectural finish upgrades

1. **Remove and replace entire suspended acoustic tile ceiling system.** The existing suspended ceiling system is old, water-stained, and deteriorated. The system does not provide its original fire-rating. Gypsum board panels on top of the Armstrong Fiberguard ceiling tiles have in most instances been removed. Required tenting over recessed light fixtures does not meet code. The ceiling grid is not seismically braced as required.

Although well-maintained, the original ceiling system has reached the end of its useful life. Renovation of the building will involve extensive work above the existing ceiling. This work can be performed more efficiently if the entire ceiling system is removed. A new 2 ft. x 4 ft. ceiling grid and acoustic tiles are recommended in all areas. The ceiling system in areas which have been recently renovated can be removed and salvaged for reuse.

2. **Remove and replace deteriorated carpet floor covering.** The quality of carpet varies considerably throughout the facility. A general estimate indicates that during a major renovation, approximately 50% of the existing carpet would need to be replaced; 25% would need to be cleaned, and 25% would be salvaged for reuse.
3. **Replace existing furnishings in public areas.** Existing furnishings in the facility, although in relatively good condition, are old and dated and not professional looking by today's standards.

Modern furnishings should be provided as part of the building renovation, particularly in those areas where the public is involved, such as courtrooms, jury rooms, and jury assembly area.

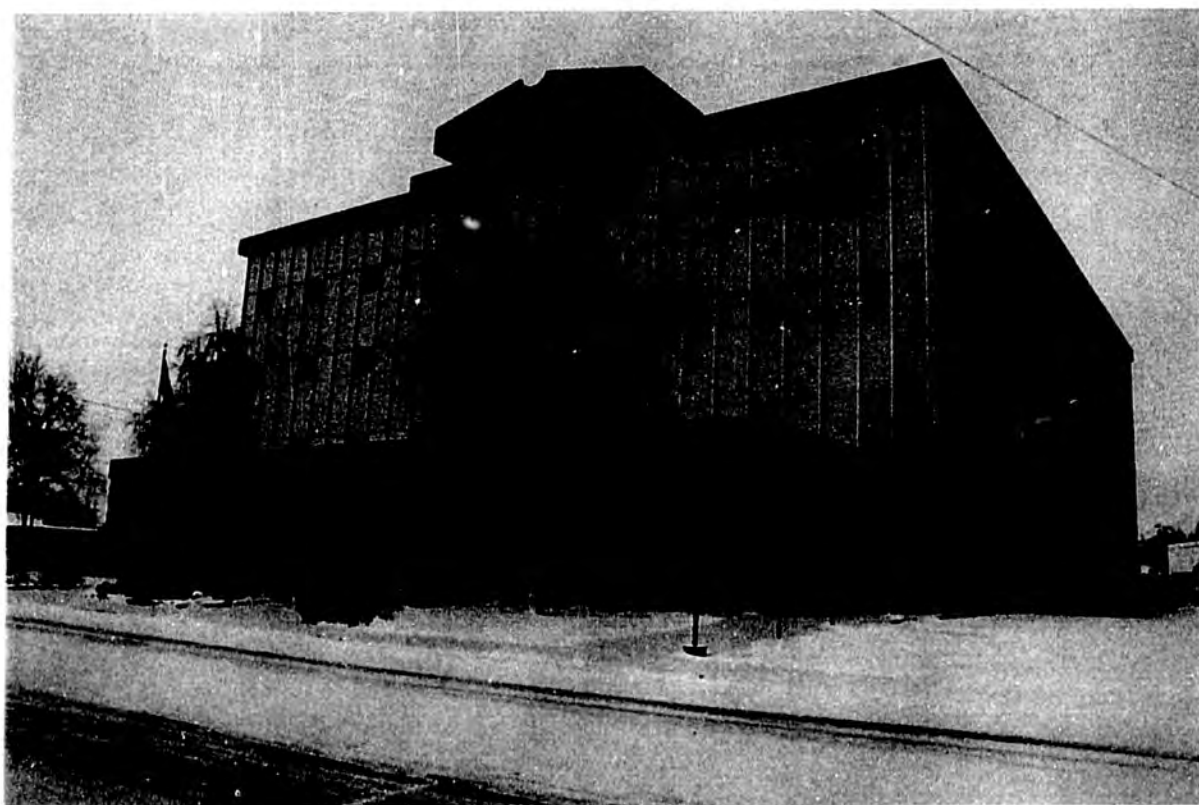


Photo #1

Courthouse from northeast

PHOTOGRAPHS

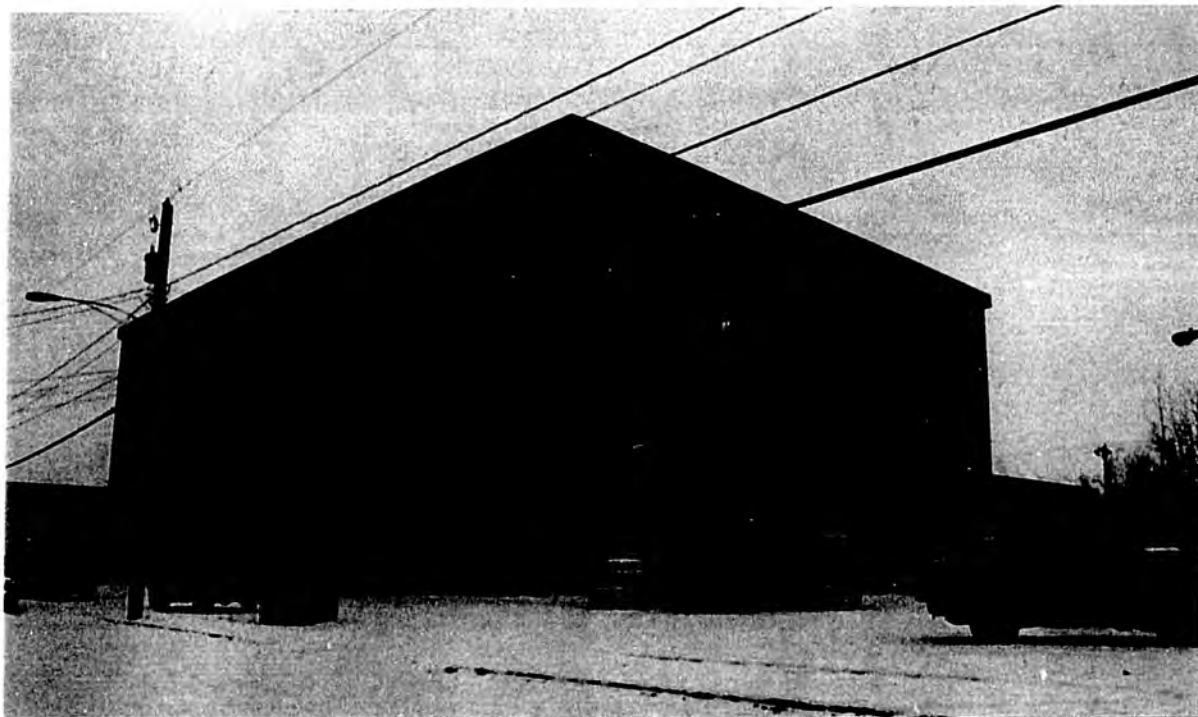


Photo #2

Courthouse from northwest

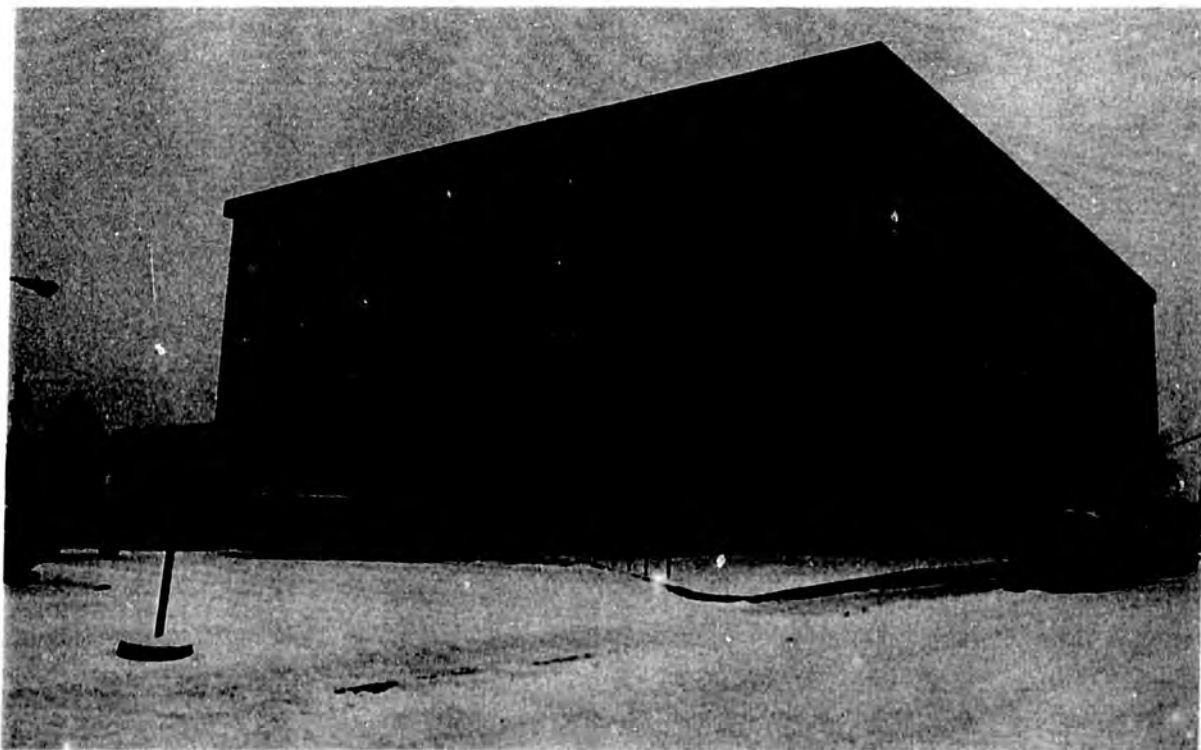


Photo #3

Courthouse from southwest

PHOTOGRAPHS

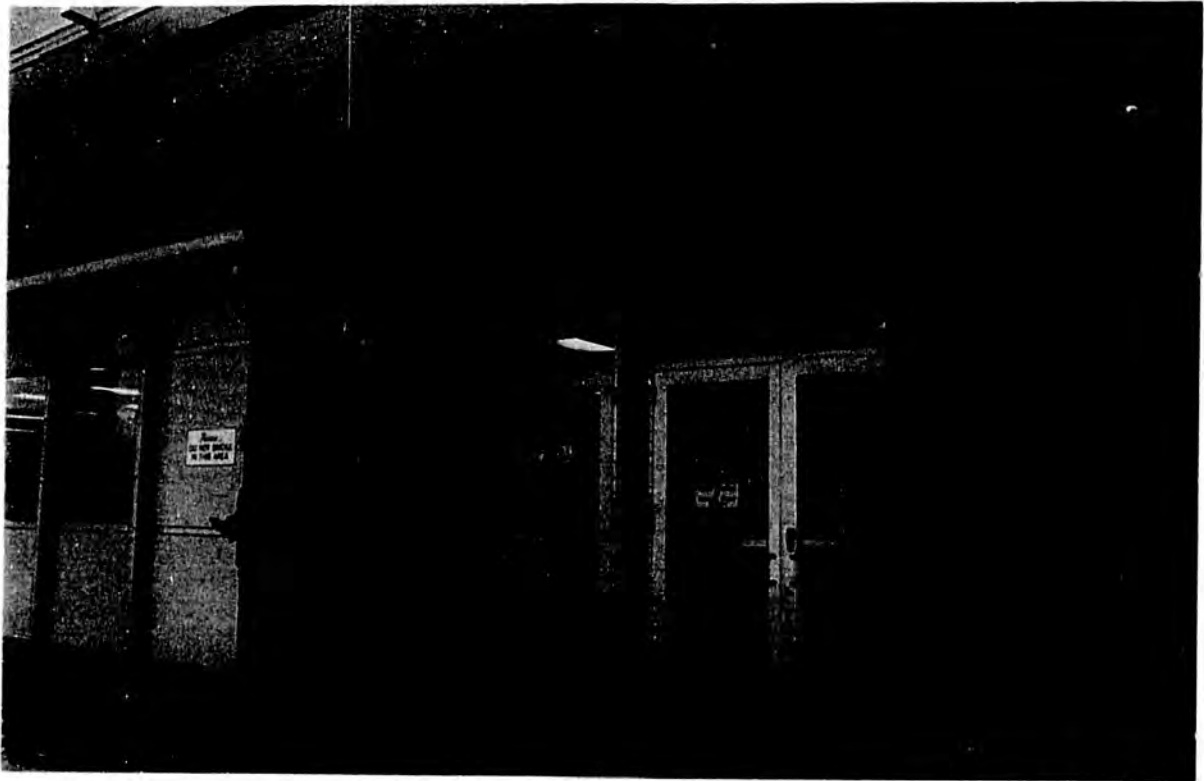


Photo #4

Law Library Entrance

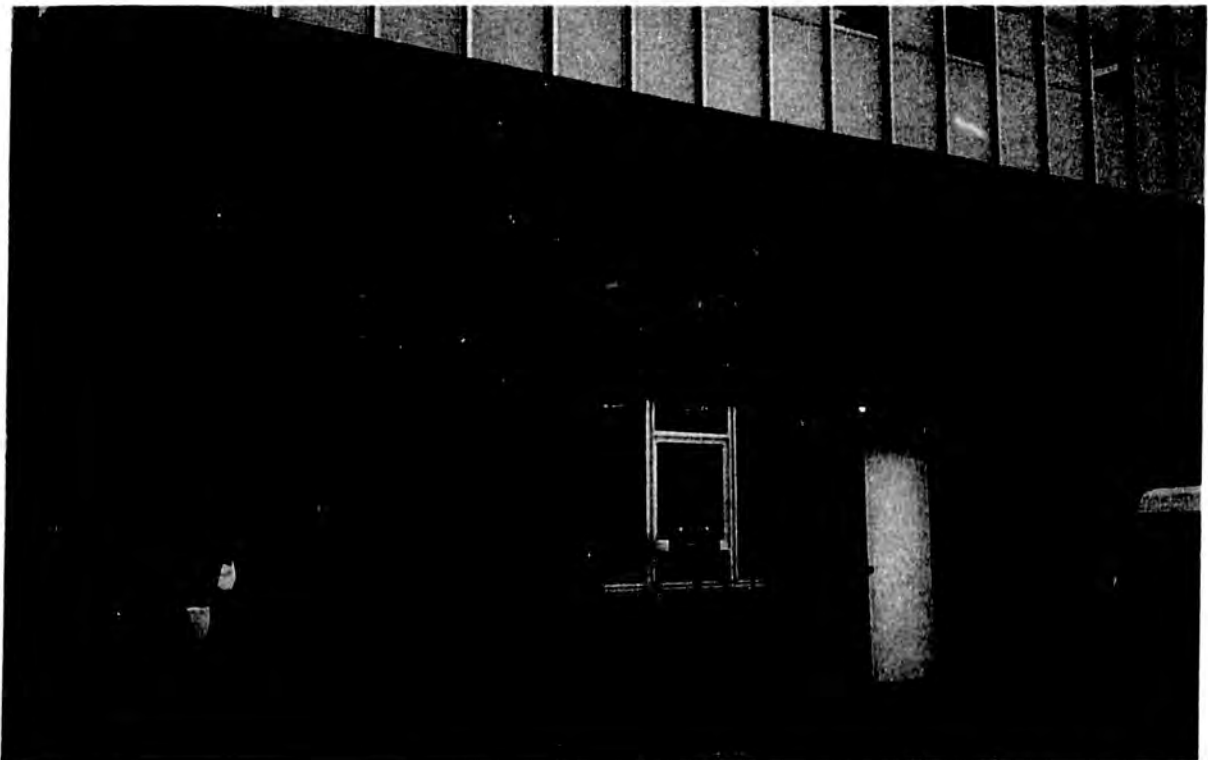


Photo #5

Maintenance Entrance

PHOTOGRAPHS



Photo #6

Delaminating Exterior Panels



Photo #7

Failing South Soffit

PHOTOGRAPHS

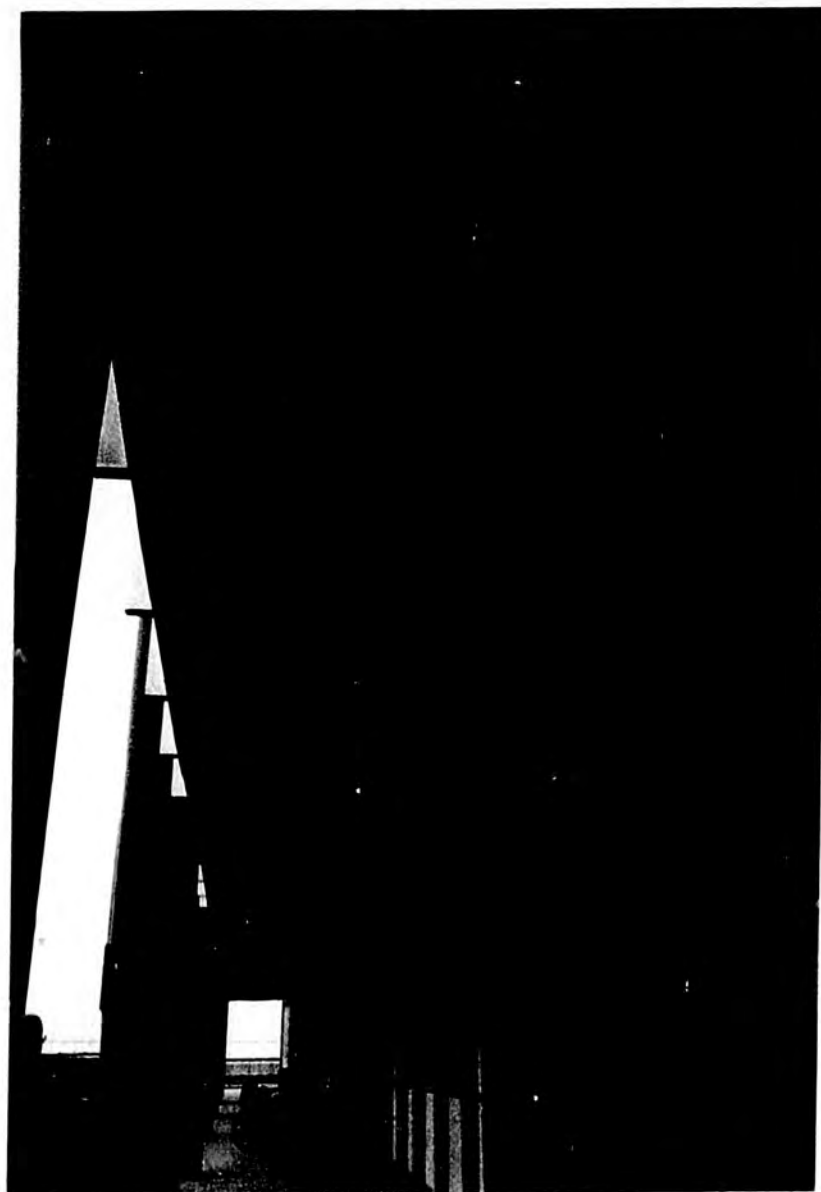


Photo #8

Damaged North Soffit

PHOTOGRAPHS



Photo #9

Detail of Soffit



Photo #10

New IRMA Roof

PHOTOGRAPHS



Photo #11

Main First Floor Lobby



Photo #12

Fourth Floor Lobby (Elevators at left)

PHOTOGRAPHS

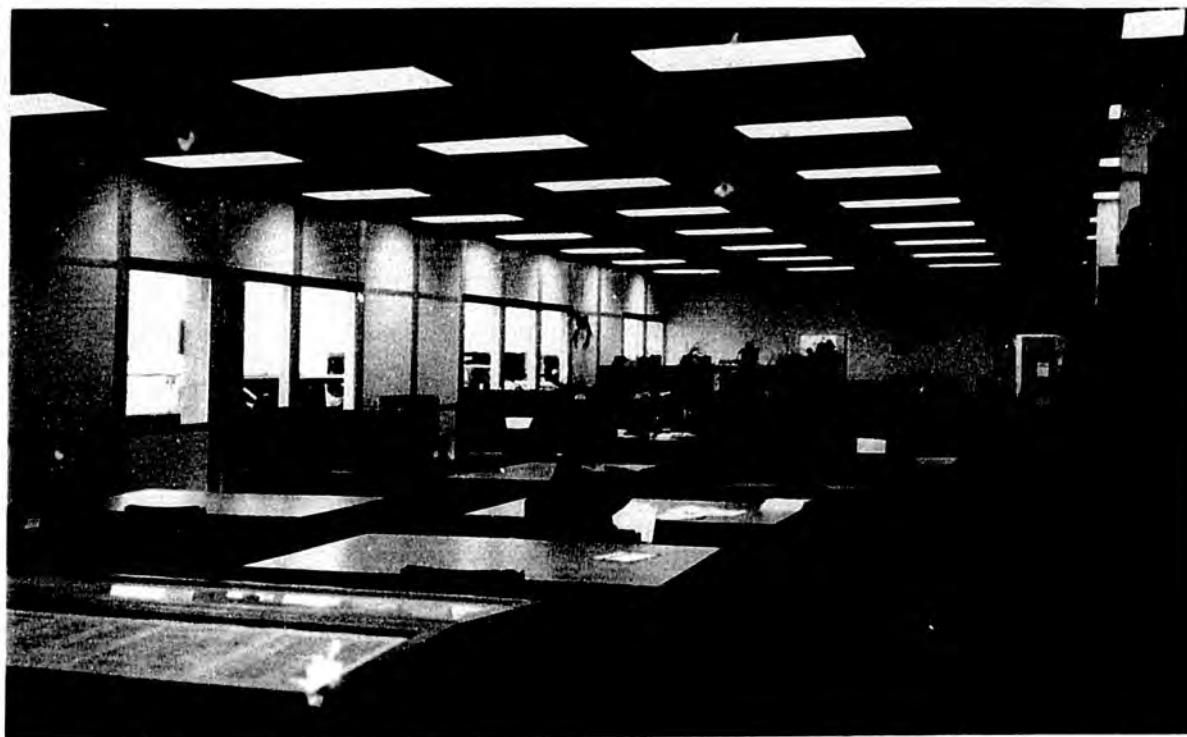


Photo #13

Law Library (A3)



Photo #14

Jury Assembly (A3)

PHOTOGRAPHS



Photo #15

Accounting/Traffic



Photo #16

Clerk of the Courts (A3)

PHOTOGRAPHS

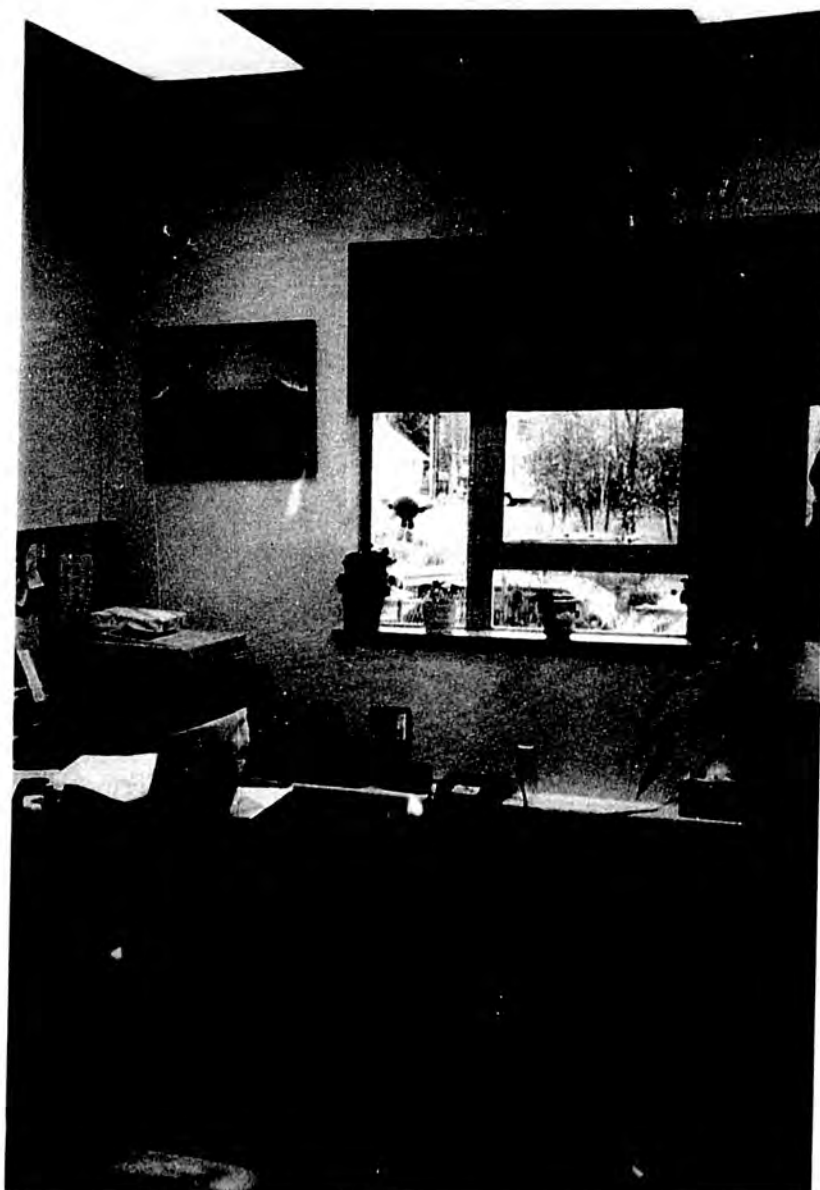


Photo #17

Typical Office

PHOTOGRAPHS



Photo #18

Traffic/Arraignment Courtroom



Photo #19

Traffic/Arraignment Courtroom

PHOTOGRAPHS

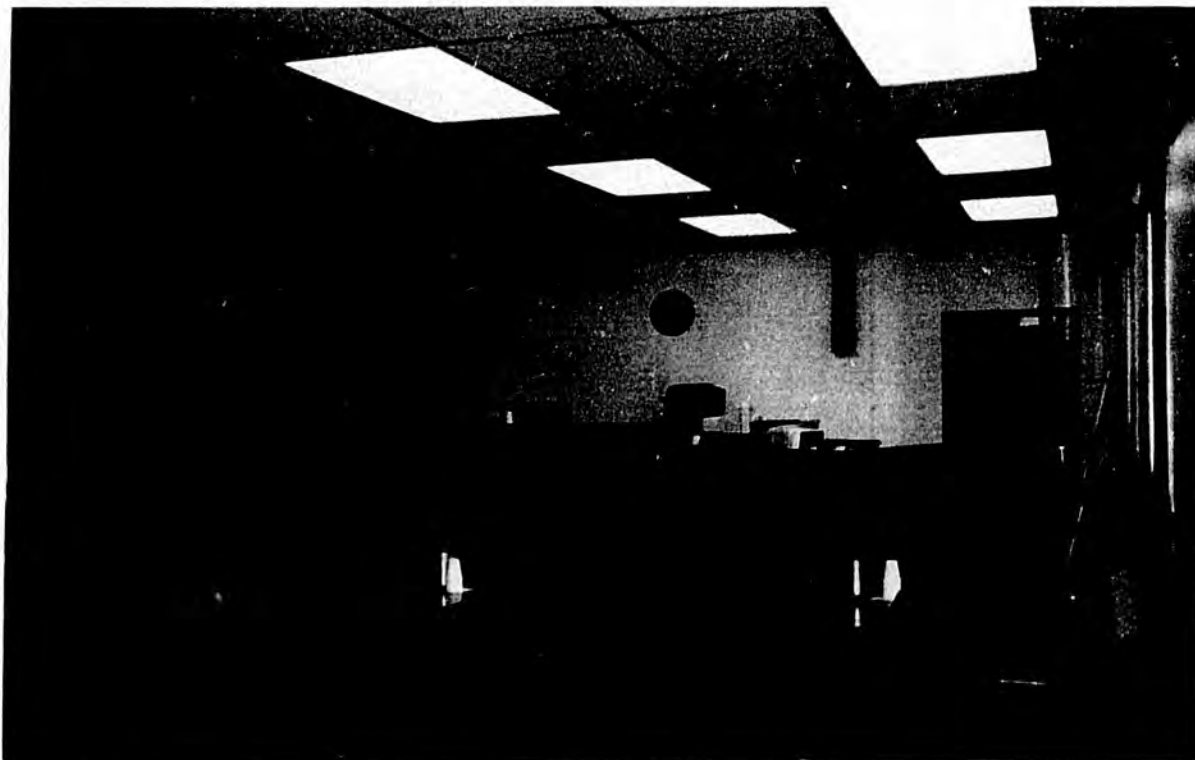


Photo #20

District Courtroom #3



Photo #21

District Courtroom #3

PHOTOGRAPHS

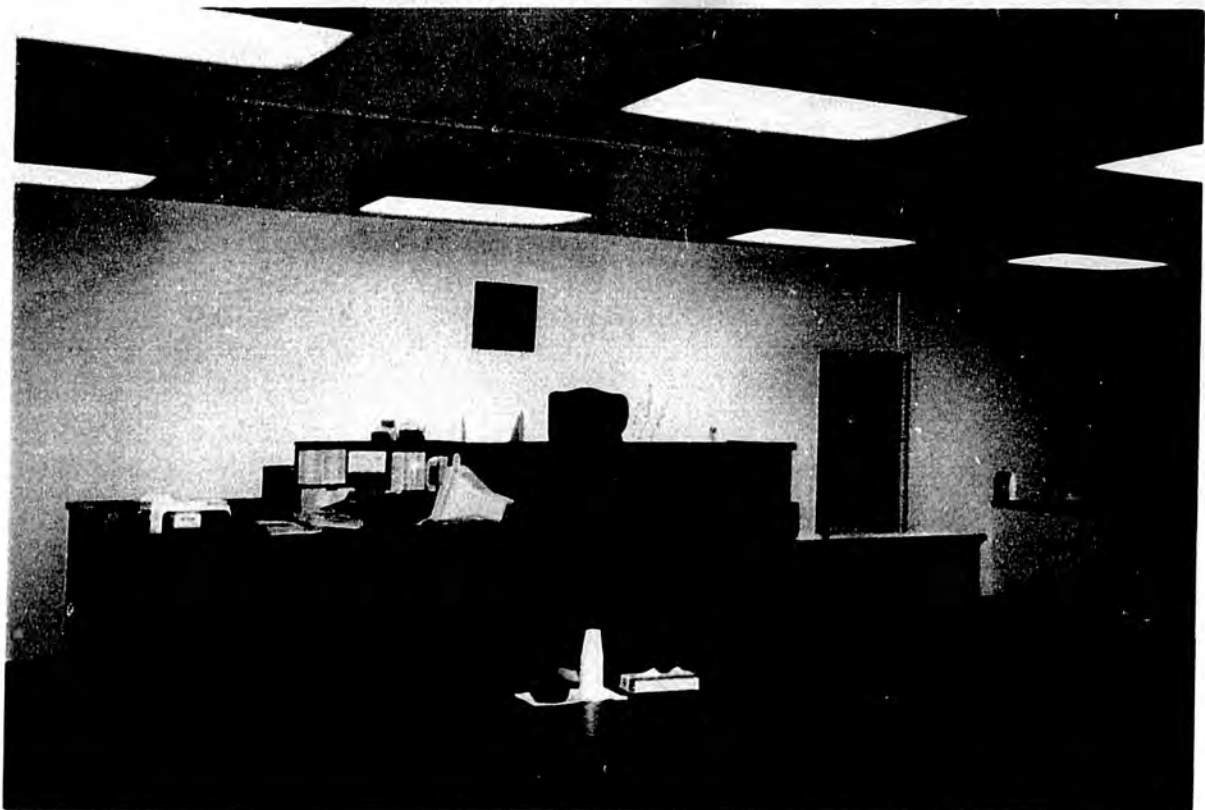


Photo #22

Superior Courtroom #4



Photo #23

Superior Courtroom #4

PHOTOGRAPHS

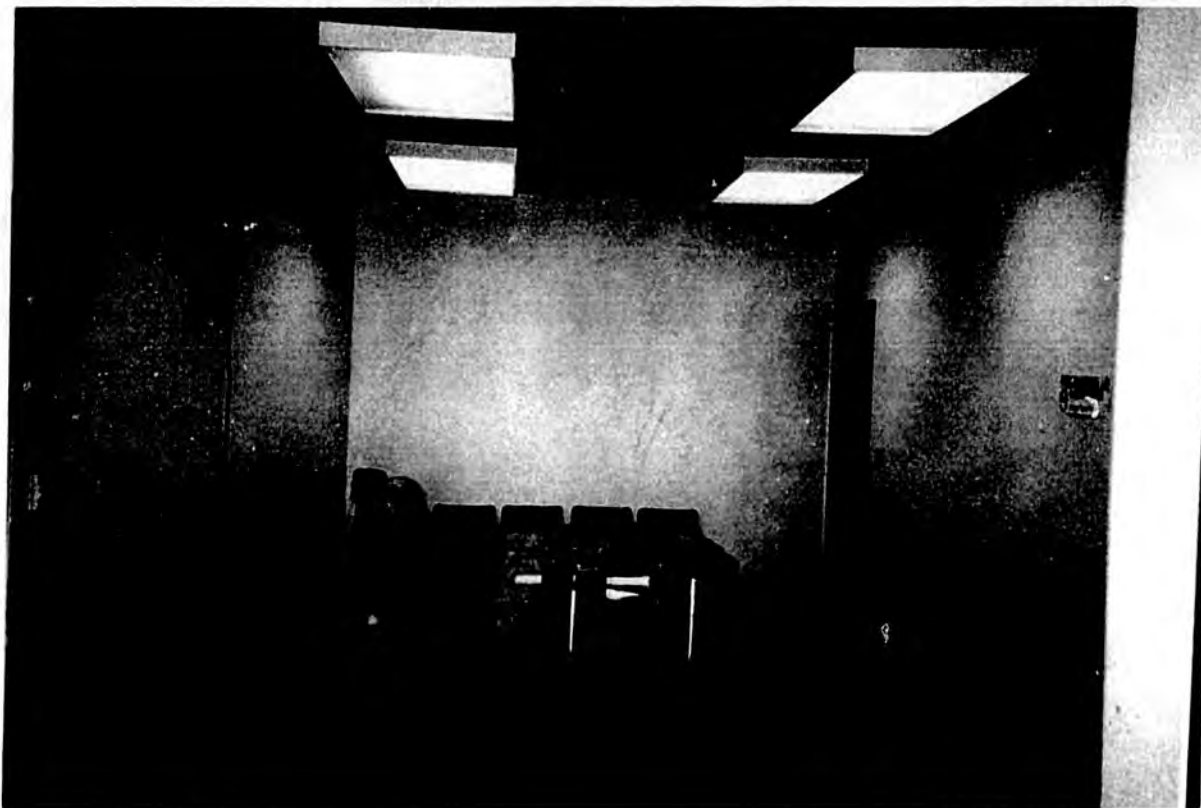


Photo #24

Typical Jury Room



Photo #25

Corridor with Wood Wainscot

PHOTOGRAPHS



Photo #26

Bench in Corridor



Photo #27

Fixed Seating in Corridor

PHOTOGRAPHS

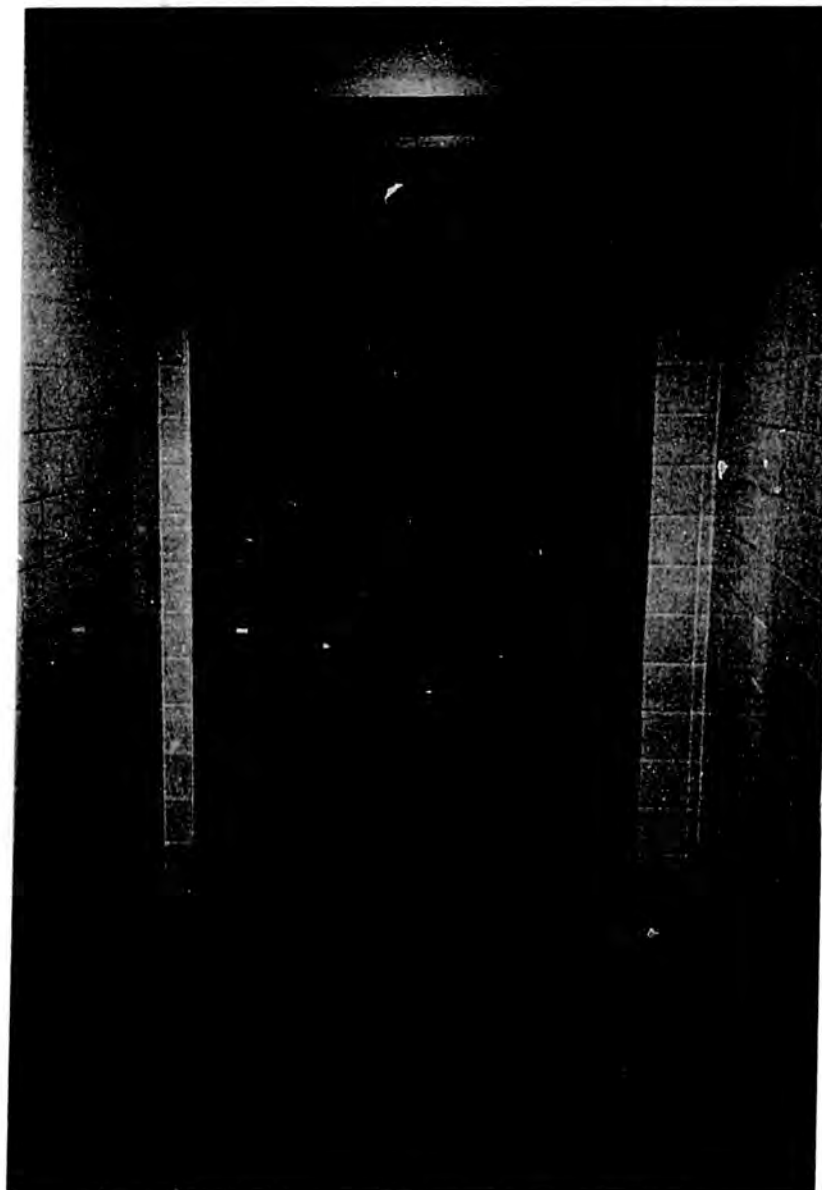


Photo #28

Louvered Toilet Room Door

PHOTOGRAPHS



Photo #29

Typical ADA Toilet Room



Photo #30

Typical Non-ADA Toilet Room

PHOTOGRAPHS

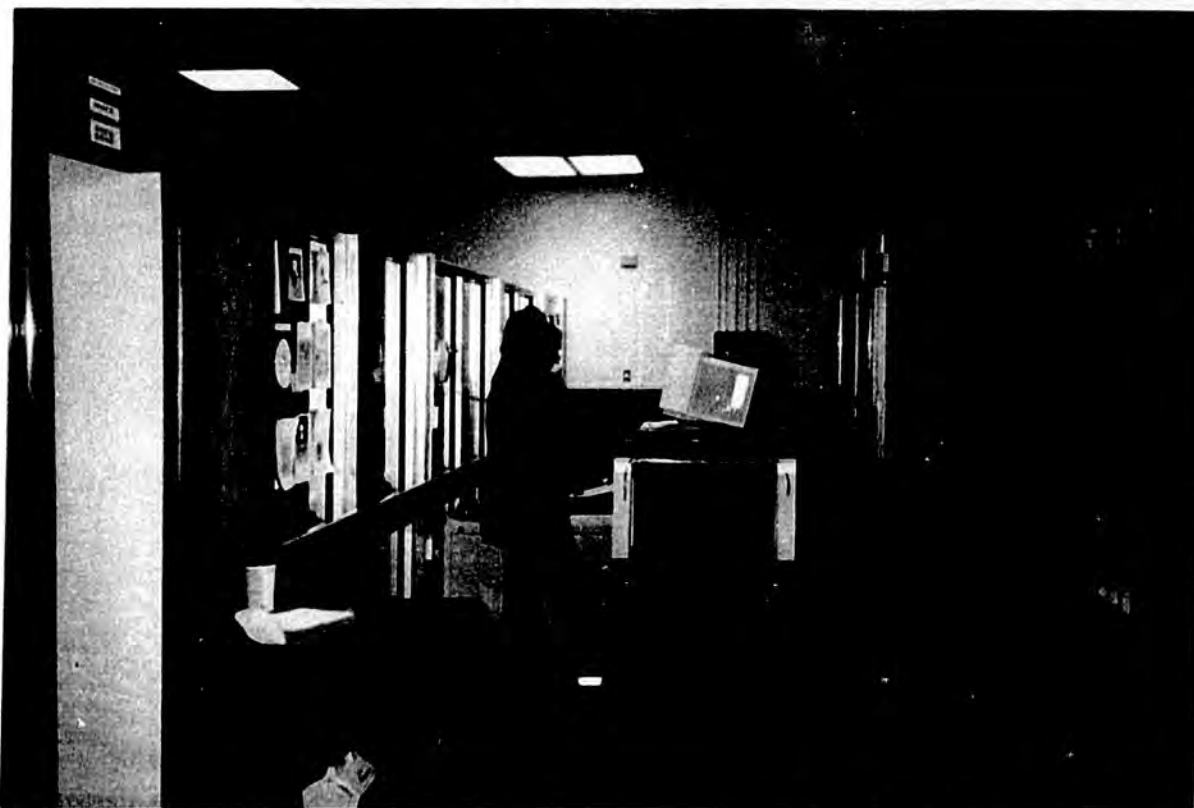


Photo #31

Security at Public Entry

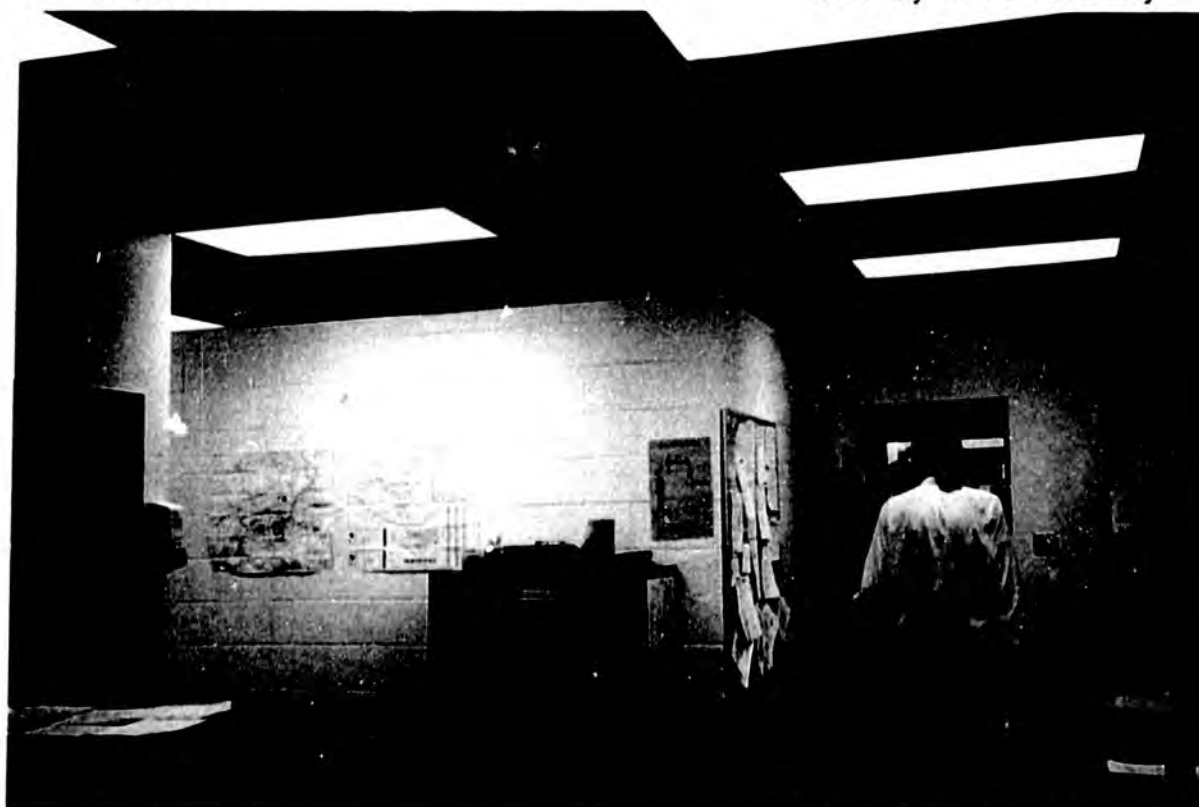


Photo #32

Cells (I3) in AST Offices

PHOTOGRAPHS

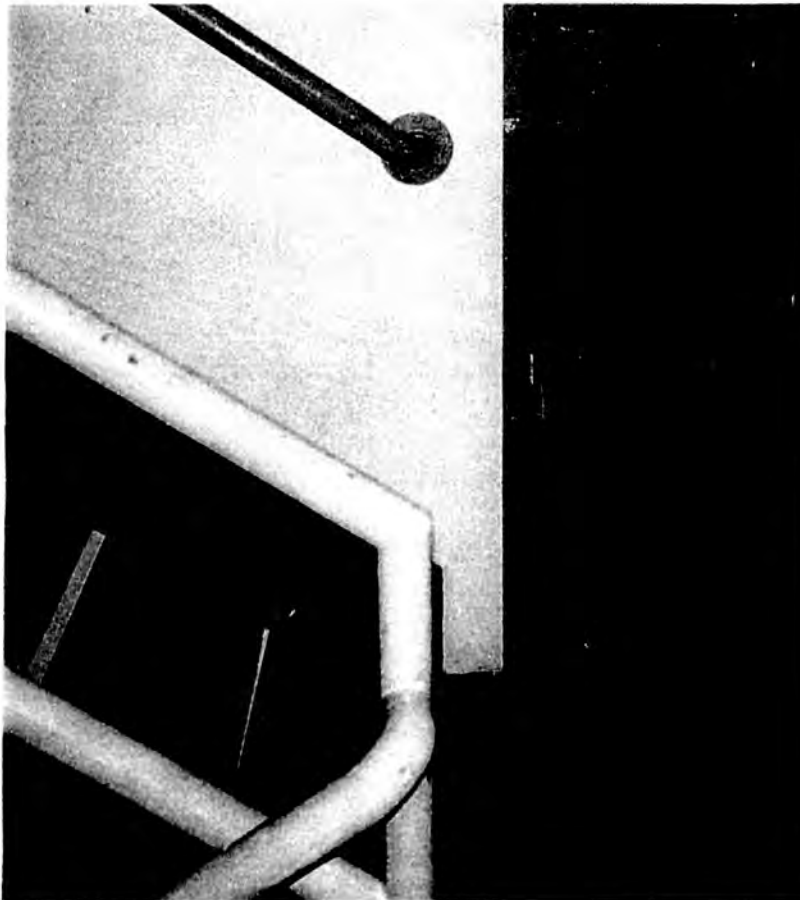


Photo #33
Non-compliant
Handrails
at Exit Stairs

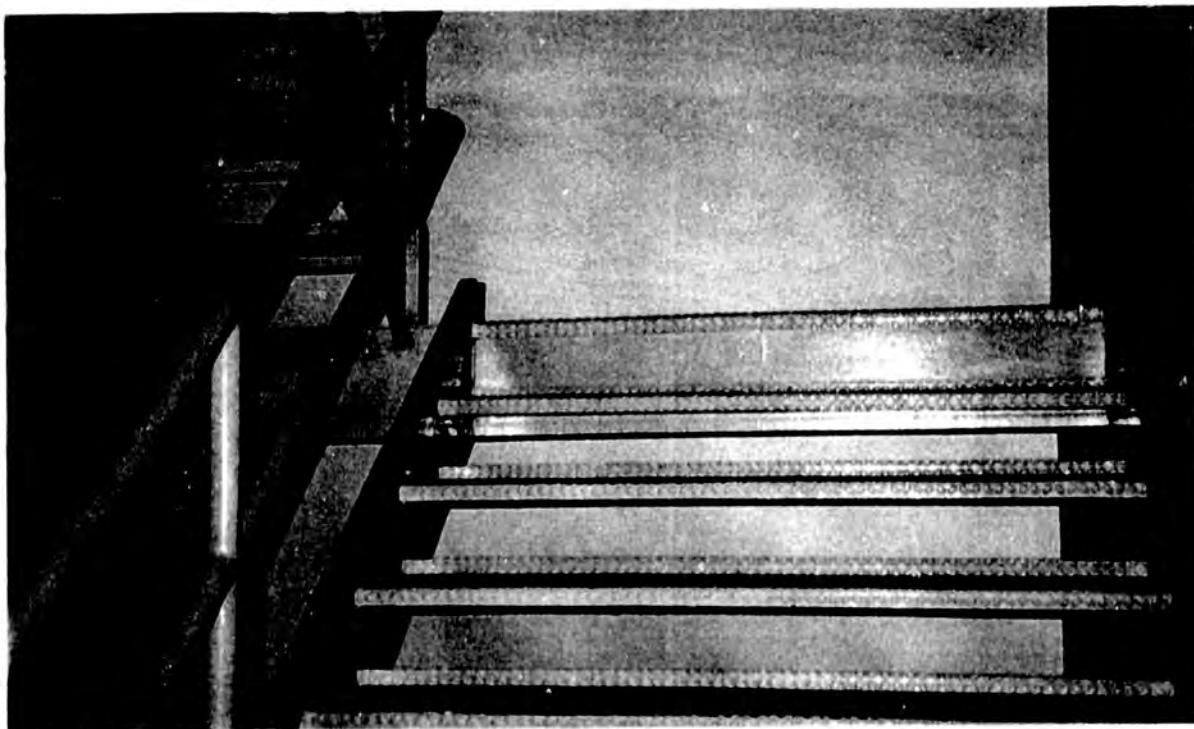


Photo #34

Open Risers at Exit Stairs

PHOTOGRAPHS

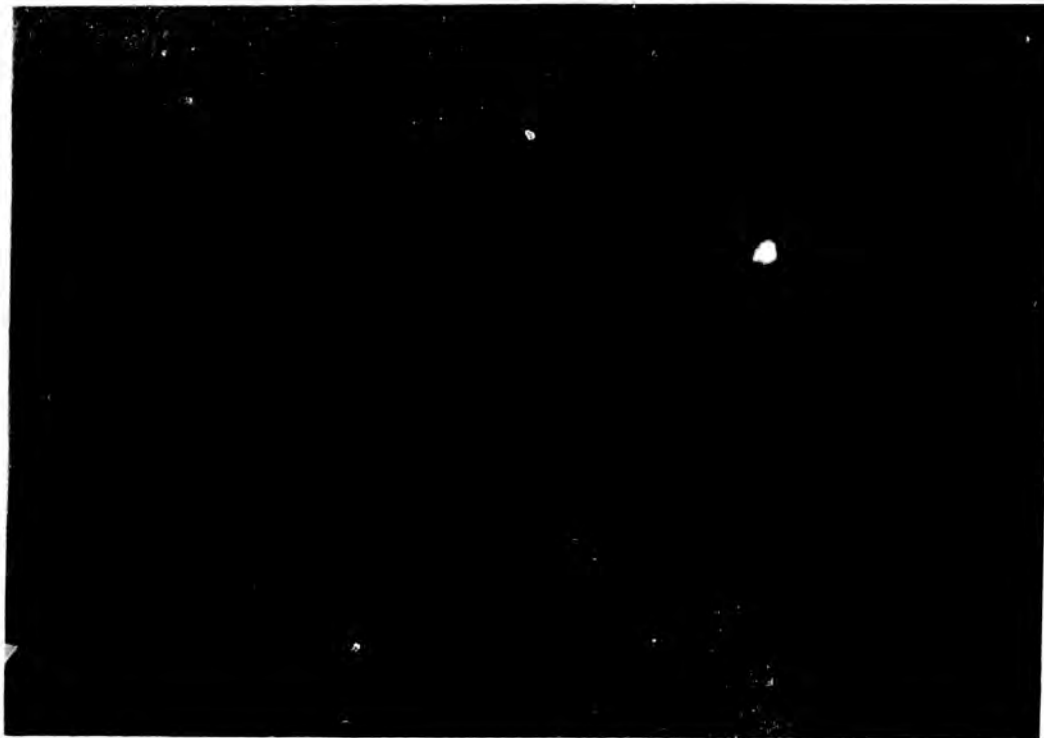


Photo #35

Damaged Ceiling Tile



Photo #36

Damaged Floor Tile and Mastic

PHOTOGRAPHS

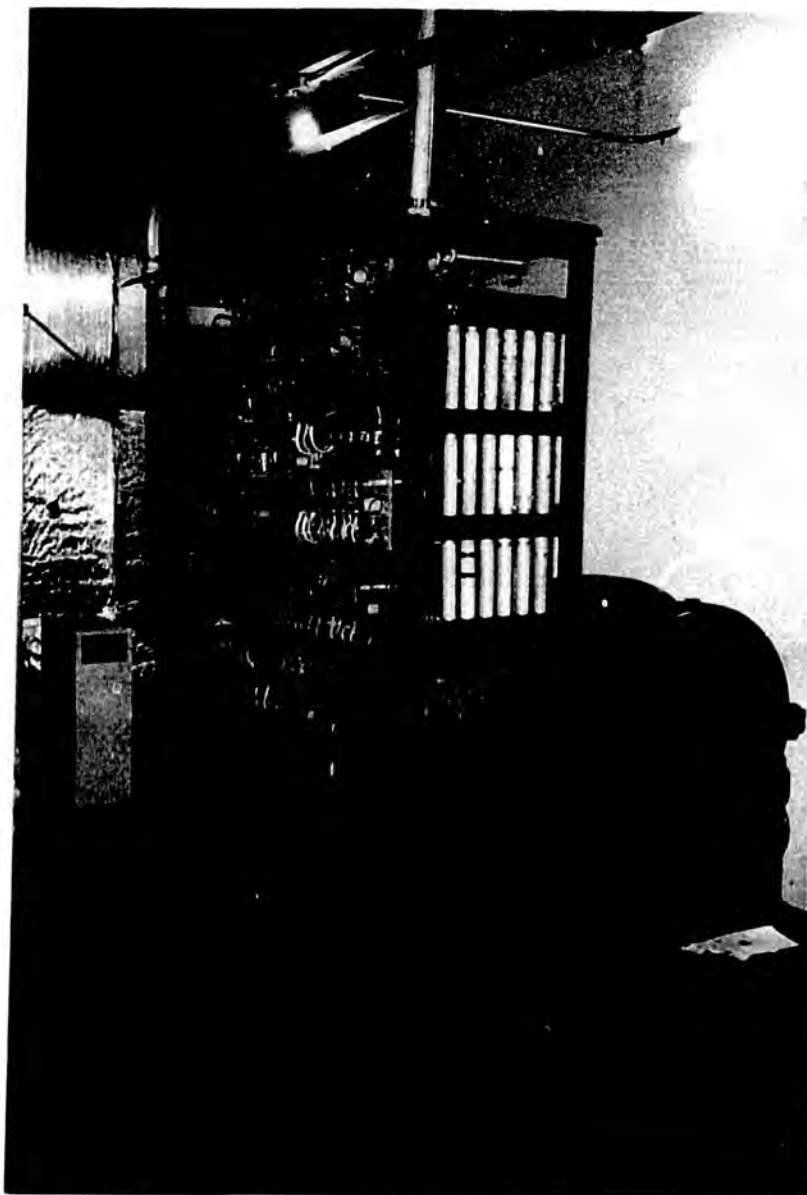


Photo #37

Original (Unenclosed)
Elevator Machinery

PHOTOGRAPHS

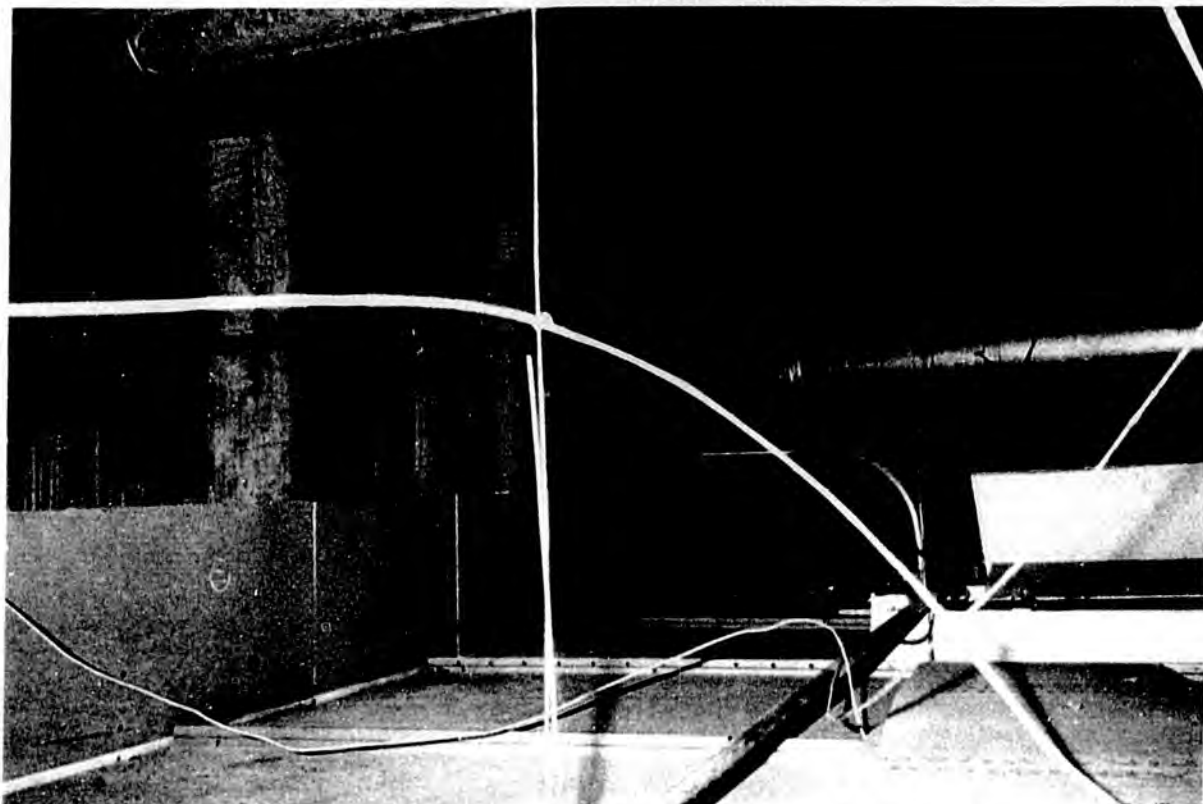


Photo #38

Exposed Wood Stud Walls Above Ceiling

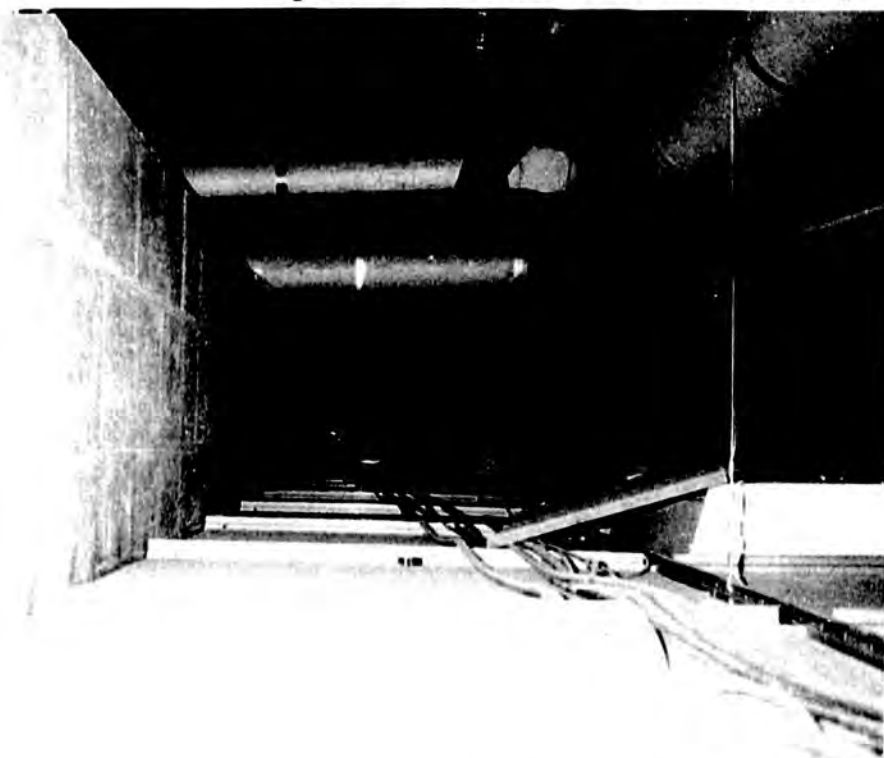


Photo #39

Masonry Wall Above Ceiling

PHOTOGRAPHS

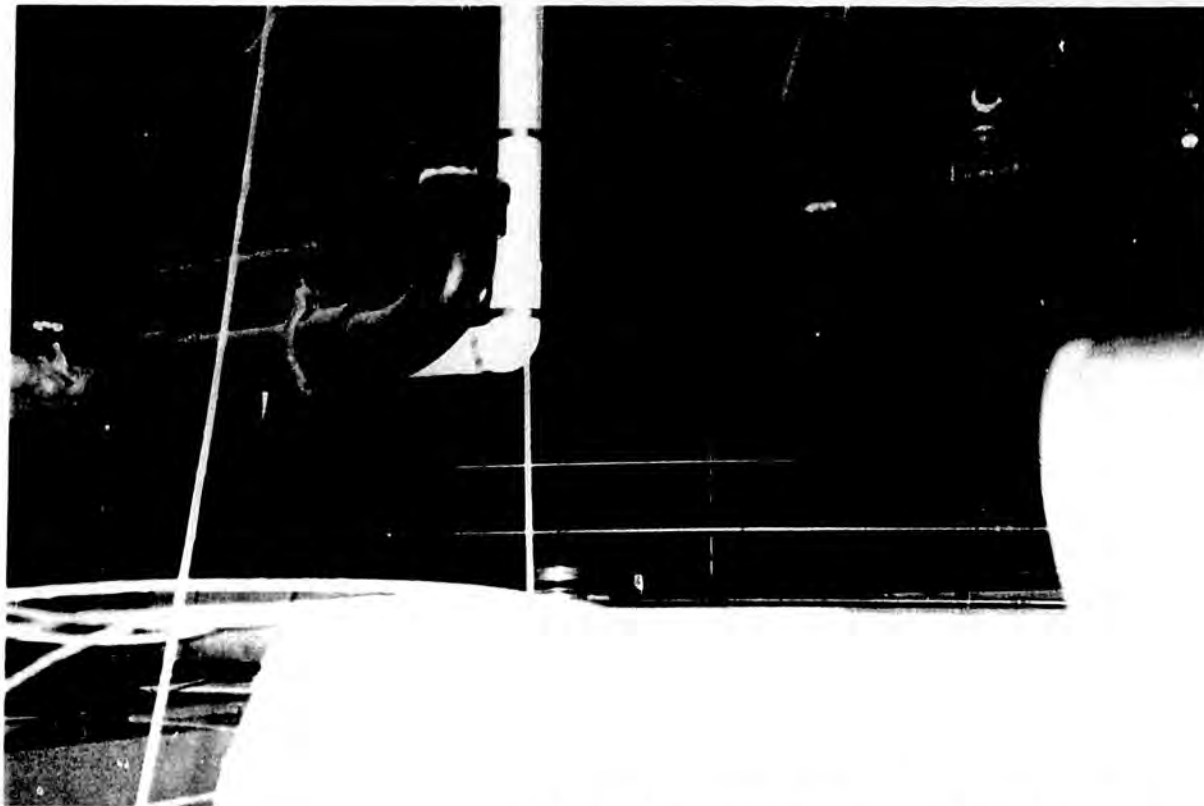


Photo #40

Typical Plumbing Lines in Ceiling Plenum

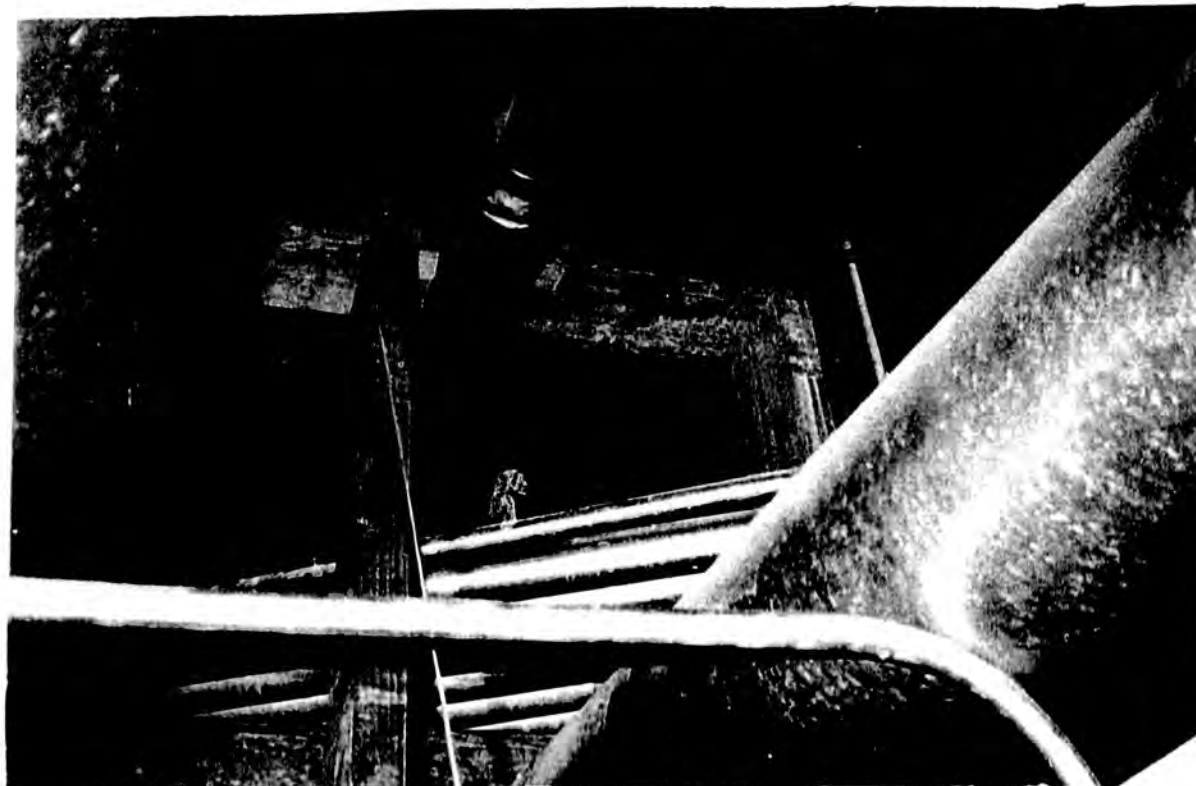


Photo #41

Utility Crossings in Ceiling Plenum

PHOTOGRAPHS

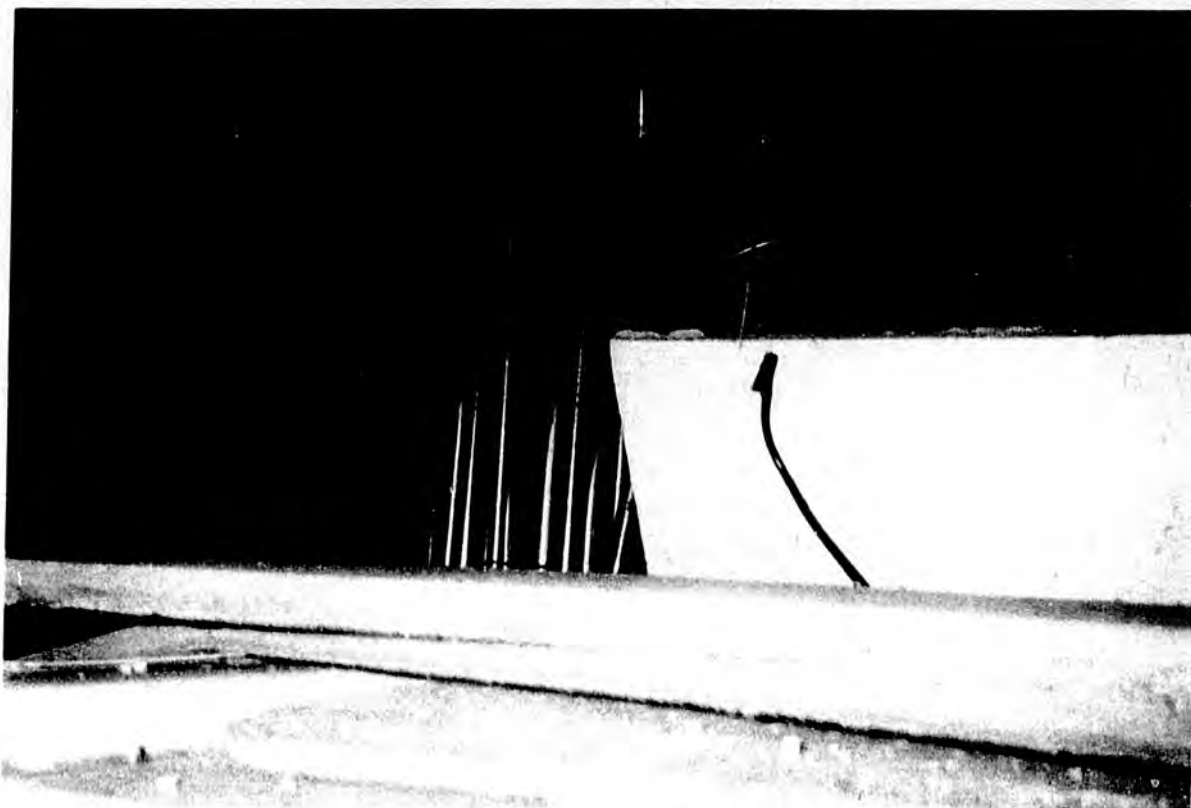


Photo #42

Conduit Risers in Ceiling Plenum

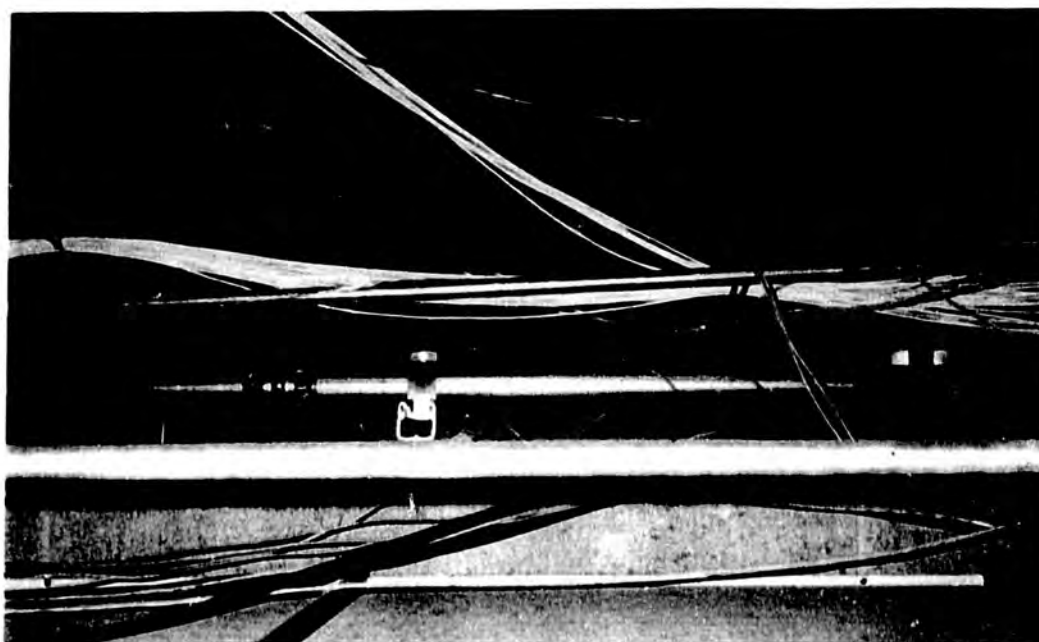


Photo #43

Wiring (non-rated) in Ceiling Plenum

F. STRUCTURAL

LOFTUS ENGINEERING ASSOCIATES INC.

Building Description

The Fairbanks Courthouse is a four-story structure 150 feet by 120 feet in plan with a sizable mechanical penthouse on the roof. At the ground/first floor, there are single story extensions at the front and rear of the building. These extensions are approximately 25 feet and extend across the full width of the building. At the first floor there is an 8½ foot setback from the column line to the building line creating a second floor soffit along the north and south side of the building. The remainder of the building, second floor to roof, has a regular rectangular layout without re-entrant corners or vertical irregularities.

Most of the courthouse structure is a steel frame with wide flange columns and girders. The floor beams are open web steel joists spanning between the girders. The floors and roof are reinforced concrete slabs poured on corrugated metal form deck. There are two stairway or stairway/elevator cores, one at the west and one at the east end of the building, which are constructed of cast-in-place concrete walls, beams, and floors. The penthouse is framed with wide flange steel columns and beams with a steel roof deck. The first floor extensions have concrete masonry walls supporting open web steel joists and a concrete roof deck.

The foundation for this building is cast-in-place concrete. Large spread footings support the steel columns and strip footings support CMU walls and concrete walls. The first floor is a 4 inch concrete slab on grade.

The lateral load resisting system for this building relies on the steel moment resisting frames in both the E-W and N-S directions. In the north-south direction, all eight frame lines act to resist lateral loads. In the east-west direction, only the center two of four frame lines are effective in resisting lateral loads. The moment connections between girders and columns are constructed using cover plates with full penetration welds to the columns and fillet welds to the girder flanges. The girder flanges are not directly connected to the columns. The concrete walls at stairwells and the elevator shaft, as well as the CMU walls at the first floor, have some capacity to resist lateral loads. However, these elements were not designed as shear walls to resist horizontal loads, nor were they detailed to provide the levels of ductility required by current building codes. While the walls provide some redundancy, they cannot be relied on to resist lateral loads due to wind or earthquakes, and should be ignored in evaluating this element of building performance.

F. STRUCTURAL

Existing Conditions

The main steel beams, columns, and connections in the courthouse building were examined in a few locations above the architectural ceiling. These buildings components are all in fair to good condition. The moment connections were not cleaned and painted after field welding, as would be the case under current standard practice. As a consequence, the welds and adjacent heat-affected steel all have surface corrosion. No welds were found in the brief field examination which showed any deep rust.

The structural concrete at the stairwells is in good condition. No large cracks or spalling concrete were found. There are some tight, irregular cracks in the concrete walls which are the expected result of concrete shrinkage as it dries. One concrete construction (cold) joint in the northwest stairwell shows evidence of slight movement. This may have been a result of the recent (October 5, 1995) earthquake, but is not a serious problem. The concrete masonry walls at the front and rear of the building are in good condition and do not show signs of movement or deterioration.

There are two areas where structural related building deficiencies were observed. One is in the first floor mechanical room on the west end of the building. In this room are two large air handling units which are suspended from the structural roof above. These units are simply hung and do not have the required angle bracing to keep them from swinging and perhaps falling during an earthquake. The second deficiency is in the area of the northwest stairway at the second, third, and fourth floors and on the west side of the law library at the first floor. In these areas, there are CMU partition walls which do not tie to the structure above. In at least one area, these walls have no vertical reinforcement or grout. Walls such as this are extremely vulnerable to falling during an earthquake. In fact, one of these walls moved enough in the recent quake to cause large cracks in the architectural covering.

Structural Analysis

A preliminary analysis of the courthouse structure was made in order to determine if it meets the requirements of the current building codes. This analysis was based on original as-built drawings dated May 15, 1962, prepared by B.C. Hamilton. Due primarily to the penthouse, the structure has different size beams and columns in adjacent frames. In order to simplify this analysis, only one typical frame in each direction was modeled. Dead loads and floor live loads were based on the original design drawings. A snow load of only 30 psf was used in the gravity analysis. The reason for using this non-code value was that it was the original design load. In addition, there is documentation from the 1992 Re-roof project indicating that the building is close to its design limit at the reduced snow load. As specified in the current

F. STRUCTURAL

Fairbanks code, one-half of the design snow load of 50 psf was included in the building weight for seismic calculations. Based on the 1994 UBC, the seismic base shear and the vertical distribution of shear through the building were determined. These lateral loads were combined with gravity loads and applied to the typical frames. The frames were also analyzed under gravity loads alone.

Output from the frame analyses gives design Moments, Shears, and Axial loads in all of the beams and columns. A selected number of the critical members were checked to compare the design loads against beam or column capacity. The results of this check indicate that for both gravity and lateral loads, the courthouse structure is close to its design capacity. In fact, at the fourth floor and roof there are some members where loads exceed the capacity. This situation would be worse if a design snow load of 50 psf were used. The results of these analyses do not necessarily indicate that the building is unsafe. First, the analyses was only preliminary in nature and refinements would be made in a detailed design check. Second, design live loads are essentially a worst case condition and are rarely reached. The code, in fact, allows live load reductions based on the tributary area affecting a particular member and this refinement was not included in the preliminary design deck. Further, an analysis of all building frames would result in a better understanding of the lateral load distribution and its effect on the structure. This might result in either increasing or decreasing the design loads to particular members.

Recommendations for Renovation

The Fairbanks Courthouse, in general, is in good structural condition and meets most of the code requirements for strength and stiffness. There are no serious problems, from a structural standpoint, which would preclude the renovations required. However, if it is decided to renovate the Courthouse building, several structural related work items should be anticipated.

1. **A detailed inspection of all CMU partition walls will be required.** It can be anticipated that most will require additional reinforcement and grouting. They also should be extended up to or structurally tied to the slabs above.
2. **All major mechanical equipment which is to remain in service should be inspected for stability during a large earthquake.** At least two air handlers will require lateral support.
3. **A detailed structural analysis of the entire building should be made.** In order to meet the current code requirements for snow and earthquake loads, it will probably be necessary to strengthen some of the roof beams and their connections to the columns. In a worst case, this could be as many as 38 beams and 76 connections.

G. MECHANICAL

MBA CONSULTING ENGINEERS INC.

The following paragraphs will address the mechanical systems for the Fairbanks Courthouse, as related to the deficiencies and requested improvements described in the proposed statement of services prepared by the Alaska Court System.

This report will summarize the reported deficiencies and requested improvements. It will provide a description of existing mechanical systems and their operation, provide an analysis of problems associated with the current systems, and make recommendations for system upgrades. Apparent code deficiencies are also included for consideration by the authority having jurisdiction.

Summary of Deficiencies and Requested Improvements

Complaints include inadequate heating and cooling of the building, problems with air circulation, and too few control zones. Requested improvements include a new energy efficient control system and a flexible ventilation system sized for increased electrical cooling loads.

Existing System Description

Ventilation System: Each floor is provided with a two-deck multi-zone air handling system. The fan units are located between the east stairwell and men's restroom on floors two through four and serve the floor below. The unit for the fourth floor is located in the Penthouse. The first floor has an additional unit located in the mechanical room at the northwest corner of the building.

Each unit is provided with a heating coil and up to five face and bypass dampers at the unit discharge. The principal of operation is that each face and bypass damper regulates a constant supply airstream thru or around the heating coil or a mixture of both to satisfy the setpoint of a thermostat located in the space.

Typical zones include four perimeter zones by exposure and a single interior zone that is not affected by solar or heat loss influences. This type of system relies on zones controlled by one thermostat having similar load characteristics. There is a single duct off the unit discharge for each control zone and air diffusers for each ventilated space.

The air supply to each multizone unit is preconditioned by heating and chilled water coils located in the penthouse. The return air path is via the ceiling plenum of each floor to an individual duct shaft connected to a return

G. MECHANICAL

fan plenum on the fourth floor near the (northwest) stairwell. The return fan is a 49 inches DWDI centrifugal unit. The unit discharge is ducted to a relief opening thru the roof and also back to the penthouse. The heating coil at the penthouse is on the return air- stream only. Outside air and return air is mixed thru panel fans and then cooled if required with chilled water coils. A vane axial fan is used to pressurize the multizone fan room plenums.

Heating System: The building heat source is district steam. The steam is reduced to 15 psi in a below grade vault outside the northwest corner of the building. A heat exchanger in the mechanical room generates heating water for circulation throughout the building. A three inch primary heating main, with two base mounted heating pumps, circulates to secondary pumps feeding the third and fourth floor radiation loops and multizone and penthouse heating coils. Each floor is provided with perimeter baseboard heat with two position thermostat controls. Entries are provided with fan coil heating units. The maintenance office and garage have unit heaters.

All terminal heating devices are of original building vintage. However, the steam convertor and all heating pumps are new from approximately 1988.

Cooling System: The courthouse uses ground water for cooling. A deepwell pump is located on the north side of the building. Groundwater is pumped through a 3 inch copper main to the penthouse chilled water coils. The water is chemically treated in the mechanical room to prevent sediment scaling of the chilled water coils. The water is then wasted to the storm drain system.

Exhaust Ventilation System: All toilet rooms are provided with exhaust ventilation. Six fan are indicated on the original drawings, however, EF-1, 2, and 3 were the only units actually confirmed during the fixed investigation. Make-up air for toilets is through door louvers communicating with the corridor. A number of door louvers were blanked off.

Temperature Controls System: The temperature controls system is pneumatic. A new dual air compressor unit is located in the electrical vault. The system has been upgraded over the years, including some European manufactured control components. The maintenance staff has built a main panel indicating system status for fan units, outside air, and penthouse equipment.

Fire Protection System: The building is fully sprinklered including upright heads provided in the ceiling plenums. A flow alarm valve is provided for each floor. The sprinkler service is located in a closet on the southeast corner of the building. The system was installed in 1987.

G. MECHANICAL

Domestic Water System: Piping and fixtures are of original building vintage. Domestic piping is copper, however, some galvanized piping is used for stops and at drain connections. There appeared to be good water flow to fixtures at faucets and flush valves. Faucet aerators have been removed. A new steam to domestic hot water generator has been installed.

Analysis of Operational Problems

An analysis of the existing ventilation, heating, and cooling systems indicates that much of the equipment and duct distribution system is incompatible with desired requirements and performance characteristics for an upgraded facility. Consideration must be given to system type, system capacity, ability to upgrade system control, and with respect to current age of equipment compared to accepted useful life. The following paragraphs address these issues relative to the existing systems.

Air distribution for each floor is supplied by a constant volume multizone air handling unit. The limited number of control zones available is inherent to this type of system. Ducting for each zone originates at the air handling unit and the quantity of zones is dependent upon the coil face area and the number of face and bypass dampers to tap into.

An earlier upgrade attempted to provide additional zones by installing control dampers at some of the outlets to emulate operation of a variable air volume system. The upgrade did not address the affect of these dampers with regard to varying duct static pressure and the potential to relieve excess air to portions of the system without damper control. A 1983 report, prepared by Stephen Kailing, indicates the results of the system retrofit were not satisfactory.

There are approximately 14 heating zones per floor that are located around the perimeter of the building. These zones are controlled independent of the ventilation zones with separate thermostats. The separate control will allow the baseboard to act as "re-heat" for room ventilation air. In rooms that do have air system control, the thermostats will want to fight each other resulting in inefficient operation.

With regard to ventilation system capacity, the total original design air flow for the facility is 51,540 cfm; which is .78 cfm/ft² based on 69,495 ft² of conditioned space.

G. MECHANICAL

A block heating and cooling load for the facility was performed using thermal performance and area data from the Energy Management Report for Fairbanks Court and Office Building, prepared by North American Energy Services. Results indicate a peak cooling cfm for a constant volume system to be 85,134 cfm, or 1.23 cfm/ft². This value assumes one person per 100 ft², 3 watt/ft² of lighting, and 1 watt/ft² miscellaneous power. This corroborates the results of Stephen Kailing's report that current airflow is 40 percent low based on a constant volume system.

A variable air volume system would require 74,000 cfm allowing for a diversity of zone peaks. This is still 30% higher than the capacity of the installed equipment.

The original equipment for this facility has been in place since 1962. Although maintenance service appears to have been excellent over the years, the equipment is showing its age. The multizone units interior insulation has begun to erode away. The duct system interior is probably dirty based on dust and dirt build-up on equipment and grille faces.

In addition to age and condition, it will become increasingly difficult to obtain spare parts for equipment repair and service.

Code Deficiencies

Code deficiencies relative to 1994 Uniform Codes are as follows:

1. Fire/Smoke dampers are required in accordance with UBC 713.10.
2. Door louvers for exhaust air make-up at toilets are not in accordance with 1-hour corridor requirements.
3. Ceiling plenums contain combustibles, UMC 601.3.
4. Elevator shafts are not vented per UBC 3004.

Corrections of these items are at the discretion and direction of the authority having jurisdiction.

G. MECHANICAL

Recommendations

Observations made during the two days on site and subsequent analysis point to ventilation system replacement, rather than any form of upgrade. Insufficient control zones is inherent to a multizone system. The existing system capacity is sufficiently low relative to air volume required and the age of equipment all point to an upgrade being impractical.

A properly designed mechanical system for this facility would include the following changes:

1. **Remove all existing multizone air handling units and convert these spaces into a supply air shaft.**
2. **Reuse return air shaft including return fan. Upgrades would include addition of fire/smoke dampers at shaft penetrations, duct modifications as required to accommodate shaft construction, and addition of variable speed drive to the return fan.**
3. **Return duct and relief may be reused, but may create velocity noise at peak building operating hour and maximum return air capacity.**
4. **Remove mechanical equipment in Penthouse. Provide new built-up 74,000 cfm system to include:**
 1. 85 ft² of O/A louver.
 2. 100 ft² of preheat coil, 1,851 MBH, 124 GPM.
 3. 148 ft² of chilled water coil, 140 tons of cooling capacity.
 4. 185 ft² of filter area including 30% efficient pre-filters and 85% efficient bag filters.
 5. Two new 37,000 cfm plug fans in parallel with variable speed drives, 40 hp each.
 6. Discharge silencers and duct to supply air shaft.
5. **Remove existing supply air duct and diffusers. Provide new medium velocity spiral duct distribution system from shaft and provide variable air volume boxes for each control zone; tie-in baseboard control to associated VAV box.**
6. **Provide new direct digital control system. Pneumatic hybrid system can be considered for control of large actuators.**
7. **Replace existing exhaust fans and clean or replace exhaust duct work.**
8. **Heating system will remain in place with modifications as required to accommodate ventilation system changes.**

G. MECHANICAL

These system changes, along with upgrades to the building envelope, will provide desired results with regard to heating, cooling, air circulation rate, and control zones. The system will be capable of responding to varying electrical loads, and additional duct taps with new boxes will provide additional zone flexibility. The system also takes advantage of load diversity, recognizing that solar influences do not occur on all exposures at the same time, and that loads change relative to occupancy schedules.

II. ELECTRICAL/COMMUNICATIONS

LAKE & BOSWELL CONSULTING ELECTRICAL ENGINEERS

Electrical Systems

On October 10, 1995, Michael Goulding of Lake & Boswell Consulting Electrical Engineers Inc., performed a cursory electrical inspection of the Alaska Court System Fairbanks Courthouse. The purpose of the inspection was to examine the condition of the existing power distribution, lighting, and communication systems in the building. A brief interview was held with Mr. Larry Kraus, chief technical and maintenance person at the Fairbanks Courthouse, discussing the existing electrical power distribution, telephone, intercom, duress signaling, fire alarm, and computer networking systems. During this visit, several rooms on each floor, the stairways, mechanical and electrical rooms, and the elevator equipment room were observed.

Electric Power Distribution

The power system is approaching 35 years of age, which is near the end of its useful life. The incoming service is 208Y/120 volt three phase, 1600 amps, which feeds a main distribution panel in Room 163. There are significant safety and code violations in the main distribution panel. Cables exiting the main distribution panel pass through sharp-edged holes in the rear of the panel, and conduits exiting the panel are terminated in a sheet of metal which is not an original part of the panel. There is also evidence that the main cross bus in the main distribution panel has been immersed in flood water at some time in the past. The main distribution panel needs to be replaced with a larger unit, but the room is too small. All of the outlying panelboards are fully loaded (no spare circuits left). There is a clear need for more circuits which can only be addressed by adding more panelboards. Adding more panelboards would require more feeders, but the main distribution panel is also fully loaded. Finally, the main distribution panel and downstream panelboards are by a manufacturer who is no longer in business.

Lighting System

The existing lighting system is at the end of its useful life and needs to be replaced. The system is primarily made up of lay-in 24 by 48 inch fluorescent fixtures mounted in a suspended ceiling. The majority of the ceiling tiles are in poor condition and will need to be replaced. It is understood from Mr. Kraus that many of the electrical branch circuits (receptacles, etc.) utilize the lighting fixtures as raceways, which is not a recommended practice. As a part of any future remodel work, some space above the new ceiling would be a return air plenum for the building heating and ventilation system. It is common practice to have return air pass through the lighting fixtures, but the current fixtures do not allow this.

II. ELECTRICAL/COMMUNICATIONS

Telephone System

The existing telephone wiring system is obsolete and needs to be replaced. Many of the cross connect cabinets contain wooden terminal blocks with soldered connections which are difficult to maintain. It is understood that the District Attorney and Judicial Services offices are served by the "Statewide" telephone system. Telephone service to the rest of the Fairbanks Courthouse is through a PBX system provided by Winter Telecom of Anchorage. The PBX is maintained by Fairbanks Courthouse staff, and is approximately four years old.

Miscellaneous Communication Systems

The existing duress signaling system was built up by a subcontractor at the University some years ago; the system works, but is not easy to reconfigure or maintain.

The courtrooms and jury rooms have special voice recording needs for record keeping. There is currently no existing raceway or wiring system which addresses this well. There is much exposed wiring which is subject to damage due to personnel activities. Research will be required to determine what products are available to update these systems.

Fire Alarm System

The existing fire alarm system appears to be functional and well maintained overall; Mr. Kraus had no complaints with the system.

Computer Networking

The Fairbanks Courthouse does not appear to have an extensive computer network system at this time. There were no crossconnect cabinets or telecom closets established to allow effective installation or maintenance of a computer network.

Access Control System

The Fairbanks Courthouse currently has a card access system by Software House. This system was installed approximately a year ago and appears to be in working order.

II. ELECTRICAL/COMMUNICATIONS

Conclusion and Recommendations

1. **Installation of a new 480V service and main distribution panel in the northeast corner of the building is recommended.** Assuming one floor is remodeled at a time, a new electrical room would be provided on each floor. Smaller distribution panels in each electrical room would be supplied by a 480V feeder from the main distribution panel. New outlying panelboards would then be served from the electrical rooms on their respective floors. A battery backed emergency lighting power inverter on each floor would also be provided. To prevent an electrical distribution failure event from affecting the emergency power inverters, it is preferred not to locate the inverters in the electrical rooms. The new electrical distribution system would not occupy the mechanical rooms due to required mechanical system expansion.
2. Lighting technology is moving to energy efficient T-8 bulbs with electronic ballasts. It appears that a good portion of the buildings' electrical load is consumed by the lighting system. The Courthouse would benefit from reduced electrical consumption and reduced cooling costs if the lighting system were updated. **Due to the return air issue and energy efficiency of modern lighting systems, it is recommended that the courthouse install a new lighting system.** A portion of the new lighting fixtures and all exit signs will be fed from the battery-backed emergency power inverters as required. Courtroom lighting would require special attention to address security issues and appearance. Exterior lighting would also be upgraded as desired by the owner.
3. **The entire telephone wiring system needs to be replaced, and new telecom closets should be provided in the revised floor plan.** If there is any problem with the existing PBX, it is recommended that the courthouse have their vendor determine a solution so it can be addressed during the remodel project. The revised telephone system could also address courthouse intercom needs.
4. **The existing duress signaling system should be replaced with a new system.** There are commercial products available which can serve the purpose; however, some research would be required to see what is available. This is an issue which the Courthouse should consider before design work for new systems is begun. There is a tendency for manufacturers to roll duress signaling, access control, and even fire alarm functions into one system. It is desirable to keep these systems separate as much as possible to maximize reliability and minimize response time. If a new access control system is carefully selected and laid out, duress signaling and access control could be combined with good results. Combining these systems with the fire alarm system in any event is not recommended..

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

NORTECH ENVIRONMENTAL AND ENGINEERING CONSULTANTS

Nortech completed the preliminary environmental assessment segment of the Fairbanks Courthouse Inventory and Condition Survey. The effort was specifically focused on hazardous materials that would significantly impact the cost of a major building renovation. The work scope included: a review of historical hazardous materials records and building documents provided to the survey team; interviews with building personnel; a limited visual walkthrough inspection of the facility; random sampling to characterize unknown suspect materials which could not be identified visually; and preparation of this condition survey report. The Courthouse Inventory and Condition Survey environmental scope of work did not include a detailed inspection and quantification of hazardous materials present or assessment of the site and adjacent property conditions.

The environmental assessment identified potential concerns regarding Asbestos, Lead Based Paint (LBP), Underground Storage Tanks (UST), site conditions and Polychlorinated Biphenyls (PCBs). Following the Summary Of Findings section, each of the identified concerns is addressed in detail separately including a brief background description, analysis of results, and a discussion of recommendations.

Summary of Findings

The preliminary environmental assessment determined the following conclusions and recommendations regarding the environmental concerns identified during the Courthouse Inventory and Condition Survey:

- ◆ **PCBs** Polychlorinated Biphenyls (PCBs) were identified as a concern in a electrical transformer as well as in the fluorescent light fixtures ballasts located on-site. Available information from the building maintenance files and personnel interviews reported that no remaining PCB concerns are present on-site.
- ◆ **LEAD** Lead based paint (LBP) is present in the building. However, sample results indicated that only the base layer of paint exceeds the Federal action level for public housing. While LBP is present the significance of this concern is limited to project design and management. A properly developed and managed technical specification for LBP and demolition which accurately informs the contractor, and requires the development of work plans involving LBP engineering controls and verifiable work practices should eliminate any incremental cost to required project demolition.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

- ◆ **ASBESTOS** Asbestos Containing Materials (ACM) are present on the interior and exterior of the Courthouse building envelope. Of greatest significance is the damaged friable asbestos material in the interior portions of the building. Beyond the scope of the renovation effort building services needs to provide for regular inspections and repair of friable ACM. Federal and state regulatory requirements specify a detailed AHERA asbestos inspection and quantification of ACM for project design efforts. During renovation it is recommended that all friable material be abated. In order to minimize ACM renovation project cost it is recommended that non friable ACM be Managed In Place (MIP) under the development of an AHERA certified management plan. To eliminate life cycle asbestos costs, abatement of floor tile with asbestos or contaminated adhesive should be seriously considered and developed as a project Additive Alternative. Exterior ACM building panels will involve no asbestos life cycle or renovation cost.
- ◆ **UNDERGROUND STORAGE TANK (UST)** An abandoned incinerator Underground Storage Tank (UST) is present on-site in noncompliance with current Federal and State regulations. UST closure and assessment in accordance with current ADEC regulations is recommended.
- ◆ **SITE CONDITIONS** Further assessment and investigation of site conditions is warranted during design. In association with the UST closure sampling, a routine Environmental Assessment (EA) of the parcel and adjacent properties including interviews and researching historical records is recommended.

The following survey sections discuss each of the identified concerns separately in detail including a brief background description, analysis of results, and a discussion of recommendations.

PCB Background

Polychlorinated Biphenyls, commonly known as PCBs, belong to a family of organic compounds known as chlorinated hydrocarbons. PCBs were produced in the United States between 1929 and 1977, when the primary U.S. manufacturer voluntarily stopped production due to mounting public concern over their harmful environmental effects. Once released into the environment, PCBs tend not to break down into less toxic substances, but persist and take several decades to slowly decompose. By remaining in the environment, PCBs can be taken up and stored in the fatty tissues of all organisms from which they are slowly released into the bloodstream. Through bioaccumulation and biomagnification, the cumulative quantity of PCBs consumed by humans can

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

be quite significant. Chronic effects include reproductive system effects, gastric disorders, skin lesions (chloracne), and possible tetragenic, liver and nervous system damage. They are presumed carcinogens in humans based on studies which have shown them to cause cancerous tumors in animals. Acute effects in high doses can damage the liver, and exposure to the vapor can irritate the eyes, nose and throat.

Courthouse PCB Concerns and Recommendations

The PCB area of concern identified in the Courthouse relates to the transformers on site and ballasts in the fluorescent lighting fixtures. Building maintenance reported that all light fixture ballasts in the building have been removed (1989). The single electrical transformer observed on-site is located on the north side of the building. The unit is owned by MUS and was reported by Larry Colp, MUS electrical engineer, to have been sampled on January 5, 1987, and analysis results reported a less than 1% PCB content. *Based on available information PCBs will not have any impact on renovation design or project costs.*

Lead Based Paint (LBP) Background

Elemental lead (Pb) is a heavy metal at room temperature and pressure that can combine with various other substances to form numerous lead compounds. Lead is toxic when absorbed into the body at significant doses by either inhalation or ingestion. Lead adversely affects numerous body systems and causes health impairment and disease that arise after periods of exposure as short as days (acute exposure) or as long as several years (chronic exposure). Acute exposure can lead to acute encephalopathy, a condition affecting the brain that develops quickly into seizures, coma, and death from cardiorespiratory arrest. Chronic exposure may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems.

Typically, lead concerns are divided into three categories: residential housing, worker safety during handling and removal/demolition efforts, and final disposal of lead-containing materials. Currently, there is no requirement for lead containing materials to be removed except in residential public housing. The U.S. Department of Housing and Urban Development (HUD) guidelines for public housing consider $> 1.0 \text{ mg/cm}^2$ by X-ray Fluorescence (XRF), or $> 0.5\%$ by weight (quantitative measures) as abatement action levels. However, the presence of lead based paint, while not always a significant inhabitant concern, raises a renovation worker safety and final waste disposal concern regarding LBP material removed during demolition. LBP demolition debris must be properly disposed of in accordance with applicable regulations. A Toxicity Characteristic Leaching Procedure (TCLP) test is required for the lead-containing debris to determine if it is hazardous or non-hazardous.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

Courthouse LBP Inspection and Sampling Results

A limited grab sampling effort of selected locations throughout the Courthouse was conducted. Complete layer samples were obtained from random locations on various floors and building spaces throughout the facility to obtain a representative characterization of the paint surfaces within the building. The results are listed below.

LEAD CONTAINING PAINTS, SUBSTRATE		LEAD CONTENT	
		(PPM)	% by weight
Sample #1012-01P	Stair A - East, Fourth Floor First tread below north landing	25,900	2.59
Sample #1012-02P	Stair A - East, Fourth Floor West Wall at center landing	985	0.0985
Sample #1012-03P	Corridor 327 South wall outside Room 340	24.4	0.0024
Sample #1012-04P	Lobby 257 East wall outside Room 256	183	0.018
Sample #1012-05P	Storage Room 130 East wall, south end	510	0.0510
Sample #1012-06P	Security 141 North wall outside Room 137	3550	0.3550

The sample results of this lead paint survey at the Courthouse ranged from 0.0024% to 2.59% by weight. Only one composite paint sample taken from the metal stairwell on the east end of the building reported lead levels in excess of HUD's action level of 0.5% (5000 ppm).

Sample #1012-06P was examined further by electron microscopy to determine if a particular layer of paint contained a majority of the lead. Analysis revealed a layer of primer was painted on the gypsum board, followed by a layer of paint containing the majority of the lead, and several subsequent layers of non-lead based paint. See Appendix A. Based on the available laboratory results it appears that a LBP layer is present throughout the building. However, due to the additional non-lead layers in the areas other than the stairwell only the stairwell sample exceeded the action level which is based on the percentage of lead content.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

Courthouse LBP Concerns and Recommendations

Therefore, based on federal standards, generally considered conservative, and the limited sample results reviewed, there is not a significant wide-spread lead concern in the Courthouse. However due to its presence *it is recommended that design include a LBP and modified demolition technical specification that informs the contractor and requires him to develop work plans and engineering controls that properly address these concerns in his base bid.* This will address worker safety and waste disposal concerns and avoid changed conditions during renovation, project delays and cost overruns. The following briefly summarizes the issues and contractor requirements necessary to address the LBP concerns during demolition at no significant incremental cost.

First and foremost, the LBP contract documents will inform the contractor of the anticipated presence, location and significance of the identified lead based paints. Where renovation will require encountering and/or removal of LBP materials during demolition it will be necessary for the contractor to develop a work plan that will identify the work practices, engineering controls, personal protective equipment and monitoring that will be undertaken in order to adequately protect the workers as well as comply with applicable state and federal regulatory requirements. However, no special containment or abatement efforts are anticipated. In brief, removal of lead containing building materials intact, as a whole unit, using demolition techniques that do not concentrate (removing only the paint layer) or allow the contaminant to become airborne (flames, torches, heat guns, etc) will effectively eliminate any extensive lead abatement effort and/or contractor cost. Following development of an approved work plan actual LBP demolition efforts should be limited to a brief pilot effort to prove up the work plan's proposed techniques.

If properly developed, this approach to LBP hazards in the contract documents and during project management will eliminate any significant project LBP cost.

For lead based paint (LBP) abatement waste materials a limit of 5 ppm in the TCLP extract is allowed. If the LBP demolition waste is non-hazardous (i.e., the TCLP is less than 5 ppm) the debris may be disposed of as general construction debris at the FNSB landfill. Again through the development of appropriate contract documents and an approved work plan utilizing appropriate work practices and engineering controls, the demolition effort can avoid concentrating LBP materials into hazardous wastes requiring additional cost for disposal. This can be accomplished by avoiding concentrating LBP and removing the entire LBP covered building material (e.g. the entire metal stairs). The TCLP procedure involves representative sampling of the entire LBP waste and typically does not exceed the allowable regulatory limit when the entire building component is removed.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

Asbestos Containing Material (ACM) Background

The term asbestos is used for a group of fibrous, naturally occurring silicate minerals which exhibit properties rendering them useful in commerce. During the past century, asbestos has been mined, processed, and used in thousands of products. Because of the exceptionally effective insulating, fire-resistant, and reinforcing properties of asbestos-containing materials (ACM), they have been utilized widely as surface-applied finishes (for acoustical, decorative, and fire-retardant purposes), and as thermal system insulation (TSI) in the construction of buildings, as well as in equipment used in buildings. Under certain conditions, ACM can release asbestos fibers into the air of buildings, which can be inhaled by and reach the lungs or occupants. At the relatively low concentrations of airborne asbestos fibers encountered by general building occupants, lung cancer and mesothelioma are the diseases of concern. Although public concern over asbestos in buildings has focused primarily on potential risks to general building occupants, there does not appear to be sufficient justification on grounds of risk to the health of general occupants for arbitrarily removing intact ACM from well-maintained buildings. Measures to control the release of asbestos fibers (from the disturbances of ACM, dust, or debris) should be employed routinely where needed during the operation and maintenance of buildings. Uncontrolled disturbance of ACM should be avoided whenever possible.

Courthouse ACM Inspection and Sampling Results

Asbestos is a known hazardous material in the Courthouse building. The identification of ACM was based on a building walkthrough plus document review from random sampling efforts performed by the maintenance department during small scale renovation efforts, State of Alaska Department of Transportation and Public Works reports, an Asbestos Survey Report prepared by Environmental Health Sciences - Alaska, and additional documents provided by the courthouse. The documents reviewed confirmed ACM, however locations and quantities were not reported. During the inspection no destructive testing or inspection of unaccessible spaces were included. For this report no additional sampling was performed as all suspect materials had been previously sampled or were identified visually. Utilizing as-built information and the above named documents, quantities of the types of ACM in the building have been roughly estimated and are included in the order of magnitude quantities provided below:

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

1. ACM Floor Tile Mastic and Cove Base Mastic, approximately 80,000 square feet. The 1964 as-built plans reported that vinyl asbestos tile (VAT) was installed throughout approximately 50% of the building. However, sample analysis of a limited number of samples taken by the maintenance staff have reported no VAT. While the extent of VAT is in question analysis of the tile mastic in locations sampled confirmed that the mastic contains asbestos. Therefore, it was assumed for this survey that all of the floor tile and adhesive is ACM. Based on as-built drawings there is approximately 80,000 square feet of the material.
2. Asbestos Containing Ceiling Tile (CT). The maintenance staff at the Courthouse reported that the CT had been sampled on numerous occasions and no ACM had been reported. The EHS Asbestos Survey Report confirmed this.
3. ACM Panel, approximately 25,000 square feet located in the curtain wall siding on the exterior of the building.
4. Thermal System Insulation (TSI), in linear feet. The EHS Asbestos Survey Report stated that the distribution piping was insulated with fiberglass on the straight runs. This was verified visually during the walkthrough inspection. For the purpose of this report, no linear feet of TSI on distribution piping have been included.
5. Thermal System Insulation (TSI), a minimum of 700 fittings (see Appendix B, site photos). The quantities of fittings were estimated from a review of the as-built drawings provided. The TSI on the roof drains measured approximately 500 linear feet. Roof drain bowls and fittings were previously confirmed as TSI during the EHS 1991 report. However building maintenance reported that all the roof drain ACM has since been abated during the recent reroofing project.
6. Wall material, roughly estimated to be approximately 200,000 square feet. The interior walls of the office suites were painted gypsum wall board. Previous sample results have reported the wall board to be free of ACM, however the joint compound was reported to contain 5-6% asbestos.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

Courthouse ACM Concerns and Recommendations

Asbestos containing materials are present on the interior and exterior of the Courthouse building envelope. Of greatest significance is the damaged friable asbestos material in the interior portions of the building. Beyond the scope of the renovation effort building services needs to provide for regular inspections and repair of friable ACM.

The proposed work is the selective renovation and new construction of the Courthouse. Ideally, if funding is available, a complete removal of all ACM within the building should be undertaken. This recommendation does not include the exterior ACM building panels. Concurrent abatement of the interior asbestos hazards will be more cost effective than future abatement efforts, avoid any future annual maintenance and regulatory expense, and avoid the higher abatement cost during the ultimate demolition of the building. *Therefore, it is recommended that project alternates be developed that would identify the cost to fully abate the asbestos hazard during the current renovation.*

Floor Tile: As stated previously, contrary to the as-built plans, sampling results have indicated that the floor tile may or may not be ACM, however the tile mastic contains asbestos. The same mastic is also used on the cove base. The intent of the renovation design would be to cover/encapsulate the majority of the floor tile with carpet and manage in place. In locations where the renovation design would require the contractor to remove floor tile to complete the design the mastic would be abated in accordance with applicable regulations. An additive alternate to abate the ACM floor tile and mastic is recommended.

ACM Panel: This non-friable ACM material is located throughout the exterior of the building. The exterior siding is composed of a layer of porcelain coated metal, one and one-half inch of yellow non-extruded foam, ACM panel, and a final layer of porcelain coated metal. In areas where it would be encountered/disturbed during renovation the intent of the renovation design would be to remove/abate the material in accordance with applicable regulations. If removal is required and the material is handled without causing the material to become friable (i.e. grinding, sawing, abrading) no additional costs should be assumed. The exterior ACM panel is not located inside the building envelope therefore it may remain in place and would not be a ongoing management concern. The ACM building panels will involve no significant asbestos life cycle or renovation cost.

I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

Thermal System Insulation (TSI): This friable ACM material is located throughout the building in ceilings and pipe chases and represents the ACM of greatest significance. It is recommended that all TSI be removed during the renovation project. In the event that all piping is to be replaced, removal of the ACM coated pipe is less expensive than removal of the insulation alone. Renovation cost estimates should include abatement of friable TSI.

Wall Material. As previously mentioned the majority of all interior walls are of non-ACM gypsum board with ACM joint compound. As a homogenous surface however the composite wall system contains less than 1% asbestos by weight and therefore is not considered to be ACM by EPA for disposal purposes. While there is no added ACM disposal cost there is a worker safety concern during demolition. As demonstrated during the recent ADA bathroom renovation the demolition concern can be managed through the development of properly developed technical specifications that accurately inform the contractor and require a work plan that employs engineering controls and work practices that adequately address these concerns. It is *NORTECH's* opinion, based on previous renovation efforts performed within the Courthouse, that properly designed contract specifications directing the contractor to use proper engineering controls and work practices will enable the interior renovation to be performed as a standard demolition project. The engineering controls and work practices should not constitute a significant increase in cost of the project.

Underground Storage Tank (UST) and Site Conditions

UST Background

In the past 20 years, an unprecedented amount of environmental legislation has been enacted at both the federal and state level. These new regulations and requirements involve the use of Underground Storage Tanks (UST) as well as site conditions on-property and off. Prior to renovation or construction it has been routinely and standard practice to complete environmental site assessments to further investigate the presence of on and off property concerns that may impact the proposed project. Recently promulgated UST regulations require secondary containment, registration of non-heating oil USTs, leak detection, spill and overfill protection and no longer permit abandonment in place. Typically the least cost approach to UST closure is removal. As part of the closure the tank excavation must be assessed and sampled for site contamination.

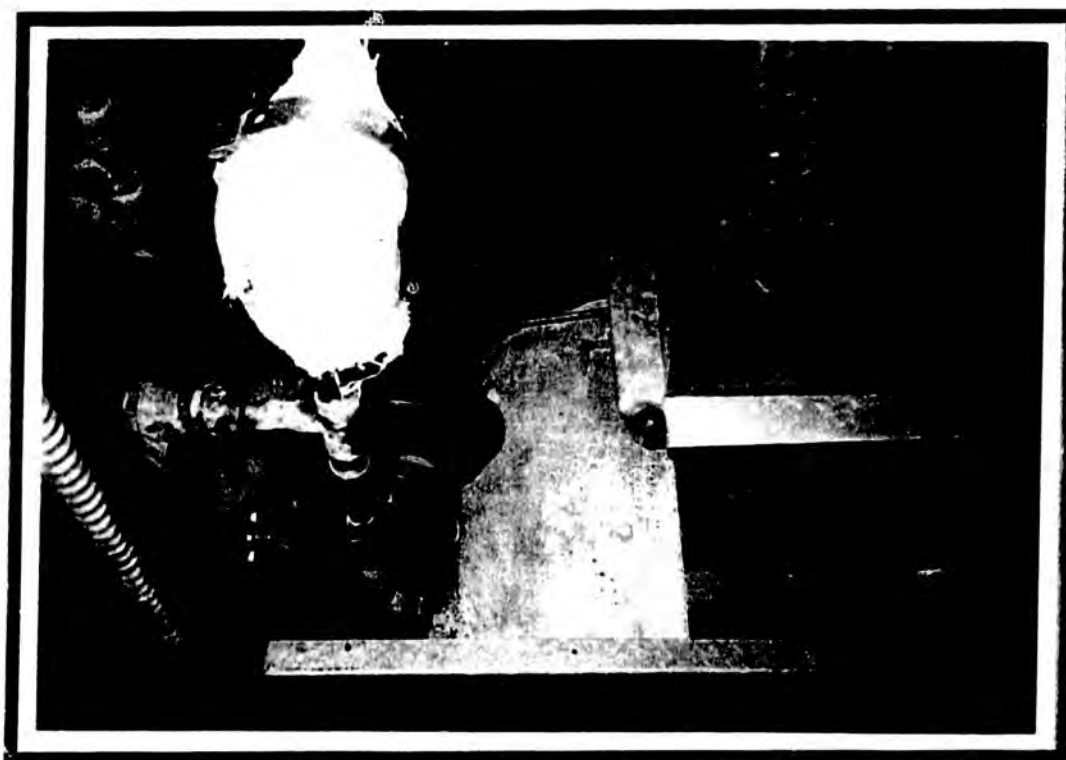
I. ENVIRONMENTAL/HAZARDOUS MATERIALS ABATEMENT

UST Concerns and Recommendations

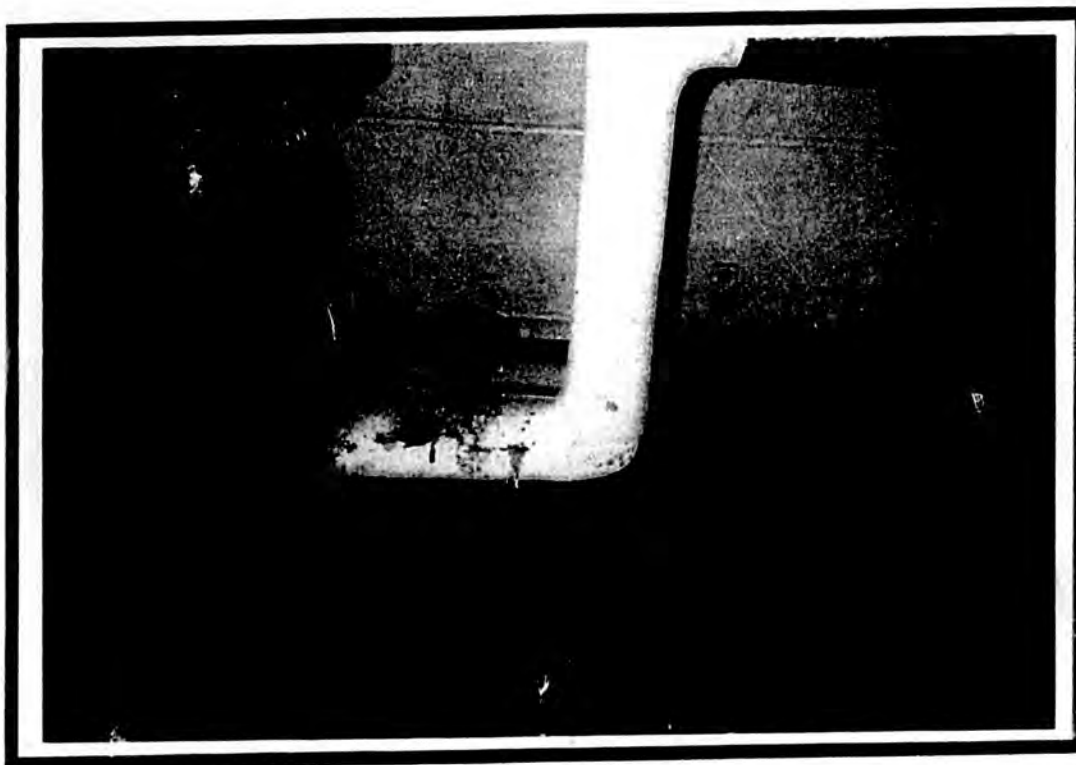
The Fairbanks Courthouse Inventory and Condition Survey work scope did not include a environmental site assessment or UST component. During the site visit, an abandoned 500 gallon UST previously used to supply fuel to an incinerator which has since been removed, was identified from as-built plans beneath a concrete pad at the west end of the building. Maintenance personnel confirmed the UST was abandoned in place. As a non-heating oil UST the tank is in non-compliance with current regulatory requirements for registration and closure. The condition of the tank and the impact it may have on adjacent soils, is unknown. UST closure and assessment in accordance with current regulations is recommended. Further environmental review of the Courthouse site is warranted during the design phase to evaluate the potential for contamination of the environment by hazardous materials or petroleum products that may be present within, adjacent to, or beneath the site. The evaluation would take into consideration both historical site uses and current operating practices as determined by a review of available environmental records, historical photographs and maps, and personal interviews. Any recommended site sampling could be completed in conjunction with the UST closure effort.



Description of Photo: Friable asbestos, north hallway ceiling, 3rd floor.



Description of Photo: Friable asbestos, north hall ceiling, 3rd floor.



Description of Photo: Friable asbestos fitting, 1st floor, mechanical room.



Description of Photo: Friable asbestos, 1st floor, mechanical room.

J. LIFE/SAFETY CODE REVIEW

1. Code Compliance Review

October 1995

Code References 1994 Uniform Building Codes
 1993 National Electrical Code
 1994 ANSI/NFPA 101 Life Safety Code
 1991 Americans with Disabilities Act

General Code Information (Ref. UBC Tables 3-A & 3-B)

Area	78,504 sf
Occupancy	Mixed: B - Offices A3 - Courtrooms and Jury Assembly I3 - Judicial Services Area
Required Occupancy Separations	B/I3 - 2 hour Boiler Room: (Mech 122) 1 hour
Construction Type	Type II - 1 hour (if modified)
Sprinklers	Provided
Yards	All four sides

J. LIFE/SAFETY CODE REVIEW

Notes: The existing building has the following Courtroom distribution:

First Floor	Courtroom #5 - Traffic/Arraignments	58 occupants
Second Floor	Superior Courtroom D	94 occupants
	Superior Courtroom E	33 occupants
Third Floor	District Courtroom #1	67 occupants
	District Courtroom #2	57 occupants
	District Courtroom #3	54 occupants
	Superior Courtroom #4	78 occupants
Fourth Floor	Superior Courtroom A	82 occupants
	Superior Courtroom B	82 occupants
	Superior Courtroom C	95 occupants

These occupant loads are based on existing fixed seating. The 3rd and 4th floor courtrooms' classification as A3 occupancies is in direct conflict with UBC Table 5-B, which limits the height of A3 occupancies in Type II 1-Hour buildings to 2 stories. The 3rd & 4th floor courtrooms must be relocated to lower floors, or reconstructed with Type II F.R. construction, or located in new facilities provided elsewhere with the appropriate construction type and building height.

(See Fire-Resistive Construction Requirements, following.)

J. LIFE/SAFETY CODE REVIEW

Existing Areas

Floor	Area (SF)	Floor-to-Floor Height	Height. Above Street
First Floor	15,173	14'6"	14'6"
+ E. Canopy	140	-	-
Second Floor	18,440	13'0"	27'6"
Third Floor	18,440	13'0"	40'6"
Fourth Floor	18,440	16'6"	56'6"
Roof Penthouse	1,948	9'0"	65'6"
TOTAL	78,504		(non high rise)

J. LIFE/SAFETY CODE REVIEW

Allowable Areas
(Ref. UBC Tables 5A & 5B)

	Type II-1 hr B Occupancy (4 stories)	Type II-F.R. B Occupancy (12 stories)
Basic allowable area	18,000	39,000
Additional area if multistory building	+18,000	+39,900
Subtotal: allowable area	36,000	79,800
Additional area if separate 4 sides	+36,000	+79,800
Subtotal: allowable area	72,000	159,600
Add allowable area if sprinklered	+72,000	+159,600
TOTAL ALLOWABLE AREA	144,000 sf	319,200

Notes: The original building was constructed as a **Type II** building under the 1955 Uniform Building Code. Its construction type has since been tentatively identified as Type III-1 Hour, if modified (Linck, 1972); Type IV-1 Hour & Type IV-N as existing (McKenzie, 1976); Type II - 1 hour (CBCo, 1980); non-compliant Type II-FR, actually Type V-N (Morris, 1984); and Type III with sprinkler exception (GDM, Inc., 1994).

We recommend Classification as a **Type II, 1-Hour** building with B occupancy which would allow construction of 4 stories, but will require a 1-hr. upgrade of corridor and ceiling plenum construction, and 1-hr. fireproofing of the existing structural frame.

J. LIFE/SAFETY CODE REVIEW

Fire-Resistive Construction Requirements (Ref. UBC Table 6-A)

Type II - 1 Hour

1. Bearing Walls - exterior	1 Hr.
2. Bearing Walls - interior	1 Hr.
3. Nonbearing Walls - exterior	1 Hr.
4. Structural Frame	1 Hr.
5. Partitions - permanent*	1 Hr.
6. Shaft Enclosures	1 Hr.
7. Floors & Floor-Ceilings	1 Hr.
8. Roofs & Roofs-Ceilings	1 Hr.
9. Exterior Doors & Windows	N/A due to Yards 4 Sides
10 Stairways	Noncombustible (Complies)

Notes: Type II 1 Hour construction requires non-combustible structural frame and floor systems. Other construction is to be noncombustible and 1-hr. construction throughout.

Fire retardant treated wood may be used in permanent partitions. The existing building has original wood stud framing of fire retardant-treated wood.

Flamespread Requirements (Ref. UBC Table 8-A & 8-B)

A,B Occupancies	Class I (Enclosed Vertical Exits) Class II (Other Exits) Class III (Rooms/Areas)
I Occupancy	Class I (Enclosed Vertical Exits) Class I (Cells) Class II (All Other Areas, Sprinklered)

J. LIFE/SAFETY CODE REVIEW

Occupant Load (Ref. UBC Sect. 1003)

(See Appendix for Courtroom Occupant Loads & Floor Occupant Loads/Exiting Calculations)

Floor	Occupant Load	No. of exits	Required exit widths	Existing exit widths
First Floor	337.13	8	67.43"	432"
Second Floor	239.19	3	47.84"	108"
Third Floor	336.96	3	67.39"	108"
Fourth Floor	366.15	3	73.23"	108"
Mechanical Penthouse	-	1	36"	36"
TOTAL	1,279.43			

Existing exit width and numbers comply with code requirements.

Exit Doors (Ref. UBC Sect. 1004)

Exit Doors must swing in the direction of travel where the occupant load exceeds 50. In the existing building, the following exit doors do not comply and must be modified:

Jury Assembly:	Three doors onto Corridor 124
Superior Courtroom D:	Three doors: Two onto Corridor 215 One into Anteroom 263A
Clerk of Court:	Two doors onto Lobby 321
District Courtrooms 1 & 2:	One door ea. onto Corridor 327

Corridors (Ref. UBC Sect. 1005)

Obstructions: (Ref. 1005.4)

Required minimum corridor width varies in the existing building, depending on the occupant load exiting through each corridor. There are existing obstructions in the corridors: drinking fountains, bench seating, and fixed chair seating, as well as outswinging exit doors. *These obstructions must be removed so that the required exit width of each corridor is not obstructed.*

Corridor Construction: (Ref. 1005.7)

Corridor walls and ceilings are required to be 1-hr. fire-resistive construction. *Completion of this rating is required for all components not in compliance.*

J. LIFE/SAFETY CODE REVIEW

Openings (Ref. UBC Sect. 1005.8)

Corridor doors where walls are required to be 1-hr. fire-resistive construction must have a 20-minute rating, contain no louvers, bear a fire rating label, be self/automatic closing, and be smoke gasketed. *The majority of existing corridor door and frame assemblies do not comply and must be replaced.* Door glazing must also comply with UBC Chapter 24.

Elevator lobbies or equivalent protection for the elevator doors must be provided on the upper floors of the building. The first floor lobby may claim an exception as the building is a B occupancy with the first floor protected by an automatic sprinkler system.

Stairways (Ref. UBC Sect. 1006)

Spiral Stair: The metal spiral stair connecting the 4th floor Superior Court Judges' Chambers to the 3rd floor Clerk of the Court offices is not permitted. This type of stair is only permitted in R (Residential) occupancies. *It must be replaced by an acceptable conventional stair or omitted entirely.*

Handrails: Although the basic structure of the metal exit stairs complies with Code requirements for dimensions and materials, *risers must be added where they do not exist, and the handrail system must be replaced with an ADA and UBC compliant system.*

Accessibility (Ref. UBC Sect. 11)

See separate report section on ADAAG Compliance Review.

Plumbing Fixtures (Ref. UBC Chapter 29)

The numbers of water closets, urinals and lavatories comply with and exceed the requirements of Table A-29-A. However, only 8 drinking fountains have been provided, and 10 are required ($1452.24/150=9.68$). *Two drinking fountains should be added, on floors with the highest occupant loads.*

Elevators (Ref. UBC Chapter 30 & ASME A17.1)

Standby power provided by a separate generator is required to one elevator; it is not provided on site. The elevator hoistway is not vented to the outside, as required. A separate elevator machine room has not been provided; the original elevator machinery is located in the penthouse mechanical room, along with air handling and radio/communications equipment panels. (No radio equipment should be located in the same room as the elevator machinery, if solid state devices are included in its control system.)

Standby power would be provided with the installation of an emergency power source for the building. Venting of the hoistway should be completed. ASME A17.7 also requires the installation of a 6' high grille enclosure with gate separating the elevator machinery from other equipment in the room.

J. LIFE/SAFETY CODE REVIEW

2. ADA Upgrades Review

An accessibility audit was conducted June 1992 to determine existing deficiencies and associated costs to make the building compliant with ADA regulations.

The following list summarizes the deficiencies noted in the audit and determines which items have been corrected at the time of this inventory and condition survey. It is assumed those items not yet completed will be corrected as part of the building renovation.

Item	Complete	Partially complete or to be completed	In design phase	Not done
Parking spaces	X			
Exterior accessible route	X			
Ramps				X
Exterior signage	X			
Interior signage	X			
Interior accessible route	X			
Stairways				X
Toilet Rooms	X			
Interior Doors		X		
Drinking fountains	X			
Public Telephones				X
Elevator Entrances/Cabs	X			
Assembly Areas				X
Alarms	X verify			
Counters				X

J. LIFE/SAFETY CODE REVIEW

Parking Spaces: Complete.

Two (2) handicapped parking spaces with an access aisle have been provided at the northeast corner of the building's parking lot, close to the public entry. These comply with the requirement for 2% handicapped spaces computed using the on-site parking space total of 83. There are 7 handicapped parking spaces in the State parking garage, complying with the 2% requirement for the 147 ACS parking spaces in that location.

Exterior Accessible Route: Complete.

Provided from the handicapped parking spaces to the public entry. Signage and handrails are present.

Ramps: Not Done.

Two exterior ramped sidewalks exist, from the east sidewalk up to the public entry. Handrails should be provided.

Exterior Signage: Complete.

Directs visitors and staff to the handicapped parking and entry.

Interior Signage: Complete.

Provided at each office or suite door.

Interior Accessible Route: Complete.

(See section on Interior Doors below for existing impediments.)

Stairways: Not Done.

Open risers and handrails are non-compliant.

Toilet Rooms: Complete.

The main set of toilet rooms on the first floor have compliant doors, automatic door openers and fixtures, installed in a recent 1994 renovation. One single sex ADA-compliant toilet room has been supplied for the law library, and jury rooms on the 2nd, 3rd and 4th floors.

Note: These toilet rooms located off jury rooms are not accessible to the public or staff while juries are in session. Modification of entrances and fixtures in the southeast bank of toilet rooms on these floors should be considered.

Interior Doors: Partially complete/To be completed.

A number of entrance doors to suites and offices do not meet clear access or clear opening requirements and should have hinge modifications. Lever handles have been installed. Many doors also require adjustment of existing closures to required pressures.

J. LIFE/SAFETY CODE REVIEW

Drinking Fountains: Complete.

ADA-compliant drinking fountains have been installed:

- * In the corridor next to the Law Library.
- * In the 1st floor Main Lobby.
- * In the 2nd floor north corridor.

Existing drinking fountains have been lowered to ADA-compliant heights on the 3rd and 4th floors.

Public Telephones: Not done.

An ADA-compliant public telephone should be installed in the 1st floor Main Lobby.

Elevator Entrances/Cabs: Complete.

ADA-compliant elevator signage and controls have been installed.

Assembly Areas: Not Done.

- Space for (2) wheelchairs needs to be reserved and signage installed in each assembly area in the building, particularly Courtrooms.
- Areas and signage for assistive listening devices should be designated at each assembly area.
- Public visitors/jurors are requested to identify special needs/disabilities with the Clerk of Courts office.
- Judge/clerk/witness benches and jury boxes are presently inaccessible in many locations, due to the existence of one or more risers. Temporary ramps should be located in each assembly area for the use of handicapped persons requiring access to these areas. In the case of jury boxes, an area should be set aside for wheelchair jurors at each box.

Fire Alarms: Complete.

The system was installed in 1986. It should be tested to verify compliance with ADA for the audible annunciators.

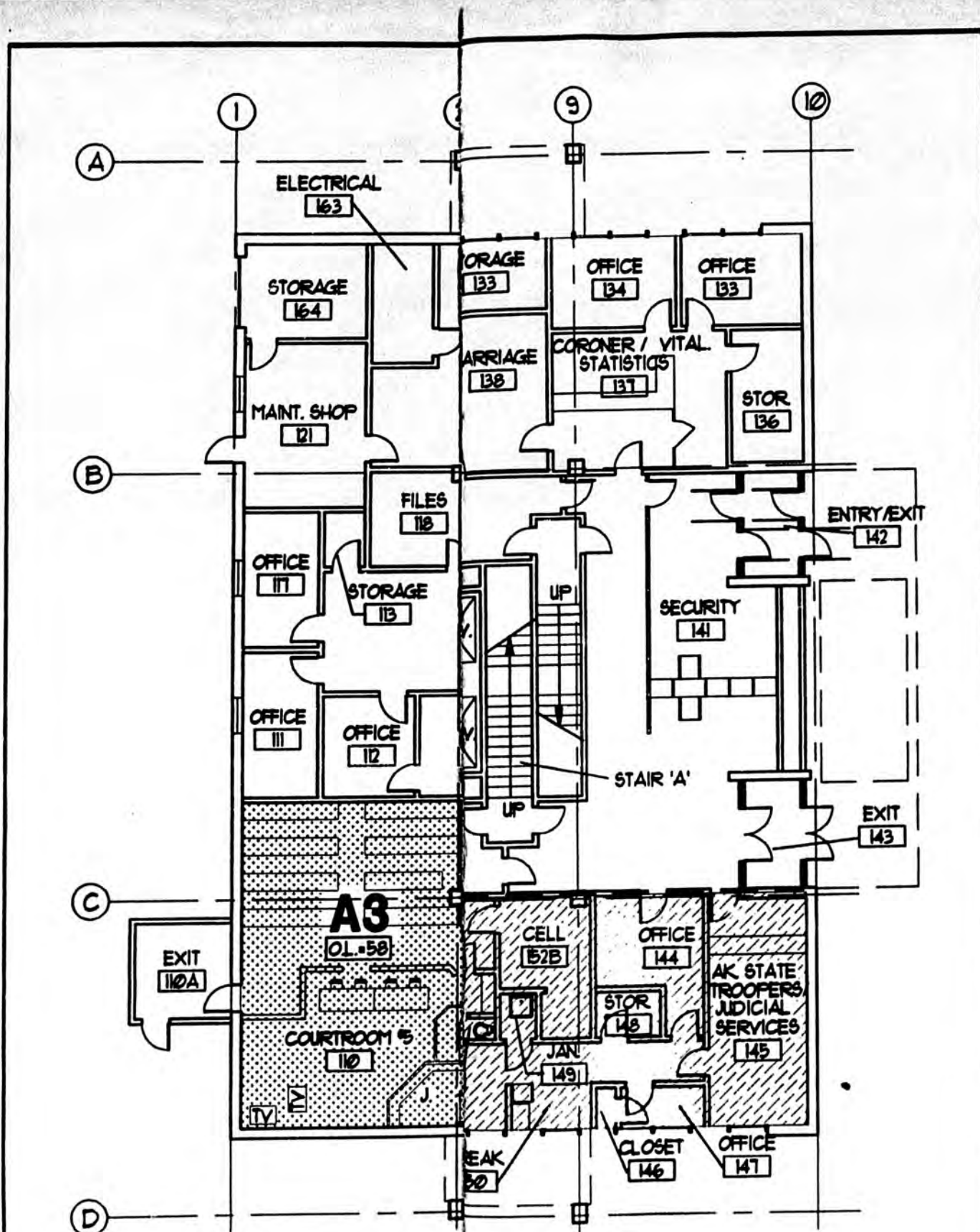
Counters: Partially Complete/To be Completed.

Lower counter sections for the use of handicapped persons should be provided at the following offices which provide public services and have fixed/built-in counters:

- | | |
|---|--------------|
| * Alaska State Troopers/Judicial Services | First Floor |
| * Jury Assembly | First Floor |
| * Accounting/Traffic | First Floor |
| * District Attorney | Second Floor |
| * Clerk of Courts Office | Third Floor |

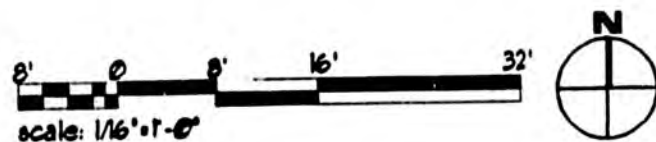
These corrections can be accommodated in planned renovations on a partial or building-wide basis.

**THE FOLLOWING DOCUMENT HAS NOT
BEEN FILMED BUT IS AVAILABLE IN THE
ORIGINAL FILE.**



LEGEND

- A3 OCCUPANCY
- 13 OCCUPANCY
- 2 HR OCCUPANCY SEPARATION



FAIRBANKS CO
charles bettleworth and comp

**OCCUPANCY TYPES
FIRST FLOOR PLAN**

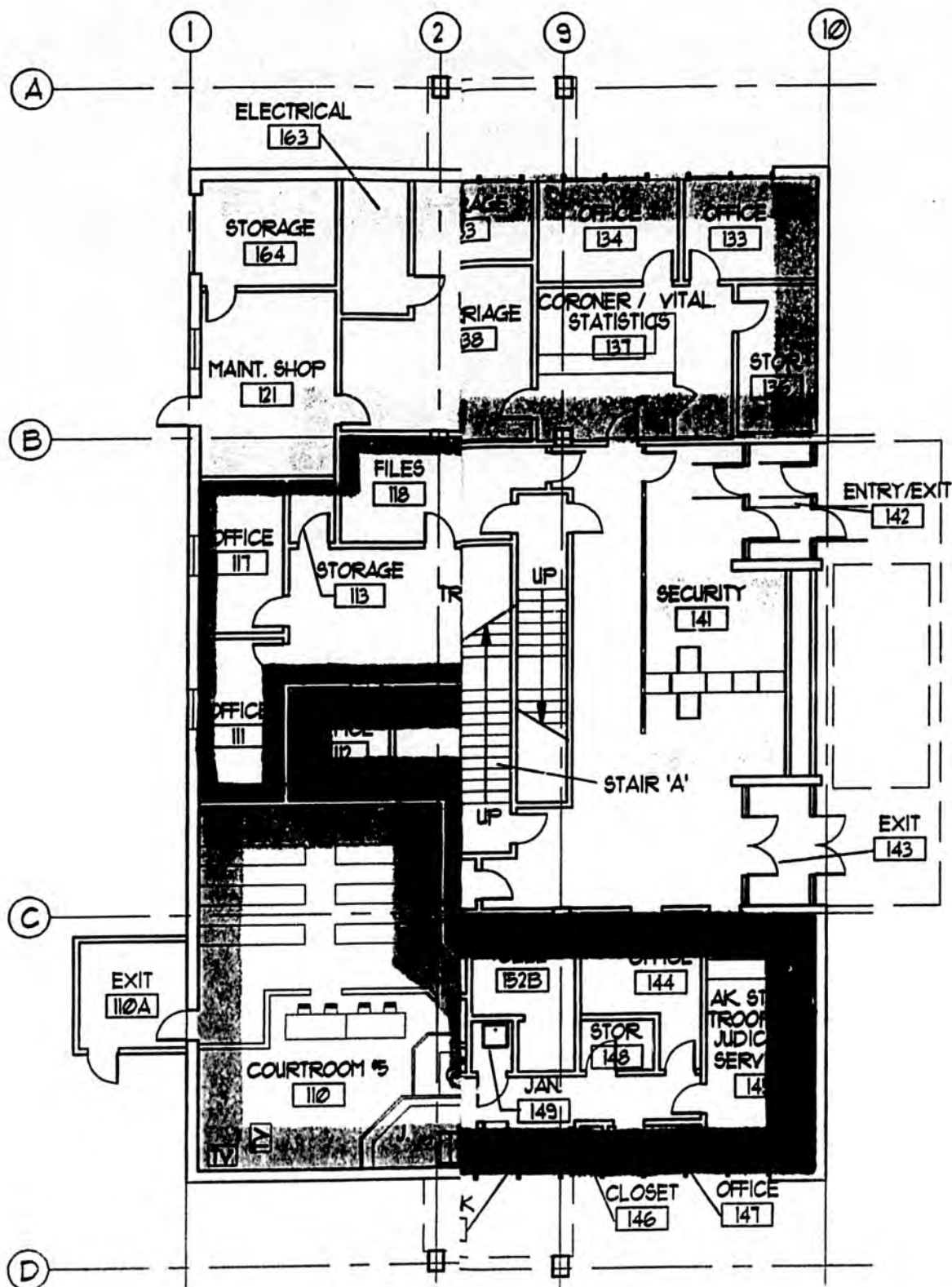
K. FACILITY PROGRAM/SPACE UTILIZATION ANALYSIS

Space Title	Location	Current NASF*
Supreme Court	Floor 4	1669.75
Superior Court	Floors 2,3,4	15902.50
District Court	Floor 3	6054.50
Grand Jury	Floor 2	893.25
Area Court Administrator	Floor 2	1072.50
Law Library	Floor 1	5311.00
Clerk of the Courts	Floor 3	5841.00
Transcripts	Floor 1	1251.50
In-Courts	Floors 2,4	1188.50
Magistrates and Masters	Floors 1,2	3934.50
Accounting/Traffic	Floor 1	1023.50
Court Services	Floor 1	2032.00
Custody Investigation	Floor 2	611.00
Judicial Services	Floors 1,4	1384.75
Building Services	All floors	6965.50
District Attorney	Floor 2	**4,614.75
TOTAL NASF		59750.50
TOTAL GROSS SF		78504.00
BUILDING EFFICIENCY		0.76

* Net assignable square feet, calculated without circulation or structure

** Leasing Agency

**THE FOLLOWING DOCUMENT HAS NOT
BEEN FILMED BUT IS AVAILABLE IN THE
ORIGINAL FILE.**



FILE: FY-A1

FAIRBANKS COURTHOUSE
charles bettsworth and company

**EXISTING SPACE UTILIZATION
FIRST FLOOR PLAN**

APPENDIX

A

TABLE 3-A—DESCRIPTION OF OCCUPANCIES BY GROUP AND DIVISION

GROUP AND DIVISION	SECTION	DESCRIPTION OF OCCUPANCY
A-1	303.1.1	A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.
A-2		A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.
A-2.1		A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-3		Any building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-4		Stadiums, reviewing stands and amusement park structures not included within other Group A Occupancies.
B	304.1	A building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts, and eating and drinking establishments with an occupant load of less than 50.
E-1	305.1	Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.
E-2		Any building used for educational purposes through the 12th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.
E-3		Any building or portion thereof used for day-care purposes for more than six persons.
F-1	306.1	Moderate-hazard factory and industrial occupancies include factory and industrial uses not classified as Group F, Division 2 Occupancies.
F-2		Low-hazard factory and industrial occupancies include facilities producing noncombustible or nonexplosive materials which during finishing, packing or processing do not involve a significant fire hazard.
H-1	307.1	Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high explosion hazard as listed in Section 307.1.1.
H-2		Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a moderate explosion hazard or a hazard from accelerated burning as listed in Section 307.1.1.
H-3		Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high fire or physical hazard as listed in Section 307.1.1.
H-4		Repair garages not classified as Group S, Division 3 Occupancies.
H-5		Aircraft repair hangars not classified as Group S, Division 5 Occupancies and heliports.
H-6	307.1 and 307.1.1	Semiconductor fabrication facilities and comparable research and development areas when the facilities in which hazardous production materials are used, and the aggregate quantity of material is in excess of those listed in Table 3-D or 3-E.
H-7	307.1	Occupancies having quantities of materials in excess of those listed in Table 3-E that are health hazards as listed in Section 307.1.1.

TABLE 3-A—DESCRIPTION OF OCCUPANCIES BY GROUP AND DIVISION—(Continued)

GROUP AND DIVISION	SECTION	DESCRIPTION OF OCCUPANCY
I-1.1	308.1	Nurseries for the full-time care of children under the age of six (each accommodating more than five children), hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).
I-1.2		Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).
I-2		Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five persons).
I-3		Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.
M	309.1	A building or structure, or a portion thereof, for the display and sale of merchandise, and involving stocks of goods, wares or merchandise, incidental to such purposes and accessible to the public.
R-1	310.1	Hotels and apartment houses, congregate residences (each accommodating more than 10 persons).
R-3		Dwellings, lodging houses, congregate residences (each accommodating 10 or fewer persons).
S-1	311.1	Moderate hazard storage occupancies include buildings or portions of buildings used for storage of combustible materials not classified as Group S, Division 2 or Group H Occupancies.
S-2		Low-hazard storage occupancies include buildings or portions of buildings used for storage of noncombustible materials.
S-3		Repair garages and parking garages not classified as Group S, Division 4 Occupancies.
S-4		Open parking garages.
S-5		Aircraft hangars and helistops.
U-1	312.1	Private garages, carports, sheds and agricultural buildings.
U-2		Fences over 6 feet (182.9 mm) high, tanks and towers.

TABLE 3-B—REQUIRED SEPARATION IN BUILDINGS OF MIXED OCCUPANCY¹ (HOURS)

	A-1	A-2	A-2.1	A-3	A-4	B	E	F-1	F-2	H-2	H-3	H-4,5	H-6,7 ²	I	M	R-1	R-3	S-1	S-2	S-3	S-5	U-1 ³
A-1		N	N	N	N	3	N	3	3	4	4	4	4	3	3	I	I	3	3	4 ⁵	3	I
A-2			N	N	N	I	N	I	I	4	4	4	4	3	I	I	I	I	I	3 ⁵	I	I
A-2.1				N	N	I	N	I	I	4	4	4	4	3	I	I	I	I	I	3 ⁵	I	I
A-3					N	N	N	N	N	4	4	4	3	2	N	I	I	N	I	3 ⁵	I	I
A-4						I	N	I	I	4	4	4	4	3	I	I	I	I	I	3 ⁵	I	I
B							I	N ⁶	N	2	I	I	I	2	N	I	I	N	I	I	I	I
E								I	I	4	4	4	3	I	I	I	I	I	I	3 ⁵	I	I
F-1									I	2	I	I	I	3	N ⁶	I	I	N	I	I	I	I
F-2										2	I	I	I	2	I	I	I	N	I	I	I	I
H-1	NOT PERMITTED IN MIXED OCCUPANCIES. SEE CHAPTER 10.																					
H-2											I	I	2	4	2	4	4	2	2	2	2	I
H-3												I	I	4	I	3	3	I	I	I	I	I
H-4,5													I	4	I	3	3	I	I	I	I	I
H-6,7 ²														4	I	4	4	I	I	I	I	3
I															2	I	I	2	4	4 ⁵	3	I
M																I	I	I ⁴	I ⁴	I	I	I
R-1																	N	3	I	3 ⁵	I	I
R-3																		I	I	I	I	I
S-1																			I	I	I	I
S-2																				I	I	N
S-3																				I	I	I
S-4	OPEN PARKING GARAGES ARE EXCLUDED EXCEPT AS PROVIDED IN SECTION 311.2.																					
S-5																						N

N—No requirements for fire resistance.

¹For detailed requirements and exceptions, see Section 302.4.²For special provisions on highly toxic materials, see the Fire Code.³For agricultural buildings, see also Appendix Chapter 3.⁴See Section 310.2.1 for exception.⁵Group S, Division 3 Occupancies used exclusively for parking or storage of pleasure-type motor vehicles and provided no repair or refueling is done may have the occupancy separation reduced one hour.⁶For Group F, Division 1 woodworking establishments with more than 2,500 square feet, the occupancy separation shall be one hour.

TABLE 5-B—BASIC ALLOWABLE BUILDING HEIGHTS AND BASIC ALLOWABLE FLOOR AREA FOR BUILDINGS ONE STORY IN HEIGHT¹

TYPE OF CONSTRUCTION		TYPES OF CONSTRUCTION								
		I	II			III		IV	V	
		F.R.	F.R.	One-hour	N	One-hour	N	H.T.	One-hour	N
		UL	100 (48 768 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	55 (16 764 mm)	40 (12 192 mm)
Use Group	Height	x 0.0029 for m ²								
A-1	H	UL	4	Not Permitted						
	A	UL	29,900							
A-2, 2.1 ²	H	UL	4	2	NP	2	NP	2	2	NP
	A	UL	29,900	13,500	NP	13,500	NP	13,500	10,500	NP
A-3, 4 ²	H	UL	12	2	1	2	1	2	2	1
	A	UL	29,900	13,500	9,100	13,500	9,100	13,500	10,500	6,100
B, F-1, M, S-1, S-3, S-5	H	UL	12	4	2	4	2	4	3	2
	A	UL	39,900	18,000	12,000	18,000	12,000	18,000	14,000	8,000
E-1, 2, 3 ⁴	H	UL	4	2	1	2	1	2	2	1
	A	UL	45,200	20,200	13,500	20,200	13,500	20,200	15,700	9,100
F-2, S-2 ³	H	UL	12	4	2	4	2	4	3	2
	A	UL	59,900	27,000	18,000	27,000	18,000	27,000	21,000	12,000
H-1 ⁵	H	I	1	1	1	Not Permitted				
	A	15,000	12,400	5,600	3,700					
H-2 ⁵	H	UL	2	1	1	1	1	1	1	1
	A	15,000	12,400	5,600	3,700	5,600	3,700	5,600	4,400	2,500
H-3, 4, 5 ⁵	H	UL	5	2	1	2	1	2	2	1
	A	UL	24,800	11,200	7,500	11,200	7,500	11,200	8,800	5,100
H-6, 7	H	3	3	3	2	3	2	3	3	1
	A	UL	39,900	18,000	12,000	18,000	12,000	18,000	14,000	8,000
I-1.1 ⁶ , 1.2	H	UL	3	1	NP	1	NP	1	1	NP
	A	UL	15,100	6,800	NP	6,800	NP	6,800	5,200	NP
I-2	H	UL	3	2	NP	2	NP	2	2	NP
	A	UL	15,100	6,800	NP	6,800	NP	6,800	5,200	NP
I-3	H	UL	2	Not Permitted ⁷						
	A	UL	15,100							
R-1	H	UL	12	4	2 ⁹	4	2 ⁹	5	3	2 ⁹
	A	UL	29,900	13,500	9,100 ⁹	13,500	9,100 ⁹	13,500	10,500	6,000 ⁹

R-3	H	UL	3	3	3	3	3	3	3	3
	A	Unlimited								
S-4	See Table 3-H									
U ⁸	H A	See Chapter 3								

A—Building area in square feet.
H—Building height in number of stories.
H.T.—Heavy timber.
NP—Not permitted.

N—No requirements for fire resistance.
F.R.—Fire resistive.
UL⁴—Unlimited.

¹For multistory buildings, see Section 504.2.

²For limitations and exceptions, see Section 303.2.

³For open parking garages, see Section 311.9.

⁴See Section 306.3.

⁵See Sections 307 and 412.

⁶See Section 308.2.1 for exception to the allowable area and number of stories in hospitals and nursing homes.

⁷See Section 312.2. *See 22*

⁸For agricultural buildings, see also Appendix Chapter 3.

⁹For limitations and exceptions, see Section 310.2.

TABLE 6-A—TYPES OF CONSTRUCTION—FIRE-RESISTIVE REQUIREMENTS (In Hours)
 For details, see occupancy section in Chapter 3, type of construction sections in this chapter and sections referenced in this table.

BUILDING ELEMENT	TYPE I	TYPE II			TYPE III		TYPE IV	TYPE V	
	Fire-resistive	Noncombustible			Combustible		H.T.	1-Hr.	
		Fire-resistive	1-Hr.	N	1-Hr.	N		1-Hr.	N
1. Bearing walls—exterior	4 Sec. 602.3.1	4 Sec. 603.3.1	I	N	4 Sec. 604.3.1	4 Sec. 604.3.1	4 Sec. 605.3.1	I	N
2. Bearing walls—interior	3	2	I	N	I	N	I	I	N
3. Nonbearing walls—exterior	4 Sec. 602.3.1	4 Sec. 603.3.1	I Sec. 603.3.1	N	4 Sec. 604.3.1	4 Sec. 604.3.1	4 Sec. 605.3.1	I	N
4. Structural frame ¹	3	2	I	N	I	N	I or H.T.	I	N
5. Partitions—permanent	I ²	I ²	I ²	N	I	N	I or H.T.	I	N
6. Shaft enclosures ³	2	2	I	I	I	I	I	I	I
7. Floors and floor-ceilings	2	2	I	N	I	N	H.T.	I	N
8. Roofs and roof-ceilings	2 Sec. 602.5	I Sec. 603.5	I Sec. 603.5	N	I	N	H.T.	I	N
9. Exterior doors and windows	Sec. 602.3.2	Sec. 603.3.2	Sec. 603.3.2	Sec. 603.3.2	Sec. 604.3.2	Sec. 604.3.2	Sec. 605.3.2	Sec. 606.3	Sec. 606.3
10. Stairway construction	Sec. 602.4	Sec. 603.4	Sec. 603.4	Sec. 603.4	Sec. 604.4	Sec. 604.4	Sec. 605.4	Sec. 606.4	Sec. 606.4

N—No general requirements for fire resistance.

H.T.—Heavy timber.

¹Structural frame elements in an exterior wall that is located where openings are not permitted or where protection of openings is required, shall be protected against external fire exposure as required for exterior bearing walls or the structural frame, whichever is greater.

→ ²Fire-retardant-treated wood (see Section 207) may be used in the assembly, provided fire-resistance requirements are maintained. See Sections 602 and 603.

³For special provisions, see Sections 304.6, 306.6 and 711.

807.1.1 Floors. In other than dwelling units, toilet room floors shall have a smooth, hard nonabsorbent surface such as portland cement, concrete, ceramic tile or other approved material which extends upward onto the walls at least 5 inches (127 mm).

807.1.2 Walls. Walls within 2 feet (610 mm) of the front and sides of urinals and water closets shall have a smooth, hard nonabsorbent surface of portland cement, concrete, ceramic tile or other smooth, hard nonabsorbent surface to a height of 4 feet (1219 mm), and except for structural elements, the materials used in such walls shall be of a type which is not adversely affected by moisture. See Section 2512 for other limitations.

EXCEPTIONS: 1. Dwelling units and guest rooms.

2. Toilet rooms which are not accessible to the public and which have not more than one water closet.

In all occupancies, accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls shall be installed and sealed to protect structural elements from moisture.

807.1.3 Showers. Showers in all occupancies shall be finished as specified in Sections 807.1.1 and 807.1.2 to a height of not less than 70 inches (1778 mm) above the drain inlet. Materials other than structural elements used in such walls shall be of a type which is not adversely affected by moisture. See Section 2512 for other limitations.

807.1.4 Shower doors. For shower doors, see Sections 2406.4 and 2407.

807.2 Water Closet Room Separation. See Section 302.6 for requirements to separate water closet rooms.

TABLE 8-A—FLAME-SPREAD CLASSIFICATION

MATERIAL QUALIFIED BY:	
Class	Flame-spread Index
I	0-25
II	26-75
III	76-200

TABLE 8-B—MAXIMUM FLAME-SPREAD CLASS¹

OCCUPANCY GROUP	ENCLOSED VERTICAL EXITWAYS	OTHER EXITWAYS ²	ROOMS OR AREAS
A	I	II	II ³
E	I	II	III
I	I	I ⁴	II ⁵
H	I	II	III ⁶
B, F, M and S	I	II	III
R-1	I	II	III
R-3	III	III	III ⁷
U	NO RESTRICTIONS		

¹Foam plastics shall comply with the requirements specified in Section 1001.5. Carpeting on ceilings and textile wall coverings shall comply with the requirements specified in Sections 804.2 and 805, respectively.

²Finish classification is not applicable to interior walls and ceilings of exterior exit balconies.

³In Group A, Divisions 3 and 4 Occupancies, Class III may be used.

⁴In Group I, Divisions 2 and 3 Occupancies, Class II may be used or Class III when the Division 2 or 3 is sprinklered.

⁵In rooms in which personal liberties of inmates are forcibly restrained, Class I material only shall be used.

⁶Over two stories shall be of Class II.

⁷Flame-spread provisions are not applicable to kitchens and bathrooms of Group R, Division 3 Occupancies.

The occupant load for buildings or areas containing two or more occupancies shall be determined by adding the occupant loads of the various use areas as computed in accordance with the applicable provisions of this section.

1002.1.3 Fixed seating. For areas having fixed seats and aisles, the occupant load shall be determined by the number of fixed seats installed therein. The required width of aisles serving fixed seats shall not be used for any other purpose.

For areas having fixed benches or pews, the occupant load shall not be less than the number of seats based on one person for each 18 inches (457 mm) of length of pew or bench.

Where booths are used in dining areas, the occupant load shall be based on one person for each 24 inches (610 mm) of booth length or major portion thereof.

1002.1.4 Reviewing stands, grandstands and bleachers. The occupant load for reviewing stands, grandstands and bleachers shall be calculated in accordance with this section and the specific requirements contained in Section 1021.

1002.2 Maximum Occupant Load.

1002.2.1 Assembly occupancies. The maximum occupant load for assembly occupancies shall not exceed the occupant load determined in accordance with Section 1002.1.

EXCEPTION: When approved by the building official, the occupant load for an assembly occupancy may be increased provided the maximum occupant load served does not exceed the capacity of the exit system for such increased number of persons. The building official may require an aisle, seating or fixed equipment diagram to substantiate such an increase, and may require that such diagram be posted.

1002.2.2 Other occupancies. For other than assembly occupancies, an occupant load greater than that determined in accordance with Section 1002.1 is permitted; however, the exit system shall comply with the provisions of this chapter for such increased number of persons.

1002.3 Posting of Room Capacity. Any room having an occupant load of 50 or more where fixed seats are not installed, and which is used for assembly purpose, shall have the capacity of the room posted in a conspicuous place on an approved sign near the main exit from the room. Such signs shall be maintained legible by the owner or the owner's authorized agent and shall indicate the number of occupants permitted for each room use.

1002.4 Revised Occupant Load. After a building is occupied, any change in use or increase in occupant load shall comply with this chapter. See Section 3405.

SECTION 1003 — EXITS REQUIRED

1003.1 Number of Exits. Every building or usable portion thereof shall have at least one exit, no less than two exits where required by Table 10-A and additional exits as required by this section.

For purposes of this section, basements and occupied roofs shall be provided with exits as required for stories.

EXCEPTION: Occupied roofs on Group R, Division 3 Occupancies may have one exit if such occupier areas are less than 500 square feet (46.45 m²) and are located no higher than immediately above the second story.

Floors complying with the provisions for mezzanines as specified in Section 506, Exception 3 shall be provided with exits as specified therein.

Occupants on stories above the first and in basements shall have access to not less than two separate exits from the story or basement.

EXCEPTIONS: 1. Second stories having an occupant load less than 10 may be provided with only one exit.

2. Two or more dwelling units on the second story or in a basement may have access to only one common exit when the total occupant load served by that exit does not exceed 10.

3. Except as provided in Table 10-A, only one exit need be provided from the second floor or a basement within an individual dwelling unit or a Group R, Division 3 congregate residence.

4. When the third floor within an individual dwelling unit or a Group R, Division 3 congregate residence does not exceed 500 square feet (46.45 m²), only one exit need be provided from that floor.

5. Floors and basements used exclusively for service of the building may have one exit. For the purposes of this exception, storage rooms, laundry rooms, maintenance offices and similar uses shall not be considered as providing service to the building.

6. Storage rooms, laundry rooms and maintenance offices not exceeding 300 square feet (27.87 m²) in floor area may be provided with only one exit.

7. Elevator lobbies may have one exit provided the use of such exit does not require keys, tools, special knowledge or effort.

For special requirements see the following sections: Group A, Section 1016; Group E, Section 1017; Group H, Section 1018; Group I, Section 1019; Rooms Containing Fuel-fired Equipment and Cellulose Nitrate Handling Rooms, Section 1020; Reviewing Stands, Grandstands and Bleachers, Section 1021; Laboratories, Sections 304.2.2 and 305.2.4; and Open Parking Garages, Section 311.9. For stage exits, see Section 405.3.6.

Every story or portion thereof having an occupant load of 501 to 1,000 shall not have less than three exits.

Every story or portion thereof having an occupant load of 1,001 or more shall not have less than four exits.

The number of exits required from any story of a building shall be determined by using the occupant load of that story.

The maximum number of exits required for any story shall be maintained until egress is provided from the structure. (See Section 1010.)

1003.2 Width. The total width of exits in inches (mm) shall not be less than the total occupant load served by an exit multiplied by 0.3 (7.62) for stairways and 0.2 (5.08) for other exits nor less than specified elsewhere in this code. Such widths of exits shall be divided approximately equally among the separate exits.

The maximum exit width required from any story of a building shall be maintained.

1003.3 Arrangement of Exits. 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.

EXCEPTION: The separation between exit doors in the exit enclosures which are interconnected by a one-hour fire-resistive corridor conforming to the requirements of Section 1005 may be measured along a direct line of travel within the exit corridor. Enclosure walls shall not be less than 30 feet (9144 mm) apart at any point in a direct line of measurement.

Where three or more exits are required, at least two exits 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 the exits, and the additional exits shall be arranged a reasonable distance apart so that if one becomes blocked the others will be available.

1003.4 Travel Distance. The maximum travel distance shall not exceed 150 feet (45 720 mm), unless otherwise allowed by this section. The maximum travel distance may be increased in accordance with the following:

1. In a building equipped with an automatic sprinkler system throughout, the maximum travel distance may be 200 feet (60 960 mm).

2. The maximum travel distance of 150 feet (45 720 mm) and the maximum travel distance of 200 feet (60 960 mm) allowed by Item 1 may be increased up to an additional 100 feet (30 480 mm) when this increase in travel distance occurs in the last portion of the travel distance and is entirely within a one-hour fire-resistive corridor complying with Section 1005.

3. In one-story buildings classified as Group F, Division 2 or Group S, Division 2 Occupancies, and in one-story Group S, Division 5 Occupancy airplane hangars, the travel distance may be 400 feet (121.9 m) if the building is equipped with an automatic sprinkler system throughout and provided with smoke and heat ventilation as specified in Section 906.

4. In an open parking garage as defined in Section 311.9, the exit travel distance may be 300 feet (91 440 mm) in a building not equipped with an automatic sprinkler system throughout and may be increased to 400 feet (121.9 m) in a building equipped with an automatic sprinkler system throughout. Travel distances may be measured to open stairways which are permitted in accordance with Section 1009.1.

Special travel distance provisions are contained in other sections of this code as follows:

1. For atria, see Section 402.4.
2. For Group B office and Group R, Division 1 Occupancies, see Section 403.
3. For Group E Occupancies, see Section 1017.
4. For Group H Occupancies, see Section 1018.
5. For malls, see Section 404.4.3 and 404.4.5.

1003.5 Exits through Adjoining Rooms. Rooms may have one required exit that passes through an adjoining or intervening room which provides a direct, obvious and unobstructed means of travel to an exit corridor, exterior exit door, horizontal exit, exit passageway or enclosed stairway, provided the total travel distance does not exceed that permitted by other provisions of this code.

EXCEPTIONS: 1. Rooms within dwelling units may exit through more than one intervening room.

2. Rooms with a cumulative occupant load of 10 or less may exit through more than one intervening room.

In other than dwelling units, exits shall not pass through kitchens, store rooms, restrooms, closets or spaces used for similar purposes.

Foyers, lobbies and reception rooms constructed as required for corridors shall not be constructed as intervening rooms.

SECTION 1004 — DOORS

1004.1 General. This section shall apply to every exit door serving an area having an occupant load of 10 or more, or serving hazardous rooms or areas, except that Sections 1004.3, 1004.9, 1004.10 and 1004.11 shall apply to all exit doors regardless of occupant load. Buildings or structures used for human occupancy shall have at least one exterior exit door that meets the requirements of Section 1004.6. Doors and landings at doors which are located within an accessible route of travel shall also comply with Chapter 11.

1004.2 Swing and Opening Force. Exit doors shall be of the pivoted or side-hinged swinging type. Exit doors shall swing in the direction of exit travel when serving any hazardous area or when the area served has an occupant load of 50 or more. The door shall swing to full-open position when an opening force not to exceed 30 pounds (133.45 N) is applied to the latch side. For other door opening forces, see Chapter 11 and Section 905.3. See Section 3207 for doors swinging over public property.

EXCEPTIONS: 1. Group I, Division 3 Occupancy used as a place of detention.

2. Doors within or serving an individual dwelling unit.

3. Special door conforming with Section 1004.8.

Double-acting doors shall not be used as exits when any of the following conditions exist:

1. The occupant load served by the door is 100 or more.
2. The door is part of a fire assembly.

1005.3 Height. Corridors and exterior exit balconies shall have a clear height of not less than 7 feet (2134 mm) measured to the lowest projection from the ceiling.

1005.4 Projections. The required width of corridors shall be unobstructed.

EXCEPTION: Handrails and doors, when fully opened, shall not reduce the required width by more than 7 inches (178 mm). Doors in any position shall not reduce the required width by more than one half. Other nonstructural projections such as trim and similar decorative features may project into the required width 1 1/2 inches (38 mm) on each side.

1005.5 Access to Exits. When more than one exit is required, they shall be so arranged that it is possible to go in either direction from any point in a corridor to a separate exit, except for dead ends not exceeding 20 feet (6096 mm) in length.

1005.6 Changes in Elevation. When a corridor or exterior exit balcony is accessible to the handicapped, changes in elevation of the floor shall be made by means of a ramp, except as provided for doors by Section 1004.9.

1005.7 Construction. Walls of corridors serving a Group R, Division 1 or Group I Occupancy having an occupant load of 10 or more and walls of corridors serving other occupancies having an occupant load of 30 or more shall be of not less than one-hour fire-resistive construction and the ceilings shall not be less than that required for a one-hour fire-resistive floor or roof system.

EXCEPTIONS: 1. One-story buildings housing Group S, Division 2 Occupancies.

2. Corridors more than 30 feet (9144 mm) in width where occupancies served by such corridors have at least one exit independent from the corridor. (See Chapter 4 for covered malls.)

3. Exterior sides of exterior exit balconies.

4. In Group I, Division 3 Occupancies such as jails, prisons, reformatories and similar buildings with open-barred cells forming corridor walls, the corridors and cell doors need not be fire resistive.

5. Corridor walls and ceilings need not be of fire-resistive construction within office spaces having an occupant load of 100 or less when the entire story in which the space is located is equipped with an automatic sprinkler system throughout and an automatic smoke-detection system installed within the corridor. The actuation of any detector shall activate alarms audible in all areas served by the corridor.

6. In other than Type I or II construction, exterior exit balcony roof assemblies may be of heavy-timber construction without concealed spaces.

7. Within office spaces occupied by a single tenant, partial height partitions which form corridors and which do not exceed 6 feet (1829 mm) in height need not be fire resistive, provided they are constructed in accordance with Section 601.5 and are not more than three fourths of the floor-to-ceiling height.

8. Corridor walls and ceilings need not be of fire-resistive construction within office spaces having an occupant load of 100 or less when the building in which the space is located is equipped with an automatic sprinkler system throughout.

When the ceiling of the entire story is an element of a one-hour fire-resistive floor or roof system, the corridor walls may terminate at the ceiling. When the room-side fire-resistive membrane of the corridor wall is carried through to the underside of a fire-resistive floor or roof above, the corridor side of the ceiling may be protected by the use of ceiling materials as required for one-hour floor or roof system construction or the corridor ceiling may be of the same construction as the corridor walls.

Ceilings of noncombustible construction may be suspended below the fire-resistive ceiling.

For wall and ceiling finish requirements, see Table 8-B.

For restrictions on the use of corridors to convey air, see Chapter 10 of the Mechanical Code.

1005.8 Openings.

1005.8.1 Doors. When corridor walls are required to be of one-hour fire-resistive construction by Section 1005.7, every interior door opening shall be protected by a tight-fitting smoke- and draft-control assembly having a fire-protection rating of not less than 20 minutes when tested in accordance with U.B.C. Standard 7-2. Said doors shall not have louvers. The door and frame shall

bear an approved label or other identification showing the rating thereof, the name of the manufacturer and the identification of the service conducting the inspection of materials and workmanship at the factory during fabrication and assembly. Doors shall be maintained self-closing or shall be automatic closing by actuation of a smoke detector in accordance with Section 713.2. Smoke- and draft-control door assemblies shall be provided with a gasket so installed as to provide a seal where the door meets the stop on both sides and across the top.

EXCEPTIONS: 1. Viewports may be installed if they require a hole not larger than 1 inch in diameter through the door, have at least a 1/4-inch-thick (6.4 mm) glass disc and the holder is of metal which will not melt out when subject to temperatures of 1,700°F. (927°C.).

2. Protection of openings in the interior walls of exterior exit balconies is not required when it is possible to exit in two directions.

1005.8.2 Openings other than doors. Where corridor walls are required to be of one-hour fire-resistive construction by Section 1005.7, interior openings for other than doors or ducts shall be protected by fixed glazing listed and labeled for a fire-protection rating of at least three-fourths hour in accordance with Section 713.9. The total area of all openings, other than doors, in any portion of an interior corridor shall not exceed 25 percent of the area of the corridor wall of the room which it is separating from the corridor. For duct openings, see Sections 713.10 and 713.11.

EXCEPTION: Protection of openings in the interior walls of exterior exit balconies is not required when it is possible to exit in two directions.

1005.9 Location on Property. Exterior exit balconies shall not be located in areas where openings are not permitted or where openings are required to be protected due to location on the property.

1005.10 Elevators. Elevators opening into a corridor serving a Group R, Division 1 or Group I Occupancy having an occupant load of 10 or more, or a corridor serving other occupancies having an occupant load of 30 or more shall be provided with an elevator lobby at each floor containing such a corridor. The lobby shall completely separate the elevators from the corridor by construction conforming to Section 1005.7 and all openings into the lobby wall contiguous with the corridor shall be protected as required by Section 1005.8.

- **EXCEPTIONS:** 1. In office buildings classed as Group B Occupancies, separations need not be provided from a street floor lobby, provided the entire street floor is protected with an automatic sprinkler system.
2. Elevators not required to meet the shaft enclosure requirements of Section 711.
3. When additional doors are provided in accordance with Section 3007.

Elevator lobbies shall comply with Section 3002.

In fully sprinklered office buildings, corridors may lead through enclosed elevator lobbies if all areas of the building have access to at least one required exit without passing through the elevator lobby.

SECTION 1006 — STAIRWAYS

1006.1 General. Every stairway having two or more risers serving any building or portion thereof shall conform to the requirements of this section. When aisles in assembly rooms have steps, they shall conform with the provisions in Section 1014.

EXCEPTION: Stairs or ladders used only to attend equipment or window wells are exempt from the requirements of this section.

1006.2 Width. The minimum stairway width shall be determined as specified in Section 1003.2 but shall not be less than 44 inches (1118 mm) except as specified herein and in Chapter 11. Stairways serving an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width.

Handrails may project into the required width a distance of 3 1/2 inches (89 mm) from each side of a stairway. Stringers and other projections such as trim and similar decorative features may project into the required width 1 1/2 inches (38 mm) on each side.

1006.3 Rise and Run. The rise of steps shall not be less than 4 inches (102 mm) or greater than 7 inches (178 mm). Except as permitted in Sections 1006.4 and 1006.6, the run shall not be less than 11 inches (279 mm) as measured horizontally between the vertical planes of the furthestmost projection of adjacent treads. Except as permitted in Sections 1006.4, 1006.5 and 1006.6, the largest tread run within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm). The greatest riser height within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm).

EXCEPTIONS: 1. Private steps and stairways serving an occupant load of less than 10 and stairways to unoccupied roofs may be constructed with an 8-inch-maximum (203 mm) rise and a 9-inch-minimum (229 mm) run.

2. Where the bottom or top riser adjoins a sloping public way, walk or driveway having an established grade and serving as a landing, the bottom or top riser may be reduced along the slope to less than 4 inches (102 mm) in height with the variation in height of the bottom or top riser not to exceed 3 inches (76 mm) in every 3 feet (914 mm) of stairway width.

1006.4 Winding Stairways. In Group R, Division 3 Occupancies and in private stairways in Group R, Division 1 Occupancies, winders may be used if the required width of run is provided at a point not more than 12 inches (305 mm) from the side of the stairway where the treads are narrower, but in no case shall any width of run be less than 6 inches (152 mm) at any point.

1006.5 Circular Stairways. Circular stairways may be used as an exit, provided the minimum width of run is not less than 10 inches (254 mm) and the smaller radius is not less than twice the width of the stairway. The largest tread width or riser height within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm).

1006.6 Spiral Stairways. In Group R, Division 3 Occupancies and in private stairways within individual units of Group R, Division 1 Occupancies, spiral stairways may be installed. Such stairways may be used for required exits when the area served is limited to 400 square feet (37.16 m²).

The tread must provide a clear walking area measuring at least 26 inches (660 mm) from the outer edge of the supporting column to the inner edge of the handrail. A run of at least $7\frac{1}{2}$ inches (191 mm) is to be provided at a point 12 inches (305 mm) from where the tread is the narrowest. The rise must be sufficient to provide 6-foot 6-inch (1981 mm) headroom. The rise shall not exceed $9\frac{1}{2}$ inches (241 mm).

1006.7 Landings. Every landing shall have a dimension measured in the direction of travel not less than the width of the stairway. Such dimension need not exceed 44 inches (1118 mm) when the stair has a straight run. There shall not be more than 12 feet (3658 mm) vertically between landings. For landings with adjoining doors, see Section 1004.10.

EXCEPTION: Stairs serving an unoccupied roof are exempt from these provisions.

1006.8 Basement Stairways. When a basement stairway and a stairway to an upper story terminate in the same exit enclosure, an approved barrier shall be provided to prevent persons from continuing on into the basement. Directional exit signs shall be provided as specified in Section 1013.

1006.9 Handrails. Stairways shall have handrails on each side, and every stairway required to be more than 88 inches (2235 mm) in width shall be provided with not less than one intermediate handrail for each 88 inches (2235 mm) of required width. Intermediate handrails shall be spaced approximately equally across with the entire width of the stairway.

EXCEPTIONS: 1. Stairways less than 44 inches (1118 mm) in width or stairways serving one individual dwelling unit in Group R, Division 1 or 3 Occupancies or a Group R, Division 3 congregate residence may have one handrail.

2. Private stairways 30 inches (762 mm) or less in height may have handrails on one side only.

3. Stairways having less than four risers and serving one individual dwelling unit in Group R, Division 1 or 3, or a Group R, Division 3 congregate residence or serving Group U Occupancies need not have handrails.

The top of handrails and handrail extensions shall be placed not less than 34 inches (864 mm) or more than 38 inches (965 mm) above the nosing of treads and landings. Handrails shall be continu-

ous the full length of the stairs and, except for private stairways, at least one handrail shall extend in the direction of the stair run not less than 12 inches (305 mm) beyond the top riser nor less than 12 inches (305 mm) beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.

The handgrip portion of handrails shall not be less than $1\frac{1}{4}$ (32 mm) inches nor more than 2 inches (51 mm) in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners.

Handrails projecting from a wall shall have a space of not less than $1\frac{1}{2}$ inches (38 mm) between the wall and the handrail.

1006.10 Guardrails. Stairways open on one or both sides shall have guardrails as required by Section 1001.5.

1006.11 Protection of Exterior Wall Openings. Except in Group R, Division 3 Occupancies, all openings in the exterior wall below and within 10 feet (3048 mm), measured horizontally, of an exterior exit stairway or unprotected openings in an interior exit stairway serving a building over two stories in height or a floor level having such openings in two or more floors below shall be protected by fixed, self-closing, or automatic-closing fire assemblies having a three-fourths-hour fire-protection rating.

EXCEPTIONS: 1. Openings may be unprotected when two separated exterior stairways serve an exterior exit balcony.

2. Protection of openings is not required for open parking garages conforming to Section 405.

1006.12 Interior Stairway Construction. Interior stairways shall be constructed as specified in Sections 602.4, 603.4, 604.4, 605.4 and 606.4.

Except when enclosed usable space under stairs is prohibited by Section 1009.6, the walls and soffits of the enclosed space shall be protected on the enclosed side as required for one-hour fire-resistive construction.

All required interior stairways which extend to the top floor in any building four or more stories in height shall have, at the highest point of the stair shaft, an approved hatch openable to the exterior not less than 16 square feet (1.5 m²) in area with a minimum dimension of 2 feet (610 mm).

EXCEPTION: The hatch need not be provided on pressurized enclosures or on stairways that extend to the roof with an opening onto that roof.

Stairways exiting directly to the exterior of a building four or more stories in height shall be provided with means for emergency entry for fire department access.

1006.13 Exterior Stairway Construction. Exterior stairways shall be constructed as specified in Sections 602.4, 603.4, 604.4, 605.4 and 606.4.

Exterior stairways shall not project into yards where openings are not permitted or protection of openings is required.

Enclosed usable space under stairs shall have the walls and soffits protected on the enclosed side as required for one-hour fire-resistive construction.

Stairways exiting directly to the exterior of a building four or more stories in height shall be provided with means for emergency entry for fire department access.

1006.14 Stairway to Roof. In buildings four or more stories in height, one stairway shall extend to the roof surface, unless the roof has a slope greater than 4 in 12. See Section 1006.12 for roof hatch requirements.

1006.15 Headroom. Every stairway shall have a headroom clearance of not less than 6 feet 8 inches (2032 mm). Such clearances shall be measured vertically from a plane parallel and tangent to the stairway tread nosings to the soffit above at all points.

1006.16 Stairway Identification. Approved stairway identification signs shall be located at each floor level in all enclosed stairways in buildings four or more stories in height. The sign shall identify the stairway, indicate whether there is roof access, the floor level, and the upper and lower terminus of the stairway. The sign shall be located approximately 5 feet (1524 mm) above the floor landing in a position which is readily visible when the door is in the open or closed position. Signs shall comply with requirements of U.B.C. Standard 10-2.

SECTION 1007 — RAMPS

1007.1 General. Except for ramped aisles in assembly rooms, ramps used as exits shall conform to the provisions of this section. Ramped aisles within assembly rooms shall conform with the provisions in Section 1014. Ramps which are located within an accessible route of travel shall also comply with Chapter 11.

1007.2 Width. The width of ramps shall be determined as specified in Section 1003.2, but shall not be less than 44 inches (1118 mm), except as specified herein. Ramps serving an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width.

Handrails may project into the required width a distance of 3 1/2 inches (89 mm) from each side of a ramp. Other projections, such as trim and similar decorative features, may project into the required width 1 1/2 inches (38 mm) on each side.

1007.3 Slope. The slope of ramps required by Chapter 11 which are located within an accessible route of travel shall not be steeper than 1 unit vertical in 12 units horizontal (8% slope). The slope of other ramps shall not be steeper than 1 unit vertical in 8 units horizontal (12.5% slope).

1007.4 Landings. Ramps having slopes steeper than 1 unit vertical in 15 units horizontal (6.7% slope) shall have landings at the top and bottom, and at least one intermediate landing shall be provided for each 5 feet (1524 mm) of rise. Top landings and intermediate landings shall have a dimension measured in the direction of ramp run of not less than 5 feet (1524 mm). Landings at the bottom of ramps shall have a dimension in the direction of ramp run of not less than 6 feet (1829 mm).

Doors in any position shall not reduce the minimum dimension of the landing to less than 42 inches (1067 mm) and shall not reduce the required width by more than 3 1/2 inches (89 mm) when fully open.

When ramp access is provided to comply with Chapter 11 and a door swings over a landing, the landing shall extend at least 24 inches (610 mm) beyond the latch edge of the door, measured parallel to the door in the closed position, and shall have a length parallel to the direction of travel through the doorway of not less than 5 feet (1524 mm).

1007.5 Handrails. Ramps having slopes steeper than 1 unit vertical in 15 units horizontal (6.7% slope) shall have handrails as required for stairways, except that intermediate handrails shall not be required. Ramped aisles need not have handrails on sides serving fixed seating.

1007.6 Construction. Ramps shall be constructed as required for stairways.

1007.7 Surface. The surface of ramps shall be roughened or shall be of slip-resistant materials.

1007.8 Guardrails. Ramps open on one or both sides shall have guardrails as required by Section 509.

1007.9 Headroom. Ramps shall have a headroom clearance of not less than 7 feet (2134 mm). Such clearances shall be measured vertically from the finished floor surface of the ramp and landings to the soffit above at all points.

SECTION 1008 — HORIZONTAL EXIT

1008.1 Used as a Required Exit. A horizontal exit may be considered as a required exit when conforming to the provisions of this chapter. A horizontal exit shall not serve as the only exit from a

1021.7.10 Minimum exit width. No exit shall be less than 42 inches (1067 mm) in width.

SECTION 1022 — BUILDING SECURITY

See Appendix Chapter 10 for requirements governing building security.

TABLE 10-A—MINIMUM EGRESS REQUIREMENTS¹

USE ²	MINIMUM OF TWO EXITS OTHER THAN ELEVATORS ARE REQUIRED WHERE NUMBER OF OCCUPANTS IS AT LEAST	OCCUPANT LOAD FACTOR ³ (square feet)
		× 0.0029 for m ²
1. Aircraft hangars (no repair)	10	500
2. Auction rooms	30	7
3. Assembly areas, concentrated use (without fixed seats) Auditoriums Churches and chapels Dance floors Lobby accessory to assembly occupancy Lodge rooms Reviewing stands Stadiums Waiting area	50 50	7 3
4. Assembly areas, less-concentrated use Conference rooms Dining rooms Drinking establishments Exhibit rooms Gymnasiums Lounges Stages	50	15
5. Bowling alley (assume no occupant load for bowling lanes)	50	4
6. Children's homes and homes for the aged	6	80
7. Classrooms	50	20
8. Congregate residences	10	200
9. Courtrooms	50	40
10. Dormitories	10	50
11. Dwellings	10	300
12. Exercising rooms	50	50
13. Garage, parking	30	200
14. Hospitals and sanitariums— Health-care center Nursing homes Sleeping rooms Treatment rooms	10 6 10	80 80 80
15. Hotels and apartments	10	200
16. Kitchen—commercial	30	200
17. Library reading room	50	50
18. Locker rooms	30	50

(Continued)