REPORT ON

INDOOR AIR QUALITY IN STATE FACILITIES

SUBMITTED TO

THE JOINT STANDING COMMITTEE ON

STATE AND LOCAL GOVERNMENT

114TH MAINE LEGISLATURE

SUBMITTED BY

THE DIVISION OF SAFETY AND ENVIRONMENTAL SERVICES

BUREAU OF PUBLIC IMPROVEMENTS

MAINE DEPARTMENT OF ADMINISTRATION

AFTER REVIEW BY

THE LABOR-MANAGEMENT COMMITTEE ON BUILDING SAFETY

JANUARY 30, 1989

TABLE OF CONTENTS

EXECUTIVE SUMMARY

As directed by law, the Bureau of Public Improvements conducted a study of indoor air quality in facilities occupied by State employees. A variety of techniques were used to maximize limited resources in known or suspected problem areas.

Projections based on data gathering during October through December indicate that 10-20% of State employees (roughly 2000) occupy space where CO_2 levels exceed the legal standard set by the Legislature. A degree of response action or of additional study is recommended based on the source of the CO_2 or other pollutant and the degree to which it exceeds the standard. These range from further study to significant renovation.

In some cases, the Bureau has been pursuing corrective actions, particularly where leased space is involved. This will continue. In other cases, financial support is needed to take corrective action or undertake design level studies preparatory to corrective action. Rough cost estimates are provided where they can be developed.

The effects of smoking are a visible sign of air quality problems and a frequent irritant to a number of employees. The Governor is currently evaluating a proposal to prohibit smoking in State facilities which would impact this problem.

Legislative review and response is necessary to support continued program activity in this area.

BACKGROUND

At the second regular session of the 113th Legislature, a bill addressing air quality in State facilities was introduced and given public hearing by the Joint Standing Committee on State and Local Government. The bill reflected a concern on the part of employee unions, particularly the Maine State Employee's Union, that indoor air quality affecting State employees was often the cause of discomfort and low productivity and occasionally created unhealthful conditions. After hearing and subsequent discussions involving the Department of Administration and others the Committee reported out, and the Legislature passed, modified legislation which became Chapter 733 of the Public Laws of 1987 (5 MRSA 1742 (24)).

Partially as a result of that law, the Department modified its organizational structure by creating the Division of Safety and Environmental Services (DSES) within the Bureau of Public Improvements (BPI). Previously established and operating as the Division of Asbestos Management Activities, the Division was focusing its efforts on asbestos management in State and public school facilities. Asbestos is basically an air quality problem so the evolution of the Division's responsibilities to include Chapter 733 was a natural one. (Note: DSES is also involved in evaluating and/or correcting problems with radon, hazardous chemicals, fire safety, and other building safety issues.)

Chapter 733 requires that the Bureau of Public Improvements undertake a number of actions aimed at the development of "a plan by which priorities are established for improving indoor air quality and ventilation standards in buildings occupied by State employees." The plan is to be developed in cooperation with a labor-management committee established for this purpose. The Bureau is to report its findings to the Joint Standing Committee on State and Local Government no later than January 16, 1989.

Specifically, the report is to contain:

1. A description of the extent of any air quality or ventilation problems.

2. Priorities for improvements.

3. A timetable for addressing priorities.

4. A recommendation, with alternatives, for addressing the priorities.

5. The costs of addressing the priorities.

6. Information on leased facilities occupied by State employees, if possible.

This report is intended to fulfill, to the degree reasonably possible, the requirements of Chapter 733.

NEW OR RENOVATED BUILDINGS

Chapter 733 establishes indoor air quality standards and requires their application to new construction, renovation, or leases undertaken after September 1, 1988. The standard adopted is the proposed revision, 1981R, of the ANSA-ASHRAE Indoor Air Quality and Ventilation Standards, dated July 15, 1986. At the time of legislative action it was anticipated that the proposal would have been approved and implemented in 1988. As it happens, two additional drafts have been circulated, the latest dated October 15, 1988, and final implementation is not expected until Fall of 1989.

The Bureau has developed new construction and lease standards which require the application of the ASHRAE standards as identified in the July 15, 1986 or later draft. These have been applied since September 1, 1988 as required. (See attachment). The responsibility for compliance is placed on the contractor or leasor, with BPI reviewing plans and, if needed, conducting on site checks. No instance of a renovation meeting the threshold standard of 50% or more of the building's value has occurred, so that aspect of the law remains untested. Burleigh Building is the only facility designed since September 1, 1988 and it will meet the new standards.

METHODOLOGY

Because no funds or staff were provided with the requirements of Chapter 733, the Bureau developed a methodology which was intended to maximize available resources and meet the intent of the law. In addition, BPI wanted to develop a capacity to respond to occupant complaints about buildings as a matter of course. The following outlines the methodology adopted.

1. The Labor Management Committee on Building Safety was asked to participate in the process and a subcommittee on indoor air quality was appointed. The Subcommittee was comprised primarily of State and union designees who had some familiarity with indoor air quality problems.

2. The Subcommittee worked with the DSES to develop a tiered strategy that would look at a number of buildings at varying levels of intensity. Briefly, the process involved the following tiers:

   A. Active Response Buildings. These locations were identified as "problem" buildings and were deemed in need of efforts to evaluate and correct problems due to the high level of occupant complaints or known air quality problems. In these cases professional assistance was employed to develop corrective measures or recommendations were provided to the occupant agency and landlord.

   B. Problem Facilities. These locations were identified as worthy of particular attention because of their size and institutional nature (ie. occupants confined for long periods of time) or because of the nature of the building or the activities. In this category are those with air flow limitations, those with indoor activities that generate pollutants, or those where there had been complaints.

      In these cases, a mixture of consulting experts or trained staff from several State agencies were used to conduct the tests and evaluate the results.

   C. Capitol Complex. It was decided to undertake a more intense survey of Augusta/Hallowell buildings because of proximity and the large number of workers affected.

      Tests in these buildings were conducted by trained staff from State agencies.

   D. A Random Sample. Using statistically correct sampling methods, a 5% sample of buildings outside the above categories was drawn. Staff and travel limitations made visits impractical so passive dosimeters were provided to an occupant selected from a contact list. Instructions for use and location were provided in the mailed kit and the results were returned to DSES for analysis and compilation. (See attached instruction sheets and building list).

3. All buildings were tested for Carbon Dioxide (CO_2). CO_2 is an easily measured component of the air in a building which is an indicator of the amount of fresh air that is available. Higher CO_2 readings indicate a build-up of the products of respiration and a corresponding lack of air exchange.

   While CO_2 itself is not harmful at levels normally found in office buildings, inadequate fresh air does lead to drowsiness, the likelihood of increased problems with body odors, and an accumulation of pollutants that can be irritants to the respiratory system. Thus, the end result can range from lowered productivity to discomfort to genuine health problems, and can vary greatly among individuals.

   DSES normally uses CO_2 readings of 800 ppm as a point at which further attention should be directed to a facility. ASHRAE standards indicate that readings of 1000 ppm or above are cause for concern.

   In specific instances, additional testing beyond the basic CO_2 readings was done. For example, a limited number of radon canisters were located in the State Office Building and the six major institutions to get an estimate of potential problems in those locations. (NOTE: A radon survey of additional heated State buildings is planned for this winter.) In a few cases, specific symptoms or on-site observation led to concerns for cigarette smoke levels, hydrocarbons, volatile organic compounds, or mold. Each such case was evaluated separately and corrective recommendations made.

4. The Division was fortunate to have a summer intern provided through the University of Maine to assist with the air quality study. In recognition of the fact that perception is often as important as reality in evaluating indoor air quality problems, the intern conducted interviews with a variety of building occupants throughout the State. The questionnaire used to elicit information in the interviews was designed to get opinions and observations about indoor air quality. The results aided in focusing test locations and identifying potential occupant symptoms or unrest on this issue.

   Useful observations are reported in relation to each building comment later in this report. However, the designation and operation of smoking areas created the second most frequent negative concern, exceeded only by the general observation of "stuffy" conditions which created drowsiness or increased respiratory distress.

EXTENT OF PROBLEM

A building by building analysis is provided as Appendix 1 of this report. However, a categorical summary of the results would be useful at this point. It must be emphasized that these conclusions are based on limited data, some of which may have a significant error rate. In most cases, the study identifies problems which need further study rather than definitive problems that could be corrected immediately.

1. RESPONSE ACTION BUILDINGS

These buildings were included in the study while specific corrective action was being devised. Problems ranged from minor to major, but all had a significant impact on occupant morale. In most cases, the buildings were leased and efforts were made to deal with the owner to take corrective action. Problems included:

a. Inadequate ventilation, quantity or quality, for the number of occupants.

b. Moldy carpets and/or wet basements leading to odors and irritation and with the potential for health problems.

c. Uneven or inadequate temperature management appropriate to the season.

d. Inadequate maintenance of ventilation systems, especially filters.

e. Leaking oil tank, leading to odors inside the building.

f. Smoking areas with inadequate air exchange for the number of users.

g. Rest rooms with inadequate air exchange.

It is interesting to note that most of the leased spaces with problems are relatively recent renovations. In some cases, simple balancing of the air handling system can solve the problem, but in others significant investments have been, or will need to be, made. The new lease standards should correct that situation over time, but in the interim negotiations with owners will be needed.

2. PROBLEM FACILITIES

It was expected that problems would be more likely in these facilities due to the method of selection. In many cases there were fewer than anticipated, especially in the institutions. As expected, air quality was noticeably affected by the number of occupants per square foot, and the type of occupant. For example, the Maine State Prison has crowded conditions, a high level of cigarette smoking and little active ventilation except openable windows. Pineland, on the other hand, has low occupancy per square foot, little smoking, and a less active population. Thus, although both institutions have older buildings with full-time populations, the air quality at the Prison is markedly lower.

Other problem buildings include those with operational laboratories and others with garages. In such cases, the source of the problem is, or can be, isolated. For example, the Departments of Agriculture and Environmental Protection have labs in office buildings. Although the labs themselves need regular monitoring, they do have complete ventilation systems designed to provide a safe workplace and to avoid impact on office space. Conversely, the Department of Marine Resources labs at Boothbay Harbor have serious problems with formaldehyde based chemicals and cannot effect improvements without capital funds which are in the proposed budget for consideration by the 114th Legislature.

3. CAPITAL COMPLEX

CO_2 studies done in these buildings show a broad range of result, but very few major problems. As expected, the most obvious "sore thumb" is the State Office Building, and corrective recommendations have been provided by the consultant. The State Planning Office and several other buildings need further study to determine the extent of the problems identified and possible solutions.

4. RANDOM SAMPLE

These facilities in outlying areas were tested by local personnel. Due to the limitations of the testing personnel and the error rate inherent in the dosimeter, these readings need further checking. In most cases the CO_2 reading was low or non-existent, but in some very high rates were recorded. These locations will receive an on-site visit by Division staff before April 1 to undertake more detailed testing.

PRIORITIES FOR IMPROVEMENT

Based on the Division's best analysis of the available data and the necessity to get maximum value for the dollars invested, the following priorities are identified, by category.

It should be noted that actual costs for these projects are impossible to determine based on the available data. Each building situation is different and requires on-site evaluation and initial design decisions before a determination of required corrective action and related costs can be made.

In a few cases specific information has provided a basis for recommending corrective action. In most cases, however, the proposal must be generic. A budgetary estimate for the installation of a ventilation system in a building without any system other than heat (such as the institutions) is $11.00 per square foot of ventilated space. This includes an allowance for additional heating capacity to temper the additional outside air brought in. If air conditioning is added to such a system the cost would escalate to $13.00/sf.

In cases with existing ventilation systems a $7.00/s.f. cost can be used as an average estimate for reaching ASHRAE standards, but costs will vary widely with the situation. It is possible, for example, that minor operational changes to equipment or methods can result in a noticeable difference. As another example, it has been suggested that unblocking the unit ventilators in the State Office Building, at a cost of $200,000 could have significant improvement value. Costs for additional studies are based on an estimated average of 9 cents/s.f.

None of the costs listed include any ancillary factors such as engineering, asbestos removal, or restoration.

1. CORRECTIVE ACTION

a) State Owned Buildings

1) Boothbay Harbor - Marine Resources

This laboratory situation, involving five small facilities, should get immediate attention. Hazardous chemicals are being used under inadequate conditions. A specific proposal has been made by the department and is being considered for funding. Estimated cost - $250,000

2) 221 State St. - Human Services Building

Specific recommendations for equipment modification and operational changes have been made by a consultant. The Department and BPI should implement those recommendations within available funds. Estimated cost - $518,000

3) State Office Building

The consultant's final report is pending, but there are apparently modifications which can be made at a reasonable cost that could improve the air quality in the building. BPI should evaluate those recommendations and seek funding to implement them where required. Estimated cost - $200,000 to repair ventilators - complete retrofit = $2,118,000

4) Cultural Building

This building generally has adequate air through a computer controlled ventilating system. However, the system in the Library needs rebalancing after recent renovations and several enclosed areas may need additional ventilation. Should be done before summer. Estimated cost - $5,000.

b) Leased Buildings

1) Lewiston Office Building

A number of corrections have been made to this facility and BPI/DHS negotiations with the owner have led to a list of agreed improvements. An early decision as to priorities and cost allocations should be made so that work can begin. High priority should be given to the elimination of fuel oil odors and safety issues such as damaged rug replacement.
Estimated cost - $61,500

2) Snow Building - Western Ave., Augusta

Additional attention to the provision of fresh air is required. DHS should resolve the smoking policy at an early date and act accordingly on the smoking room in the Snow Building. Estimated cost - None to State

3) DHS Office - Houlton

Negotiations on corrective actions in this building continue and some adjustments have been made by the owner. These efforts should be completed as soon as possible. New space now being renovated on the second floor should be designed for ASHRAE standards if possible. Safety related recommendations have been implemented. Estimated cost - None to State

4) DHS - Forest Ave., Portland

Negotiations with the owner for corrective actions to be implemented within the remaining two plus years of the lease have been slow. These efforts should be increased and remaining corrections made as soon as possible. Lease adjustments are required. Estimated cost - $20,000.

2. ANALYSIS FOR CORRECTIVE ACTION

a) Maine State Prison

The Prison is the focus of significant renovation work and planning for a variety of reasons. Strong consideration should be given to providing smoke free areas for occupants who choose not to smoke, and to making specific modifications in several key areas to improve ventilation. These include the "hospital" area and the control room. Further study would be required to develop solutions for the problem areas. Estimated cost - $30,000.

b) Bangor Mental Health Institute

Additional study is recommended in Building E to determine corrective action. Occupant comments indicate the perception of ventilation problems generally, so additional general testing should be done at intervals during the year. Smoking policies should be evaluated. Estimated cost - $2,500.

c) Augusta Mental Health Institute

Several locations with concentrations of people and CO_2 exceeding 1000 ppm need further analysis leading to recommendations for correction. General testing should be done in warm weather months. Estimated cost - $5,000.

d) Maine Youth Center

Longer term evaluation of the radon reading in Cottage 2 should be conducted. Specific analysis for air quality corrective action should be done in House A and the Security Building. Occupant comments indicate ventilation problems in warm weather months which should be verified by further testing. Estimated cost - $3,500.

e) Pineland Center

Further evaluation is needed in specific areas during warm weather to evaluate occupant comments about ventilation.

3. FURTHER AIR QUALITY STUDY

a) Systematic

1) Buildings identified in this study which require further air quality study to clarify results include:

a) Business Development - 193 State St.

General analysis

b) Department of Human Services - Ft. Kent

General analysis

c) Department of Humans Services - Rockland

General analysis

d) Department of Marine Resources - Lamoine

General analysis

e) Brookton Elementary School

Gymnasium

f) State Planning Office - 184 and 187 State St.

Upper floors in both buildings

g) Bureau of Employee Health - Sewall St.

General analysis

h) Inland Fisheries & Wildlife - State St.

General analysis

i) Capitol Building

Hearing rooms and high occupancy offices

j) Department of Transportation - Capitol St.

General analysis

k) Others - Not in priority order

- Augusta District Court - General
- CETA Building - One office
- Department of Conservation - Old Town - General
- Economic & Community Development - Second floor
- Flynn House - Bathroom
- Harlow Building - Humidification
- Department of Human Services - Whitten Rd. - General
- Department of Labor - Skowhegan - General
- Marine Resources - Hallowell - 2nd floor
- Nash School - Disabilities Council
- Retirement - Computer room

- Veterans Cemetery - Office

- Department of Transportation - Guilford

- Department of Transportation - Woodland

2) Buildings that have known pollutant sources which should be evaluated systematically beyond CO_2 levels include:

a) Education Building - Print Shop

b) Department of Labor - Print Shop

c) Camp Keyes - Print Shop

d) All laboratories

e) Other print shops

f) Motor Vehicle Maintenance Areas

g) Welding Shops

h) Other specialized activity space.

Costs for these analyses and some corrective actions not involving major capital investment were anticipated in the Department's 1990-92 budget proposals.

3) Over time, all buildings not included in the study should have at least a dosimeter level analysis to verify extrapolated conclusions.

b) Response to incidents and complaints

The Division should stand ready to respond to these concerns on a continual basis.

APPENDIX I

BUILDING REPORTS

RESPONSE ACTION BUILDINGS

1. State Office Building - Augusta

a. Analysis - Due to employee complaints, this building was tested initially by staff and subsequently by consultants. Several above standard radon readings were documented and 11 CO_2 readings above the 1000 ppm ASHRAE guideline were identified. The highest reading was 1800 ppm in a meeting room, but most readings were in the 1100 ppm and 1200 ppm range. (It should be noted that none of these tests occurred during a period of significant legislative activity which often severely crowds hearing rooms with limited ventilation capacity. Such testing will be done over the course of the 1989 session.)

b. Occupant Comments - Intern interviews were conducted during the summer months, whereas actual testing was conducted during the winter when CO_2 would be expected to peak. Nevertheless, occupant comments were uniformly negative, ranging from mild to serious. The comments focused on stuffiness, lack of air movement, and respiratory irritation or ailments. In several specific locations, complaints about supervisors smoking in offices and the resulting drift of smoke were made. (This information was forwarded to the appropriate Commissioner).

c. Recommended Action - At the report date, a consulting engineer was making further evaluations of the building's mechanical systems with a view to offering alternative actions in more detail. With a few specific exceptions, the building is served by unit ventilators which outlet the heat from a central boiler and "should" add fresh air as needed. The system was modified to save energy, however, and the amount of fresh air entering the ventilators is limited or non-existent. If useful improvements could be made by restoring the system to design parameters costs of less than $250,000 might be incurred. A major system installation in the building would involve millions of dollars in asbestos removal and equipment costs.

It is recommended that the consultant's report be evaluated when complete and that corrective action be implemented in areas identified as a source of high CO_2 or frequent complaints. Energy cost penalties should be evaluated with great care.

d. Radon - Radon canisters placed in the basement of this building in five locations resulted in three readings above the U.S.E.P.A. guideline of 4.0 pc/l. Additional testing and analysis will be pursued in these three locations.

2. 221 State St. - Human Services Building - Augusta

a. Analysis - This building was the subject of several test programs over the last two years. Due to employee complaints, the Maine State Employee's Association hired a Virginia consultant to conduct air quality tests and make recommendations. That report was reviewed and additional testing done by DHS Division of Health Engineering staff engineer, Gene Moreau. The results of that study were used as the base for a State consultant's study which confirmed the earlier reports and focused on specific recommendations for improvement.

Serious problems were identified in the smoking area and in the degree to which the existing ventilation system was meeting design parameters. Part of the problem was traced to operational practices designed to save energy and part to the need for equipment modifications. Serious problems were also confirmed in the Public Health Laboratory which has an independent ventilation system that is inadequate for the demand.

b. Occupant Comments - Numerous concerns about secondary smoke and stuffy conditions confirm the test results. Areas of particular concern include the lab, the data entry area, and the upper floor which is subject to summer heat problems and crowded conditions.

c. Recommended Actions - The consultant's report lists a number of recommendations in priority areas. Many of the lab problems have been addressed with an upgraded ventilation system but more remains to be done. A design for a ventilated smoking room has been completed but the Department has undertaken an evaluation of the current smoking policy and intends to end smoking in most buildings by June 1. Internal relocation of staff and redesign of upper floor office spaces will have affected air flow patterns as well.

Key recommendations for action focus on equipment adjustment or changes to increase the quantity and control over outside air flow, increasing the height of the boiler exhaust stack to eliminate entrainment of discharge gases and implementation of a vigorous maintenance program. Finally, replacement of a potentially moldy carpet is recommended.

No specific cost estimates are available for these recommendations at this time except that a firm price of $25,000 was determined for the creation of a smoking room which apparently will not be developed.

3. **Snow Building - Western Avenue, Augusta - DHS**

a. Analysis - Eugene Moreau of the Division of Health Engineering, DHS, spent considerable time evaluating employee complaints in this facility. The building was recently renovated from a tire company garage into leased space for the Public Utilities Commission and now Human Services. The DSES consultant recently reviewed the data and the building with Moreau, and concluded that outside air input is inadequate. The smoking room has sufficient air for only two smokers and additional work is needed in the bathrooms.

b. Occupant Comments - Employee complaints led to the initial DHS studies. Complaints included odors in the bathrooms, inadequate smoking room air, stuffiness. DHS renegotiated the lease to get some of the problems corrected but some remain.

c. Corrective Recommendations - Based on the renegotiated lease, the landlord made some modifications and improvements. The most recent consultant report suggests the need for more effort. DSES and DHS will pursue corrections with the landlord. No costs to the State should be involved.

4. **200 Main St. - Lewiston Office Building**

a. Analysis - This space, which is actually two adjoining buildings, was converted from department stores to office space and is on a lease purchase arrangement. The primary occupant of 200 Main St. is DHS, with 198 Main St. occupied by a variety of agencies and occupancy changes going on at this time.

These buildings have been a continual source of problems, many relating to indoor air quality. The recent renovation at 198 Main St. was designed in a low cost way so that ventilation was inadequate in some areas, temperature control uneven and controls limited. 200 Main St. has been occupied a longer time and the design of the system is not adequate for office space. In addition to the problems noted at 198 Main, there was a moldy rug and oil fumes from a fuel tank leak adjacent to the building. Both temperature and ventilation are unbalanced and inadequate. The smoking room was a health hazard.

b. Occupant Comments - The occupants have been complaining about this set of buildings for a long time. The number of problems and difficulties with the landlord in correcting them led to a situation early in 1988 when no amount of corrective action could convince them of improvement. The trend does seem to be shifting to a more positive direction.

c. Corrective Action - BPI has put more effort into addressing problems at 198-200 Main St. than any other leased space. A full-time BPI staff person was assigned to the buildings to correct minor problems before they became irritants. The Director of BPI took responsibility for all communications between the owner and the State and relations have improved markedly. A thorough consultant analysis of the building was performed and many of the recommendations have been implemented, including an upgrade of the smoking room. Additional work is needed and negotiations with the owner are in process to gain those corrections and improvements. Some may require funding, in which case the renting agencies will have to judge the relative priorities.

5. **DHS Offices - Calais**

a. Analysis - This rented space was the subject of intense review by DHS, BPI, and an MSEA representative. A number of environmental and safety violations and concerns were found. These included moldy rugs, bad wiring, furnace vent problems, unsafe rugs, and inadequate ventilation.

b. Occupant Comments - Confirmed the problems noted above and registered complaints with State officials and the union.

c. Corrective Action - BPI recommended, and DHS agreed, that the space be vacated at the earliest opportunity. BPI assisted DHS in finding new facilities which will be occupied in the Spring of 1989. The landlord corrected fire and safety violations.

6. **DHS Offices - Houlton**

a. Analysis - This leased space was renovated for DHS use and has been occupied by them for eight years. Employee complaints led to DSES visiting the building and making some recommendations. Concerns included poor temperature control, excess moisture, moldy carpets, poor ventilation in some areas.

b. Occupant Comments - were the basis of the request for a review of the building and confirmed the problems noted above.

c. Corrective Action - DHS and the building owner have discussed the problems. Some have been corrected and others are being negotiated.

7. **DHS - Forest Avenue - Portland**

a. Analysis - Work on this building was generated and conducted by DHS and a consultant for MSEA. DSES provided minor assistance. Problems included unsafe conditions in the smoking room, fumes from the basement garage, and inadequate ventilation in some spaces.

b. Occupant Comments - Employee complaints led to MSEA employing a consultant and the identification of several problems.

c. Corrective Action - The smoking room problem has been corrected and designs for the remainder of the work done. Negotiations with the owner for lease adjustments continue.

8. **Machias Court House**

a. Analysis - The District Judge objected to the Administrative Office of the Court about serious odor problems during court sessions. The recently installed ventilation system was judged by BPI to be inadequate for the room.

b. Corrective Action - BPI assisted the Regional Administrative Officer to design a solution which he then took responsibility for implementing.

9. **Complaints Received But Not Yet Resolved**

a. DHS Offices - 151 Capitol St., Augusta

Restrooms in Maternal and Child Health Offices have inadequate ventilation.

b. Harlow Building - Augusta

Department of Conservation employee has filed complaints about respiratory irritation.

c. DHS Offices - Bangor

General complaints about drowsiness, stuffiness, etc.

d. Levinson Center - Bangor

General complaints about stuffiness and respiratory irritation.

e. McCarthy Building - Augusta

General complaints about stuffiness on ground floor. Safety concerns identified and under correction by owner and DHS.

PROBLEM FACILITIES

1. **Augusta Mental Health Institute (AMHI)**

   a. Analysis - Sampling was done in all buildings at AMHI. Of the 488 people observed by the consultant during the testing period, 262 were subject to air quality conditions exceeding 800 ppm and 125 were subject to levels exceeding 1000 ppm. As at the Prison, levels of fresh air were controlled quite often by open windows since there are few active ventilation systems.

   Radon measurements, with one exception of 6.3, were below standards.

   b. Occupant Comments - Complaints about stuffy warm weather conditions and tobacco smoke were common.

   c. Corrective Action - The number and size of buildings at AMHI would require significant study and design to resolve these problems. Attention to improvement of ventilation in designated smoking areas would be most beneficial.

2. **Agriculture - Laboratory - Deering Building**

   a. Analysis - This small laboratory was checked because of its presence in an office building and due to expressions of concern by lab employees. The consultant found one inoperative lab hood and several safety concerns but no significant air quality problems.

   b. Occupant Comments - No consequential comments in the Deering Building except for safety matters in the lab.

   c. Corrective Action - DSES provided a laboratory consultant to Agriculture Department staff and a training and equipment strategy was developed and is now being implemented.

3. **Bangor Mental Health Institute (BMHI)**

   a. Analysis - All radon readings at BMHI were well below EPA guidelines. However, some of the 245 CO_2 samples indicated levels of concern, a few as high as 1400 ppm. Specifically, Building E had readings in the 950 to 1400 range and no diffusers were present. Building K had 800 to 1000 ppm readings.

   b. Occupant Comments - Occupants expressed complaints about stale air and temperature control in a number of areas. Complaints about smoking were frequent.

   c. Corrective Action - Particular attention should be directed to evaluating ventilation needs in Building E to determine if a mechanical system is feasible. Further CO_2 studies in Building K should be conducted. In addition, general testing at intervals throughout the year should be done to determine reason for occupant concerns. BMHI should evaluate changes in smoking policy.

4. **Marine Resources - Laboratory - West Boothbay**

a. Analysis - This facility was selected for consultant air quality review because it is a lab and the Director had expressed concern for air quality. Unacceptably high formaldehyde levels were found in four separate locations in the complex. Several locations had high (1000 ppm) CO_2 readings and odors were common. Permissible exposure limits were significantly violated in several locations and existing lab hoods were inadequate to deal with the problems.

b. Occupant Comments - Employees expressed concern about safety given the poor ventilation and high levels of harmful vapors. Complaints were registered about odors and balancing of the heating system.

c. Corrective Action - Operational changes by lab personnel have been made to reduce vapors and formalin handling where possible. A request for capital funds to improve the labs and remove the safety hazard is part of the BPI capital budget.

5. **Maine Correctional Center (MCC)**

a. Analysis - With generally newer facilities, MCC had lower CO_2 rates and better ventilation. 100 of the 490 persons observed occupied space where the CO_2 reading exceeded 800 ppm and none exceeded 1200 ppm. Numbers in smoking areas also declined to reflect the improved ventilation from open windows.

All radon levels at MCC were below EPA standards.

b. Occupant Comments - None

c. Corrective Action - No immediate action required.

6. **Maine State Prison (MSP)**

a. Analysis - As expected, air quality conditions at MSP were not at acceptable levels in many locations. The primary ventilation system was open windows, a questionable method in mid-winter and from an energy control standpoint. Over 50% of the observed population was located in air quality conditions which exceeded 800 ppm of CO_2 and some 400 people are in spaces where readings exceed 1000 ppm. Those numbers drop dramatically in areas where smoking was prevalent, reflecting the tendency to open windows in those areas. It is assumed that mid-winter conditions would reduce or preclude the use of open windows and increase the impact on air quality.

Many of the shop areas were not designed to temper make up air, thus forcing a choice between cold outside air or no outside air.

Radon readings were slightly above the EPA guideline at 4.5 pc/l, but are not of concern.

b. Occupant Comments - Complaints were high in some areas, particularly the "hospital" section, where body odor and smoke combine from an adjacent cell area. It appears that some recent renovations have added to the problem by eliminating windows which provided cross ventilation.

c. Corrective Action - Substantial additional study and design efforts would be required to develop responses to these problems. Endemic overcrowding reported by Corrections officials exacerbates the problem.

7. **Maine Youth Center - South Portland**

a. Analysis - Several of the 205 CO_2 samples in this location exceed 1000 ppm, and Cottage 2 had a 27.3 pc/l radon reading. House A had several locations without diffusers that were high. The Security Building has diffusers but some locations had inadequate outside air. Questions were raised about fume potential in the welding vocational shop but could not be tested at the time of this survey. The vocational school had some CO_2 readings above 800 ppm.

b. Occupant Comments - Occupants complained of hot and stuffy condition, throat irritation and sinus problems in specific locations during the summer months.

c. Corrective Action - Additional data should be gathered in specific problem areas for both CO_2 and radon. It is possible that operational adjustments could resolve the problems in the Security Building. Seasonal testing should be done to evaluate occupant complaints.

8. **Pineland Center**

a. Analysis - Most of the thirty buildings were surveyed and involved 186 CO_2 readings and 27 radon samples. In most areas both measurements were well within acceptable levels. The Muskie Treatment building and Pownal Hall showed slightly elevated CO_2 levels, mostly in the 900 to 1000 ppm range.

Three locations at Pineland had radon measurements of 15.5 pc/l and above, with a maximum of 26.3 pc/l.

b. Occupant Comments - staff complained of ventilation problems in specific areas during warm weather months. Eye irritation and fatigue were common.

c. Corrective Action - Additional CO_2 testing in a few specific locations should be undertaken as time is available. Longer term radon testing is indicated at the Hotel, Berman School, and Pownal Hall. Seasonal air quality testing should be done to verify occupant complaints.

9. Department of Transportation Photo Lab - Augusta

a. Analysis - This location was tested by a consultant due to employee complaints about odors. A number of chemicals are in constant use as part of the film processing system. The consultant concluded that air quality met all known standards for health but recommended several engineering changes that could be made to improve work comfort.

b. Occupant Comments - Except for strong odors in the processing room, there is no serious employee concern about this lab.

c. Corrective Action - Recommendations were passed on to DOT for consideration.

CAPITAL AREA BUILDINGS

1. **Administration Building - Hallowell**

   All readings were within acceptable limits.

2. **Bureau of Employee Health**

   Readings of 1300 ppm and 1500 may have been elevated by a large meeting that day. Space should be checked again during normal operational mode. If numbers remain high, further evaluation with employees should be done, followed by consideration of ventilation changes.

3. **Bureau of Health (157 Capitol St.)**

   Measurements for CO_2 averaged 875 with a high of 1000. No particular cause for concern in the absence of employee complaints.

4. **Business Development (193 State St.)**

   With average readings of 1125 ppm and a high of 1300 ppm, this building needs early attention. Further testing and consideration of a ventilation system is appropriate if readings remain at this level.

5. **Capitol Building**

   At the time of this study, the Capitol Building was lightly populated and exhibited very low CO_2 readings. This building should be re-evaluated during the legislative session for a more accurate reading.

6. **Central Building - Hallowell**

   Readings in the 600 to 700 ppm range were within acceptable limits.

7. **CETA Building**

   This building has no mechanical ventilation system. Some complaints about toilet odors and about stuffiness and very dry air. Small office CO_2 readings in one location was 1200 ppm. Follow-up testing in that area should be conducted.

8. **Cleveland Building - Hallowell**

   All readings within acceptable limits.

9. **Cultural Building**

   The highest CO_2 readings in this building were at the 850 ppm level in office areas of the Library and Archives. While not of great concern, there were isolated cases of employee complaints. It was recommended that ventilation system rebalancing be explored as the probable solution given that the building has an active air conditioning system.

10. **Deering Building Offices**

A few CO_2 measurements at 800 ppm. Occasional complaints about heat in summer due to lack of circulation. No action required.

11. **Economic and Community Development (189 State St.)**

CO_2 readings in two locations were 1000 ppm. There were no employee complaints but additional air testing should be done to confirm these marginal levels.

12. **Education Building**

This building generates employee complaints as the result of its layout and proximity to the driveway between it and the Cultural Building. Due to the chopped up nature of the offices, air circulation is limited. In many cases, this is offset by available windows under control of the occupants or by local air conditioning. No significant CO_2 deficiencies were recorded. The third floor print shop has localized solvent fume problems and needs its hood relocated. The operation of vehicles near the loading dock continues to create odor problems for nearby occupants.

13. **Flagg-Drummer Building - Hallowell**

All readings within acceptable limits.

14. **Flynn House**

Readings of 900 ppm suggest a marginal problem. There are complaints of an "oily" smell which apparently is sewage gas from the bathroom. BPI should do follow-up on this building.

15. **Gardiner Annex**

All readings were within acceptable limits.

16. **Harlow Building**

Highest CO_2 reading was 700 ppm, with most much lower. There are employee complaints about draftiness, headaches, and dry air. Building has a mechanical system on the lower floors. Follow up with regard to humidification should be conducted.

17. **Human Services - Whitten Road**

After complaints from occupants, air quality testing in the building averaged 1300 ppm. Department officials indicate an intention to reduce occupancy in a program shift. Should this not alleviate the problem, attention should be paid to the ventilation system by the landlord.

18. **Inland Fish and Wildlife**

A 1200 ppm reading on the first floor, when combined with employee complaints about congestion, headaches, etc., suggest the need for further testing. Although CO_2 was better on the second floor, complaints of stale air were common.

19. **Department of Labor (Union St.)**

Despite employee concerns for stale air, the test process showed only one reading to support this. That 1100 ppm reading, however, was in a closed in break area with coffee machines. As a separate issue, the hood over a duplicating machine in the print shop is inadequate to control solvent fumes affecting operator. BPI is working with Labor on this problem. In addition, Labor is exploring a general ventilation upgrade to ASHRAE standards.

20. **Maine State Retirement**

Testing was done on two separate visits. Initial CO_2 readings apparently were taken when air conditioning was off due to construction activity near the air intake. Readings of 1200 to 1500 ppm were common. A second series of tests found levels above 600 only in the computer room. That room has a large air conditioner which was not operating due to excessive noise levels. Room modifications to be made when the computer is installed could correct the problems or add to them. System design should be done with care.

21. **Marine Resources - Hallowell**

Second floor CO_2 measurements of 1000 suggest a potential problem, but there have been no complaints registered. All other readings were well below limits.

22. **Old Max Building**

All readings at or below 600 ppm. No employee complaints registered.

23. **Old Motor Vehicle Building (PUC)**

Test results were all acceptable. No apparent problems.

24. **Motor Transport Complex**

All measurements for CO_2 were acceptable. No checking for other pollutants was done but high levels of fresh air suggest it is unlikely that other pollutants would collect.

25. **Nash School Building**

Generally acceptable measurements, excepting the office of the Developmental Disabilities Council which showed a 1000 ppm reading, and generated complaints of stuffiness and nasal/bronchial problems. This space should be checked further to determine why it is significantly different from the rest of the building.

26. Ray Building

Numerous CO_2 readings in the 800-900 ppm range. Building does not have mechanical ventilation and is somewhat overcrowded. However, open office plan allows good circulation. Windows can be opened but temperature controls cannot be adjusted locally to compensate. A reduction in staff occupancy as part of the current relocation program should help to reduce CO_2. In the absence of significant complaints, no further testing is needed. However, at some point the laboratory in the building should be checked for the record.

27. State Planning Office (184 State St.)

Air quality levels deteriorated as the upper floors were checked, with CO_2 readings as high as 1200 ppm and an average of 890 ppm for the building. Further testing and evaluation of employee impacts is warranted by these results.

28. State Planning Office (187 State St.)

While this building had a higher average reading (975 ppm) the highest reading was 1050 ppm. Like its counterpart, further testing is warranted here but there were no employee complaints.

29. Transportation Building

Numerous complaints about stuffiness, "lousy" air, and fluctuating temperatures correlate with numerous CO_2 measurements ranging from 800 to 1400 ppm. Given the past air quality difficulties in this building, presumably corrected, significant additional testing should be done before any course of action is set.

RANDOM SAMPLE BUILDINGS

1. **Board of Dental Examiners - West Minot**

   Small, one person office in a private home. Passive dosimeter reading of 1950 ppm.

2. **Camp Keyes Print Plant - Augusta**

   One reading of 1600 ppm indicates possibility that printing materials may affect air quality conditions. Area should be checked again for CO_2 and, if still high, for hydrocarbons and volatile organic compounds.

3. **Department of Conservation - Old Town**

   Two samples register 1100 ppm, indicating the need for further testing.

4. **Defense & Veteran's Service - Presque Isle**

   One reading of 1100 ppm was almost 4 times higher than the others. Placement near a furnace could account for high reading. Further testing should be done.

5. **District Court - Augusta**

   Three consistent readings of 1100 ppm indicate the need for further testing. As a relatively new building, this court has a ventilation system that may need adjustment.

6. **District Court - Springvale**

   No change in color recorded. In the absence of complaints - deemed acceptable.

7. **Department of Education - Brookton Elementary School**

   Gymnasium shows a dosimeter reading of 3250 ppm. Further testing should be conducted at an early date to confirm and/or correct this problem.

8. **Ferry Terminal - Lincolnville**

   No change in dosimeter recorded. In the absence of occupant complaints - deemed acceptable.

9. **Human Services - Capitol Shopping Center - Augusta**

   No indication on test tubes of any CO_2.

10. **Human Services - Fort Kent**

    Three tests showed consistently high readings, ranging from 1450 to 2750 ppm. This leased facility should be checked at the earliest opportunity.

11. **Human Services Office - Rockland**

Passive samples indicate very high readings (3500 ppm) and the need for further evaluation at an early date.

12. **Judicial Department - 70 Center St. - Portland**

All readings acceptable.

13. **Department of Labor - Lewiston**

20 person office on Lisbon St. in leased space. Three tests show readings below 550 ppm.

14. **Department of Labor - Skowhegan**

Both dosimeter registered 1100 ppm. This area should be scheduled for further testing.

15. **Marine Resources Patrol HQ - Lamoine**

Two extremely high measurements (3800 and 4700 ppm) suggest the need for an immediate evaluation.

16. **Military Bureau - Bldg. 235 - Bangor**

Measurements at acceptable levels.

17. **Military and Naval Children`s Home - Bath**

No change of color in the dosimeter. In the absence of occupant complaints - deemed acceptable.

18. **Piscataquis County Court House - Dover-Foxcroft**

No change of color on the dosimeter. In the absence of occupant complaints - deemed acceptable.

19. **SKUD House - West Boothbay Harbor**

No change of color in dosimeter recorded. In the absence of occupant complaints - deemed acceptable.

20. **State Liquor Store - Biddeford**

No change in dosimeter within the prescribed time period. In the absence of occupant complaints - deemed acceptable.

21. **State Police Barracks - Scarborough**

All readings acceptable.

22. **Transportation - Guilford Maintenance Camp**

Measurement shows a high reading (1950 ppm) in the office and a low reading in the garage area. Area should be tested further.

23. **Transportation - Lovell Maintenance Garage**

No change of color in dosimeter recorded. In the absence of occupant complaints - deemed acceptable.

24. **Transportation - Poland Camp Building - Poland**

No significant reading.

25. **Transportation - North Berwick Camp Bldg. 55321**

Measurement at 300 ppm. Acceptable.

26. **Transportation Garage - Waldoboro**

Acceptable levels recorded.

27. **Transportation Maintenance Garage - Woodland**

Dosimeter reading is 1100 ppm but as this was in the garage, it should be checked to confirm accuracy.

28. **Veteran's Memorial Cemetery - Office Building 1**

Two measurements of 975 and 1950 ppm indicate the need for additional testing at an early date. No ventilation system.

APPENDIX II

TECHNICAL ANALYSIS

SAMPLING AND ANALYSIS METHODS

Air sampling strategy for this study was stratified. The first category was defined to include only buildings believed to have air quality problems. The second category used was institutions, both correctional and MHMR. Third was "core office space", essentially the Capitol Planning District, AMHI office space and the former Stevens School buildings in Hallowell. The fourth was a "modified" 5% random sample of all other State office space statewide. The methodology used differed within each category and is discussed below.

1. Response Action Buildings

This category was internally subdivided based on the extent of existing air quality data for these buildings. For those which had been sampled previously for indoor air quality, ventilation load/design analyses were performed by either BPI personnel or consultants and specific recommendations prepared for correction of the problem.

Also included in category 1 are those buildings which have an established history of complaints, but insufficient air sampling to establish a detailed picture of the problem. These buildings were subjected to comprehensive CO_2 sampling by consultants or BPI personnel to characterize existing ventilation problems in detail. Load/design analyses and sampling for specific pollutants other than CO_2 were not done.

2. Problem Facilities

This stratum consisted largely of the major State institutions, AMHI, MCC, MSP (surveyed by Harriman Associates), Pineland Center, MYC, and BMHI (surveyed by Balsam Environmental Consultants). These were comprehensive CO_2 surveys intended to characterize ventilation quality throughout the institutions, and separately examining smoking areas. Both consulting firms utilized electronic CO_2 monitors regularly calibrated throughout the surveys. This provided "instantaneous" CO_2 levels, in contrast to the eight-hour exposure of dosimeters as used for the random sample buildings. Counts of employees represented by each sample were collected and radon content was measured in the lowest occupied levels of these buildings, as well.

3. Capital Area Buildings

Buildings in category 3 were sampled for CO_2 levels by volunteers using either electronic monitors or Drager reagent-tube equipment. Both techniques provide "instantaneous" readings, and accuracy is comparable. Depending on the make of the tube and the user's confidence, Drager results were presented with less precision (to the nearest 100 ppm, vs. nearest 50 ppm). However, the difference is insignificant, since it is well within the range of reading-to-reading variation. All volunteers were familiar with the device used. The sampling strategy for this category differed from the previous one, since priority was given to

areas identified as "potentially worst" for a given building, based on floor plans and subjective impressions gathered by questionnaire. Sampling was also limited to office space, and to "worst" times of day (mid - to late afternoon)..

4. **Random Sample Buildings**

Buildings in this category were selected by first extracting a 5% random sample from all State buildings containing office space outside the previous strata. This sample was modified with MSEA assistance to ensure representation of as many building types and agencies as possible, and to include at least one building in each county. The resulting building list represents perhaps 5% to 6% of "other buildings" and is still almost completely random. Samplers were instructed to seek the "worst" locations in this stratum as well.

CO_2 levels in these buildings were assessed by use of dosimeters exposed and read by personnel in the buildings. These dosimeters required eight-hour exposure, and therefore represent daily average levels, rather than instantaneous "worst" readings. Though the contacts in the building were very conscientious in using the dosimeters and reporting the results, there appear to have been some errors resulting from the lack of familiarity with, and the inherent difficulty of, reading the dosimeters. While a pre-use calibration exercise with the dosimeters showed that they could be read with reasonable accuracy at low CO_2 concentrations, the majority of readings reported were either zeros or 900 ppm. This will be discussed further below. This calibration exercise showed considerable variation in accuracy between dosimeters, the 95% confidence interval about the mean being $\pm$ 52%. It also showed that the dosimeters tend to err on the high side, by 24% on average. A correction for this was applied to the apparent readings before further analysis.

ANALYSIS AND CONCLUSIONS

Summary results of this study are presented in Table 1 and Figure 1. Exposure levels in the figures are expressed in terms of estimated percentage of occupants likely to be exposed at a given CO_2 concentration at some time during the course of a working day. "Estimation" was an effort to make comparable the results from differing field methodologies. It may result in slight overestimation of population, but reliability of proportions is improved. CO_2 concentrations are diagrammed in increments of 100 ppm. That is, exposures graphed at 500 ppm are all those greater than 400 but less than or equal to 500 ppm, at 600 ppm those greater than 500 but less than or equal to 600 ppm, and so forth.

1. Response Action Buildings

Results from this category are graphed in Figure 1. The mode ("peak") of this curve is approximately 550 ppm but maximum levels exceed the 1500 ppm maximum of categories two and three. It is not readily apparent why these levels should cause significantly more complaints than for those other strata. Other factors, particularly temperature control and humidity, may be important as the CO_2 level approaches 1000 ppm. These suspicions cannot be evaluated with current data.

It is also possible that the indicated air-exchange problems in these buildings result from energy-conservation measures in the construction or renovation design of the buildings. Further study of these "problem" buildings is clearly required for this to be confirmed.

It should be noted that this category contains a higher proportion of leased space than is the statewide norm, (52% vs 16%) suggesting that leased space may have lower overall quality of ventilation than State-owned space. This possibility has been pursued through comparison of leased vs. owned space below. The contribution of leased space to this curve attributed to lease space is shown unshaded - it does not differ significantly form the owned space.

2. Problem Facilities

Figure 1 presents these results solely for the major institutions. This is the "cleanest" category, modal exposure occurring near 500 ppm. However, there still exist exposures at up to 1400 ppm, not significantly different in this respect from Strata One and Three. The low mode appears to result from intermittent and/or low occupation of many institutional spaces, rather than any superiority in air exchange. This stratum contains a higher proportion of non-office space than others and the strong secondary peak at 1200 ppm makes this situation clear. Consideration of the state prison mess hall as fully-occupied produced that peak and significantly increases the proportion of exposures above 1000 ppm for the entire category.

3. Capital Area Buildings

This category represents office buildings, predominantly large ones. It includes some buildings also included in the Response Action category as generating complaints. The primary peak of the curve in Figure 3 occurs at about 800 ppm significantly higher than even category one. The proportion of exposures above that level is significantly higher than that of category two. This appears to be a result of the more continuous occupation of office space which predominates in this category.

4. Random Sample Buildings

The curve presented in Figure 4 differs in two dramatic ways from all previous categories. First, the "body" of the curve below 1000 ppm is "concave": that is, it shows two apparent peaks at the extreme ends of this range. This is clearly an artifact of inexperienced reading of the dosimeters used. These dosimeters are particularly difficult to read at low exposure levels and therefore such levels tend to be recorded as $\leq$300 ppm (essentially a zero reading) by inexperienced readers. While it is clear that all these low readings fall below 800 ppm, the actual peak cannot be established. It appears likely that an unknown proportion of the results recorded at 900 ppm are actually below 800 ppm, for the same reasons. Nonetheless, the proportions of exposures below 800 ppm, between 800 and 1000 ppm, and greater than 1000 ppm is very similar to that of category three, as is reasonable to expect.

Of more concern is the small number of exposures at or well above 1000 ppm. Phone conversations with the readers indicate that these are not the product of incorrect procedures, but "honest" readings. They will be checked with instruments of better accuracy and precision, but must be accepted as real at this point. There is a light scattering of exposure above the 1500 ppm maxima of the other strata, reaching as high as 3800 ppm. This includes a "clump" around and above 3000 ppm. At these levels, CO_2 is increasingly significant as an air pollutant in its own right, as opposed to a simple indicator of ventilation.

Workspaces showing such levels are likely to be decidedly uncomfortable, and the lack of ventilation indicated has the potential of concentrating other air pollutants to the point of impairment of function, if not health risk. This is the only category in which leased space is represented in proportion to its actual occurrence, but this difference does not fully explain the unexpectedly high maxima. Indeed, a majority (58%) of readings above 1500 ppm are in leased space and approximately 69% of the exposures at these levels occur there. This is taken as further indication that leased space may have more and/or worse ventilation problems than owned space. One possible reason may be that leased space tends to be newer and more energy efficient, but also more dependent on mechanical systems than on "leaky" walls. Further study would be required to confirm this.

While this category represents the 40% or so of State employees who work outside the facilities in the other categories, it must be remembered that it does so only by means of a 5-6% "semi-random" sample. This is far from the 80-100% sampling in the other strata. It is reliable within those limits, but there is room for considerable additional study. Because of geography, such a study would require substantial additional funding and time.

5. **Leased Space**

The graph for leased space represents a compilation of data from all leased space included in previous categories. It differs from other groups only in having a significant secondary peak at 1000 ppm and in occasional readings above 1500 ppm. This last is shared with the Random Sample curve and includes the highest readings from that curve. This high end also shares the limitations on accuracy of that curve.

Both the secondary peak and the curve maximum represent a minority of leased buildings which can be characterized as super-tight. While such buildings clearly are present in all other categories, they appear to make up a higher proportion of leased buildings that of owned. This is consistent with more recent construction/renovation. This adds weight to the suggestion that the relative youth of leased buildings explains their disproportionate share of the Response Action category.

6. **Smoking Areas**

The Smoking Area curve was largely abstracted from data from the major institutions. Its only significant difference from its parent curve is a narrower range: i.e., there were no exposures to fresh air but there were also fewer exposures to levels above 1000 ppm. From comments by the surveyors, it appears that this is due to special efforts made to ventilate smoking areas. Some of these may be extreme (open windows in winter), but they bring the smoking areas into the overall pattern of ventilation for the institutions. Given the pollutants generated by smoking itself, this is inadequate.

CONCLUSIONS

It must be remembered that this study almost entirely represents office and institutional space. A few "special-purpose" spaces, such as labs and garages, which have associated special air-pollution problems are included, but the only factor assessed here is the general quality of ventilation, using CO_2 levels as an indicator. An effort was made, though unevenly, to assess "worst-case" conditions, both by timing and location of the samples. Problems other than ventilation and pollutants other than CO_2 have not been formally addressed. The CO_2 study itself is a mixture of differing field and reporting methods. Within these limitations, however, it is still possible to make some generalizations.

It presently appears that, at worst, at least 65-70% of State employees are routinely exposed only to CO_2 levels below the 800 ppm BPI-recommended maximum. Further, an additional 15-20% work below the ASHRAE recommended maximum of 1000 ppm. Of the 10-20% who are exposed above the ASHRAE maximum, as many as 4-5% may be exposed to levels approaching or exceeding 3000 ppm, with an additional 1-2% exposed at levels between this and 1500 ppm. While this is not a happy situation for employees so exposed, the relatively small numbers are encouraging as representing a less daunting task, a "do-able" job.

Based on these figures, an attempt has been made to estimate the cost of corrective action. This is presented in Table 1. Numbers of employees were estimated from the present grand total of active State employees furnished by the Bureau of Human Resources -- 13,227. Averages were weighted according to the proportion of total State employees estimated to be represented by each sampling category.

The number of employees estimated to fall in each estimation category was then multiplied by the average gross square footage per employee of leased and owned heated buildings computed from figures provided by the Division of Professional Services. These square footages were in turn multiplied by estimated remediation cost per square foot figures provided by Harriman Associates.

The categories used in Table 1 are defined as follows:

"No Ventilation" includes all spaces which yielded CO_2 concentrations above 1500 ppm. Buildings in this category are both "super-tight" and unventilated. Correction cost was estimated at $\$11/ft^2$ (see main body of report). The existence of this category depends heavily on the reliability of the Random Sample results and it may more-or-less telescope into the following category on further examination.

"Inadequate" includes all spaces which yielded readings between 1000 ppm (the ASHRAE limit) and 1500 ppm. These are mainly "super-tight" buildings which have some designed-in ventilation which is clearly inadequate to the present occupation. Correction costs were estimated at $\$7/ft^2$.

"800 - 1K ppm" includes all spaces yielding readings between 800 and 1000 ppm. These are largely the same type of buildings included in the previous estimating category, and the same cost rate was used. These buildings are a significant proportion of both owned and leased space, and produce a distinct secondary peak on the various distribution curves at 800 - 900 ppm, significantly above the "typical" building peak of 500 - 600 ppm, and very close to the ASHRAE limit. These spaces are likely to be pushed over the ASHRAE limit by day-to-day changes in utilization, and need attention.

The resulting cost figures presented in Table 1 are the result of a long chain of estimations and are therefore not to be taken as precise. A variation of $\pm$25% is not unreasonable to expect. However, they are valid order-of-magnitude estimates and bases for comparison.

FIGURE 1.

Distribution Curves: Occupant Population vs. CO_2 Concentration

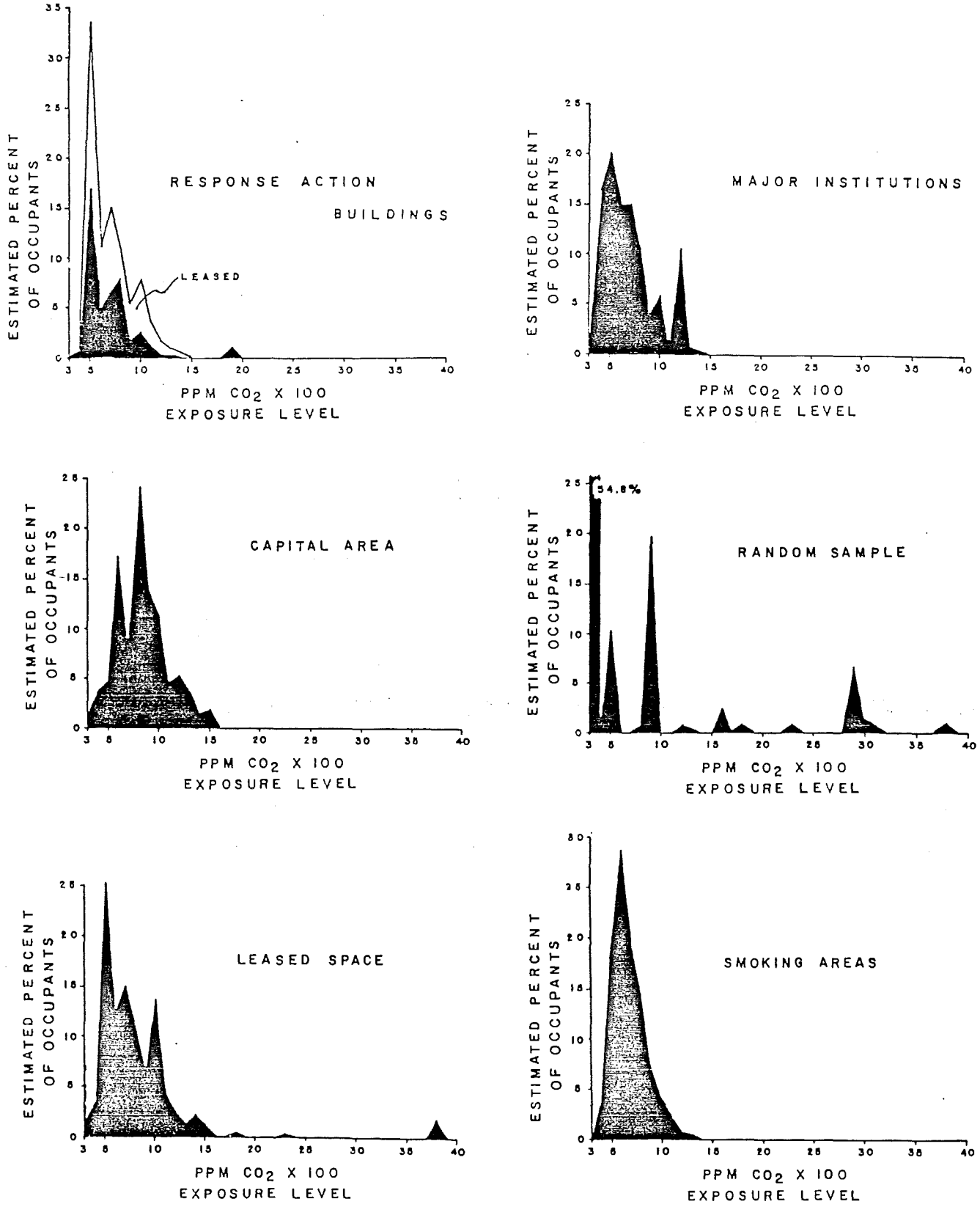


Table 1

SUMMARY OF ESTIMATIONS

VENTILATION CATEGORY	OWNED SPACE			LEASED SPACE			TOTALS		
	EMPLOYEES	GROSS FT^2	COST '88$	EMPLOYEES	GROSS FT^2	COST '88$	EMPLOYEES	GROSS FT^2	COST '88$
No Ventilation	780	440k	4.8m	44	25k	280k	820	460k	5.1m
Inadequate	1000	590k	4.1m	220	121k	870k	1300	710k	5.0m
SUBTOTAL	1800	1.0m	9.0m	260	150k	1.2m	2100	1.2m	10.0m
800-1K ppm	2000	1.1m	7.8m	450	260k	1.8m	2400	1.4m	9.6m
GRAND TOTAL	3800	2.2m	17.0m	710	410k	3.0m	4500	2.6m	19.6m

NOTE: Numbers are rounded to two significant figures.

APPENDIX III

MISCELLANEOUS

23. Inventory of land. To periodically inventory all land owned by any state agency and, together with other state agencies, determine land that is needed by state agencies for other uses and land that is surplus. Prior to offering any land for sale, the commissioner shall review with the Maine State Housing Authority and other state agencies the information derived from the inventory.

A. By February 1, 1988, the commissioner shall provide an initial report on the status of the land inventory to the joint standing committees of the Legislature having jurisdiction over economic development; state and local government; and appropriations and financial affairs.

B. Notwithstanding any other provision of law, the procedure for the distribution of surplus state property for the purpose of this subsection shall take priority over any other procedure for the disbursement of surplus state land.

C. Nothing in this subsection shall be construed to pertain to public reserved lands which are exempt from this subsection.; and

Sec. 3. 5 MRSA §1742, sub-§24, is enacted to read:

24. Application of minimum air ventilation standards. Beginning September 1, 1988, to apply the ANSA-ASHARE Indoor Air Quality and Ventilation Standards contained in the proposed revision, 1981 R, July 15, 1986, as prepared by the American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. or more stringent standards to buildings occupied by state employees during normal working hours. These standards shall be applied to buildings which are constructed or substantially renovated by the State after September 1, 1988, and to buildings for which the State enters into new leases or renews leases following the date in this subsection. For the purpose of this subsection, "substantial renovation" means any renovation for which the cost exceeds 50% of the buildings' value.

A. The bureau, in cooperation with a labor-management committee established to look at this issue, shall develop a plan by which priorities are established for improving indoor air quality and ventilation standards in buildings occupied by state employees. This plan shall include data gathering and analysis of air quality in a sample number of buildings by which reasonable projections and estimates concerning air quality can be established. The bureau shall report its findings to the joint standing committee of the Legislature having jurisdiction over state and local government no later than January 16, 1989. This report, at a minimum, shall contain the following:

(1) A description of the extent of the problem, if any, with respect to air quality and ventilation in buildings occupied by state employees;

(2) Priorities of locations for which the improvement of air quality is necessary. These locations shall be areas occupied by state employees during normal working hours;

(3) A timetable by which these priorities could be addressed;

(4) A description of what may be necessary to address these priorities, including feasible alternatives;

(5) The costs of addressing these priorities; and

(6) If possible, locations leased by the State which may not meet the air quality standards defined in this subsection.

Nothing in this paragraph may be construed to require the bureau to conduct an in depth analysis for each building or to present technical data for each building occupied by state employees.

B. The indoor air quality and ventilation standards applied by the bureau shall remain in effect until the Board of Occupational Safety and Health adopts air quality and ventilation standards.

Sec. 4. 5 MRSA §1877, sub-§10 is enacted to read:

10. Indoor air quality and ventilation improvements. The commissioner shall develop priorities for improving indoor air quality and ventilation in preparing budget requests for the repair and capital improvement of state buildings.

Sec. 5. 26 MRSA §42, as amended by PL 1977, c. 615, is further amended to read:

§42. Powers and duties

The bureau shall collect, assort and arrange statistical details relating to all departments of labor and industrial pursuits in the State; to trade unions and other labor organizations and their effect upon labor and capital; to the number and character of industrial accidents and their effect upon the injured, their dependent relatives and upon the general public; to other matters relating to the commercial, industrial, social, educational, moral and sanitary conditions prevailing within the State, including the names of firms, companies or corporations, where located, the kind of goods produced or manufactured, the time operated each year, the number of employees classified according to age and sex and the daily and average wages paid each employee; and the exploitation of such other subjects as will tend to promote the permanent prosperity of the industries of the State. The director is authorized and empowered, subject to the approval of the Governor, to accept from any other agency of government, individual, group or corporation such funds as may be available in carrying out this section, and meet such requirements with respect to the administration of such funds, not inconsistent with this section,

as are required as conditions precedent to receiving such funds. An accounting of such funds and a report of the use to which they were put shall be included in the biennial report to the Governor. Each agency of government shall cooperate fully with the bureau's efforts to compile labor and industrial statistics. The director shall cause to be enforced all laws regulating the employment of minors and women; all laws established for the protection of health, lives and limbs of operators in workshops and factories, on railroads and in other places; all laws regulating the payment of wages, and all laws enacted for the protection of the working classes. He shall, on or before the first day of July, biennially, report to the Governor, and may make such suggestions and recommendations as he may deem necessary for the information of the Legislature. He may from time to time cause to be printed and distributed bulletins upon any subject that shall be of public interest and benefit to the State; and may conduct a program of research, education and promotion to reduce industrial accidents. The bureau shall be responsible for the enforcement of indoor air quality and ventilation standards with respect to state-owned buildings and buildings leased by the State. The bureau shall enforce air quality standards in a manner to ensure that corrections to problems found in buildings be made over a reasonable period of time, using consent agreements and other approaches as necessary and reasonable.

Sec. 6. 26 MRSA §565-A is enacted to read:

§565-A. Air quality and ventilation; evaluation of buildings; standards

1. Advise and propose standards. The board shall work with the Bureau of Public Improvements with respect to evaluation of indoor air quality and ventilation in buildings occupied by state employees and the preparation of the report pursuant to Title 5, section 1742, subsection 24, paragraph A.

A. The board may advise the Bureau of Public Improvements and propose for consideration by the bureau air quality and ventilation standards that are more stringent than the minimum standards as defined in Title 5, section 1742, subsection 24.

Effective August 4, 1988.

CHAPTER 734

H.P. 642 — L.D. 865

AN ACT Relating to the Maine Uniform Transfers to Minors Act.

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 33 MRSA c. 19, as amended, is repealed.

Sec. 2. 33 MRSA c. 32, is enacted to read:

CHAPTER 32

MAINE UNIFORM TRANSFERS TO MINORS ACT

§1651. Short title

This chapter shall be known and may be cited as the "Maine Uniform Transfers to Minors Act."

§1652. Definitions

As used in this Act, unless the context otherwise indicates, the following terms have the following meanings.

1. Adult. "Adult" means an individual who has attained 21 years of age.

2. Benefit plan. "Benefit plan" means an employer's plan for the benefit of an employee or partner.

3. Broker. "Broker" means a person lawfully engaged in the business of effecting transactions in securities or commodities for the person's own account or for the account of others.

4. Conservator. "Conservator" means a person appointed or qualified by a court to act as general, limited or temporary guardian of a minor's property or a person legally authorized to perform substantially the same functions.

5. Court. "Court" means the Probate Court.

6. Custodial property. "Custodial property" means any interest in property transferred to a custodian under this Act and the income from and proceeds of that interest in property.

7. Custodian. "Custodian" means a person so designated under section 1660 or a successor or substitute custodian designated under section 1669.

8. Financial institution. "Financial institution" means a bank, trust company, savings institution or credit union, chartered and supervised under state or federal law.

9. Legal representative. "Legal representative" means an individual's personal representative or conservator.

10. Member of the minor's family. "Member of the minor's family" means the minor's parent, step-parent, spouse, grandparent, brother, sister, uncle or aunt whether of whole or 1/2 blood or by adoption.

11. Minor. "Minor" means an individual who has not attained 18 years of age.

12. Person. "Person" means an individual, corporation, organization or other legal entity.

INDOOR AIR QUALITY QUESTIONNAIRE

Documentation

Department:
Bureau/Agency:
Address:

Number of employees in bureau/agency:
Number of employees in most densely populated room:
Number of air quality workman's comp claims in department:

Date and time of interview:

Background Information

Functioning ventilation mechanism? yes / no

Air conditioning? yes / no

Sealed windows? yes / no / no windows

Location:

Work area close to smoking area? yes / no / somewhat

Work area close to exit? yes / no / somewhat

Weather at this very moment?

rainy	cold
humid, hot	mild
dry	windy

Additional information:

(Please note here if there are any activities taking place in the work area that do not occur on a daily basis, i.e. construction, painting, cleaning, use of pesticides, etc.)

Employee Interview

Name:
Gender:
Occupation:
Typical tasks during work day:

Judgement of atmospheric conditions in work area:

Range of answers from 1 to 5:

1 - very pleasant
2 - pleasant
3 - acceptable
4 - unpleasant
5 - very unpleasant

	summer	winter
Humidity	_____	_____
Ventilation / air movement	_____	_____
Amount of tobacco smoke	_____	_____
Odor	_____	_____
Temperature	_____	_____
Amount of dust	_____	_____
Level of noise	_____	_____
Lighting	_____	_____
other_____	_____	_____

Symptoms

How often, if at all, do you experience any of these symptoms?

	Every day	Few times a week	Few times a month	Never
Headaches	_____	_____	_____	_____
Fatigue	_____	_____	_____	_____
Nausea	_____	_____	_____	_____
Eye irritation	_____	_____	_____	_____
Throat irritation	_____	_____	_____	_____
Sinus congestion	_____	_____	_____	_____
Other_____	_____	_____	_____	_____

When do you experience these symptoms on a seasonal basis?

Symptom	autumn	winter	spring	summer
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Do these symptoms diminish when you leave the work area for a long period of time?

yes
no
somewhat

Medical Treatment Information

If any of the answers for symptoms are "every day" or "few times a week:"

Have you had any medical attention from a doctor to treat these symptoms?

yes
no

If "yes," please describe:

Do you have any additional comments in terms of the indoor air quality in your work area that have not already been addressed in this questionnaire?

John R. McKernan, Jr.
Governor

Henry E. Warren
Director

Department of Administration
Bureau of Public Improvements
DIVISION OF SAFETY AND ENVIRONMENTAL SERVICES

Telephone (207) 289-4509

TO:

FROM: Henry Warren, Div. of Safety and Environmental Services

DATE:

SUBJECT: Assistance with Air Testing

You have been identified as a staff person whose knowledge and experience could be very helpful in conducting an indoor air quality survey in the following building(s) occupied by State employees. Please assist us by reading the packet of materials, assigning or recruiting helpers where needed, and conducting the screening survey on our behalf.

Thanks for your help. Call if you have any questions.

This kit contains _____ dosimeters and _____ floor plans for these buildings in your area.

_____

_____

_____

Please return the results of your tests and the marked floor plans to our office no later than _____.

John R. McKernan, Jr.
Governor

Henry E. Warren
Director

Department of Administration
Bureau of Public Improvements
DIVISION OF SAFETY AND ENVIRONMENTAL SERVICES
Telephone (207) 289-4509

TO: Building Contacts

FROM: Henry Warren, Div. of Safety and Environmental Services

SUBJECT: Indoor Air Quality Survey

Your assistance is absolutely critical to the Division's ability to carry out the Legislature's recent mandate focusing attention on indoor air quality as it affects employees and others in State facilities. Attached is an article written for our newsletter, "At Your Service," which explains the scope and components of our effort.

Since no funds were appropriated for the project and most staff time is being volunteered by agencies concerned about this issue, it is impossible for us to conduct a detailed survey or even look at most buildings outside the Augusta area. Your cooperation will enable the Division to identify potential problem areas that require further investigation as time and funds allow. It will also contribute to the Legislature's knowledge about indoor air quality in our facilities and perhaps to improvements in that area.

Please read the enclosed instructions carefully, consult with others in your building who may help you locate good test locations, set up the test equipment and return the results to us by the deadline date indicated.

Please, call us with any questions you may have. Thanks for your help.

Attachments

Take a Deep Breath

The Labor-Management Committee on Safety, working through the Division of Safety and Environmental Services, will be conducting indoor air quality studies in a variety of State facilities during November and December. The 113th Legislature directed that such a study be undertaken in order to determine the degree to which our facilities comply with the most recent air quality standards. The study has several components, reflecting the limits of available time and funding, as well as the 1300 building universe that constitute the State's owned and leased heated buildings.

1. A survey of employees in a selected sample of buildings to identify hot spots and trends as seen by occupants. The survey was completed this summer by an intern.

2. A professional survey of the State Office Building and six major institutions to identify problem areas.

3. A screening survey of Augusta complex buildings using CO2 as an indicator of ventilation problems. This will be performed by volunteers from several State agencies concerned about indoor air issues.

4. A screening survey to be done by in-house staff from a test kit to be provided by the Division. These kits will be sent to a sample of buildings outside Augusta based on concentrations of State employees.

In addition to these efforts, the Division has been responding to specific complaints with the assistance of consultants. In many cases corrective recommendations have been made and are being implemented.

Finally, the Division has received assistance from the Bureau of Employee Health to enable conduct of a radon screening survey in State buildings this winter. Radon is a colorless, odorless gas which is a by-product of uranium decay in the earth. It is frequently found in Maine due to its presence in granite and other common geologic foundations, and can seep into buildings through the foundation. More about this project in a later issue.

None of these ambitious air quality projects can succeed without the help of employees who will let us know about problem areas and conduct simple tests if requested.

Questions and comments are welcome.

CO2 Air Quality Test

INSTRUCTIONS

1) Read all materials provided with this kit.

2) Find a location(s) within your work area which has the following characteristics. The location:

   a) Is not near a door or window that is likely to be opened frequently during the test.

   b) Is not a designated smoking area.

   c) Is not near a vent fan, air conditioner vent, or other source of direct air.

   d) Is 3 to 5 feet above floor level.

   e) Is an area considered to be "dead air" space or stale air space by some occupants.

   f) Is in an area occuped frequently by a significant number of employees, or

   g) Is in an area where odors or other noticeable problems have been identified by occupants.

3) Conduct the test over an 8 hour period in temperature and ventilation conditions that are typical of those found in the space at this time of the year. Mark the location(s) on the floor plan provided.

4) Read the CO2 evaluation tube and fill in the results on the attached return sheet.

5) Place the tube in an envelope and discard as broken glass.

CO2 Air Quality Test

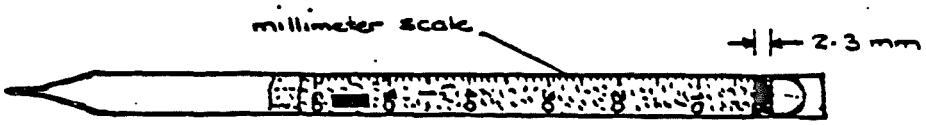
Dosimeter Tube

CARBON DIOXIDE (CO2)

Carbon dioxide is a gas that is produced by combustion, some appliances and by tobacco smoking. It is a product of human and animal respiration, and is always present at some level in the atmosphere. An excess amount of CO2 in a building is an indication of inadequate ventilation or air exchange. More than 1000 ppm (parts per million) of carbon dioxide in the air may cause headaches, drowsiness, or respiratory distress. The air may feel stuffy or overly still.

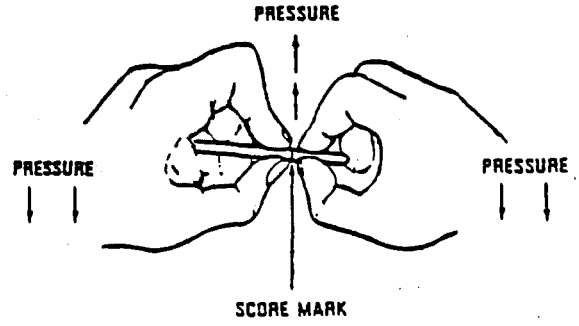
THE CARBON DIOXIDE DOSIMETER

The carbon dioxide tube contains a blue chemical. If CO2 is present, a pale pink color will appear and travel up the tube. After 8 hours, read the scale on the side of the tube to determine how far the color change has traveled. If the color change is uneven, try to find an average value. The tube sketched below has 2 to 3 mm of color change.



USE OF THE DOSIMETER TUBE

Break the tube at the score mark on the blunt end. Use of a cloth to cover the tube when breaking it will contain glass chips. Then set the tube in accordance with the attached instructions.



NOTE: The limits of accuracy in such as screening test are very wide. Do not base any conclusions on the results of these tests. More work will be done to clarify these tests where appropriate.

CO2 Air Quality Test

Return Sheet
(One Sheet Per Tube)

RETURN TO Division of Safety and Environmental Services
Statehouse Station 77
Augusta, Maine 04333

NAME OF DEPARTMENT _____

BUILDING NAME _____

BUILDING ADDRESS _____

_____

NAME OF TESTER _____

TEL. # _____

DATE AND TIME OF THIS TEST _____

LOCATION OF EVALUATION TUBE (#___)

1. Describe in detail - (Placement, height off floor, distance from operational vent, etc.)

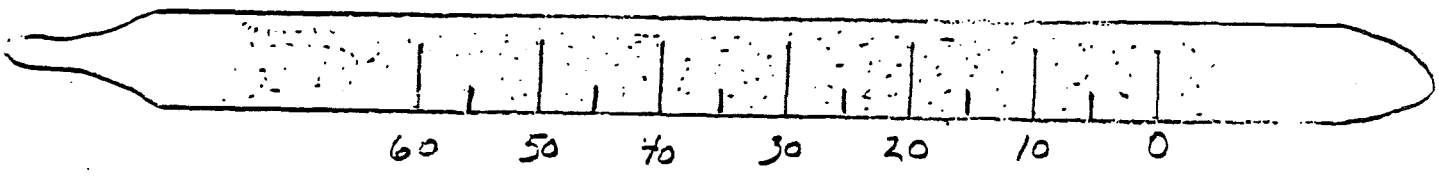
_____

_____

2. Indicate location by marking and returning enclosed floor plan(s). If more than one CO2 evaluation tube is used on a floor, please assign a number (1,2,3 etc.) to each tube, and use it in the description and on the floor plan for each return sheet.

TEST RESULTS FOR TUBE #_____:

(Mark the location on this drawing where the tube changes color, if it does)



Comments from Tester or others about indoor air quality in the location of this dosimeter tube.

_____

_____

CAPITAL COMPLEX AIR SURVEY

Instructions

1. Identify the buildings in your area of responsibility.

2. Review intern comments, if available, and study the floor plan provided.

3. While the tests can be taken at any time during the working day, afternoon tests for CO2 tend to be more reflective of real conditions.

4. If possible, locate the supervisor of the staff in each area to be studied before entering the area. Describe your intentions, answer any questions, and inquire about any air quality related complaints from occupants.

5. Based on your experience and the knowledge gained to this point, identify locations within the building where a CO2 test is likely to yield a worst case, or at least typical result. Look for dead space, complaint areas, small offices with limited outside air, or concentrations of occupants.

6. Take one test outside of the building in a "clear" area.

7. Take CO2 measurements and note the results directly on the floor plan provided.

8. Note any comments from occupants on the return sheet. Include your own observations, where appropriate, about air quality, odors, potential sources of contaminants including CO2, equipment capacity or condition, etc. In short, apply your experience and judgement and share the results. Remember that this is a screening survey to identify the need for more detailed study in the future. It will not serve as the basis for any corrective action, in and of itself.

9. Return the comment sheet and the marked floor plan for each test taken to the Division of Safety and Environmental Services on or before December 1, 1988.

If there are any questions call anytime.

CAPITAL COMPLEX AIR SURVEY

Comment Sheet

NAME OF SURVEYOR _____

TEL # _____

BUILDING NAME _____

BUILDING # _____

BUILDING LOCATION _____

TIME OF DAY _____

OF OCCUPANTS IN TEST AREA _____ SIZE OF TEST AREA _____S.F.

TEST LOCATION _____

_____

LOCATION NOTED ON FLOOR PLAN AS # _____

TEST READING OUTDOORS _____PPM

TEST READING IN TEST LOCATION _____PPM

COMMENTS FROM OCCUPANTS RELATING TO THIS LOCATION_____

_____

_____

COMMENTS FROM TESTER RELATING TO THIS LOCATION _____

_____

_____

LEASE

between

and

THE STATE OF MAINE

This INDENTURE, made and entered into this _____ day of _____, 19___ by and between _____ _____, whose address is _____, Maine _____ for themselves, their heirs, executors, administrators, successors and assigns (hereinafter called the "Lessor") and THE STATE OF MAINE, _____ _____ whose address is State House Station #_____, Augusta, Maine 04333 (hereinafter called the "Department"), WITNESSETH:

1. **GRANT**: The parties hereto, for the consideration hereinafter mentioned, covenant and agree that the Lessor does hereby lease, demise and let to the Department the following premises, viz:

2. **PREMISES**: A portion of the building located at _____ _____. More specifically, a net area of _____ square feet of interior space. Space to be renovated at Lessor's expense in accordance with mutually agreeable plans and specifications. Refer to attached floor plan.

3. **TERMS**: To have and to hold the said premises with their appurtenances for the term of _____ years, beginning on _____, 19____ and ending on _____, 19____. This lease shall automatically be extended from year-to-year under the same terms and conditions through _____, 19____, unless notice shall be given to the Lessor sixty (60) days prior to the completion of the initial term or any extension thereof, or unless terminated sooner, in accordance with subsequent sections of this lease.

4. **RENEWAL:** The Department shall have the option to renew this lease for two terms of five (5) years each, after the above term, and upon the same covenants and conditions, except for rent which shall be negotiated, unless the Department gives to the Lessor sixty (60) days written notice of intention to terminate, in which case the lease hereby created shall terminate in accordance with such notice.

5. **EXTENSION**: At termination date of this lease or any extension or renewal thereof, the Department may continue in possession on a month-to-month basis by paying the specified monthly rental until one party shall give the

other written notice of termination. Such notice shall be given at least thirty (30) days before the premises are to be vacated. Should such an extension expire prior to the end of a month, the rental shall be apportioned to the date specified in the notice.

6. **NON-ASSIGNABILITY:** The Department shall not assign this lease in any event, and shall not sublet the demised premises, except to a desirable tenant with the written approval of the Lessor, and will not permit the use of said premises by anyone other than the Department, such sublessee and the agents and servants of the Department and of such sublessee.

7. **RENTAL:** YIELDING AND PAYING THEREFORE, based on _____ _____(_____) per square foot, an annual rent of _____(_____) for the term of this lease, said payment to be made in twelve monthly installments of _____ _____(_____) in arrears, in accordance with the State's usual accounting procedures, commencing with the first month of occupancy as established by the provisions of paragraph 3.

8. **CASUALTY DAMAGE:** The Department agrees that in case of fire or other casualty resulting in damage to the premises, it will give immediate notice thereof to Lessor, who shall thereupon, with expedition and in a good and workmanlike manner, after said damage, enter upon and undertake such repairs and rehabilitations, as is necessary to restore said premises to their original condition before such damage, provided that such damage, with reasonable dispatch, can be repaired within ninety (90) days.

In the event that said demised premises are subject to repair and rehabilitation within said ninety (90) days, the rental herein shall be abated in the proportion that the amount of space which is not available to and usable by the Department as a result of such casualty and/or the work and labor incidental to its rehabilitation bears to all of the space in the demised premises.

In the event that said demised premises be totally destroyed by fire or other casualty, or shall be rendered partly untenantable, and the repair and rehabilitation of said demised premises shall be of an extent requiring more than ninety (90) days for its completion, then this lease, at the option of either the Department or the Lessor, may be terminated, and the obligation to make rental payments thereupon shall cease as of the date of such damage or destruction.

9. **COVENANTS OF THE DEPARTMENT:** The Department does hereby covenant and agree with the Lessor that it will:

(a) Pay the said rent at the times and in the manner aforesaid;

(b) use and occupy said premises in a careful and proper manner;

(c) permit the Lessor or its agent entrance to said premises to inspect the same and to make such repairs as are necessary for the safety, comfort, and preservation of the building;

(d) not commit nor suffer any waste on said premises;

(e) not permit any other person to carry on therein any offensive trade or business;

(f) not use the premises for any purpose other than a governmental purpose;

(g) not engage in any hazardous activity on said premises so as to substantially increase the cost or risk the cancellation of fire and casualty insurance on said premises;

(h) peaceably quit and deliver up the premises to the Lessor at the termination of this lease in as good order and condition, reasonable wear, tear, and obsolescence and unavoidable casualties excepted, as they are in at the beginning of the term of the lease and shall surrender all alterations, additions and improvements, except office furniture and equipment put in at the expense of the Department, at the termination of this lease;

(i) be responsible for any and all loss or damage caused to any and all personal property of the Department or under the control of the Department located, in, on, or about the demised premises, unless the loss or damage is as a result of the negligences or willful acts or omissions of the lessor;

(j) pay for electrical power used for interior lighting and office equipment, provided it is separately metered;

(k) observe energy conservation practices in the operation of the building and be in compliance with such guidelines on energy consumption as the State of Maine may issue;

(l) pay for telephone services; and

(m) shall notify the Division of Risk Management, Department of Administration of dates of occupancy and vacating of premises, and any area changes in lease space use.

10. **COVENANTS OF LESSOR:** And the Lessor, on its part, and at its own expense, covenants and agrees with the Department that it will:

(a) maintain the grounds, premises and fixtures in good repair and tenantable condition during the continuance of this Lease. If the Lessor does not commence repairs within a reasonable period of time, after notification, the Department may have the repairs made and charged to the account of the Lessor. Maintenance, repairs, and painting will be done during non-work hours except in an emergency situation or as approved by the Department.

(b) allow the Department to occupy the premises during the term aforesaid and any renewal thereof peaceably and free from the lawful claims of all other persons;

(c) pay all charges for electricity used for heating, hot water, air conditioning, air handling and exterior lighting used in the building or on the grounds;

(d) pay all charges for fuel used in heating and ventilation systems, humidification and domestic hot water production;

(e) clean/wash all interior and exterior cleanable/washable surfaces and repaint all painted surfaces in colors agreeable to the Department at least once every three years for interior surfaces, at least once every five years for outside surfaces;

(f) provide heating, ventilation and air conditioning in accordance with the following:

I. Heating (**BOCA Code Article 2500.2, Article 13, Sec. M-1301.1-.3**)

a. All Occupied Areas:

Provide a heating system capable of maintaining 70° inside temperature while the outside temperature is at minus 20°F below zero, 15 MPH winds, and the ventilation system in operation. Automatic individual room temperature controls shall be included in, but not limited to, conference rooms, offices, work areas, entry ways and halls, bathrooms and other appropriate areas;

b. Miscellaneous/Storage

II. Ventilation

a. All Occupied Areas: (**P.L. 733, 1988, 5 MRSA 1742(24)**)

Provide equipment to meet the minimum positive ventilation rates (in cubic feet per minute, CFM) with outdoor air in accordance with **ASHRAE 62-1981R Standards.** Under no circumstances shall any type of treated recirculated air be a substitute for the outdoor air requirements of these tables.

Location	Estimated Occupancy/Sq. Ft.	Required Outdoor Air CFM/Person
Office	1/143	20
Lobbies	1/33	15
Conference/Waiting	1/16	20 & 15
Bathrooms	1/10	50
Snack Bar/Break Room	1/10	20
		CFM/Ft^2 Floor
Duplicating and Printing	-	0.5
Corridors	-	0.5

(All Office space will be labelled "Designed to Meet Code for Ventilation - No Smoking".)

b. Designated Smoking Area:

For buildings over 5,000 sq. ft. up to 15% of space shall be equipped with independently* controlled ventilation equipment sized to meet minimum smoking rates in accordance with **ASHRAE 62-1981R.**

Area	Estimated Occupancy/Sq. Ft.	Required Outdoor Air CFM/Person
Waiting Rooms	1/16	60
Conference	1/16	60
Snack Bar/Break Room	1/14	60

* No cross contamination may exist to non-smoking area.

III. Air Conditioning **(BOCA Code Article 2500.2, Article 13 - Sec. M-1301.1-.3)**

a. General Office Space:

Provide adjustable automatic temperature control system of air conditioning to maintain an inside temperature range of 72° - 78°F.

IV. Humidification **(BOCA Code Article 2500.2, Article 13 - Sec. M-1301.1-.3)**

a. General Office Space:

Provide controlled relative humidity between 20-30% in the winter and 50-55% in the summer.

b. Other Areas:

No requirements unless otherwise specified for designated smoking areas or others;

(g) furnish hot and cold water for lavatory, kitchen sink, toilet and drinking purposes;

(h) furnish and maintain walks and parking spaces for a minimum of _____ cars in a parking area adjacent to the premises building; said parking area shall be paved, marked with lines, and provided with lighting **(ANSI/IES Standards)**. Lines shall be remarked as needed or at least once every two years; at least _____ parking spaces shall be reserved for the handicapped and marked/signed with the recognized handicapped symbol.

(i) allow the Department to make interior alterations, improvements and attach fixtures in the premises, provided any alterations, improvements, or attachment of fixtures which would affect the structural parts of the building or its heating, plumbing, or electrical systems, shall not be performed by the Department without the prior written consent of the Lessor;

(j) allow the Department to attach informational signs in or upon the premises, provided attachment of informational signs to the exterior of the premises shall be performed in a workmanlike manner with prior written consent of the Lessor;

(k) furnish a sign reading "STATE OF MAINE (name of Department)" or such name as designated by the Department to be attached to the exterior of the premises or erected adjacent to the premises. The size, style and location of the sign will be as outlined in Exhibit "A" and as established by mutual agreement of the Lessor and the Department;

(l) furnish double glazed, operable windows with screens and suitable fire resistant coverings.;

(m) install and maintain fire detection services and maintain an adequate number of approved fire extinguishers, and exit signs as required by the Department of Public Safety, suitably located **(BOCA Code, Section 824)**;

(n) carry fire and extended coverages and casualty insurance on the premises during the entire term of this lease and any extension thereof in an amount equal to at least 80% of the replacement value of the property and any improvements thereon, written by an insurance company or companies authorized to do business in Maine;

(o) furnish all approved electrical power distribution equipment, outlets and fluorescent lighting fixtures throughout the premises capable of providing light intensity in accordance with **ANSI/IES PP-1-1 1982** Standards for Office Lighting;

(p) provide a telephone outlet box wherever a duplex electrical outlet is provided, in offices, conference rooms, interview rooms, etc. (wherever a phone may need to be installed). It should be installed, wired, and covered with a blank cover.

Provide all necessary conduit, wiring, backboards, switch rooms/spaces etc. in accordance with the current specifications of the Telecommunications Division, Department of Administration, Office of Information Services. Exhibit C.

(q) pay all charges for sewer and water services supplied to the premises;

(r) pay all taxes and other assessments on said premises;

(s) make reasonable efforts to provide for rapid ice and snow removal from steps, walkway, doorways, sidewalks and parking lots, including sanding as needed, to be accomplished prior to normal working hours, or during working hours, if more than a 3" build-up of snow occurs. Provision for piled snow to be completely removed within 24 hours; and

(t) furnish janitorial/custodial services to the premises in accordance with Exhibit "B" attached hereto and made a part of this Lease.

11. **COMPATIBLE TENANT:** If the Lessor leases/rents other space in the building, the Lessor shall not lease/rent said space except to compatible tenant, with the written approval of the Department.

12. **QUIET ENJOYMENT:** Upon payment, by the Department, of the rent herein provided and upon the observance and performance of all the covenants, terms and conditions on the Department's part to be observed and performed, the Department substantially shall be entitled to the beneficial use and peaceful enjoyment of the premises for the term hereof without hindrance or interruption by Lessor or any other person or persons, regardless of whether they are claiming by, through, or under the Lessor.

13. **HANDICAPPED:** The premises are to be free of architectural barriers and must conform substantially to **ANSI Code No. A-117.1 - 1986**, and as set forth in Maine Law that requires public buildings be made accessible to physically handicapped persons, **M.R.S.A., Title 25, Part 7, Chapter 331 (Title V, Revised Statute)**.

14. **LAW GOVERNING:** This Lease shall be governed by and construed according to Maine Law.

15. **STATE HELD HARMLESS:** The Lessor agrees to indemnify, defend and save harmless the Department, its officers, agents and employees from any and all claims and losses accruing or resulting to any person, except employees of the Department who may be injured on the leased premises, due to the negligence or willful acts or omissions of the Lessor.

16. **LIMITATIONS:** This Lease is made subject to available budgetary appropriations and shall not create any obligation on behalf of the Department in excess of such appropriations. In the event that the amount of funds appropriated is such that the Department must restrict or terminate its administrative program, this Lease shall be terminated thirty (30) days after written notification from the Department to the Lessor.

17. **LIFE CYCLE ANALYSIS:** If the square footage in Item 2 above is equal to or in excess of five thousand (5,000), then this property must meet the conditions of **Chapter 153, M.R.S.A. of 1977** as amended by **Chapter 353 of 1981** titled "Energy Conservation in Buildings Act" and "An Act Concerning Energy Efficiency in Buildings Financed with Public Funds". As a minimum, the

building shall comply with the 1987 State of Maine Energy Conservation Building Standards. Certification that the property complies with these standards shall be obtained from the Office of Energy Resources and submitted to the Bureau of Public Improvements. The Life Cycle Analysis shall pay particular attention to demonstrating that alternative modifications to lighting systems and ventilation air heat recovery have been adequately explored, evaluated and implemented.

18. **CONDITIONS:** Notwithstanding any other conditions in this agreement, it is hereby understood that this Lease shall become effective and occupancy of the premises will occur only when and if there is mutual agreement that the necessary construction or renovations have been completed to the mutual satisfaction of both the Department and the Lessor and that the premises are ready to be occupied.

19. **MUNICIPAL ORDINANCES:** In accordance with **5 M.R.S.A., Section 1742-B**, public improvements to buildings leased by the State shall comply with any applicable municipal ordinances governing the construction and alteration of buildings and shall be subject to any applicable inspections.

20. **NOTICES:** Any notices required or permitted hereunder shall be in writing and shall be sent certified mail, return receipt requested, addressed to Lessor or Department, as the case may be, at the addresses specified herein below or at such other address as a party hereto may have therefore specified by written notice hereunder, with a copy mailed to the Bureau of Public Improvements, State House Station #77, Augusta, Maine 04333 (Attn: Lease Space).

Lessor:

Department:

21. **TERMINATION:** In the event of a material violation of the terms of this lease by either party, and upon failure of that party to bring itself into compliance with the terms of this lease upon 30 days notice of the violation by the other party, such other party shall have the right to terminate this lease upon a further 30 days notice. The failure of either party to give notice of a material violation shall in no event constitute a waiver of any of the terms of this lease.

22. **BUILDING CODES AND ENVIRONMENT**

A. Asbestos:

i. Lessor shall provide the Lessee with the results of an inspection of the premises to be leased and all common and building support areas which may affect Lessee occupants or its clients. The inspection will identify all accessible friable asbestos in these areas of the building and shall be performed by a person certified in accordance with State Law and satisfactory to the Lessee. The results of this inspection shall be reported to the Lessee and made a part of this Lease Agreement.

ii. In the event that friable asbestos containing materials are identified which are in the status of "significantly damaged" or "damaged" (as described in 40 CFR 763) these materials shall be abated in a manner satisfactory to Lessee, including provision for acceptable air clearance monitoring using Phase Contrast Microscopy.

iii. In the event that asbestos containing materials are identified, but which are not damaged, Lessor shall install an operations and maintenance program satisfactory to Lessee which is designed to periodically reinspect asbestos containing materials and to take corrective action as specified in A(ii.) above when appropriate. Results of such reinspections and all air quality monitoring shall be provided to Lessee within 14 days of completion.

B. Air Quality Standards:

i. By endorsement of this Agreement, Lessor warrants that the premises occupied by Lessee's employees will comply with statutory requirements for indoor air quality (5 **M.R.S.A. §1742(24) [1988]**). Specifically, occupied spaces will receive at least 20 CFM of outside air per employee and the air will be free of harmful levels of contaminants. (**See Covenants at 10 CF II**)

ii. In the event that the quantity or quality of indoor air in the premises fails to meet the statutory standards at any time during the term of this Lease Agreement, Lessor agrees to undertake corrective action within 30 days of notice of deficiency by the Lessee or the Maine Bureau of Labor Standards. Any such notice shall contain documentation which is based on objective analyses of the indoor air quality.

iii. Lessor shall have the right to conduct air quality sampling using qualified professionals and analytical methods endorsed by ASHRAE. Should the results of Lessor's analysis fail to support the need for corrective action, the necessity for further action will be determined by the Bureau of Labor Standards.

iv. Failure to comply with statutory indoor air quality standards upon completion of the procedures outlined above shall be the basis for termination of this agreement as set forth in Section 21, at the election of the Lessee.

C. Other Hazardous Materials:

i. By endorsement of this Lease Agreement, Lessor warrants that, to the best of its knowledge and belief, the premises is free of present or potential contamination which may impact the health or safety of the occupants.

ii. The Lessor further warrants that all custodial, maintenance or other activities on the premises which are within its control are, or will be, conducted in compliance with applicable hazardous materials statutes and regulations including, but not limited to, Title 38 M.R.S.A. 1301 and Title 26 M.R.S.A. 1709.

This space left blank.

IN WITNESS WHEREOF, the parties hereunto subscribed their names as of the date first above written.

In the presence of:

LESSOR:

_____ _____

WITNESS Title

STATE OF MAINE, _____ COUNTY _____ 19____

Then personally appeared the above named _____

_____ whose title is _____

and acknowledged the foregoing instrument to be his free act and deed.

LESSOR:

_____

Notary Public

LESSEE:

_____ _____

WITNESS Title

Then, personally appeared the above named _____

_____ whose title is _____

and acknowledged the foregoing instrument to be his free act and deed.

LESSEE:

_____

Notary Public

APPROVED AS TO FORM:

_____, 19____

_____

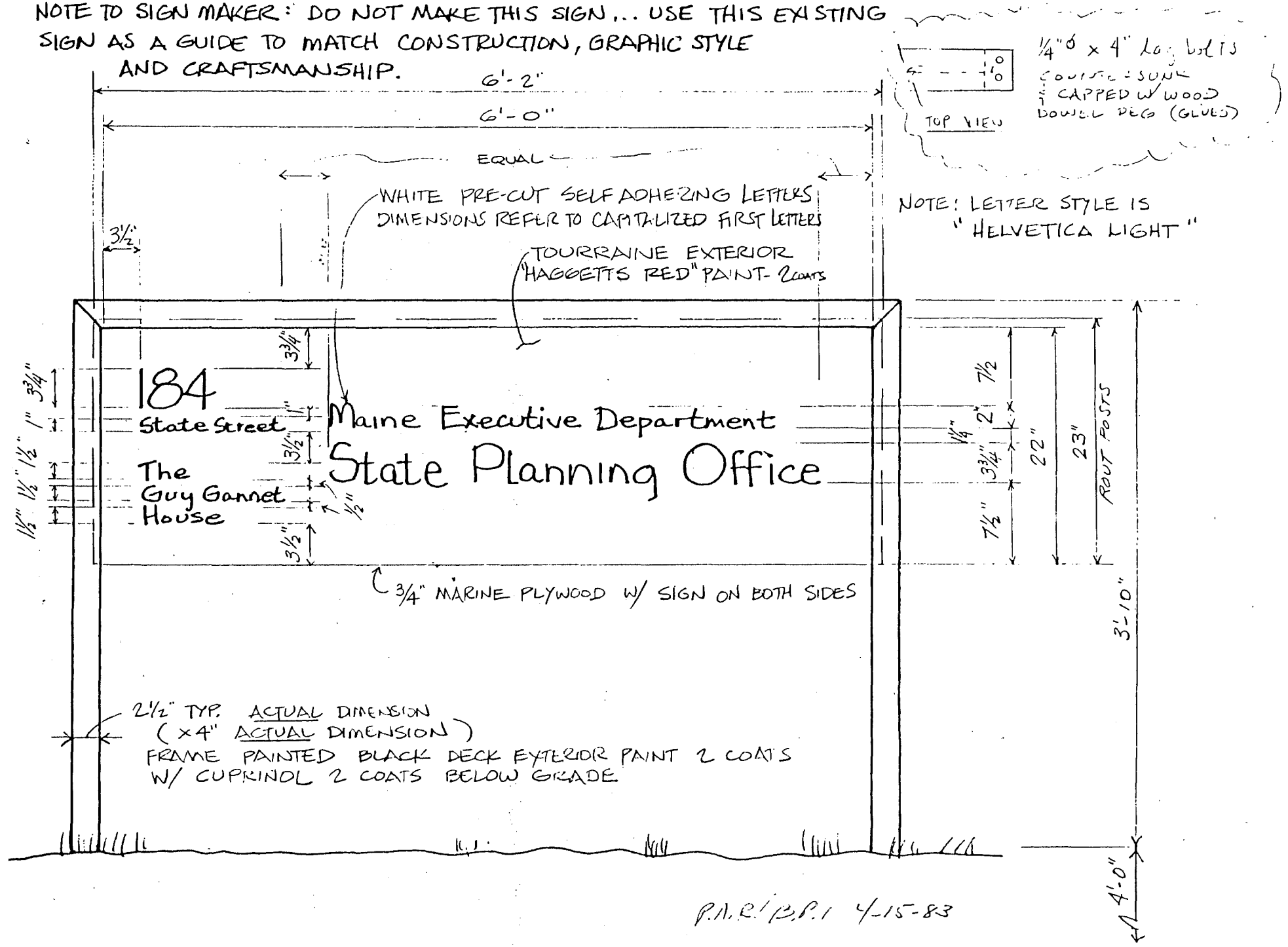
Assistant Attorney General of Maine

Approved by: _____

Dale F. Doughty, Director
Bureau of Public Improvements

AS-BUILT DWG. OF EXISTING SIGN AT GANNET HOUSE, AUGUSTA

NOTE TO SIGN MAKER: DO NOT MAKE THIS SIGN... USE THIS EXISTING SIGN AS A GUIDE TO MATCH CONSTRUCTION, GRAPHIC STYLE AND CRAFTSMANSHIP.



P.N.R./P.P.I 4-15-83

Exhibit A

Exhibit B

JANITORIAL/HOUSEKEEPING SPECIFICATIONS

CLEANING SCHEDULE - NON-FLOORS

BUILDING: ALL

FREQUENCY

ITEM	OPERATION	D	W	M	Q	A	SA
Aluminum, Steel or Wood Mullions	Clean						X
Ash trays	Empty	X					
Ash trays	Wash		X				
Baseboards, Sills, Ledges	Dust		X				
Blackboards (if any)	Wash	X					
Ceiling & Overhead	Vacuum or Dust					X	
Counter Tops	Clean & Polish		X				
Desks	Spot clean	X					
Desks	Clean & Polish			X (Rotation)			
Dispensers	Fill & Clean	X					
Door Hardware	Polish (lobby)	X					
Doors, Light Switches, Walls	Spot Clean	X					
Draperies	Clean & Press/Launder					X	
Drinking Fountains	Wash	X					
Furniture (Upholstered)	Shampoo					X	
Furniture (Non-Desk)	Dust		X				
Interior Glass	Spot Clean	X					
Interior Glass	Wash		X				
Light Bulbs & Fluorescent tubes	Replace Burned out Units	X					
Light Fixtures	Wash						X
Mirrors	Clean	X					
Paneled Walls	Clean & Polish				X		
Radiators (Heating Units)	Clean			X			
Screens (if any)	Wash					X	
Telephones	Wash & Sanitize	X					
Toilet Fixtures	Wash	X					
Toilet Room Walls and Trim	Spot clean	X					
Toilet Room Walls and Trim	Wash			X			
Venetian Blinds or Drapes	Dust			X (Rotation)			
Venetian Blinds	Wash						X
Wall Surfaces	Spot Clean	X					
Wall Surfaces	Vacuum or Dust			X (Rotation)			
Wall Surfaces	Wash				X Rotation		
Waste Baskets	Empty	X					
Waste Baskets	Wipe		X				
Waste Baskets	Wash				X		
Waste Containers	Empty	X					
Waste Containers	Wash			X			
Windows & Storm Windows	Wash In and Out						X

B

CLEANING SCHEDULE - FLOORS

TYPE OF FLOOR	FREQUENCY D	W	M	Q	A	SA
RESILIENT TILE & LINOLEUM						
Dust Mop	X					
Damp Mop	X					
Machine Buff (Traffic Area Daily-Depending on Traffic)		X				
Scrub & Top Dress			X			
Spray Buff (Traffic Area Daily-Depending on Traffic)		X				
Strip and Refinish						X
MARBLE - QUARRY - TERRAZO						
Dust Mop	X					
Sweep	X					
Damp Mop	X					
Machine Buff		X				
Scrub (Mild Soap)			X			
Seal					X	
Refinish (Marble & Terrazo Only)			X			
CEMENT						
Sweep	X					
Damp Mop		X				
Machine Scrub				X		
Acetic Rinse				X		
Seal (Unpainted)					X	
CERAMIC TILE						
Sweep	X					
Damp Mop (Germicide)	X					
Rinse	X					
Hand Scrub Grouting (Mild Detergent & Abrasive Pad and Seal Grouting)					X	
RUG OR CARPET						
Hand Pick Up	X					
Vacuum		X				
Vacuum Edges (Crevice Tool)			X			
Spot Clean	X					
Shampoo						X
Spot Vacuum (Heavy Traffic Areas)	X					

B

TYPE OF FLOOR	FREQUENCY D	W	M	Q	A	SA
ENTRANCES, LOBBIES, MAIN HALLWAYS						
Dust Mop	X					
Damp Mop	X					
Machine Buff	X					
Scrub - Top Dress			X			
Spray Buff	X					
Strip - Refinish						X
Seal						X
Vacuum Carpet	X					
Spot Clean Carpet	X					
Shampoo					X	
STAIRWAY CLEANING						
Sweep	X					
Damp Mop	X					
Scrub		X				

HOURS OF WORK: Unless otherwise specified, work shall be on a five day basis, Monday through Friday, between the hours of 4:00 p.m. and 12:00 midnight. Should occasion arise that work must be performed on other than the above schedule of the intended work on all elements other than those which are daily requirements. The schedule will be as follows:

1. Weekly Requirements - The day in the week that work will be performed
2. Monthly Requirements - The week in the month that work will be performed
3. Quarterly Requirements - The week and the month that work will be performed
4. Semi-Annual Requirements - The month that the work is to be performed
5. Annual Requirements - The month that the work is to be performed

Exhibit C

John R. McKernan, Jr.
Governor

Department of Administration
OFFICE OF INFORMATION SERVICES
Telecommunications Division
Telephone (207) 289-4030

TO: All Architects, Engineers, Electrical Contractors, Space Lessors or others dealing with the State of Maine

SUBJECT: Telecommunications Specifications

The attached copy of the State of Maine Telecommunications Specifications is given to you to be used or incorporated in any planning activities and/or specification writing dealing with State owned or leased buildings or premises.

They are general in nature and your coordination with the State Office of Information Services, Telecommunications Division is absolutely essential to "fine tune" the actual requirements concerning each specific project, BEFORE YOU PRODUCE YOUR FINAL DOCUMENTS. You are encouraged to begin this coordination as early in the process as possible.

Your contact or questions should be directed to the Office of Information Services, Telecommunications Division, State House Station 138, Augusta, Maine 04333. Telephone #: (207)289-4030.

SECTION _____ TELECOMMUNICATIONS

THESE SPECIFICATIONS SHALL APPLY IN ALL INSTANCES WHERE THE STATE OF MAINE IS, OR MAY BECOME THE OWNER OF THE PREMISES, OR WHERE THE STATE IS A LESSEE OF THE PREMISES OR A PORTION THEREOF. ALL PLANS, SPECIFICATIONS, DRAWINGS, OR TECHNICAL INFORMATION CONCERNING TELECOMMUNICATIONS MUST BE REFERRED TO AND APPROVED BY THE STATE OF MAINE, OFFICE OF INFORMATION SERVICES, TELECOMMUNICATIONS DIVISION, BEFORE PROCEEDING WITH BIDDING OR CONSTRUCTION. ALL TELECOMMUNICATIONS PBX'S, KEY OR HYBRID SYSTEMS, STATION EQUIPMENT AND TERMINAL DEVICES AND THEIR INSTALLATION SHALL BE PROVIDED BY THE STATE TELECOMMUNICATIONS DIVISION. ALL OTHER PREMISES WORK SHALL BE THE RESPONSIBILIY OF THE CONTRACTOR.

A. General

Furnish and install all telecommunications outlets, conduit, wiring, electrical outlets, backboards, racks, air conditioning, flooring, sensors, alarms, and allied accessories in accordance with the specifications and drawings contained in these documents. Relocate or remove, as required, any existing wiring, raceways, ducts, conduits equipment, etc., due to architectural changes or as shown on the drawings if it is not reused in the reconstruction or does not meet the specifications set forth in the following Sections.

B. Work Includes

Basic Telecommunications requirements for this Division includes, but is not limited to the following:

1. Section _____ Service Entrance Requirements
2. Section _____ Switchroom
3. Section _____ Wiring Closets, Conduit Runs, etc.
4. Section _____ Basic Wiring Standards
5. Section _____ Cable Television
6. Section _____ Paging System
8. Section _____ Video Requirements
9. Section _____ Mechanical Equipment

C. Related Work

1. Section _____ Removal of Old Cable and Facilities
2. Section _____ Cutting and Patching
3. Section _____ Temporary Utilities
4. Section _____ Painting and Cleanup

D. Definitions

1. Backboard: A piece of 3/4" thick, exterior plywood, on which telecommunications equipment will be mounted.

2. Cable: A combination of two or more twisted pair wire, each pair twisting around the others at not less than one revolution per linear foot of cable, and all are totally encased in an outside PVC

shield or sheath. Each conductor is individually color coded up to a maximum of twenty-five pair. Cables containing more than 25 pair are made up of multiples of 25 pair, each grouping being twisted around the others in the same manner as before and each 25 pair is color coded to differentiate it from the others within the same cable.

3. Certified: Equipment is "certified" if it has been tested and found, by a nationally recognized testing laboratory, to meet recognized standards or to be safe for use in a specified manner or application, and bears a label, tag or other record of certification.

4. Coax (Coaxial) Cable: Is a single, metallic conductor surrounded by flexible insulation, encased in a metallic woven conductor with a tough outer protective skin, providing great band width capacity as compared to twisted pair wiring.

5. CMP (Communications Plenun Cable): is a teflon coated telecommunications cable, certified not to give off noxious gas or toxic smoke when subjected to heat and flames. This cable is used in an unprotected environment (not in conduit) within an area used for environmental air. (Article 800, National Electrical Code).

6. Conduits: Piping used to encase telecommunications cabling. There are four basic types of conduit which are acceptable in specific instances:

    1. S&D (Soil & Drain) PVC - when buried and encased in concrete;
    2. Schedule 80 PVC
    3. EMT - thin wall, steel conduit; and
    4. Rigid - solid, threaded, steel conduit.

7. Connecting Block: A family of wire connecting blocks used by both the RBOC and the owner to "cross connect" between the termination point of incoming cable and the beginning of the owners cabling.

8. Cover Plate: A standard duplex electrical outlet cover which will fit over the jack and is fastened to the jack to complete the installation.

9. Demarkation Point: That point at which the RBOC terminates its incoming services within the premises.

10. Distribution/Cross Frame: A special frame or backboard which is used to receive wiring from a PBX or incoming lines from the RBOC and cut down for distribution to terminal devices.

11. Fiber Optics: In this context, is either a single mode fiber, or a group of single mode fibers in a single sheath, made of glass, capable of tremendous bandwidth and purity due to its ability to transmit light unimpeded within the strands of glass.

12. Gas Tube Protection: A device, usually installed between the point of demarkation and the premises equipment, designed to provide protection against power surges or spikes entering the system and shunts the unwanted voltage to ground.

13. Gauge: Wire size of twisted pair. When used in these specifications, telecommunications cable will be either 22 or 24 gauge, depending on location.

14. Grounding: A ground rod or grounding device which can receive an electrical charge and pass it directly to ground without damage or danger to other electrical devices or equipment.

15. Jack: A telephone and data receptacle which, when properly wired, will be housed in a standard, duplex electrical outlet box. The voice and data plugs are similar except the data plug has a special key to prevent it from being inserted into the voice receptacle.

16. Labeled: Equipment is "labeled" if it bears a valid label, seal or symbol of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc, recognizing its acceptability for the intended uses in these specifications.

17. Listed: Equipment is "listed" if it is of a kind mentioned in a list which is published by a nationally recognized laboratory which makes periodic inspections during production of such equipment, or states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.

18. PBX (Private Branch Exchange): A generic term for a telecommunications switch.

19. RBOC (Regional Bell Operating Company): In this context, a term used to designate the local telephone company. (New England Telephone, Contel, Pine Tree Tel, Hamden Tel Co., Community Services Tel Co., etc.)

20. Receptacle Box: A standard duplex electrical outlet box .

21. Station Equipment: See Terminal Devices.

22. Terminal Device: Generic term for either telephones, data devices, printers, facsimile, or other peripheral equipment, connected by telecommunications wiring.

23. Transient Voltage Protection: A device designed to shunt to ground small raises in voltage, (as small as 7.5 volts) in ten nanoseconds or less, to provide protection from power spikes to sensitive electronic equipment.

24. Twisted Pair: One pair of single conductor wires, each encased in its own colored insulation, twisted around each other at no less then one revolution per foot in length.

E. Product Criteria

1. Products used in this project shall be the standard products of a manufacturer regularly engaged in the manufacture of those products.

2. Unless approved by the OIS, Telecommunications Division, items of equipment shall essentially duplicate equipment that has been in satisfactory use for at least five years.

3. Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located reasonably close to the site.

4. When two or more units of materials or equipment of the same type or class are required, they shall be products of the same manufacturer.

5. All factory wiring of preassembled components shall be accompanied by wiring diagrams.

F. Miscellaneous

1. Protection: Responsibility for care and protection of all materials and work rests with the contractor until the entire project has been completed, tested and accepted.

2. Regulatory Requirements: All work will conform to the requirements of all applicable codes, laws, regulations, local ordinances, etc., and contractors shall cooperate with all authorities having jurisdiction. Compliance with laws and regulations on this project does not relieve the contractor from compliance with more restrictive requirements contained in these specifications.

3. Permits, Fees, Inspection: The contractor shall secure and pay for all permits, fees, inspections, street opening charges or fines assessed in connection with this project.

4. Warranty: Any manufacturers warranty shall be passed on to the owner at the completion and acceptance of the project. The Contractor shall warrant all material and workmanship to be in compliance with these specification, according to standards acceptable to the Architect/Engineer and/or the industry, and will be free of defects in both materials and workmanship for a period of one year, or longer if specifically called for in the general policies section of the specifications dealing with the entire project.

SECTION _____ SERVICE ENTRANCE REQUIREMENTS

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to complete the service entrance work in accordance with the drawings and these specifications.

B. Point of Entry

The entrance to the premises will be at a point mutually agreeable to the owner and the RBOC, which usually is a point closest to the access lines of the public carrier.

C. Conduits

1. Buried: From the property line closest to the public carrier lines, there shall be a conduit(s) buried at a minimum depth of 24", using schedule 80 PVC pipe. In those areas subject to vehicular traffic, (roads, drives, parking lots, etc.) lightweight S&D PVC (Soil & Drain) pipe may be used, provided it is encased in concrete to a minimum thickness of 3" around the pipe. In all areas where public streets are crossed, rigid steel conduit shall be used.

Size of entrance conduit(s) required in buildings:

Up to 25,000 sq. ft., use 4" diameter
25,000 to 100,000 sq. ft., use 2 each, 4" diameter
Over 100,000 sq. ft. use 3 each, 4" diameter

2. Aerial: If the main power feed to the premises is aerial, the Architect/Engineer may specifiy that the telecommunications entrance be aerial as well, up to a maximum entrance cable size of two hundred (200) pair (anything larger shall be brought in underground). Any aerial entrance shall be in compliance with RBOC requirements. All aerial telecommunications cable must be at least two (2) feet lower than any electrical entrance, and shall carry to a standard weatherhead allowing eighteen (18) feet clearance for any vehicular traffic. A minimum 2 inch diameter weatherhead and conduit shall be installed to carry cabling into the premises.

D. Length/Runs

Entrance conduits shall only be permitted to have "long sweep" elbows and not over two 90° elbows in any 200 foot section. Entrance conduit or weatherhead connection shall be continuous into the telecommunications switch room (demarkation point). If the total "run" of the entrance cable exceeds 250 feet, then a pull box of sufficient size to accommodate the diameter of the telecommunications cable shall be mounted at the nearest point of entry, inside the building.

E. Cabling

The telecommunications cable shall be appropriately sized, twisted pair, foam filled, specifically designed for underground or exterior usage. The cable and labor to install it may be provided by the RBOC. It is up to the Contractor to make this determination and to provide it if the RBOC does not. If the Contractor supplies the entrance cable, it shall be 22 gauge telecommunications cable. In certain instances, fiber optic cable may be required. In such cases, a special section, devoted to the treatment and sizing of fiber optics will be included in these specifications. If no such special section is included, then the telecommunications cable shall be as specified above.

F. Enter Switchroom

The entrance conduit may enter the switch room from either below the floor or through the ceiling. In either case, appropriate bushings shall be used in the open ends of the conduit to assure a smooth edge against the cable, and shall be properly sealed on both ends to assure no leakage or penetration of water into the switch room. Since the RBOC may furnish and install the cable the contractor shall leave a pull rope in the conduit to assist the RBOC. Entrance of the conduit into the switch room should be in a corner location allowing a left to right breakdown of the cable onto the backboard(s) provided.

SECTION _____ SWITCHROOM

A. General

Furnish all labor, materials, equipment, supplies, and perform all operations necessary to complete the switchroom work in accordance with the drawings and these specifications.

B. Size

The switchroom shall be a secure room, accessible by service technicians from a common area (hallway, lobby, etc.), air conditioned with a two hour fire rating. The overall size of the switchroom shall be as follows:

Buildings of less then 5,000 sq. ft., switchroom shall be 8' x 10'
From 5,000 to 10,000 sq. ft., switchroom shall be 10' x 12'
From 10,000 to 25,000 sq. ft., switchroom shall be 14' x 14'
From 25,000 to 100,000 sq. ft., switchroom shall be 14' x 18'
Over 100,000 sq. ft., switchroom shall be 16' x 20'

C. Lighting

Switchroom shall have a minimum ceiling height of eight (8) feet with sufficient, flush mounted and switched ceiling lighting which will provide fifty (50) foot candles at desktop level. Floor shall be solid (preferably concrete) and either sealed, or covered with a vinyl floor covering. Room shall be positioned such as to prevent any seepage of water, noxious fumes, soot or other contaminants. The floor, ceiling and walls will be constructed to meet the two (2) hour fire rating requirements, including a 30 inch wide, solid metal door and frame.

D. Air Conditioning

Switchroom shall be air-conditioned with a positive pressure and fresh air makeup, with either its own unit or a dedicated air supply and a return air duct from the room or exhaust louvers with automatic fire dampers which will close in case of fire. Air conditioning must be continuous, 24 hours per day, every day.

E. Environmental Requirements

The air supplied to the equipment room must be clean and dry. Temperature must be held between 41° and 94° F, with an optimum operating temperature of 75° F. Relative humidity must be maintained between 20 and 80% (non-condensing) with an ideal setting of 45%.

F. Sprinklers

There shall be no sprinklers (wet or dry) in the switchroom.

G. Location of Entrance Cable

Entrance cable conduit shall be brought into one corner of the room which will afford a left to right breakdown of cables onto backboards mounted on two adjacent walls. In a case where there are multiple buildings within the project, two 4" diameter conduits shall be run from the switchroom to either another switchroom or wiring closet in the other buildings. All telecommunications cable between buildings shall be 22 gauge.

H. Cable Sizes:

All cabling shall be 22 gauge between buildings and from the RBOC into the switchroom (if contractor supplied). All other cabling in a single or two story building shall be 24 gauge. In multiple storied buildings (three or more floors) riser cables from the main switchroom to remote wiring closets shall be 22 gauge inside cable. Cables shall be sheathed, twisted pairs and color coded. The amount of pairs in any cable will be the amount of telecommunications outlets being installed within the area being served by each specific cable, times 8. If there are going to be 20 telecommunications outlets installed in an area, a minimum 160 pair cable is required (20 x 8 = 160). Since there is no manufactured 160 pair cable, the next highest standard count cable (200 pair) must be provided and installed.

I. Backboards

Backboards shall be 4' x 8' x 3/4" exterior plywood sheets, painted two coats with flat black paint, mounted thirty (30) inches above the floor. Backboards shall be furred out from the walls on 2" x 4" studs, on 24" centers. These 2" x 4" studs will be applied vertically to the wall and will assure a 3 5/8" air space between the backboard and the wall behind it. The relative lengths of the backboards will be one foot less than the length of the wall on which they are mounted, leaving a six inch space on either end between the adjacent wall and the end of the backboard. (2 wall installation)

J. Electrical

Overhead fluorescent lights will have a flush mounted switch(s) adjacent to the strike side of the entrance door. Duplex electrical outlets will be provided (flush mounted) at the bottom edge of the backboards, on approximately 30" centers (i.e., 3 duplex outlets in a 8 foot backboard). Each duplex outlet will be a separate 20 amp circuit, protected by lockable circuit breaker panel accessible to service personnel only.

In the wall with the access door in it, there shall be two standard, duplex outlets at the conventional height. Each duplex outlet should be on a separate 20 amp circuit from the same panel as above.

In the remaining wall, there should be two, four gang, outlet boxes, evenly spaced so as to divide the remaining wall into thirds. Within each of the four gang boxes, each duplex outlet shall be on its own 30 amp circuit. These outlets shall be at the standard height from the floor.

If the switchroom contains its own air conditioner or other special equipment and is wired directly, then each unit shall have its own circuit breaker in the same panel.

The breaker panel, serving the telecommunications switchroom, shall be dedicated to the room and fed directly from the main entrance to the premises.

Electrical equipment and recepticals, fed from this secondary breaker panel shall be properly grounded to a separate ground rod or connected to a continuous metal water pipe (not less than 1/2 inch in diameter which is connected to an underground water pipe that is in direct contact with earth for 10 feet or more) by number 6 AWG copper wire. The ground rod or ground cable shall be made available near the entrance conduit and backboard to enable the direct grounding of gas tube and transient voltage protection devices as well as all switching equipment.

NOTE: THE ABOVE REQUIREMENTS ARE GENERAL IN NATURE. THERE MAY BE SPECIFIC REQUIREMENTS DUE TO SWITCH CONFIGURATION. CONTACT THE STATE OF MAINE, TELECOMMUNICATIONS DIVISION (207-289-4030) BEFORE SPECIFICATIONS ARE WRITTEN.

K. Finish

Floor finish shall either be sealed concrete, vinyl-covered, or non-static carpet. Walls and ceiling shall be painted two coats of semi gloss paint in either off white or light beige color. Steel door and louvers (if any) shall be painted in accordance with the general painting section or as the Architect/Engineer shall direct. Backboards shall be covered with two coats of flat black paint.

L. Distribution

There shall be conduits exiting the switchroom from a point diagonally across from the entrance cable, either through the ceiling or into the floor. The size and number of conduits will be dependent on the size of the total building and the number and locations of wiring closets (next section). After all cabling is in place, all conduit openings shall be sealed with a polyurethane foam to assure a positive seal against rodents, moisture, smoke or gas penetration.

M. Telecommunications Outlets

There shall be two telecommunications outlets at the standard electrical outlet height, in the approximate location of any work desk which may be placed in the room These outlets shall be wired using the same specifications as for the balance of the premises.

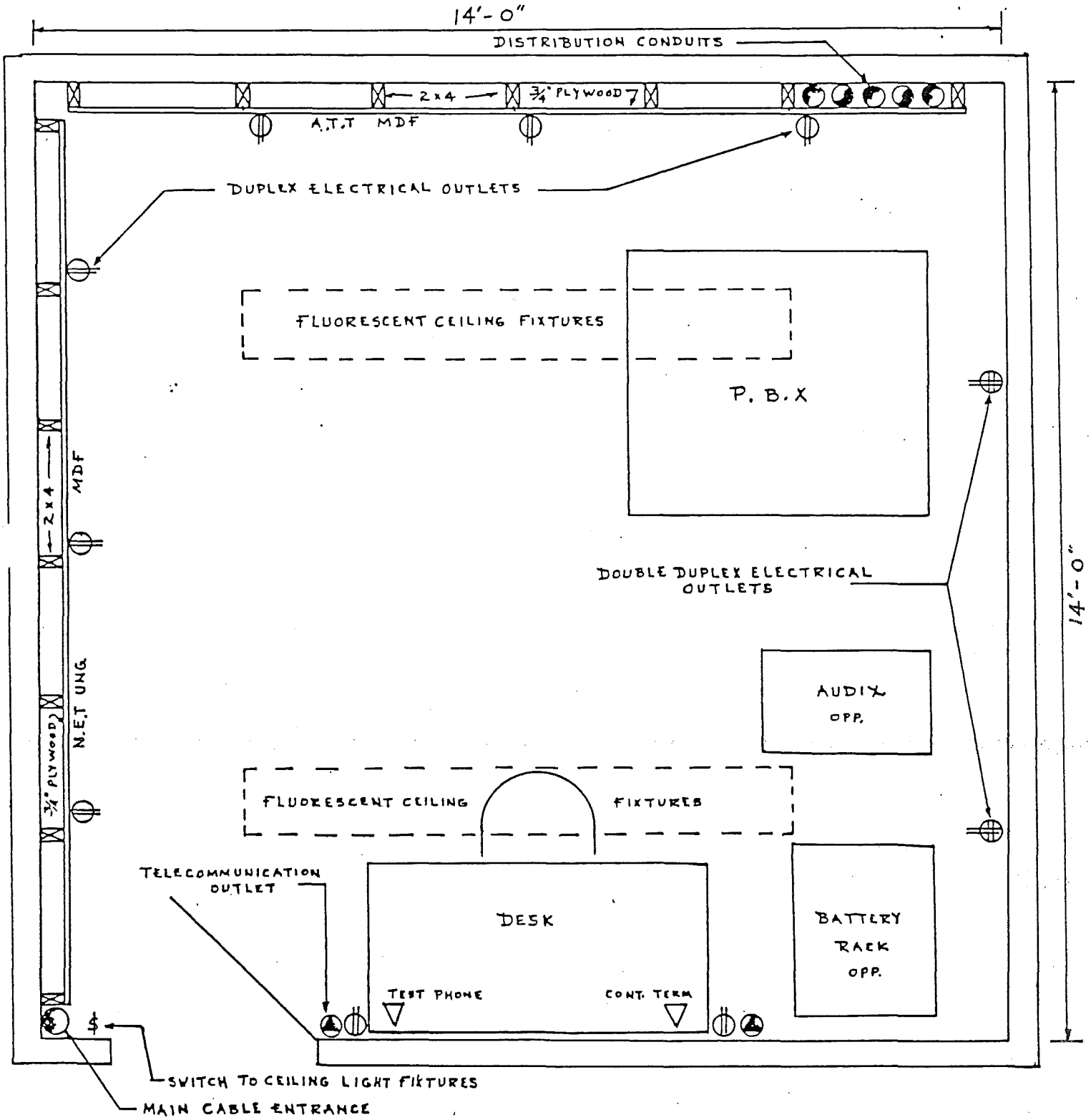
N. Keying/Security

The switchroom, any wiring cabinets and power cabinets (circuit breakers) shall all be keyed alike and shall be different from any other lock and key combinations present in the premises.

O. Fire Extinguisher

There shall be a ten pound dry type (Ammonium Phosphate Base) fire extinguisher mounted on the wall or in a recessed cabinet, on the outside of the switchroom, immediately adjacent to the handle side of the entrance door. Use a Type A, Size II, Type B:C Size II, Classification 4-A:60B:C extinguisher.

TYPICAL 14×14 SWITCHROOM



SECTION _____ WIRING CLOSETS, CONDUIT RUNS

A. General

Furnish all labor, materials, equipment, supplies, and perform all operations necessary to complete the wiring closets in accordance with the drawings and these specifications.

B. Size

A wiring closet(s) shall be a secure room(s), accessible by service technicians from a common area (hallway, lobby, etc.) and shall be constructed to meet a one (1) hour fire rating. Sizes will vary, depending upon telecommunications requirements, but will roughly fall into three categories:

1. Specific closet room approximately 5' x 8';
2. A recessed closet off a hallway with a double access door approximately 3' deep by 7' high by 8' long;
3. Wall access panels recessed into a corridor wall, approximately 2' deep, 7' high and 4' long.

All closets will contain 5/8" exterior plywood backboards, covered with two coats of flat, black paint. (See Switchroom for specific Backboard details). In a multi-floored environment, there shall be at least one wiring closet per floor.

C. Environmental Requirements

Wiring closets shall be provided with continuous positive ventilation with exhaust through door/wall louver(s). Normal building supplied air is sufficient provided it shall be clean, dry and free of corrosive fumes and the maintained temperature is between 41° and 94° F with humidity between 20 and 80% non-condensing. Equipment in wiring closets may generate approximately 480 - 500 BTU/hour. (Could be more; contact State Telecommunications Division for actual BTU ratings.)

D. Electrical

Each wiring closet shall have a minimum of two duplex electrical outlets, on a 20 amp circuit breaker. This circuit breaker must be proprietary to telecommunications usage, but the breaker shall have a screw locking device applied which will prohibit an accidental opening of the circuit. Each closet shall be provided with a switchable light source sufficient to support the identification of wiring and the needed illumination to provide a comfortable working environment.

E. Finish

Finish of closets shall be comparable to surrounding areas in both quality and colors.

F. Distribution

The incoming conduit from the switch room shall terminate at the left end of the backboard in the wiring closet to allow a left to right breakdown of wiring. On the right end of the backboard, there shall be conduit exit points for distribution throughout the premises. These exit points shall either be full conduits or sleeves through the ceiling, floor, or some type of exit which can be made tight (foam filled in the ends of conduits, sleeves, etc.).

G. Sprinklers

There shall be no sprinklers (wet or dry) in the wiring closets.

H. Keying/Security

All wiring closets shall be keyed alike and the same as the switchroom, and shall be keyed differently than any other locks in the premises.

SECTION _____ WIRING STANDARDS

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to complete the telecommunications wiring in accordance with the drawings and these specifications.

B. Scope, Services

The total number of wiring runs and the sizes of the cables will be dependent upon the size, occupancy and use of the premises.

1. All inside wiring to a telecommunications jack, whether it is used or future, will be one, four pair, jacketed, 24 gauge, twisted wire to the top outlet, or voice side of the jack, and one, four pair, jacketed, 24 gauge twisted wire cable to the bottom outlet of the jack, or the data side. Note: THIS IS 2 EACH, 4 PAIR CABLES TO EVERY WIRED LOCATION.

2. All 4 pair cable that is installed will be connected to an AT&T Jack number 106BFO. This is a duplex modular jack with a standard electrical duplex outlet cover, to be used where an electrical box is built flush into a wall. (See wiring schematics for proper connections.)

3. All 4 pair cable will be run from the jacks to one central area designated as a switchroom. The cables will be identified by a jack number, voice or data. In places where there are multiple floors or vast areas, a secondary area(s) will be used to bring the 4 pair cables back to a wiring closet, and then be connected via a cable of sufficient size to carry all pairs back to the main telephone room.

4. All interior cables shall be of 24 gauge, sheathed, twisted pair, and color coded. The amount of pairs in the cable will be equal to the total number of pairs terminated in the wiring closets. Should the total number of pairs required exceed the number contained in a standard cable size, then the next greater size cable shall be installed.

5. In all instances where telecommunications cable is run, either between the switchroom and wiring closets, and/or from wiring closets or the switchroom to the terminal jacks, and is not in conduit, the cable must be fire rated. In those instances where the cables are run over ceilings or below the roof structure which is used in any way for environmental air, it shall be CMP covered cable, and labeled as such.

6. For cabling runs between switchroom and wiring closets, the end of each run will be supplied with an appropriate plywood backboard (see switchroom section). Both ends shall be cut down on connector blocks as specified (contact the State Telecommunications Division for specifications). All cable should be labeled.

7. Placement of jacks in any building(s) will follow this rule of thumb; "wherever an electrical outlet is placed, a duplicate outlet box shall be placed for the use of the telecommunications jacks". Exception to the rule:

   a. closets
   b. toilets
   c. mechanical rooms, boiler, pump, generator, etc.
   d. stairwells and hallways

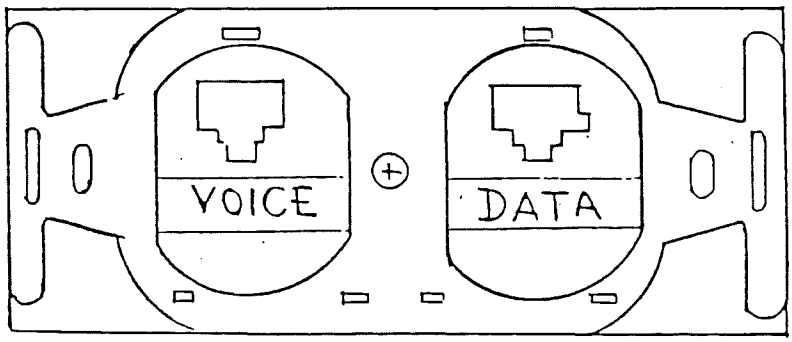
   This rule of thumb should be scrutinized carefully between architect and owner, so as to understand the use and future use of specialized areas such as classrooms, conference areas, hearing rooms, libraries, etc.

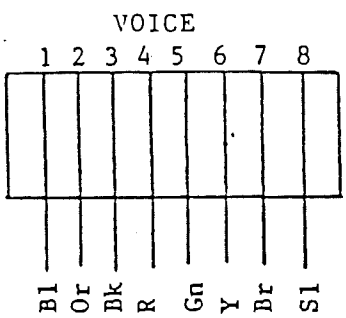
A.T&T JACK 106 BFD

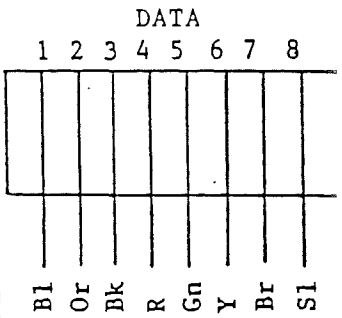
FLUSH: REQUIRES A STANDARD ELECTRICAL BOX

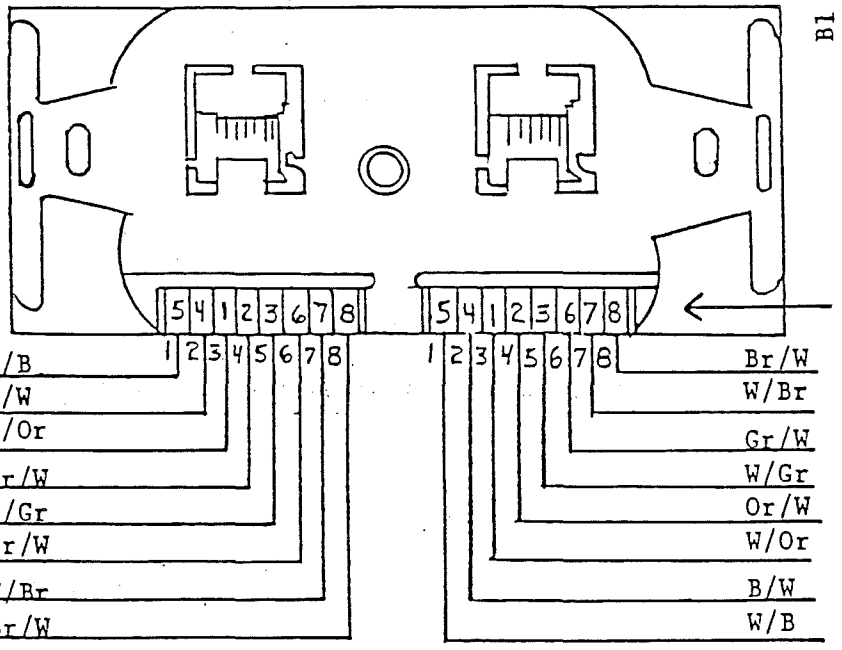
NON-FLUSH: REQUIRES A WIREMOLD BOX 2347

BOTH: REQUIRE AN ELECTRICAL DUPLEX FACEPLATE







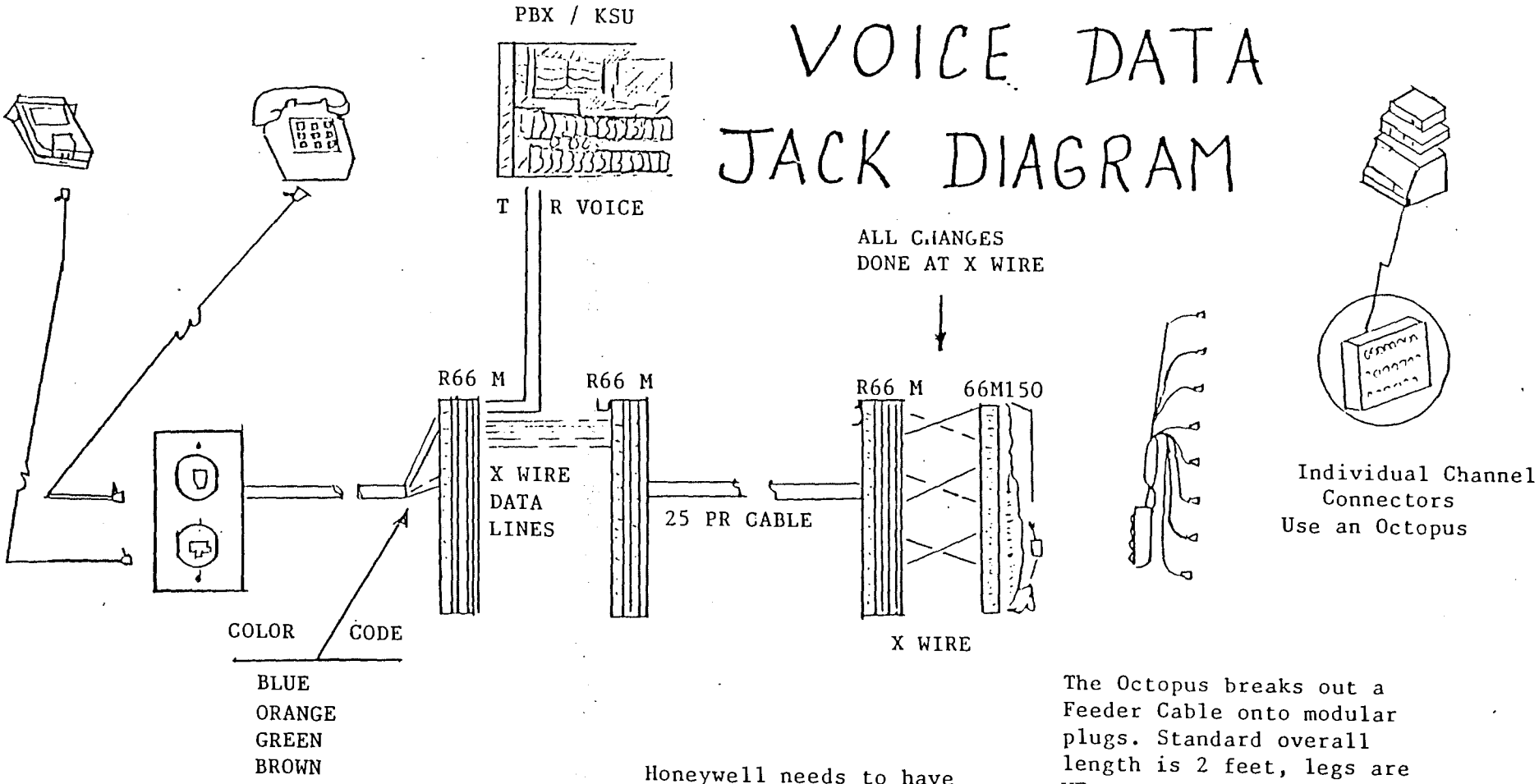


DATA
4 pair
twisted cable
24 ga.

VOICE
4 pair
twisted cabl
24 ga.

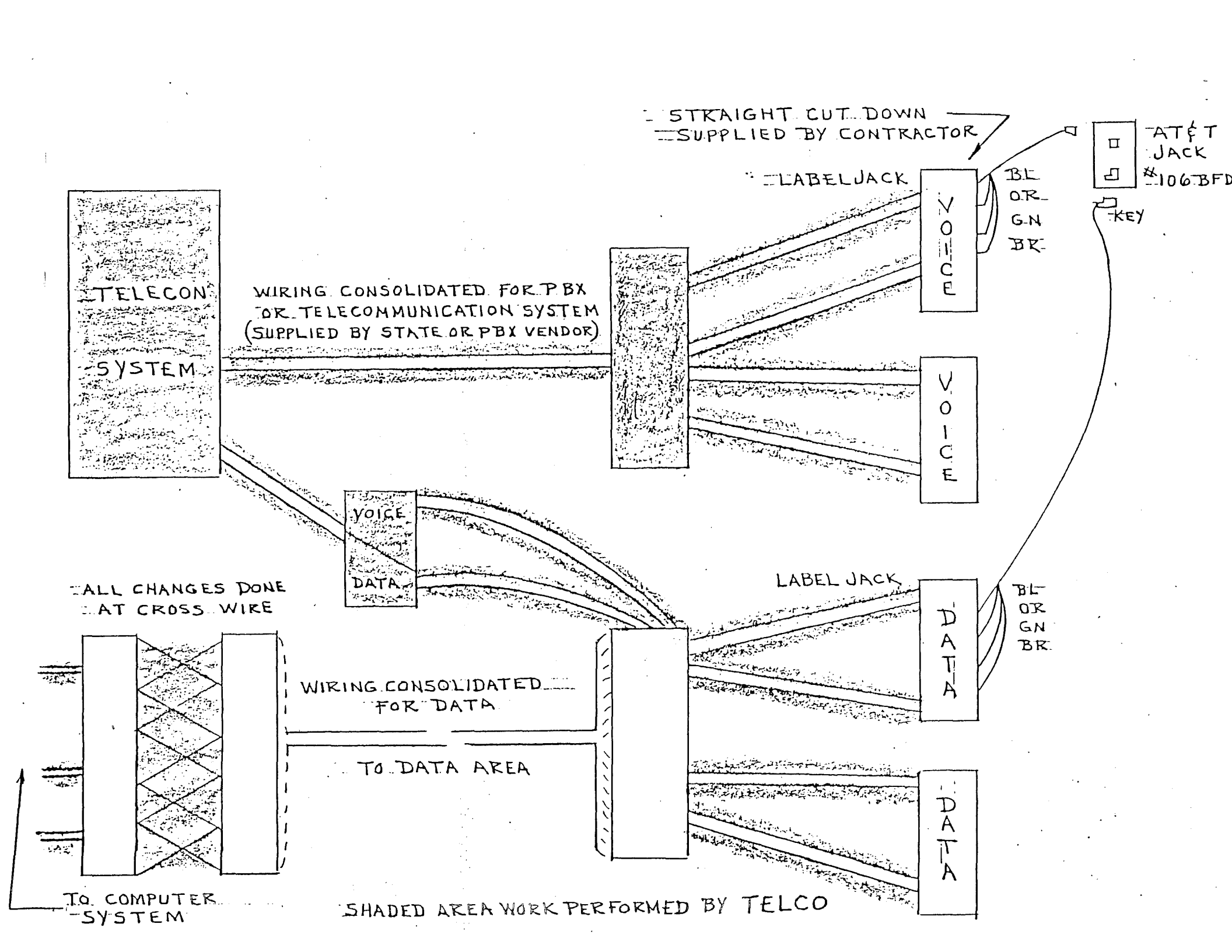
AS MARKED	T & R	CABLE COLOR	PIN #
1. White/Blue	T 1	White/Blue	5
2. Blue	R 1	Blue/White	4
3. White	T 2	White/Orange	1
4. Yellow	R 2	Orange/White	2
5. Red	T 3	White/Green	3
6. Black	R 3	Green/White	6
7. White/Brown	T 4	White/Brown	7
8. Brown	R 4	Brown/White	8

VOICE DATA JACK DIAGRAM



Honeywell needs to have the 3rd pair reversed. Change X Wire between R66 M and 66M150 only!

The Octopus breaks out a Feeder Cable onto modular plugs. Standard overall length is 2 feet, legs are WE type modular cord. Standard 50-position sex is Male Plug. Number (#) of plugs and modular Polarisation and Sequence as noted.


STRAIGHT CUT DOWN
SUPPLIED BY CONTRACTOR
LABEL JACK
AT&T JACK #106 BFD
KEY
BL OR GN BR
TELECON SYSTEM
WIRING CONSOLIDATED FOR PBX OR TELECOMMUNICATION SYSTEM (SUPPLIED BY STATE OR PBX VENDOR)
VOICE
VOICE
VOICE
DATA
ALL CHANGES DONE AT CROSS WIRE
LABEL JACK
BL OR GN BR
DATA
WIRING CONSOLIDATED FOR DATA
TO DATA AREA
DATA
TO COMPUTER SYSTEM
SHADED AREA WORK PERFORMED BY TELCO

SECTION _____ CABLE TELEVISION

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to complete the cable television work in accordance with the drawings and these specifications.

B. Entrance

The entrance to the premises will be at a point mutually agreeable to the owner and the local cable TV company or if the signal is to be provided by antenna arrangements, than in accordance with the general architectural plans showing that point closest to the installation of the receiving devices.

C. Conduit

From the property line closest to the cable TV company facilities or the antenna location, there shall be a conduit buried at a minimum depth of 24" using two inch (2") schedule 40 PVC pipe. Should the antenna location be on top of the building, then a conduit shall be installed from the base of the location. In all cases, the entrance should parallel the telecommunications conduits if possible.

D. Run

Entrance conduits shall only be permitted to have "long sweep" elbows and not over two 90° elbows in any 200 foot section. Entrance conduits shall be continuous into the telecommunications switch room (demarkation point). If the total "run" of the entrance coax cable exceeds 250 feet, then a pull box of sufficient size to accommodate the coax cable shall be mounted at the nearest point of entry, inside the building.

E. Cable

The Cable Television coaxial cable shall be appropriately sized and shall have the proper ohm rating, designed for underground usage. The coax and the labor to install it shall be provided in this proposal.

F. Location

Entrance conduit may enter the switch room from either below the floor or through the ceiling. In either case, appropriate bushings shall be used in the open ends of the conduit to assure a smooth edge against the coax, and shall be properly sealed on both ends to assure no leakage or penetration of water into the switch room after the coax is in place.

1. Entrance of the conduit into the switch room should be in a corner location, allowing a left to right connection to branch extensions, onto a backboard provided. This entrance and the location of the backboard shall be on a wall location other than those used for telecommunications, twisted pair cross connections.

G. Backboard

The backboard shall be of the same construction, affixed to the walls, and painted in the same manner as those required in the switchroom section.

H. Other Runs

Conduit runs carrying coaxial cables to other areas shall exit the switchroom via a sleeved conduit(s) (in the same general area as the entrance coax) which shall be sealed in the same manner as the end of the telecommunications entrance conduit(s).

1. Coaxial cable runs to terminal locations shall either be placed in conduit or the coaxial cable itself shall be fire rated CMP. Cable terminations shall be in a standard electrical box, with soldered connections to a female connector mounted in an electrical box cover made or modified for this purpose.

Identification

All cables shall be marked at the switchroom end to identify the cable termination point. The cables shall not be "cut down" or connected, but shall be left with sufficient length to be affixed to the backboard and properly connected to junction terminals and boosters (supplied by others) as required.

SECTION _____ PAGING SYSTEM

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to complete the Paging System work in accordance with the drawings and these specifications.

B. Speakers

All speaker units shall be listed equipment and installed in accordance with the manufacturers recommendations. Units shall be installed so as to grant access to the wiring connections should the need arise.

C. Wiring

There shall be a four pair, 24 gauge, twisted pair cable to each unit from the switch room or the nearest wiring closet. All wiring, not in conduit, must be fire rated or CMP labeled.

D. Identification

One end of the cables should be "made up" or affixed to the speaker unit, while the other end shall be curled up and marked in the switch room or wiring closet in such quantities as to allow easy connectability to the telecommunications system on the backboard.

SECTION _____ VIDEO REQUIREMENTS -

NO REQUIREMENTS FOR THIS PROJECT

SECTION _____ MECHANICAL EQUIPMENT

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to complete the Mechanical Equipment work in accordance with the drawings and these specifications.

B. Air Conditioning

There shall be a forced air conditioning and ventilation system in the switch room. Should the building system be sized and operated to assure adequate ventilation and air conditioning as required by the PBX specifications, on a continuous 24 hour per day operation, then separate feed and return air ducts shall be ducted into and exit from the switch room. All mechanical equipment shall be listed and certified as to its use and application in this instance and for this specific use. There shall be labeled fire dampers installed in all ductwork with a certified fire closing link fuse or other device designed to close off the air flow.

1. Should the design call for an independent, dedicated air conditioning unit for the switch room, then such a unit shall be provided. The unit provided shall be of a recognized, listed brand designed for such an application and shall be installed in such fashion as to prevent any possible leakage of water into the switch room. Therefore, if a water cooled unit is provided, it shall be installed outside the switch room. Should an air cooled unit be provided, it may be installed within the switch room in a location not directly over the PBX or backboard locations.

C. Wiring

All wiring, circuitry and electrical components shall be UL approved and installed in accordance with all codes.

D. Circuit Breakers

All electrical circuits utilized shall be backed by a circuit breaker of sufficient size to support the installation and shall be located in the proprietary electrical cabinet described in the Switchroom section.

SECTION _____ REMOVAL OF OLD CABLE AND FACILITIES

A. General

Execute all removal of old telecommunications cable, conduits, racks and other facilities presently existing within the premises and not reused in any new installation, in accordance with the drawings and these specifications.

B. Inspection

The Contractor shall inspect existing conditions with the State of Maine, Telecommunications Division to assure first hand knowledge as to what is to be removed and which existing conduits, cables, etc., shall be reused.

C. Removal

Removal shall consist of cutting or otherwise disconnecting all wiring and/or cabling and removal of such by pulling out of conduits, raceways, over ceilings, in crawl spaces or wall cavities, removing surface wiring or cable and any fastening devices wherever possible. Should wiring and/or cables be currently installed in walls, floors or ceilings such as to make it impossible to remove, then such wire and/or cable shall be cut as close to the surface as possible and the cut ends taped to prevent accidental reuse, and shall be pushed inside the structure to allow patching and refurnishing of the remaining holes. In all cases, removal of telecommunications facilities shall be accomplished in such a manner as to allow for a clean, clear surface to remain which can be patched, restored and painted to match the surrounding conditions without degradation to the premises.

All removed items shall be removed from the premises in accordance with the general provisions regarding this project or as the Architect/Engineer shall dictate.

SECTION _____ CUTTING AND PATCHING

A. General

Execute cutting, fitting, and patching (including excavation and backfill if needed) and furnish all labor, materials, equipment, supplies, temporary barricades, covers for equipment/furnishings and perform all operations necessary to complete the telecommunications project in accordance with the drawings and these specifications.

B. Inspection

The contractor shall inspect conditions, including any and all elements subject to damage, movement, disruption or safety requirements during cutting and patching operations.

C. Acceptance

The commencement of cutting or patching means the contractor has accepted existing conditions.

D. Protection

Contractor shall provide supports, temporary barricades, covers, or other protective devices to assure protection of other portions of the project from direct, indirect or incidental damage.

E. Restoration

All restoration work will be accomplished with new materials by the crews or work forces performing the original work on this project, whenever possible.

F. Cutting

All cutting of rigid materials shall be accomplished using metal, wood cutting or masonry saws or core drills. Pneumatic tools shall not be used in occupied buildings without prior approval of the owner.

G. Corrosive Materials

Whenever conduits, piping or wiring traverses through walls and cannot be closed securely for reasons of expansion or contraction, pipe collars shall be used to close the opening as much as possible against dust, dirt and other corrosive materials or for cosmetic purposes.

H. Finish

All finish work shall be smoothed, sanded, fitted and painted or finished to assure a cosmetically acceptable, finished product.

I. Exterior

Any exterior trenching shall be backfilled, tamped, and covered to match the preexisting conditions (i.e., gravel, crushed stone, hot top, cement sidewalk, loam and sod, etc.).

SECTION _____ TEMPORARY UTILITIES

A. General

Furnish all labor, materials, equipment, supplies and perform all operations necessary to provide temporary heat, lighting and power for any telecommunications activities deemed needed by the Architect, Engineer, Owner or Lessee, prior to the completion and acceptance of the project.

B. Supervision

The contractor shall allow Owner or Lessee supervised telecommunications installers, technicians or service personnel including telecommunications contractor(s) under contract to the Owner or Lessee to enter the premises and to perform required telecommunications installations, repairs, modifications, etc.

C. Temporary Measures

All telecommunications activities performed under this section shall be provided with temporary heat and toilet facilities as deliverable and available to the balance of the project, as well as temporary lighting and power outlets as required to accomplish their tasks.

D. Coordination

Telecommunications contractors and personnel under control of the Owner or Lessee shall coordinate all activities and hours of working with the contractor or subcontractor responsible for the completion of the telecommunications portion of this project.

E. Protection

The contractor shall take all steps required to secure and protect telecommunications equipment, supplies and tools placed in the premises and not part of this contract. Such protection shall include, but is not necessarily limited to, security, temporary covers, barricades, heat, etc.

SECTION _____ PAINTING AND CLEANUP

A. General

Furnish all labor materials, equipment, supplies and perform all operations necessary to complete the painting and cleanup of all telecommunications activities in accordance with the drawings and these specifications.

B. Coordination

The contractor shall coordinate with the general contractor for the entire project or premises to assure completion of all work in accordance with these plans and specifications.

C. Painting

Final painting shall be accomplished with color selection being determined either by requirements to match existing work or as directed by the contractor/subcontractor responsible for painting and interior finish work for the entire project.

D. Rubbish Removal

At the completion of the telecommunications work, all scrap materials, broken or discarded construction materials, boxes, cartons, scrap wire/cable, empty containers, temporary barricades, safety devices, temporary utility connections, etc. shall be removed from the premises or placed at the direction of the general contractor responsible for the total project.

E. Cleanup

All areas involved in the scope of the telecommunications plans and specifications shall be swept clean, mopped down and floor finish applied, if required. All hand smudges, paint droppings or other noticeable defects which would affect the cosmetic appearance of the project shall be corrected to the satisfaction of the general contractor, and the architect/engineer on the project.

62-1981R

TABLE 3

OUTDOOR AIR REQUIREMENTS FOR VENTILATION*

3.1 COMMERCIAL FACILITIES (offices, stores, shops, hotels, sports facilities)

APPLICATION	Estimate Max. occ. p/1000 ft2	Outdoor Air Requirements cfm/ person	l/s/ person	cfm/ ft^2	l/s/ m^2	Comments
Dry Cleaners Laundries						Dry cleaning processes may require more air.
Commerc. laundry	10	25	13			
Commerc. Dry Cl.	30	30	15			
Storage, pick-up	30	35	18			
Coin-op laundries	20	15	8			
Coin-op Dry Clean.	20	15	8			
Food & Bev. Service						
Dining Rooms	70	20	10			
Cafet. Fast Food	100	20	10			
Bars, Cockt. Lnge.	100	30	15			Supplementary smoke removal equipment may be required.
Kitchens (cooking)	20	15	8			Makeup air for hood exhaust may require more ventilating air.
						The sum of the outdoor air and transfer air of acceptable quali from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 cfm/ft^2 (7.5 L/s · m^2).
Garages, Repair Service Stations						
Encl. parking garage				1.50	7.50	Distribution among people must consider worker location and concentration of running engines; stands where engines are run must incorporate systems for positive engine exhaust withdrawal.
Auto Repair Rooms				1.50	7.50	
Hotels, Motels, Resorts Dormitories						See also food & beverage service, merchandising, barber & beauty shops, garages.
Dormitory sleeping areas	20	15	8			
Bedrooms cfm/room		30	15			Independent of room size.
Living rm cfm/room		30	15			
Baths cfm/room		35	18			Independent of room size; Installed capacity for intermittent use.
Lobbies	30	15	8			
Conference rms.	50	20	10			
Assembly rms.	120	15	8			
Gambling Casinos	120	30	15			Supplementary smoke removal equipment may be required.
Offices						
Office space	7	20	10			
Reception areas	60	15	8			Supplementary smoke removal equipment may be required.
Telecommunication centers & data entry areas	60	20	10			
Conference rooms	50	20	10			

* Table 3 prescribes supply rates of outdoor air required for acceptable indoor air quality. These values have been chosen to control CO_2 and other contaminants with an adequate margin of safety, and to account for health variations among people, varied activity levels and a moderate amount of smoking.

62-1981R

TABLE 3

OUTDOOR AIR REQUIREMENTS FOR VENTILATION

3.1 COMMERCIAL FACILITIES (OFFICES, STORES, SHOPS, HOTELS, SPORTS FACILITIES)

APPLICATION	Estimate Max. occ. p/1000 ft²	Outdoor Air Requirements cfm/ person	l/s/ person	cfm/ ft²	l/s/ m²	Comments
Public Spaces						
Corridors & Util.				0.05	0.25	
Public Restrooms cfm/ wc or urinal		50	25			
Locker & Dressing Rooms				0.05	0.25	
Smoking Lounge	70	60	30			
Retail Stores						
Sales Floors & Show room floors						
Basement & Street	30			0.30	1.50	
Upper fire	20			0.20	1.00	
Storage rms	15			0.15	0.75	
Dressing rms				0.20	1.00	
Malls & Arcades	20			0.20	1.00	
Shipp. & Rec.	10			0.15	0.75	
Warehouses	5			0.05	0.25	
Elevators				1.00	5.00	
Smoking Lounge	70	60	30			
Specialty shops						
Barber	25	15	8			
Beauty	25	25	13			
Reducing Salons	20	15	8			
Florists	8	15	8			Ventilation to optimize plant growth may dictate requirements.
Clothiers, Furniture				0.30	1.50	
Hardware, Drugs, Fabric	8	15	8			
Supermarkets	8	15	8			
Pet Shops				1.00	5.00	
Sports & Amusement						
Spectator areas	150	15	8			When internal combustion engines are operated for maintenance of playing surfaces, increased ventilation rates may be required.
Game Rooms	70	25	13			
Ice Arenas				0.50	2.50	
Swimming Pools				0.50	2.50	Higher values may be required for humidity control.
Playing Floors (Gymnasium)	30	20	10			
Ballrooms & Discos	100	25	13			
Bowling Alleys (seating areas)	70	25	13			
Theaters						
Ticket Booths	60	20	10			Special ventilation will be needed to eliminate special stage effects (e.g. dry ice vapors, mists, etc.)
Lobbies	150	20	10			
Auditorium	150	15	8			
Stages, Studios	70	15	5			
Transportation						
Waiting Rooms	100	15	8			Ventilation within vehicles may require special consideration.
Platforms	100	15	8			
Vehicles	150	15	8			

62-1981R

TABLE 3

OUTDOOR AIR REQUIREMENTS FOR VENTILATION

3.1 COMMERCIAL FACILITIES (OFFICES, STORES, SHOPS, HOTELS, SPORTS FACILITIES)

APPLICATION	Estimate Max. occ. p/1000 ft²	Outdoor Air Requirements cfm/ person	l/s/ person	cfm/ ft²	l/s/ m²	Comments
Workrooms						
Meat Processing	10	15	8			Spaces maintained at low temperatures (-10F to +30F, or -23°C to +10°C) are not covered by these requirements unless the occupancy is continuous. Ventilation from adjoining spaces is permissible. When the occupancy is intermittent, infiltration will normally exceed the ventilation requirement. (See Ref. 18)
Photo Studios	10	15	8			
Darkrooms	10			0.50	2.50	
Pharmacy	20	15	8			
Bank Vaults	5	15	8			
Duplicating Printing				0.50	2.50	Installed equipment must incorporate positive exhaust & control (as required) of undesirable contaminants (toxic or otherwise).
Education						
Classroom	50	15	8			
Laboratories	30	20	10			Special containment control systems may be required for processes functions including laboratory animal occupancy.
Training Shop	30	20	10			
Music Rooms	50	15	8			
Libraries	20	15	8			
Locker Rooms				0.50	2.50	
Corridors				0.10	0.50	
Auditoriums	150	15	8			
Smoking Lounges	70	60				

62-1981R

TABLE 3

OUTDOOR AIR REQUIREMENTS FOR VENTILATION
5.2 INSTITUTIONAL FACILITIES (HOSPITALS, NURSING HOMES, CORRECTIONAL FACILITIES)

APPLICATION	Estimate Max. occ. p/1000 ft^2	Outdoor Air Requirements cfm/ person	l/s/ person	cfm/ ft^2	l/s/ m^2	Comments
Hospitals, Nursing & Convalescent Homes						Special requirements or codes & pressure relationships may determine minimum ventilation rates and filter efficiency.
Patient Rooms	10	25	13			
Medical Procedure	20	15	8			
Operating Rooms	20	30	15			Procedures generating contaminants may require higher rates
Recovery & ICU	20	15	8			
Autopsy rms				0.50	2.50	Air shall not be recirculated into other spaces
Physical Therapy	20	15	8			
Correctional Facilities						
Cells	20	20	10			
Dining Halls	100	15	8			
Guard Stations	40	15	8			

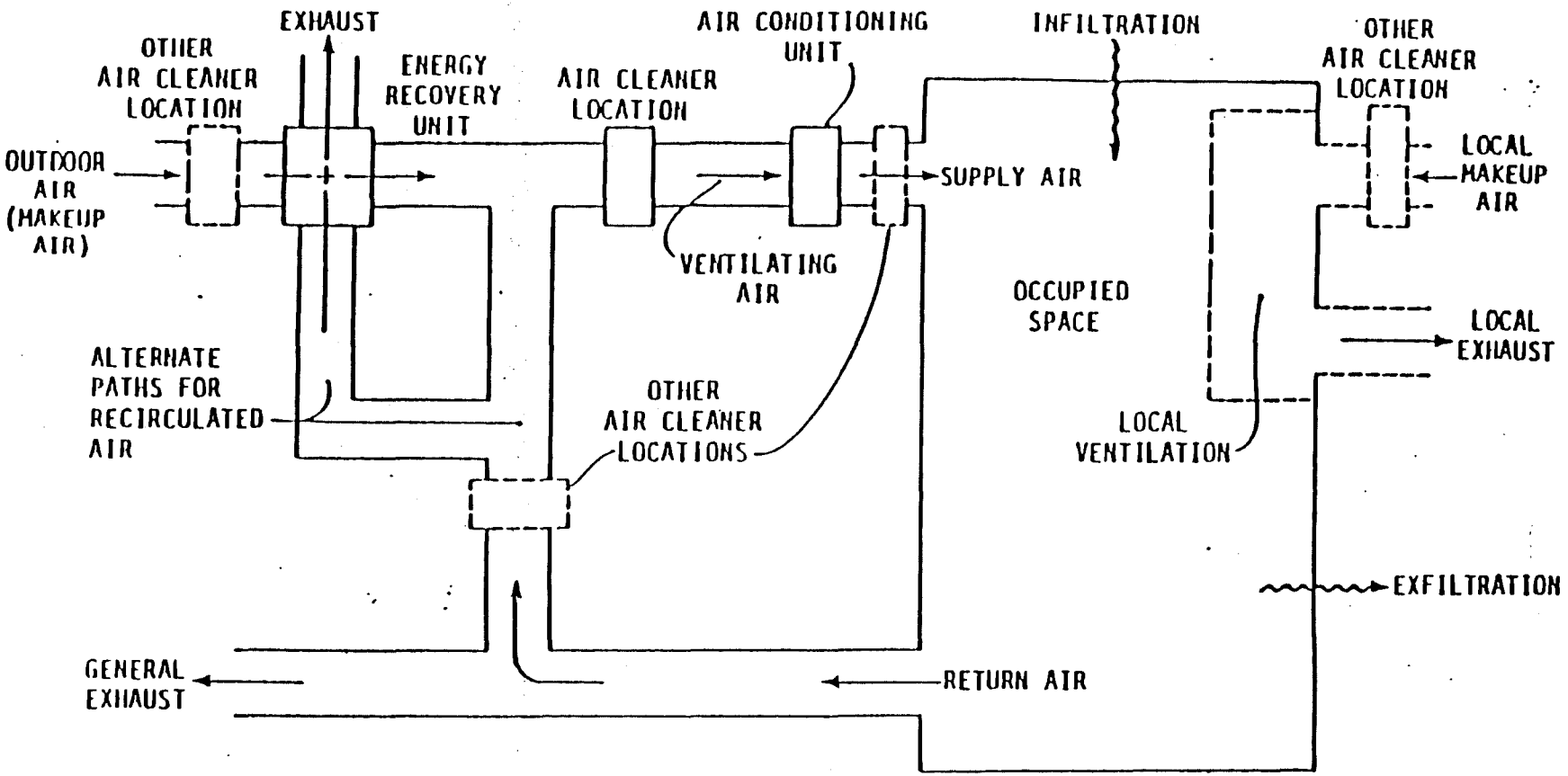


Figure 1. Ventilation System

62-1981R