UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

DESCRIPTION AND OUTLINE SPECIFICATIONS

PHARMACY - NURSING FACILITY, UNIT F

1 NOVEMBER 1977

THE ARCHITECTS COLLABORATIVE, INC.
HEALTH SCIENCES ARCHITECTS AND ENGINEERS, INC.

CONSULTANTS:
PLANNING - HOSKINS SCOTT TAYLOR AND PARTNERS, INC.
STRUCTURAL - JOHNSTON AND SAHLMAN COMPANY, INC.
ELEVATORS - LERCH BATES AND ASSOCIATES INC.

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INTRODUCTION

The material is arranged in sections consistent with the cost format, reflecting the primary parts of the building system. In general each section consists of an overall description of the systems involved followed by a more detailed outline specification. Since the material is in various stages of development and taken from more than one source we have allowed some deviations from this general format.

Basic building systems, diagrams and descriptions are included in the Appendix to give additional information on the building components.

Also included are equipment and room elevation drawings which are keyed back to the drawing set. This description and outline specification and the 18" x 24" design development drawing set are the basis for all further contract document preparation work by the Architects and Engineers. All users are to make a final review of these drawings and specifications and file written lists of final desired changes.

The cost estimate will be prepared during the month of November and will be based upon these drawings and specifications and the cost models established by the bidding of past units (A,B-C and K-E). Modifications may have to be made to the design to bring the estimated cost down within budget limits.

Final Group II Equipment Lists must be prepared during November. These lists will identify the assumed equipment by room and on a separate sheet identify characteristics required by the architect-engineer team for design purposes. It is further assumed that the lists will identify anticipated costs for the equipment to help in establishing a group II equipment cost figure.

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPENSION

INDEX A

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

GENERAL B

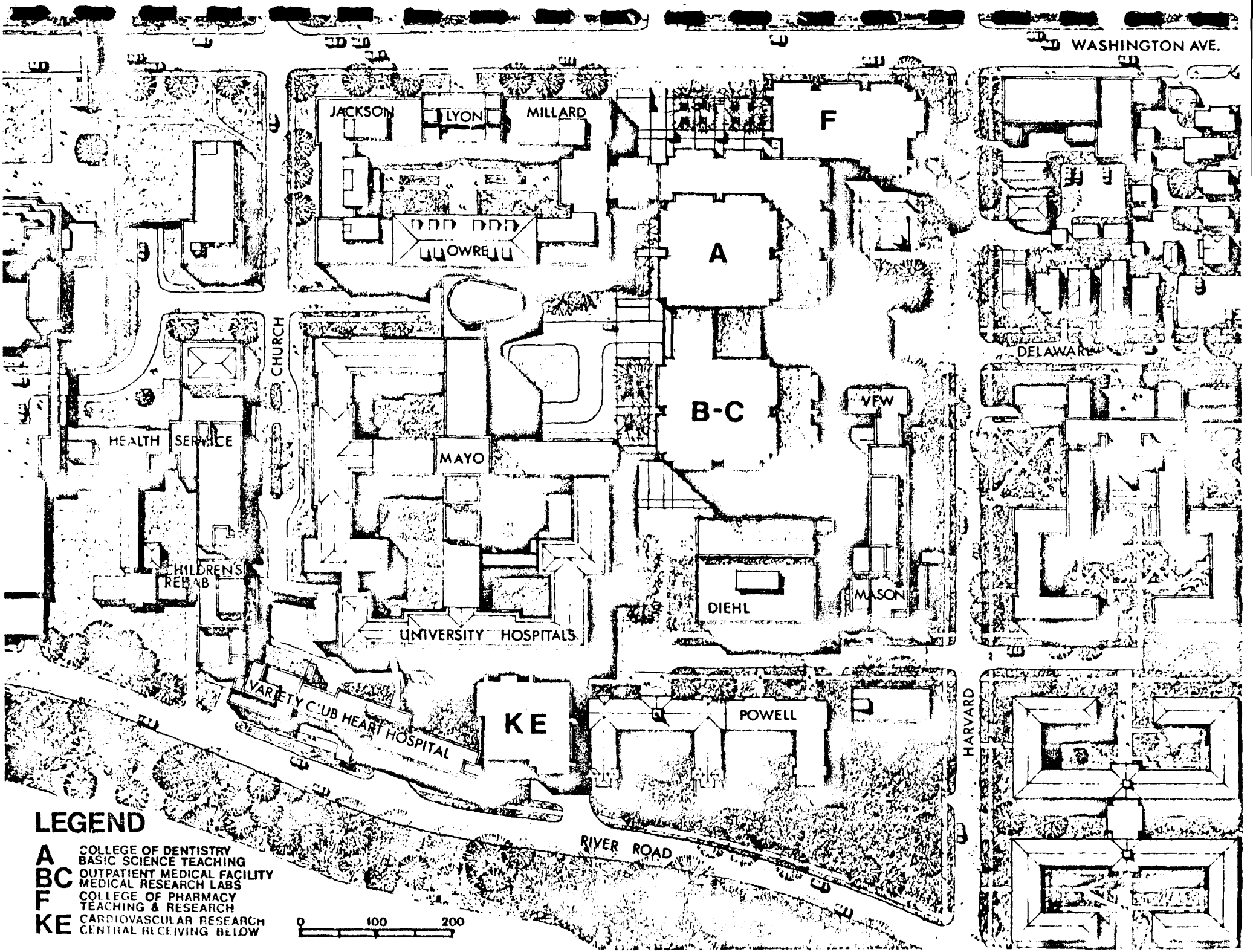
GENERAL

The proposed building system is specifically designed to accommodate the broad range of functions initially required in a health science facility, as well as subsequent changes which will occur to both the space and environmental services.

To accomplish this a 12' - 4" two-way grid is projected over the building site. In each sixth square is placed a riser containing mechanical services. Columns are located at the corners of the mechanical risers and in the E/W direction, midway between the risers. The remaining space is spanned with a 3' - 4" deep structure consisting of girders and long span trusses through which mechanical services are distributed horizontally. The bottom surface of the plane consists of a suspended lighting/ceiling system to which light-weight partitions may be secured. Walls, general mechanical services and casework can be moved with a minimum of cost and inconvenience to the user.

More detailed descriptions of the systems can be found in the sections which follow.

Construction will conform to the requirements of local and national building ordinances where applicable and to the University of Minnesota Standards for Construction.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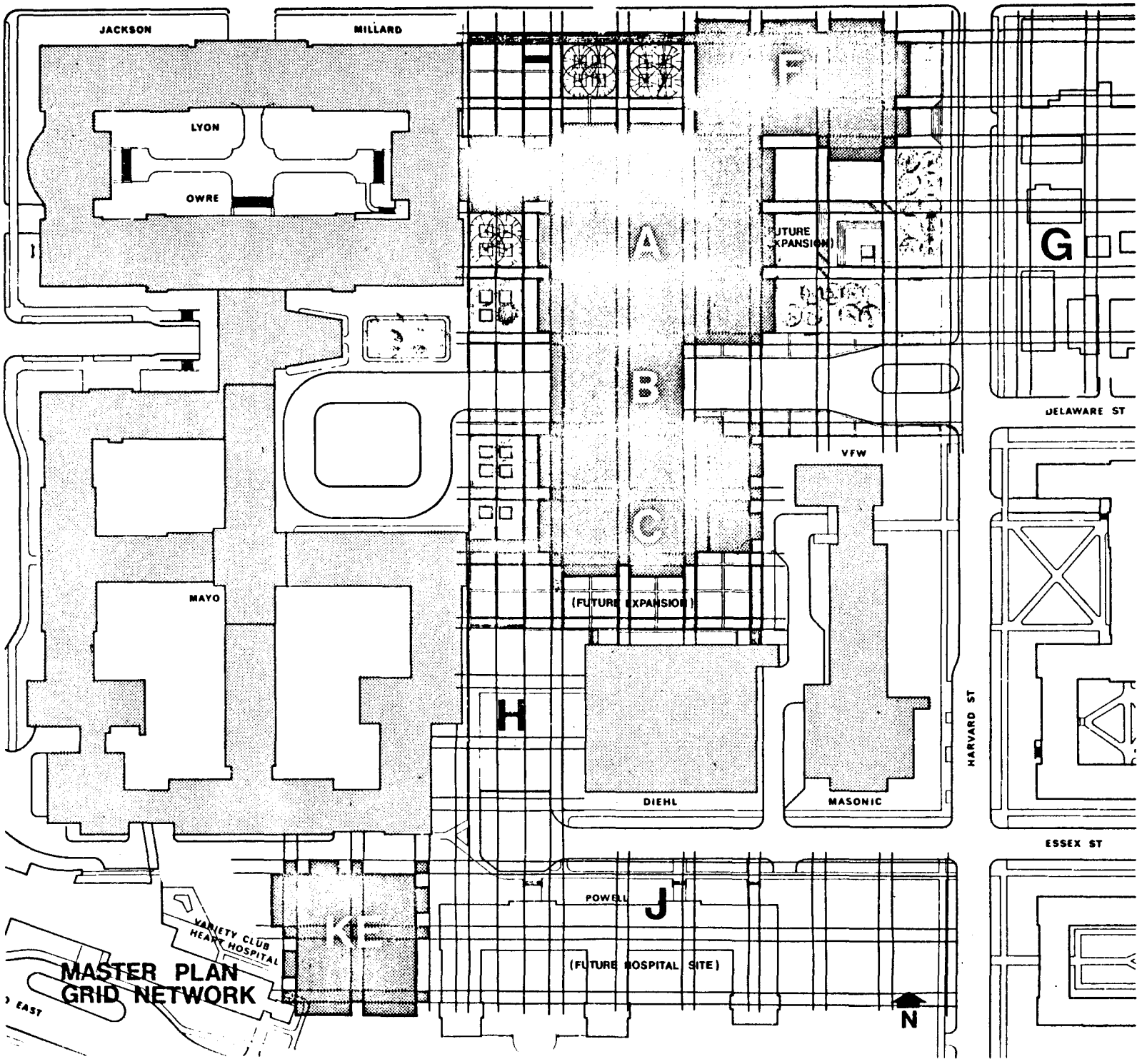
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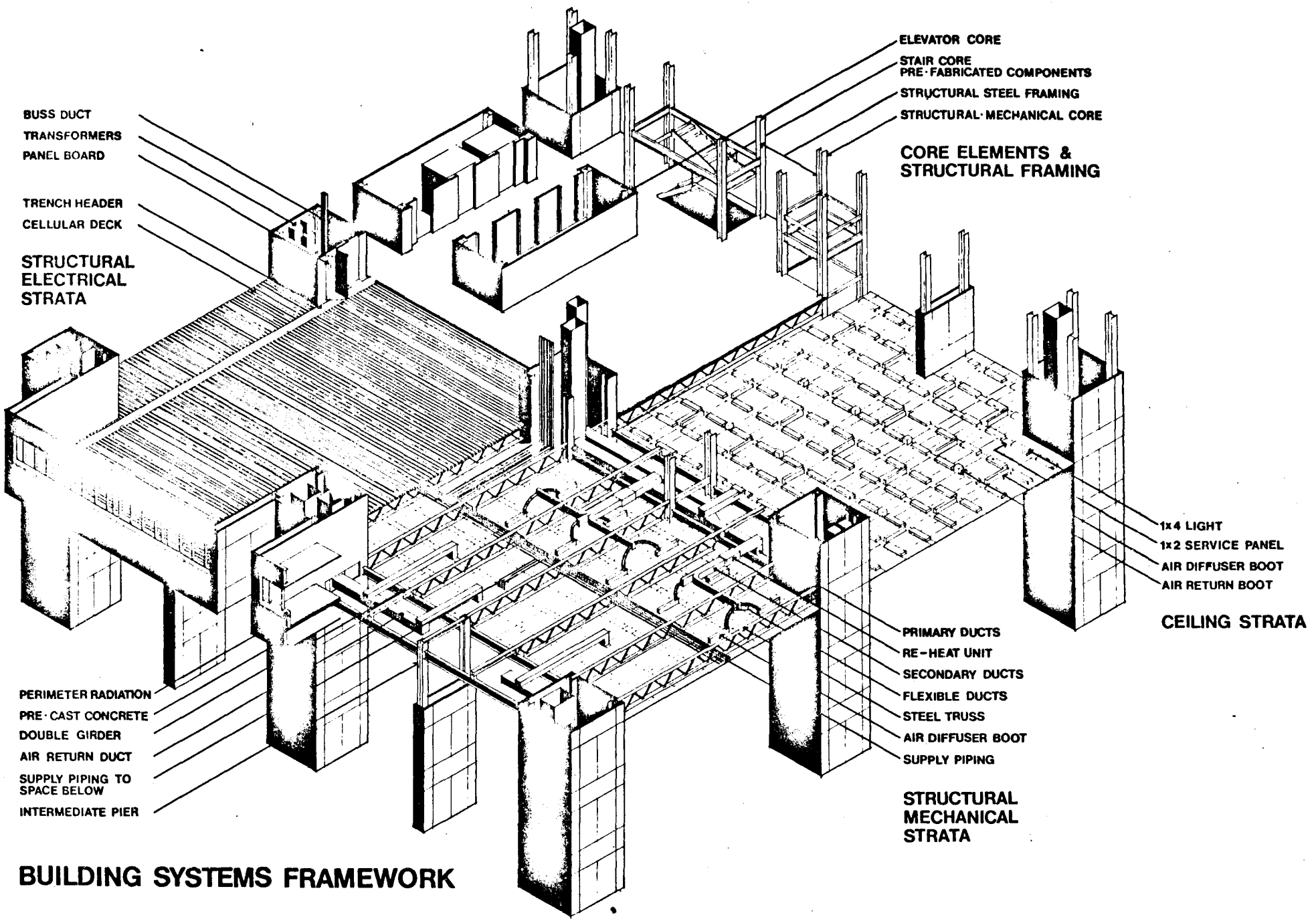
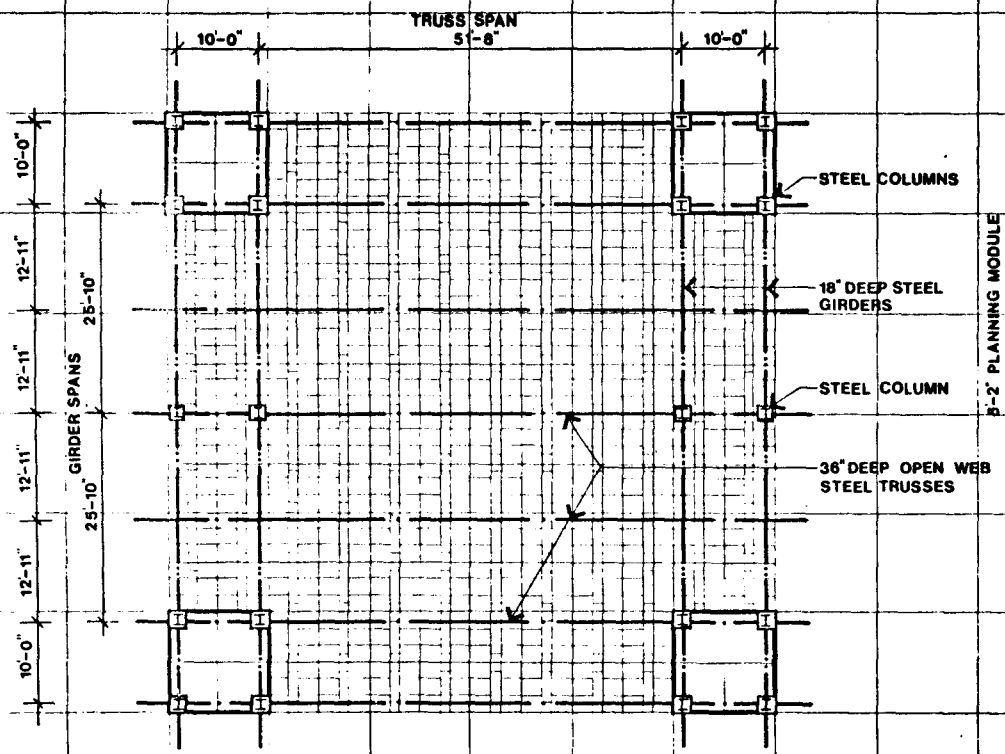
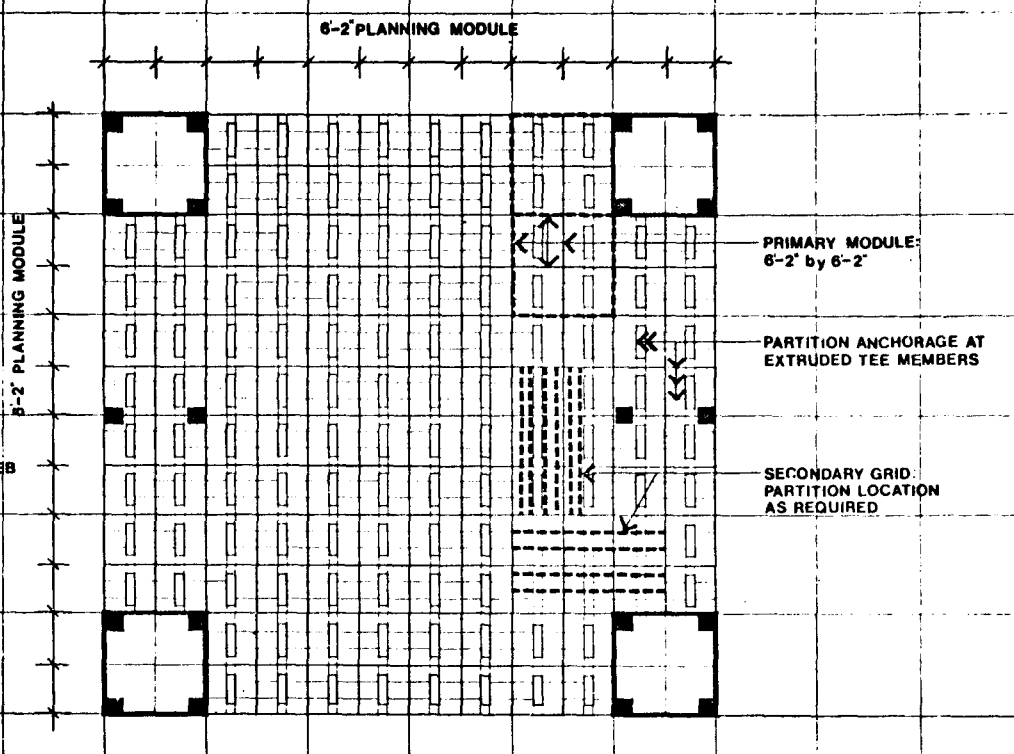


BUILDING SYSTEMS FRAMEWORK



STRUCTURAL GRID



PLANNING GRID

FOR MODULAR OR NON-MODULAR FUNCTIONS

DIMENSIONAL CHARACTERISTICS

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

SUBSTRUCTURE C

SUBSTRUCTURE

1. GENERAL

The natural soils and limestone bedrock occuring at the site have been investigated by soil borings, rock corings, and laboratory testing of samples.

Permissible design loadings for spread footings bearing on the natural soils below the first and second floors have been determined as 8000 psf and 5000 psf respectively.

For foundations bearing directly on the solid limestone bedrock, design loadings of 50 to 75 tons per square foot of area are recommended.

2. FOUNDATIONS FOR COLUMNS

All columns for Unit F will extend to bedrock except those which bear on existing Unit A columns west of Grid E-18.

3. FOUNDATION WALLS

Foundation walls below grade shall be reinforced concrete, designed to resist the lateral earth pressure loads and by encasement of the building columns, to resist lateral wind pressure loads on the structure.

Knockout panels will be provided along South wall to accommodate future expansion below grade. The future assumed function will be auditoria and classroom facilities.

4. CODES USED FOR DESIGN

a. Minnesota Building Code 1976
b. Uniform Building Code 1976
c. American Concrete Institutes "Standard Building Code Requirements for Reinforced Concrete" 1971
d. Concrete Reinforcing Steel Institute "Manual of Standard Practice for Reinforced Concrete Construction" 1973

5. MATERIALS

a. Concrete (regular weight) - f'_c = 4000 psi minimum compressive strength at 28 days of age.

b. Reinforcing Steel - Billet steel, ASTM-A615, Grade 60.

SUPERSTRUCTURE D

SUPERSTRUCTURE

1. GENERAL

Typical floor slab construction is a composite cellular steel deck with a lightweight concrete topping. The selection of this floor construction is based on the economies inherent in the lightness of the floor itself as well as the supporting steel framing and foundations. The system provides electrical raceways within the floor construction both for present and future needs and provides the required 2-hour fire rating without the need for additional fireproofing on the underside of the deck.

"Regular Weight" concrete floor slabs shall be used for mechanical equipment floors, This is necessary to provide additional load carrying strength for these floor areas as well as to produce sufficient mass to reduce vibrations in the building frame which will result from the operation of the equipment.

Two beams provide a horizontal slot at each typical floor level between the corner columns of the mechanical and electrical shafts. This "slot" creates maximum size access openings to the areas between the floor and ceiling below. The upper, and shallower, beam supports the floor and shaft walls with the lower deeper beam providing the rigid-frame action, acting with the columns to resist lateral wind loads on the building.

Open-web trusses are provided as floor supporting memebers to provide maximum flexibility for lateral distribution of the mechanical and electrical systems between the floor slab and ceiling below.

The framing of the building is designed to support future horizontal expansion one bay to the South below grade.

2. DESIGN LOADS

a. Live loads:

1. Mechanical equipment room floors - 150 psf

2. Other floors:
   1. Rooms - 80 psf (plus 20 psf for partitions)
   2. Corridors - 100 psf
   3. Auditoriums - 100 psf
   4. Stairs - 100 psf
3. Plaza areas over occupied spaces - 250 psf
4. Sidewalks over occupied spaces - 300 psf
5. Roofs - 40 psf

b. Lateral Wind Loads:

Height Zone Above Grade (feet)	Wind Pressure (PSF)
0- 50	20
50-100	25
Above 100	30

3. STRUCTURAL DESIGNS

a. Floors, Roofs and Plaza

Floor construction for the first and tenth floors shall be a 6-1/4" thick reinforced concrete slab supported on structural steel beams and open-web trusses. Partial floor areas at eighth and ninth floors to be the same.
Floor construction for all other floors and roofs shall be a 3" deep composite cellular steel deck with a 3-1/4" thick lightweight concrete topping supported on structural steel beams and open-web trusses.

The Plaza construction over occupied spaces shall be framed with structural steel beams supporting a 6-1/4" thick reinforced concrete slab.

b. Columns

Columns supporting the structure shall be structural steel wide-flange sections.

c. Wind Resistance

Resistance to wind shall be provided within the building construction by rigid-frame action along the lines of the structural steel columns, beams and trusses aligning with corners of the mechanical and electrical vertical shafts.

4. FIREPROOFING

Fireratings of 4 hours for columns and 2 hours for floor construction are required.

The cellular floor deck with lightweight concrete topping fulfills this requirement.

In general, the steel beams and columns will be sprayed with a cementitious fiber to attain the required ratings. Concrete encasement, plaster or masonry fireproofing shall be provided in areas where the use of sprayed-on fireproofing is not practicable or economical.

5. CODES USED FOR DESIGNS

a. American Institute of Steel Construction's "Manual of Steel Construction." 1969

b. American Concrete Institute's "Standard Building Code Requirements for Reinforced Concrete." 1971

c. Minnesota Building Code 1976

d. Uniform Building Code 1976

e. American Iron and Steel Institute's "Code for Design of Light Gauge Steel Structural Members." 1962

f. Concrete Reinforcing Steel Institute's "Manual of Standard Practice for Reinforced Concrete Construction." 1973

6. MATERIALS

a. Regular weight concrete - fc' = 4000 psi minimum compressive strength at 28 days of age.

b. Lightweight concrete - fc' = 3000 psi minimum compressive strength at 28 days of age and weighing not more than 110 lbs./cubic foot.

c. Concrete reinforcing steel - Billet steel, ASTM-A615, Grade 60.

d. Structural Steel - Fy = 50,000 psi, ASTM-A572.

e. Cellular steel deck - 3" deep section with deformations in hat sections to provide composite action with the lightweight concrete topping.

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

ELEVATORS E

ELEVATORS

1. GENERAL

The elevator grouping in the building consists of four elevators three of which provide primary vertical transportation for graduate students, faculty, and staff between Floors 1 and 9 and which also provide secondary vertical transportation for undergraduate students between Floors 1 and 4. Primary vertical transportation for undergraduate students has been accounted for by organizing all major undergraduate functions so that they are located no more than one floor above or below grade, and are connected by an open stairway within the elevator lobby. In addition an enclosed stairway connects to Floor 1 and up to Floor 5.

The Fourth elevator is a combined freight/passenger which shall service all floors from B to 10. This elevator will ebe used for freight traffic during off-peak demand periods and will generally be available for passenger use when needed.

2. PUBLIC ELEVATORS

3 elevators, 3500# capacity @ 500 F.P.M.

These elevators hall ave 3-6 bi-parting doors to facilitate the entry and exit of wheel chairs and carts.

3. FREIGHT/PASSENGER ELEVATOR

1 elevator, 4500# capacity @ 500 F.P.M.

This elevator shall be extra large, 6'-0" x 9'-0" or 10'-0", having 4'-0" door at front and rear to facilitate the entry of large equipment as well as wheel chairs and carts.

4. The analysis of elevator needs was prepared by Lerch-Bates and Associates, Denver, Colorado. Their report indicates that the grouping of (4) elevators as shown in the drawings will provide very good service. They further state that a grouping of (3) cars with very little service/freight interference and undergraduate student loading would provide a reasonable, albeit marginal solution if funding is tight.

EXTERIOR SURFACES F

GENERAL DESCRIPTION OF EXTERIOR ENVELOPE

All the work pertaining to the following systems is included under the title of exterior surfaces: architectural precast concrete; support assemblies, protective coating, joint sealant, and spray-on insulation for the precast concrete panels; exterior architectural metal; aluminum windows and glazing; and hollow metal work with Venetian blinds, drapery tracks, and light-proof shades.

The above listed systems allow the same degree of planning flexibility that has been established by the other building systems which are used throughout the project.

ARCHITECTURAL PRECAST CONCRETE

The precast concrete is conceived as a part of the modular envelope. All main joints in the precast concrete have been made continuous. Staggering of main joints has been avoided to insure flexibility and facilitate adjustments. The main vertical joints of the precast concrete panels are coordinated with the window joints and the 12' -4" planning grid. The main horizontal joints are coordinated also with the window head joint at the suspended ceiling plane. Typical precast concrete panels are designed, as large as possible, within the limits for normal transportation and erection. Therefore, each panel covers the maximum area minimizing the amount of form work, casting, joint extension, and handling per panel.

Also, an effort has been made to keep down the amount of formwork and to standardize the types and locations of inserts and/or other metal items cast in the concrete and to take care of varying support conditions by modifying the support assemblies. Unnecessary changes in exterior texture and complicated formwork have been avoided.

SUPPORT ASSEMBLIES

The support assemblies for the precast concrete panels are designed to allow adjustments in the three planes. Dead load, bearing support assemblies transmit their loads vertically to the structure and can be adjusted micrometrically by using jack bolts; conversely, wind load forces, bearing on the panel surfaces, are transmitted horizontally to the structure and can be adjusted micrometrically also.

PROTECTIVE COATING

No protective coatings will be used for the exposed precast concrete. Experience has indicated that the surface is sufficiently dense to resist extreme weather and moisture penetration without additional coatings.

JOINT SEALANT

The proposed joint sealant shall be a non sag, two part, poly-sulfide sealant that shall be chemically compatible with adjacent surfaces. Sealant shall be gun applied. Backing material for the sealant shall be a non staining, compressible filler.

BUILDING INSULATION

The general building insulation will be bid as a system which will pit combinations of sprayed cellulose, foam plastic, polystryrene board, polyurethane foam rigid and sprayed against each other. The successfull system must provide the following thermal and physical properties:

1. Thermal Resistance (R): greater than 8.83
2. Permeance (for vapor barrier): no greater than 0.15 perm

The vapor barrier will be a sprayed-on product to a thickness required to meet the above requirement for permeance.

The proposed roof insulation will be a part of an inverted roof membrane assembly as manufactured by Dow Chemical. The insulation will be 2" of Styrofoam RM.

ARCHITECTURAL METAL

For the exterior soffits, under the cantilevers, it is proposed to use a metallic suspended ceiling system. This exterior soffit system is to be composed of aluminum strips, prepainted with an alkyd enamel. The aluminum strips are clipped on a fixed module onto panel carriers which are v-shaped and prepared to hold the panels with a snap-on-action. Aluminum snap-on closures are to be installed between the aluminum strips.

The undersides of the steel floor decks at all exterior areas, using this soffit system under the cantilevers, are to be insulated to avoid heat loss through the floors. Also, there will be closures, in the window plane, between the window head and the underside of the steel floor deck. These vertical closures are to be insulated also.

ALUMINUM WINDOWS

As stated before, the proposed window system is conceived to coordinate the window joints with the architectural precast concrete joints, both occurring

on the 12'-4" planning grid. Each typical window frame unit is 12'-4" long. Wider window openings are made up of increments of 12'-4".

The typical units have been subdivided in five sections: Two fixed lights of 1'-6-1/2" each, located at the ends; one fixed light of 3'-1", at the center; and two lockable, fully reversible units of 3'-1" each, at the intermediate points. This spacing provides the same degree of planning flexibility, for partition location, as the ceiling system provides.

After studying the window washing requirements, a decision has been made to avoid exterior window washing. Exterior rigs are very high priced, more so for this building, due to the deep recesses under the cantilevers. To have window washers in the outside, on the concrete ledge, there were several dangerous drawbacks: First the ledge is pitched to the outside and only 8" deep, and second the window is only 5'-8" high, which would force normal sized men to work in an uncomfortable position. Due to the desired planning flexibility, the proposed window is sub-divided in smaller panes than it was contemplated in the early stage of the project; therefore, all fixed panes can be washed from the inside.

Window frames are provided with thermal breaks, by using continuous neoprene gaskets, joining the inner and outer metal frames. Also, neoprene gaskets are used to hold the glass to the frames. Aluminum sections have been reduced to a minimum, mainly by eliminating aluminum beads and trim pieces.

GLAZING

It is recommended that double glazed, thermal windows be used with an insulating type glass, such as solar bronze for the exterior pane. Total thickness of the thermal pane is conceived to be 1". Since the largest typical pane is less than 5'-8" x 3'-1", glass thickness may be kept at the minimum, recommended by the manufacturer and structural consultant. As expressed above under aluminum windows, all thermal glass panes shall be held in postiion by using continuous neoprene gaskets.

HOLLOW METAL WORK

It is proposed that interior window soffits and heating coil covers be made of hollow construction, sheet steel, properly reinforced for the attachments to structural support, hardware, and grilles. To continue with the built-in flexibility provided by the previous systems, these closures have the same subdivisions as the windows, allowing partitions to be located at points where the closures are fixed and permitting access under the pivoted windows.

These closures, besides providing the necessary grille area required for the HVAC systems, are built with continuous recesses to receive vertical Venetian blind and drapery tracks. Where no blinds or draperies are required, these recesses

shall be covered with snap-on, continuous, hollow metal closures strips.

Also, part of the hollow metal work are the insulated, hollowmetal sandwich panels which abut the window frames or the glazing where interior partitions are required.

ROOFING

The recommended roofing approach will be to use the Dow Chemical IRMA System. A 3-ply-15-lb. felt membrane will be applied to a concrete filled metal deck sloped to drains. (1/8" per foot minimum). Styrofoam insulation will be layed upon the membrane and a layer of rock balast will hold the insulation in place.

G2 ARCHITECTURAL PRECAST CONCRETE

G2.01 GENERAL

.01a Work under this section consists of furnishing and installing complete, all architectural precast concrete including all metal parts for support assemblies which are welded and embedded in the precast concrete panel as shown on the drawings and herein specified.

.01b The manufacture of the architectural precast concrete shall be by a specialty subcontractor or a team of specialty subcontractors.

.01c The erection of the architectural precast concrete panels shall be by a specialty subcontractor.

.01d Architectural precast concrete shall meet requirements of SS-S-00721a Type II or Type III and shall be the product of an established subcontractor or consortium of subcontractors having capacity and facilities for producing the quantity and quality required for this project.

G2.02 WORK NOT INCLUDED

.02a All support assembly parts not cast in precast concrete and not welded thereto are specified in the miscellaneous metal section.

.02b Caulking for joints in architectural precast concrete panels is included under the work of the sealant section.

.02c Weather proofing coating for all exterior precast concrete surfaces is included under the protective coating section.

G2.03 COMPOSITION OF PANELS

.03a Based upon a thickness of one inch minimum, the facing portion of the panels shall be composed of the following materials:

aggregate and cement types, colors and quantities, and final water/cement ratio are to be selected in the future by the architects-engineers

.03b Aggregates shall be evenly distributed and shall occupy no less than 85% of the total exposed aggregate areas.

G2.03c Back-up portion shall consist of local aggregate to be selected by architects-engineers, meeting the same specific gravity and hardness test of ASTM C-330 and grey cement.

.03d Water/cement ratio shall not be greater than five gallons of water per sack of cement.

.03e Air entraining agents shall conform to ASTM C260. Air content in the light-weight structural back-up and the facing portion shall be within the limits of 5 to 7%.

G2.04 PHYSICAL REQUIREMENTS

Precast concrete panels shall have a minimum compressive strength of 7,500 PSI at 28 days of age for the facing portion and a maximum of 5% absorption when tested by suitable size cubes cast from the same material. The cubes shall consist of all facing mix, and the applied testing pressure shall be parallel to the face when tested according to the latest methods of ACI704. Evidence of freeze and thaw test shall be submitted in which after 250 cycles the percentage of volume loss shall not exceed 0.80%. Lightweight structural concrete back-up shall have a minimum compressive strength of 5,000 PSI when tested by 6" X 12" cylinders.

G2.05 STRUCTURAL DESIGN AND REINFORCEMENTS

.05a RESPONSIBILITIES
The architects-engineers are responsible for the reinforcement and physical properties of the precast concrete panel and the support assemblies when the panel is installed and attached to the building in its assigned position.
The precast concrete manufacturer shall be responsible for the recalculation of the panels for all structural stresses, strains and temperature changes, produced by lifting the panels from the forms, transportation and erection. Any structural changes produced by this recalculation shall be submitted for approval to the architects-engineers, at the shop drawing stage.

.05b REINFORCEMENTS
Precast concrete panels shall be reinforced with a built-up welded steel wire mesh, conforming to ASTM A-82 and ASTM A-185 and additional deformed bar reinforcement, conforming to ASTM A-15, intermediate or hard grade. All bends, angles, returns, and contours shall be preformed with suitable bending equipment. Anchor brackets, loops and plates shall be securely attached to reinforcing in the positions indicated on the drawings.

G2.05c LIFTING DEVICES

The precast concrete manufacturer shall provide for lifting devices such as threaded inserts or other approved devices for lifting the panels, at first, from the forms and also for transportation and erection.

Lifting devices are to be located in unexposed surfaces of the panels. No inserts, hooks or other lifting devices may be located in any of the exterior exposed surfaces of the panels. Lifting devices types and locations shall be submitted to the architects-engineers for approval in the shop drawing stage.

.05d COVER OF REINFORCEMENT

A minimum concrete cover of 1-1/4" shall be maintained over reinforcing steel for exterior exposed aggregate surfaces.

A minimum of 3/4" concrete cover shall be maintained for exterior smooth surfaces.

A minimum of 1/2" concrete cover should be obtained for interior surfaces.

G2.06 MIXING AND PLACING

.06a Mixing of conrete shall be done in a mixer of approved type. The concrete shall be mixed until there is uniform distribution and shall be discharged completely before the mixer is recharged. The mixer shall be rotated at a speed recommended by the manufacturer and be equipped with meter for measuring water. All aggregates shall be preweighed before placing in mixer.

.06b Temperature of concrete shall be not less than 45° F. nor more than 70° F. and ambient casting area shall be not less than 45° F. and rising.

.06c Concrete shall be conveyed from the mixer to the form by methods which will not permit separation or loss of materials.

.06d Concrete shall be deposited as near to its final position as possible to avoid segregation in rehandling and flowing. High frequency, low amplitude vibration shall be used and shall be continuous to produce the required density and surface finish. When concreting is once started, it shall be carried on as a continuous operation until the casting of the panel or unit is completed.

.06e. No concrete that has hardened or been contaminated by foreign materials shall be used.

G2.07 CURING

After casting and while still in the form, the precast concrete panels are to be kept moist with approved covering as recommended by manufacturer. Precast concrete panels are not to be removed from the forms before the concrete has attained 1500 PSI. Panels are to be kept moist in an approved manner for a minimum of 5 days after removal from form.

G2.08 WORKMANSHIP

All joints shall be continuous, with an even thickness of 1/2" and all arrises shall be clean and accurate. All simulated joints and/or drips shall be true to profiles and be continuous at the intersections with the joints.

G2.09 TOLERANCES

.09a POSITION OF CAST-IN ITEMS

Inserts, bolts, plates, angles, etc.	±3/8"
Flashing reglets	±1/4"
Electrical outlets, hose bibs, etc.	±1/2"

.09b PLACEMENT OF REINFORCEMENT

Bars and mesh to be ±1/2" of position shown on approved shop drawings and never to encroach on the specified minimum cover.

.09c CASTING TOLERANCES

Over-all height and width measured at the face adjacent to the mold when cast:

10'-0" or under	±1/8"
10'-0" to 20'-0"	+1/8" -3/16"
20'-0" to 30'-0"	+1/8" -1/4"
Each additional 10'-0"	±1/16" per 10'-0"
Angular deviation of plane of side mold	1/16" per 6" depth but at least 1/16"

G2.09c (cont.)

Thickness	+1/4" -1/8"
Out of square (difference in length of the two diagonal measurements)	1/8" per 6'-0" or 1/4" total, whichever is greater

.09d AFTER CASTING TOLERANCES--BOWING AND WARPING

Without intermediate support	1/240 panel dimension
With intermediate support	1/360 panel dimension

.09e ERECTION TOLERANCES
Precast panels to be located in the center of their theoretical location on the building and adjusted to accommodate adjacent elements, proper joint width, and alignment with adjacent precast members.

1. Face width of joint	
Panel dimension (normal to joint) 10'-0" or under	±3/16"
Panel dimension (normal to joint) 10'-0" to 20'-0"	+3/16" -1/4"
Each additional 10'-0" (normal to joint)	±1/16"
2. Joint taper (panel edges not parallel)	1/40" per ft. length or 1/16" total, whichever is larger, but not greater than 3/8"
3. Panel alignment	
Jog in alignment of edge	1/4" maximum
Offset in face of panel (exterior face unless otherwise noted)	1/4"

G2.10 ANCHORS AND DOWELS
Anchors, bolts, threaded inserts, plates, angles, etc., shall be as shown on the drawings and shall be fabricated from corrosion resisting materials.

G2.11 SAMPLES

The contractor shall submit two 18" X 18" X 2" samples for approval to the architect.
A sample indicating the texture, color and finish may be seen at the office of the architect.
No material shall be fabricated prior to complete approval of the architect as to texture, color, finishes and other characteristics.

G2.12 TESTS

All precast concrete furnished under this section shall be subject to test by an approved independent testing laboratory for compressive strength and absorption from cubes taken at the manufacturer's plant. Refer to PHYSICAL REQUIREMENTS paragraph above for method of tests, strength, and absorption limits. Submit certification, in triplicate, of compliance with these requirements.

G2.13 PROTECTION

Precast concrete panels shall be handled in a nearly vertical plane at all times. Panels shall be stored vertically and leaned against proper supports until used. Any chipped, spalled, or stained pieces shall be redressed with approval of the architect and such redressing shall be guaranteed by the precast manufacturer.

G2.14 ERECTION

a) All precast concrete panels shall be cleaned just before setting.
b) Panels shall be set plumb, level, and true to line.
c) All joints shall be 1/2" wide.
d) Panels shall be lowered in place and support assemblies adjusted, as many times as necessary, so that panels are true horizontally and vertically.
e) Each panel shall be securely braced until all its support assembly connections have been secured.
f) All anchorages and/or dowels shall be accurately adjusted and the holes and sinkages filled with the approved mortar, as shown on the drawings.
g) Welding shall be done in accordance with the Standard Code for Arc and Gas Welding in Building Construction of the American Welding Society.

G2.15 CLEANING

After the completion of the setting, all precast concrete panels shall be cleaned with stiff fiber brushes, using soap powder, boiled in water, and the panels rinsed with clean water. Cleaning work shall not start until all the panels are erected and sealant installed in all the joints. Cleaning shall commence at the top and continue progressively down the face of the building.

G3 PRECAST CONCRETE--SUPPORT ASSEMBLIES

G3.01 SUPPORT ASSEMBLIES

.01a All support assemblies for architectural precast concrete panels shall be fabricated from rolled steel shapes as detailed on the drawings. All inserts and other metal items which are embedded and/or welded to the precast concrete are included under the work of the arcitectural precast concrete section.

.01b All metal items under this section shall be shop painted with primer and rust preventive paints as specified under miscellaneous metal section. All areas of steel which have been welded in the field and/or abraded shall be touched up with prime paint as specified above.

G4 PRECAST CONCRETE--JOINT SEALANT

G4.01 GENERAL

.01a This section describes materials and methods of application for sealing precast concrete joints. Application shall be coordinated with requirements as described in other sections and noted on the drawings.

.01b Materials shall be delivered to the project site in sealed containers and shall be used in strict accordance with manufacturer's printed directions.

G4.02 MATERIALS

.02a Sealant shall be a gun-grade class B, non-sag two-part polysulfide sealant licensed by Thiokol Chemical Corporation as conforming to Thiokol Building Trade Performance Specification, such as Tremco "Lasto-Meric", 3M "Weatherban", Dewey & Almy "Hornflex", or approved equal. Sealant shall be chemically compatible with precast concrete protective coating.

.02b Backing materials for sealant shall be inorganic, non-oil, non-grease and non-asphaltic, non-staining, resilient type filler and chemically compatible with sealant.

G4.03 CERTIFICATION

Contractor shall furnish certificates from an approved laboratory attesting that materials meet specified perfomance test requirements.

G4.04 SPECIALTY SUBCONTRACTOR

Sealant application shall be made by a specialty subcontractor.

G4.05 LOCATIONS & TYPES

.05a Exterior joints around perimeters of all types of metal frames adjacent to architectural precast concrete.

.05b Joints of all architectural precast concrete.

G4.06 PREPARATION

.06a Joints shall be cleaned of all dust, surface dirt, oil, and surface protection on metal items before applying sealant.

.06b Protective coatings on metallic surfaces shall be removed by solvent that leaves no residue.

.06c For joints up to 1/2" wide, the depth of the sealant should equal the width of the joint. For joints over 1/2" wide the depth should equal one-half the width, but not less than 1/2" and not more than 1". Voids or recesses beyond the above established depths shall be previously filled with backing material as specified for sealant.

G4.07 APPLICATION

.07a Sealant shall be forced into the joints mechanically, with pressure to expel all air and provide a solid filling. Surface of sealant shall be uniformly smooth and free of wrinkles. All joints shall be filled slightly convex.

.07b Joints shall be filled to within specified depth from the surface with specified backing filler and the remainder of joint then filled with sealant.

.07c Color of sealant shall be as selected by the architects.

G4.08 CLEANING

.08a Masking tape shall be used to prevent smears on materials such as architectural precast concrete and aluminum frames which would be difficult to clean.

.08b Surfaces of materials adjacent to sealed joints shall be cleaned free of smears of sealant or other soiling due to sealing operations as work progresses.

INTERIOR SURFACES G

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

CEILING SYSTEM DESCRIPTION

The ceiling system will facilitate a degree of planning flexibility equal to that afforded by the structural and mechanical system. The ceiling is conceived as a continuous suspended plane extending from exterior wall to exterior wall under which partitions can be located and relocated as necessary. Above the ceiling ducted mechanical services can be arranged and rearranged as required without interference from walls or other vertical barriers.

To accomplish this the ceiling has to embody the following characteristics:

1. The suspension system must be capable of supporting the head of all partitions and door frames and provide adequate lateral stability without additional bracing. Walls must be attached and detached without damage to the ceiling. Although most walls occur in modular locations, attachment at random locations must be possible.

2. The suspension system must provide a framework in which light fixtures, air supply and return elements, sprinklers, smoke detectors, speakers, laboratory service columns and infill panels can be located and rearranged in various combinations.

3. The ceiling must offer architectural characteristics suitable for small, intermediate and large areas.

4. The ceiling must be accessible to allow routine maintenance and rearrangement of mechanical equipment at any location above the ceiling.

The proposed ceiling system is composed of continuous service strips and of infill. The service strips are oriented in an east-west direction and are located 6' -2" o.c. at the quarter points of the 12' -4" architectural grid. The infill closes the space between the all purpose strips and provides for access to the plenum and acoustical separation of rooms.

The service strip furnishes the location for all mechanical service penetrations in the ceiling system. It is made up of alternating 4' -0" flourescent light fixture locations and 2' -2" service panel locations. The modular locations of a 4' -0" flourescent fixture is centered on the quarter points of the architectural grid but such a fixture must be relocatable at any point in the strip to accommodate non-modular rooms.

The service panel provides locations for sprinklers, smoke detectors, speakers, laboratory service columns and down lights.

Linear supply air handling elements are located as required, perpendicular to the service strip astride the cross runners with point returns located as required at the service panels.

N-S and E-W partitions may be attached to the ceiling system by boilting the partition head to cross runners which run perpendicular to the service strip on 2' -2/3" centers. E-W walls may thus be attached along any line in the zone between service strips. N-S partitions are located astride the cross runners. Non-modular N-S partitions require an addtional cross runner for support.

In order to insure that partitions can be freely moved without unnecessary difficulty or damage to the ceiling system mechanical services passing between partition and plenum above are minimized. Plumbing fixtures located in areas not subject to change, are loop-vented underfloor. We recommend low-voltage switch legs be used in these areas. In areas subject to extensive future change, piped services to laboratory benches shall be fed down from the plenum space in umbilical chases.

Detailed study of code requirements regarding fire rated walls indicates that each level be divided by only one partition which must interrupt the suspended ceiling plane. In each case the penetrating wall has been chosen as being the one least likely to be relocated.

The wall system has been designed to provide an STC rating of 45 (drywall) 54 (plaster). A one inch sound blanket increases these rating respectively to 49 and 58. The ceiling typically provides an STC rating of 43. This may be increased by the use of acoustically backed board and hold-down clips. Areas which require additional isolation will be separated from adjoining areas by accustical blanketing hang directly above the wall in the ceiling plenum. Alternatively, walls surrounding non-flexible areas such as auditoria may be extended to the structural slab to insure acoustical isolation.

CEILING SYSTEM/OUTLINE SPECIFICATION

SCOPE OF WORK

Furnish all plant, labor, materials, appliances, transportation, equipment and services necessary to properly perform the work or the contract as shown on the drawings hereinafter specified or reasonably inferred.

WORK INCLUDED

Installation of Aluminum Suspension System, Air Diffusers, Flexible Air Duct, Lighting Fixtures and Lamps, metal and acoustical ceilings of all spaces where indicated on drawings and/or finish schedule as "integrated ceiling." Flexible duct shall be connected by this contractor to the ceiling air diffusers (downstream end) and main or branch feeder lines (upstream end). This contractor shall furnish and install all lamps in integrated ceilings including service modules as detailed and shown on plans. Integrated lighting fixtures shall be connected by this contractor to conduit entry boxes located in plenum area as indicated on electrical drawings.

WORK NOT INCLUDED

Wiring from panel board to conduit entry boxes in plenum area necessary to connect the integrated lighting fixtures and all circuits as per electrical specification. Primary main and branch air ducting as outlined in the mechanical section. Work as outlined in other sections of this specification.

PERMITS, CODE RULES AND SAFETY ORDERS

Contractor shall secure all necessary permits and pay all costs or fees for prosecution of the work. All work and materials shall be in full accordance with the latest rules of the Uniform Building Code, the National Electrical Code. Where the above rules call for any work over and above that shown on the drawings or called for herein, the Contractor shall furnish all equipment and labor required for necessary installation to meet these requirements.

INSPECTION

All work and materials covered by these specifications shall be subject to inspection at any and all times by authorized representatives of the Architect, Engineer or Owner.

SUPERVISION AND WORKMANSHIP

This contractor shall personally or through an authorized competent representative satisfactory to the Architect, constantly supervise the work and shall, whenever possible, keep the same foreman on the work from commencement to completion. All workmanship shall be first class and the best type in every case. Nothing herein is to be construed as calling for other than first class workmanship and any not so fulfilling this requirement shall be removed and replaced with proper material and workmanship.

RESPONSIBILITY AND COOPERATION

Contractor shall consult architectural, structural, engineering and mechanical plans and check them with his work, as he will be held responsible for conditions shown on one or called for by one and not indicated or called for on the other that may affect his contract. Contractor shall consult with the superintendent of other trades and general contractor's superintendent to insure complete coordination of all the work.

CUTTING AND REPAIRING

The Contractor shall do all cutting necessary for the proper installation of this work and shall repair any damage done by himself or his workman and shall coordinate his work with that of other subcontractors. The contractor shall patch and repair all surfaces where existing equipment is removed. The patch surfaces shall match the existing surrounding surfaces in material and finish, and all repairs shall be done to the satisfaction of the Architect.

QUALIFICATIONS

Due to the complexity and scope of this phase of the project, the successful contractor shall present evidence that he is capable of installing the various components within his own organization, and without resorting to additional subcontractors. In addition, he shall present written evidence that he is experienced in the satisfactory installation of the products specified, including a written approval from the maunfacturer of the products he proposes to use, that he is the acceptable and authorized applicator of these products.

MATERIAL

A. Aluminum Suspension System shall be compatibly designed to function as a structural supporting system for the related ceiling system components and also serve as an indirect means of partition connectors without preordained partition locations. The 6'-2" modular layout shall be rigidly adhered to with the exception of air distribution diffuser locations which shall remain flexible to accommodate room interior air distribution requirements as set forth further on. The main ceiling grid members shall interlock with the cross runners by means of a removable clipping device which will allow relocation of cross runners along the plain of the main runner for future interior building occupancy requirements. The primary ceiling grid members shall have not less than a 3/8" deep 1/4" - 20 thread extruded linear slot which will form a continuous opening to accept National coarse threaded 1/4" - 20 screws. The slot which terminates into any primary tee grid member shall be through to the opposing slot opening. Where slots are located at primary grid cross intersections, the slots shall 'run' through the intersection in both directions. All exposed joints of the ceiling grid members shall be drawn tight and not exceed the allowed tolerances as set forth in the American Society for Testing and Material ASTM designation: C 635-69. The fully constructed ceiling system shall be designed so as not to deflect in each plane the maximum dimensions as set forth in ASTM: C 635-69. All primary sub and strutting suspension members of the ceiling grid system shall be of extruded aluminum alloy 6063-T5. The exposed surfaces shall be chemically treated and painted in accordance with procedures as outlined in ASTM-B117-61. Finish shall match within allowable tolerances the same color as the service panel. Location of ceiling grid members shall be as shown on architectural reflected ceiling plans.

B. Recessed fluorescent light fixtures noted as Type_____ to be specifically designed to fully integrate with the ceiling suspension members without reconstruction of the basic elements of either component structure. Fixture bodies shall be of steel, processed with a five stage bonderite pre=coating in conformance with Military Specification C-490-A. The finish coats shall have a hi-bake epoxy primer applied under the organic hi-bake acrylic top coat. The minimum reflectance shall be 87% within the reflectance with Underwriter's Laboratories, Inc. 57-1969 and bear evidence of listing by Underwriter's Laboratories, Inc. Fixtures shall be either 2 or 3 lamp as indicated on Electrical drawings, 430MA Rapid Start, operating on 277 volt current. Ballast shall be HPF, CBM certified, E.T.L. Approved and P-rated. All outside fixture conduit, connectors and interconnecting

conduit and circuit wiring within the fixture raceway shall be the responsibility of the Integrated Ceiling Contractor. Lens shall be of not less quality than Virgin Acrylic non-blended materials and shall be constructed with a frameless appearance and positive hinging devices. Prismatic pattern shall be L-12. Lamps for the integrated fluourescent lighting fixtures shall be Rapid Start types as manufactured by General Electric, Westinghouse or Sylvania. Successful bidder shall be required to furnish the following data or samples within three days after receipt of request from Electrical Engineer. One sample of lighting fixture, test from recognized independent laboratory indicating ballast case temperature after initial warm up period. Candle-power distribution and coefficients of utilization.

C. Acoustical flat metal pans which lay in suspended ceiling system shall be constructed of .025 metal pin perforated face panels and non-perforated back panels laminated to a cellular core, with a sound absorbing element of non-dusting glass fiber wool. Panels shall have a noise reduction coefficient of no less than 0.65 - 0.75 and average sound attenuation value of (39.3 DB) (45.4 DB). Panel thickness shall average a nominal one inch when measured over its entire plain. Metal preparation and painted surfaces shall be in accordance with ASTM-B117-61. Finish shall be commercial white as considered a 'Standard' by manufacturers.

D. Service modules shall be of such design and construction to allow supplementary lighting, service drops, communication outlets, fire sprinkler openings. Such Return Air panels shall include flexible duct connected by this contractor as described in this Specification Section. Such panels shall remain open in design concept to provide additional services as required for completion of project. Materials and finish shall match that of adjoining ceiling materials and inserts provided so that the common color scheme may be included in special areas as indicated on plans.

E. Flexible duct shall be Lok-Products Co. QC-41 or equal. The upstream end assembly shall include a volume damper internally mounted to the spin in fitting and the down stream connector shall be of the quick connect type to mate with the inlet collars provided with the Air Distribution devices. The flex duct assembly shall meet the Class I Fire Hazard requirements of the National Fire protection Association Bulletin #90A with Flame spread rating of 25 or less and a smoke development rate of 50 or under.

F. The air diffuser incorporated in the integrated ceiling system shall be of the same manufacturer as the ceiling suspension system, or if the product of another manufacturer, it shall be the responsibility of the prime manufacturer to insure adequate fit, color, match, etc. It shall utilize the ceiling suspension member as a part of the air diffuser and shall be mechanically locked to said system. The diffuser shall incorporate horizontal adjustable air control weir for control of the throw

and angle of discharge of the air from the linear slot. It shall include a flexible duct and manual volume control damper for field adjustment to design air quantities. The performance of the air diffuser will be such that it can provide proper air motion rate within the occupied space when operating within the CFM range indicated on the plans. The flexible duct and inlet collar shall be of such size as not to exceed 900 FPM velocity when operating at the maximum CFM specified.

The diffuser assembly shall be easily relocatable in the field, and shall be supported at both ends by the grid system. The system shall have been completely compatibility tested. The air distribution system including lighting ceiling panels, service module, etc. shall be tested as a system and shown to fulfill the design criteria set forth by the plans and specifications.

All tests and performance data of the Air Distributing Devices shall be made in accordance with procedures set forth in the equipment test code #1062R2 of the Air Diffusion Council and ASHRAE.

INSTALLATION

Hanger wires for the suspended ceiling system shall be attached to the building structure in an approved manner. Wires shall be threaded through the ceiling grid members and wrapped a minimum of 4 full turns to insure gaining full strength of the suspension system. Hanger wire spacing shall average no more than 4' maximum along any major load carrying member. The entire ceiling system installation shall be closely coordinated with all other trades involved. Air diffuser installation and flexible duct connections shall be the responsibility of the Integrated Contractor and shall be installed with the proper trades. The integrated lighting fixture installation is the responsibility of the Integrated Contractor and shall be installed with the proper trades.

AIR BALANCE RESPONSIBILITY

This Contractor shall cooperate with the selected test and balancing agency in the following manner:

He shall coordinate his schedule with the Air Conditioning Contractor to have his system in operating condition in sufficient time before final completion date so that the testing and balancing can be accomplished.

He shall provide the labor and tools to make corrections when required, without undue delay at no additional cost to the Owner, and he shall install balancing dampers if they are a part of his system as required by the Test and Balance Contractor at no additional cost to the Owner.

He shall advise the Test & Balance Contractor of any major changes made in his system during construction.

He shall be responsible for removing and replacing ceiling panels necessary to the testing and balancing of the air distribution system.

GUARANTEE

Upon completion of work the Contractor shall furnish the Owner a written guarantee covering the satisfactory repair and/or replacement free of charge of all workmanship and material that proves defective within a period of one (1) year from date of completion.

CLEANING AND TOUCHING-UP

After installation of entire suspended ceiling system has been completed, the Contractor shall clean the entire surfaces thereof, removing any discolorations or foreign matter, and shall touch up all abraded spots and edges (if any) with the same paint as was used in the factory - applied finish of the tile.

PARTITIONING SYSTEM

The partitioning system achieves the degree of economy and flexibility at the planning level provided by the basic mechanical and structural systems.

The total project was studied to find the basic sets of functions to be served by partitioning systems. Seen in conjunction with the ceiling system, the basic approach to the partitioning system is that is should be floor to ceiling light-weight space division. The partitions should be removable without damaging the floor or ceiling and without interrupting the activities in adjoining spaces. In this approach, doors and glass are treated as panels in the partitioning system and attached at the ceiling and floor in the same manner. The partitioning system must be locatable according to the module developed by the ceiling system - and the mechanical services provided by it, but it also must be able to adjust to non-modular conditions when functional requirements necessitate it. Prefabricated cold rooms, freezers and the like will be used and the partitioning system must accept them. There will also be several spaces which require R-F shielding and partitioning systems must be able to provide this.

Several alternatives for each required basic type were proposed and studied. The cost of each proposal was compared to the requirements for adequate sound isolation, flexibility, durability and the particular requirements of each type. Resulting from this study a selection was made.

1. Gypsum plaster on gypsum lath screw attached to channel studs is proposed as the basic system on floors 1 through 4. These floors contain large teaching labs which will be intensively used by large numbers of undergraduates and therefore are subject to infrequent change.

2. Drywall on channel studs is proposed as the basic system for the laboratory and office functions located on floors 5 through . These functions will require constant rearrangement of plan and will be used by a limited number of staff and graduate personnel.

3. Fireproof gypsum paneling is proposed to achieve the required fire rating around the floor to floor penetrations at stairs, mechanical cores, and elevator shafts.

4. Masonry is proposed for two applications:

   a. Mechanical room enclosures on Floors B and 10.

b. Animal room complex on Floor 9.

In areas of high humidity and/or where a high degree of cleanliness is required, a glazed coating is proposed such as the animal room complex or the manufacturing suite. This application may be used on plaster, dry wall and masonry.

INTERIOR FINISHES

Locker, lounge and student facilities, Floor 1.

ceiling: special lighting in locker lounge, standard integrated acoustical tile ceiling elsewhere.

walls : painted plaster.

floor : V.A.T. with carpet recess at lounge (carpet by Owner).

base : Vinyl (4")

Central supply, glasswash, shops and storage, Floor 1.

ceiling: standard integrated acoustical tile

walls : painted plaster.

floor : hardened concrete.

base : vinyl (4")

Concourse and related spaces, Floor 2.

ceiling: metal slat with painted plaster drops at major structure lines. (See reflected ceiling plans.)

walls : exposed aggregate concrete on core, circulation and structural elements, painted wood strips on other wall planes.

floor : brick pavers

base : vinyl (4")

Classroom, lab, corridor space, Floor 2

ceiling: standard integrated acoustical tile ceiling

walls : painted plaster

floor : V.A.T.

base : vinyl (4")

Toilets - typical throughout Unit F.

ceiling: painted plaster

walls : plaster with spray-glazed finish

floor : ceramic tile

base : ceramic tile

Public lobby vestibules and corridors, Floor 3.

ceiling: painted plaster

walls : painted plaster except for pre-cast concrete on mechanical and elevator cores

floor : brick pavers

base : vinyl

Drug information center, Floor 3.

ceiling: painted plaster

walls : painted plaster

floor : carpet by Owner

base : vinyl

Laboratories and related spaces, Floor 3.

ceiling: standard integrated acoustical ceiling

walls : painted plaster

floor : V.A.T.

base : vinyl

Public corridors, lobbies, Floor 4.

ceiling: standard integrated acoustical tile ceiling

walls : painted plaster

floor : V.A.T.

base : vinyl

Waiting, group lab, conference rooms in Helping Relationships, Floor 4.

ceiling: standard integrated acoustical ceiling.

walls : painted plaster

floor : carpet by Owner

base : vinyl

Nursing skills and Health Assessment, Floor 4

ceiling: standard integrated acoustical tile

walls : painted plaster

floor : V.A.T.

base : vinyl

Administration - pharmacy and nursing, student affairs and administration areas, Floor 5

ceilings: standard integrated acoustical tile, mercury vapor recessed lighting in lobby areas

walls : painted plaster

floor : carpet by Owner

base : vinyl

Corridors, lobbies and educational development, Floor 5

ceiling: standard integrated acoustical tiel

wall : painted gypsum board

floor : V.A.T.

base : vinyl

Offices and work areas, Floor 6

ceiling: standard acoustical

wall : painted gypsum board

floor : V.A.T.

base : vinyl

Conference rooms, reception, interview, typing pool, copy/work area.

ceiling: standard acoustical

wall : painted gypsum board

floor : carpet by Owner

base : vinyl

Open plan offices, reception, faculty lounge, seminar, conference rooms, group interaction, reading rooms, Floor 7

ceiling: standard acoustical

wall : painted gypsum board

floor : carpet

base : vinyl

Offices, corridors, lobbies, Floor 7

ceiling: standard acoustical

wall : painted gypsum board

floor : V.A.T.

base : vinyl

All spaces except environmental rooms, toilets, radio-active synthesis, Floor 8.

ceiling: standard acoustical

wall : painted gypsum board

floor : hardened concrete

base : vinyl

Radio-active synthesis, and dark room, Floor 8

ceiling: painted gypsum board

wall : spray-glazed gypsum board

floor : seamless vinyl

base : vinyl

All spaces except environmental rooms, toilets, animal rooms, Floor 9

ceiling: standard acoustical

walls : painted gypsum board

floor : hardened concrete

base : vinyl

Animal rooms, Floor 9

ceiling: painted plaster

walls : concrete block with spray glaze

floor : double construction with 3M membrane waterproofing and Dex-O-Tex finish

base : integral with Floor (4")

Mechanical spaces, Floors B and 10

ceiling: no suspended ceiling - no finish on structure

wall : concrete block

floors : hardened concrete

base : vinyl

Janitors closets:

ceiling: standard integrated acoustical tile

wall : painted plaster or gypsum board

floors : hardened concrete-molded slop sink

base : vinyl

Stairs

ceilings/soffits	:	painted steel
walls	:	painted plaster with gypsum board
base	:	vinyl
treads	:	concrete fill
handrails	:	metal pipe
risers	:	painted steel

EQUIPMENT H

page

CASEWORK

The flexibility afforded by the structural/mechanical system, interior partitions and ceilings will be matched by the system of casework. Elements will be dimentionally coordinated and capable of simple rearrangement to suit changing needs.

Historically casework for a project such as this has assumed five distinct forms--namely, hospital casework, laboratory cabinetry, special cabinetry such as that used in darkrooms and dental labs, dental operatory casework and station concept units as in medication and nourishment units. This has been so, primarily due to the sources of manufacture and a preoccupation on the manufacturers part to limit his production to one, two or three types of the specialized casework mentioned above.

This procedure has resulted in several different specifications. The architect is left with only one option, that is to select casework from several manufacturing sources and endeavor to find similarities in design that will least emphasize the shortcomings of the traditional system. Choices of finish and methods of installation have by tradition also differed which has led to jurisdictional disputes and consequent delays at the building site.

We propose to develop a single specification for all of the casework. The attempt would be to consolidate all of the inconsistencies of the traditional system and to develop a truly interchangeable cabinetry. This would appear to be particularly desirable in view of the fact that the whole tendency in good health science planning, is to stress the interrelationship of patient care, teaching and research. If the cabinetry to accomodate these disciplines can be coordinated, the esthetic and utilitarian possibilities are manifold. A consistency of design detail, fittings and finish would be assured. The maintenance management would be made consistent and simpler. And last, the initial cost should be less, due to the magnitude of the order.

The recommendation is to produce a non-proprietory performance specification which will lay emphasis on the consistency of design and detail to be maintained and that will delineate the differences of working surfaces and base conditions that can be accommodated. This specification will be accompanied by a catalogue of modularly coordinated casework components. Elevations and basic dimensions of units that will be used consistently throughout the facility.

The casework will be the floor mounted steel type consistent with development of Unit B/C and responding to current market conditions. See elevation drawings and description of casework system in the appendix of this report.

SPECIALTIES 1

The following items are identified to establish a quality level for the cost estimate:

Hollow Metal - Door frames will extend to the 9'-0" high ceiling and anchor to it throughout the project. Hollow metal frames will be used typically for all openings in the partitions (sidelights, pass-throughs, access hatches, etc.).

Doors:

Typical	:	Flush, solid core wood flake board core as manufactured by Weyerhauser.
Fire door	:	Solid mineral core in conformance with Underwriter's Laboratory.
Quality	:	AWI Premium Grade
Finish	:	medium density overlay of pnenolic resin for typical paint finish.

Rolling Shutters and Fire Doors - Rolling shutters and fire doors will be as manufactured by Cornell Ironworks. Finish will be bronze anodized aluminum for shutters and field painted for fire doors.

Chalkboards - Porcelain enamel steel as manufactured by Claridge Products with extruded bronze anodized aluminum trim.

Tackboards - best quality natural cork finely ground and compressed into 1/4" thick sheets with burlap back as manufactured by Claridge or Congoleum. Provide extruded bronze anodized trim.

Louvers - typical exterior louvers will be 16 guage bonderized steel, weather-proof profile, with vertical invisible mullions as manufactured by Industrial Louvers, Inc. Provide with 1/2" square mesh bird screen.

Toilet Partitions - Partitions shall be plastic laminate type as manufactured by Mid-South, or Sany metal. They shall be wall and ceiling mounted.

Lockers - student lockers shall be metal locker 2 in 1 type, 15" wide, 72" high as manufactured by Sturdy Steel, Montreal, Quebec.

Operable Walls - Walls shall be 3' - 4'-0" panel type as manufactured by Modernfold. An S.T.C. of 45 shall be maintained. Provide with sheet vinyl finish.

MECHANICAL J

I. PLUMBING SYSTEMS

A. General Description

1. Plumbing system will be installed in accordance with State and Municipal Codes plus requirements of governing agencies. The system will be arranged and constructed to be readily expanded and/or modified to meet changing building requirements. Plumbing fixtures, laboratory services, fire protection equipment, drains and laboratory equipment connections will be provided.

2. All plumbing services necessary for toilet rooms, janitors' closets and miscellaneous fixtures will be provided, including water treatment and water system pressure booster equipment. Drainage and services will be provided in certain animal areas for wash-down operations and cage washings.

3. The following risers and/or services will be provided:

a. Waste stack (acid resisting where required)

b. Vent stack (acid resisting where required)

c. Domestic cold water, hot water and circulating hot water

d. Laboratory cold water, hot water and circulating hot water.

e. Natural gas.

f. Compressed air (laboratory)

g. Vacuum (laboratory)

h. Standpipe and sprinklers

i. Nitrogen

j. Deonized water

k. Downspouts

Tees with shut-off valves or wyes will be provided on the risers for each service at every floor to facilitate future remodeling.

B. Scope of Work

1. Sanitary drainage system - connection will be made to existing system.

2. Storm drainage system - connection will be made to existing system.

3. Acid resistant drainage system will tie into sanitary sewer after proper dilution.

4. Domestic water piping systems (hot, cold and circulation), including connections with cold water main, booster pumps and connections to hot water generating equipment. A domestic hot water heating system will be installed.

5. Non-potable water supply for laboratories system to incorporate central anti-syphon loop at penthouse equipment room for upper levels above 6th Floor. A second anti-syphon loop at 5th Floor ceiling will serve lower floor laboratories. Sytem to include cold water, hot water, and circulating hot water. A laboratory hot water heating system will be installed.

6. Natural gas - Minnegasco will be source of supply. The Unit A system will be extended for laboratory services.

7. Compressed air (laboratory) - the central compressed air system of Unit A will be extended.

8. Vacuum (laboratory) - the central vacuum system of Unit A will be extended.

9. Fire standpipe system, including fire department connections and fire pump.

10. Nitrogen - piping system as required with connections to tank manifold. See Appendix Item L-10 for design analysis - nitrogen vs. compressed air for laboratory use.

11. Deionized Ater - A central demineralizer system will be provided with a piped system serving all laboratory spaces. University of Minnesota still considering the merits of central system vs. individual demineralizor stations. See Appendix Item L-10 for design analysis - Deionized Water: Central vs. Individual Stations.

C. Installation

1. Piping system serving laboratory equipment shall have risers run vertically in mechanical shafts provided with horizontal mains running at the centerline of the bays within the suspended ceiling.

2. Each service or drain not extended to connecting locations, shall be provided with capped or valved connection at each vertical shaft.

3. Piping systems for laboratory equipment will be terminated at floor or walls with valves or capped connections: final connections will be by the mechanical contractor.

4. The hot water systems shall be completely recirculating systems with reversed return as much as possible to eliminate the need for balancing various branches.

D. Materials and Equipment

1. Sanitary and storm drainage system.

a. Below grade: Service weight cast iron soil pipe and fittings.

b. Above grade: Schedule 40 galvanized wrought iron or galvanized Yoloy pipe with black drainage fittings.

2. Acid drainage system: Kimax type glass pipe and fittings above ground. Duriron below ground.

3. Domestic Water: Below grade - cast iron, above grade - Type L copper tubing with solder joint fittings; joints made with 50-50 solder.

4. Gas Piping:

a. Schedule 40 black steel pipe with black malleable fittings.

b. Gas piping 3" and over to be welded.

5. Compressed air and vacuum (laboratory use). Galvanized steel or Type L copper tubing with solder joint fittings: Joints made with 50-50 solder.

6. Nitrogen: Type K tubing with solder joint fittings; 15% silver alloy brazed joints.

7. Deionized water. Polyvinyl chloride pipe and fittings, Type II.

8. Fire Protection Systems: Schedule 40 black steel pipe with black malleable or cast iron coupling fittings.

9. Hot Water Storage Tanks: 125 pound design flange quality steel and with lining consistent with the institution's practice.

10. Pipe Insulation: All domestic laboratory hot and cold water lines shall be insulated. The cold water pipe insulation shall have a vapor barrier covering.

11. Plumbing fixtures:

a. Water closets - wall hung, elongated siphon jet, closet with chair carrier and flush valve.

b. Urinals - wall hung, vitreous china urinal with flush valve and carrier.

c. Lavatories - 20" x 18" vitreous china lavatory combination supply fitting, loose key operated valve supplies and "P" trap, self-closing valves, limited flow.

d. Service Sink - Floor receptor, poured-in-place with floor drains.

e. Shower: Flow limited to 2 GPM per head

f. Eye Wash Fountain and Deluge Shower: Chain operated deluge with self-closing valve.

g. Flushing Rim Floor Drains. As required in animal areas.

h. Drinking Fountains (Electric Water Cooler). Mounted in counter tops with integral refrigeration unit.

i. Miscellaneous Laboratory Equipment and Trim.

II. AIR CONDITIONING, VENTILATION AND REFRIGERATION

A. General Description

1. The typical air conditioning supply air system in the building is a variable air volume type with combination constant volume reheat boxes serving laboratory areas. Built-up supply air handling units will contain air blenders, air filters, preheat coils, final air filters, cooling coils, humidifiers, supply air fan and sound attenuation.

2. Distribution of air will be through medium velocity galvanized ductwork controlled by variable air volume boxes of various types as described under Equipment. Flexible duct connection will lead to plenum boots above ceiling supply diffusers. In general the supply air diffusers will be furnished by the integrated ceiling system supplier.

3. Return air will be collected through transfer grilles into a ceiling return air plenum on the office-classroom Floors, 1, 2, 4, 5, 6 and 7 and ducted return system if required on the laboratory type Floors 3, 8 and 9. Laboratory areas will be 100% exhausted by fume hoods or general exhaust system.

4. Exhaust fan systems will include toilet and janitorial areas exhaust fans, general exhaust fans, animal quarters exhaust fans, fume hood fans and miscellaneous canopy exhaust fans.

5. Miscellaneous equipment required: Booster fans will be provided where high efficiency filters are needed. Packaged air handling units will be provided in lieu of built-up air handling units for small systems serving animal areas, transformer areas, elevator equipment rooms and mechanical rooms.

6. Refrigeration for air conditioning will be accomplished with the use of a steam absorption type machine added to the basement equipment room of Unit A. The absorption unit will be a high pressure type and have approximately 970 tons of refrigeration capacity.

7. A primary-secondary type chilled water loop will be extended from Unit A with secondary circulating pumps located in the new Unit "F" basement equipment room as shown on the drawings.

8. The cooling tower for the Unit "F" chiller is existing.

9. Environmental Room cooler and freezer units will operate with self-contained mechanical and electrical devices to provide optimum dependability and control. A condenser water cooling system will be provided for water cooled condensing units.

B. Systems Installation

1. Separate air handling systems will be provided for classroom/office areas, graduate/undergraduate laboratory areas, animal quarters, transformer vault, mechanical equipment areas, for stair pressurization, greenhouse area, and make-up air system.

2. Classroom/office areas will be provided with variable air volume (VAV) system with induction type boxes in perimeter offices. Rooms will be controlled on an individual basis. Air circulating will be dependent on room internal heat gains rather than the air change basis used on Units A, B/C. A ceiling plenum

return air system will be used. The ceiling supply air diffusers will be of the linear type and be as manufactured by Lok Products similar to the ceiling system used in Units A and B/C. Where linear diffusers cannot be used, a supply air diffuser will be a part of the ceiling panel system.

3. Graduate Laboratory/Research and undergraduate laboratories and specialty work areas and other rooms with fume hood exhaust will be provided with variable air volume boxes with reheat coils. When fume hood 2-speed fans reduce to low speed (50% capacity) the related variable air volume box will also reduce the supply air by 50% through interlocking relays.

4. Factory built packaged air handling fan section with built-up coil section and filter sections will be used for those areas requiring capacities below 15,000 cubic feet per minute.

5. All fume hoods shall be specified with partial bypass feature and shall have 2-speed fan motors; high speed for normal CFM and normal hood usage and low speed for a 50% CFM reduction for nights and weekends still providing for continuous ventilation of the lower cabinet flammable storage unit. Hod exhaust will be by individual fan or by grouping several hoods to one fan when similar type hoods are in the same room. Fume hood fans will be located in the Roof Penthouse Equipment Room and arranged for high velocity discharge to the atmosphere through the roof.

6. Exhaust air in the building will be handled by separate systems for: Toilet and janitor rooms, general exhaust areas, animal quarters exhaust, stair smoke exhaust, and miscellaneous areas served by canopies or other exhaust capture devices.

7. Heat recovery from exhaust air transferred to incoming fresh air shall be provided. The animal exhaust system shall utilize a heat pipe recovery system. The toilet and general exhaust shall consider a glycol type heat recovery "run around" system.

8. Chilled water system will include a new absorption chiller, primary chilled water pump and condensor water pump located in Unit A. Secondary pumps, piping and central station unit soils will be in Unit F.

C. Materials and Equipment

1. Centrifugal fans, package unit supply fans and constant volume return and exhaust fans will have air foil blades, single or double inlet as required for specific application. Outlet velocities and tip speeds will be in accordance with recommendations of the ASHRAE guide in relation to operating static pressures.

2. Vane-Axial Fans (variable air volume systems). These in-line fans shall have adjustable pitch, air foil blades capable of in-flight adjustment with motor direct drive type in the air stream on supply air fans. Return air fans shall be belt drive for ease of motor access. Outlet velocities and tip speeds will conform to ASHRAE recommenations and will be for quiet operation. Access panels will be provided for servicing motors and adjusting blade positions. See Appendix L-10 for Design Analysis - Centrifugal vs. Vane Axial Fans for variable air volume application.

3. Exhaust Fans:

a. Exhaust fans for general service will be centrifugal type as described above.

b. Exhaust fans for hoods shall be pressure blowers with a factory applied baked-on corrosion resistant coating on air-foil wheel.

4. Packaged Units (Systems less than 15,000 CFM). Packaged supply air handling units shall include a fan section, coil section and filter section and mixing chamber where required. Animal quarters until will require a separate built-up coil section and filter section to accommodate a heat recovery system. Units shall have face and bypass dampers where applicable for proper temperature control.

5. Variable Air Volume Components.

a. Induction type variable air volume control units of the pressure-independnt type shall be used in perimeter spaces on the classroom/office floors.

b. Variable air volume control units with reheat coils shall be used as two position constant volume devices in Laboratory spaces to balance two speed fume hood exhaust.

c. Variable air volume control units shall be installed in all other areas where a fixed exhaust air quantity is not a requirement. The room supply air quantity will be varied with the room load and delivery temperature will be constant although subject to reset of the fan discharge temperature by key room thermostats.

d. Controls for variable air volume boxes shall be furnished by the successful Automatic Temperature Control Contractor and installed at the box suppliers factory. A modulating control sequence with an adjustable minimum volume setting is required.

6. Fume Hoods:

a. All fume hoods to be partial bypass type arranged so that first two thirds of sash movement from full open to 1/3 closed provides for increasing velocities over the face area. The last 10" of travel of the sash shall gradually open the bypass to maintain a reasonable velocity over the remaining opening.

b. General fume hoods, with "air foil" inlet designs, will be exhausted at a rate to produce 100 FPM over the face area of the hood. Perchloric acid hoods, with "air foil" inlet design, will be exhausted at a rate to also produce 100 FPM over the face area of the hood. Perchloric acid hood and duct work will have a wash down spray.

c. Radio-isotope hoods of the "air foil" type will be exhausted at a rate to produce a face velocity of 100 FPM. Radio-isotope hood ducts will be routed around counting rooms or other areas where interference could be a problem. Radio-isotope hoods will require absolute filters at the hoods.

d. Hoods for use with infectious materials will have an absolute filter at the hood fan discharge.

e. Two speed motors will be provided for each fume hood fan. See Appendix Item L-10 for Design Analysis - Two speed vs. single speed fume hood motors. A micro-switch shall be located so that when sash is two-thirds closed the fan motor will switch to low speed operation. See temperature control for interlock with variable air volume boxes.

7. Supply Air Unit Components

a. Built-up housings shall be constructed with double walled insulated sheet metal panels structurally supported with internal steel channels. Inner casing wall shall be perforated sheet for acoustic control. Panels shall be 4" thick for standard supply unit housing. Access doors shall be provided for access to all internal equipment.

b. Air filters: Control of air cleanliness in most areas of this building is critical and two stage filters will be provided, resulting in a 90% NBS dust spot efficiency. In areas requiring higher efficiency, "polishing" filters at the air outlets will be installed.

c. Preheat Coils

(1) Steam type coils with integral face and bypass dampers to be used for all preheat coil applications. These coils permit the use of modulating steam control and have good freeze protection design. Steam coils will be selected for correct temperature rise and freeze protection through the entire heating range required for the heating season. Coils will have copper tubes and non-ferrous fins.

(2) Face velocities will be within the range of 500 to 700 feet per minute. The coils shall be installed so that the condensate outlet is a minimum of 12 inches above the trap inlet to establish a good head of water between the coil outlet and trap inlet.

d. Cooling Coils

(1) Cooling coils will be sized to have a face area resulting in a velocity of not more than 500 feet per minute. Coils will have copper tubes with aluminum fins.

(2) Coils shall be stacked and be provided with 16 gauge galvanized iron soldered water-tight condensate drip pans. Individual drain pans for each tier of coils is desirable with upper pans piped to lowest pan for drainage out of the unit.

(3) Tube circuiting of the coils will be carefully selected to satisfy the heat transfer characteristics and equalize pressure drops. Coils will be arranged for counterflow of air and water.

(4) Balancing cocks will be provided for the cooling banks in each supply air unit. A Venturi or orifice system with pressure taps will be provided on each unit to measure flow through the cooling coil.

e. Humidifiers:

(1) Humidifiers will be of a steam multiple manifold type when used in central air units.

(2) Humidifiers at terminal locations where required shall be duct installed steam manifold type.

f. Reheat Coils

(1) Reheat coils where required will be the hot water type installed at the variable volume box in the branch duct serving its respective room or

space. The surface of the coils will be adequate to heat the room to the thermostat setting when heat gains are not present for interior rooms.

(2) Coils will be sized for approximately identical air pressure drops, and tube circuiting selected for adequate heat transfer and specific water pressure drops, so all coils have approximately the same water side pressure drop.

g. Supply Fans:

(1) Supply fans will be vane axial type having adjustable pitch blades as required for specific application. Outlet velocities and tip speeds will be in accordance with recommendations of the ASHRAE Guide in relation to operating static pressures. Fan intakes will be approximately centered on the cooling coil face to result in a uniform velocity over the coil. All fans on systems having humidifiers or cooling coils shall have interior painted with rust inhibitive coatings.

8. Duct insulation will be provided as follows:

a. Supply Ducts in Equipment Rooms. In area of the Equipment Rooms and beyond, if required, ducts shall be treated with interior sound insulation.

b. Supply Ducts concealed in shafts or ceiling spaces surrounded by air conditioning areas. These ducts will be insulated to reduce the temperature rise between the first and last take-off.

c. Exposed supply ducts through air conditioned areas. Where ducts are exposed to view they shall be insulated in a manner that results in a satisfactory appearance. These supply ducts can be insulated on the interior as described above.

d. Return Ducts generally will not be insulated; however, if they pass through spaces having higher or lower than normal temperatures, insulation will be applied to reduce heat gains or losses.

e. Fresh air ducts and mixed air plenum. Generally these ducts will be insulated using a double wall sheet metal construction with board type insulation.

f. Acoustical Duct Insulation:

(1) The interior or inlet ducts to return - exhaust fans and discharge ducts from supply fans will be insulated on the interior surface for required length, for sound attenuation, with a fireproof glass fiber sound insulation protected by a coating to prevent erosion.

(2) In general, the same treatment shall be given to relief ducts between rooms, supply, return and exhaust duct work in areas where sound transmission between rooms would be objectionable, and ductwork from the equipment rooms to adjacent areas.

9. Vibration Isolation:

a. Special foundation and support designs will be provided for all fans, pumps, compressors, etc., to reduce vibration to a minimum.

10. Chilled Water System

a. Absorption Chiller will be a high pressure type. See Appendix Item L-10 for Design Analysis - Low vs. High pressure absorption chiller. We are aware of some maintenance concerns by the University of Minnesota on high pressure machines which hopefully can be resolved with the Trane Company. The economics definitely suggest the use of the high pressure machine.

b. The primary chilled water pump and the condenser water pump serving the new absorption chiller will be constant speed, constant volume horizontal centrifugal type, each with mechanical seals.

c. Secondary chilled water pumps serving cooling coils in supply air handling units shall be variable speed type (automatic-manual adjustable frequency inverter).

11. High efficiency motors will be considered for all mechanical equipment.

III. DESIGN CRITERIA

A. Outdoor Design Data

1. Winter - 19°F

2. Summer - 89°F dry bulb

75°F wet bulb

B. Indoor Design Data

1. Winter - All occupied areas 68°F, approximately 20% relative humidity.

2. Summer - All occupied areas 78°F, approximately 55% relative humidity.

3. Indoor design conditions will be as noted above except in laboratories or other areas where process or experimental work requires conditions in excess of those stipulated in the energy code. Systems will be sized in these areas to maintain 75°F indoor temperature and 30% relative humidity winter and 50% relative humidity in summer.

IV. HEATING SYSTEM

A. General Description

1. Primary heating media, in the form of high pressure steam, will be supplied to the building from Unit "A". Steam flow meters will be used to record steam consumption. Steam pressures will be reduced and convertors will be installed to satisfy the hot water heating demands of the building.

2. Entrance vestibules, corridors, stairways and other miscellaneous rooms will be heated with cabinet unit heaters and/or fin tube radiation as required. Heating media for these units will be hot water.

3. Mechanical and electrical equipment will be grouped and located in equipment rooms which have adequate maintenance. Major equipment rooms will be provided in this unit at the Basement and Roof Penthouse. The basement equipment room will connect to the equipment room of Unit "A".

B. System Components

1. Hot water reheat and radiation systems will include convertors, pumps, piping, air separators, individual room reheat coils, fin tube radiation, unit heaters and convertors.

2. Steam and condensate return system will include pressure reducing valves, strainers, traps, and piping to central station unit heating coils, chiller, convertors, water heaters, humidifiers, sterilizers, and lab outlets.

C. System Installation

1. Reheat System

a. A forced water heating system to supply the individual room reheat coils will be provided. Quality of temperature control, simplicity of operation, and adaptability to future remodeling are features offered by this system.

b. The systems will be everse-return two-pipe, to provide equal pressure differential across all control valves. The water will be heated in the shell and tube convertors with building steam providing heat. Standby pump and convertor capacity will be provided.

2. Radiation System

a. A hot water radiation system will be provided for certain exterior rooms and building entrances. This system will supply hot water to fin tube radiation and unit heaters in such rooms or spaces. Standby pump and convertor capacity will be provided. Fine tube elements will be by the Mechanical Contractor and the enclosures will be by the General Contractor.

V. MISCELANEOUS SYSTEMS

1. Condenser Water Cooling System

a. A condenser water cooling system shall be provided to serve the Environmental Room condensing units. A small cooling tower and separate indoor basin with a tower water circulating pump and system will be installed.

2. Radiator Coolant System

a. A closed loop glycol/water system shall be provided for emergency generator engine cooling.

3. Fuel Oil System for Emergency Generator Engines

a. The National Electric Code requires an on-site fuel supply for emergency generators. Our design analysis has indicated that a fuel oil system will be the preferred system over the compressed natural gas storage system. See Appendix Item L-10 for Design Analysis - Fuel Oil vs. Compressed Natural Gas.

b. The fuel oil system will consist of two underground storage tanks with transfer pumps within the building to pump fuel oil day tanks at each diesel engine generator.

VI. AIR CIRCULATION RATES

The following air change rates are indicative of those spaces served by Constant Volume devices. Spaces served by Variable Volume devices will have air change rates dependable only on space heat gains. (Classroom/Office type spaces.)

The air change rates listed below govern the quantity of air supplied to or exhausted from a particular space unless equipment exhausts or calculated heat gains indicate that a greater volume is necessary or unless local codes require large volumes.

Air change rates are given in air changes per hour unless otherwise indicated.

AIR CIRCULATION RATES IN AIR CHANGES PER HOUR

Type of Space	Supply Rate	Return Rate	Exhaust Rate	Remarks
Dark Rooms	10		10	Note 3
Color Developing Dark Rooms	10		10	Note 4
Tablet Lab	10		10	
Tablet Pressing	10		10	
Instrument Lab	10		10	
Preparation Lab	10		10	
Extraction Lab	10		10	
Dust Room	10		10	
Sterilization and Sterilizer Rooms	12		20	Note 5
Glassware, Reagent Prep. and Dispensing	8		8	
Constant Temp. Lab	10		10	
Chromatography	20		25	Note 17
Technicians Lab	12		12	
Glass Washing	12		12	
Tissue Culture	10		10	
Chemistry Lab	12		12	Note 7
Dispensing	8		8	
Student Labs	10			Note 6

Type of Space	Supply Rate	Return Rate	Exhaust Rate	Remarks
Support Lab	12			Note 8
Faculty Lab	12-15		12-15	Note 7
Teaching Lab	15		15	
Graduate Lab	12		12	
Permentation Lab	10		10	
Extraction Lab	10		10	
Post-Doctorate Lab	10		10	
Drying and Milling	10		10	
Instrument Rooms	10	10	10	
Pharmacokinetics	10		10	
Volatile Liquid Storage			12	
Toilets			12	
Janitors' Closet			12	
Receiving			6	
Locker Rooms	4		12	
Cold Room (Prefab Room)	25 CFM		25 CFM	
Cage Washing	15		20	Note 11
Diet Preparation (Animal)	8		8	
Animal Operating	15		14	Note 12
Nutrition & Food Storage (Animal)	8		8	
Animal Rooms - Dogs	20		22	Note 10
Animal Rooms - Rabbits & Cats	15		17	Note 10
Animal Rooms - Mice, Hamsters Guinea Pigs	15		17	Note 10
Animal Rooms - Invertebrates, Chickens and Snakes	18		20	Note 10
Animal Receiving	12		13	Note 10
Animal Holding	18		13	Note 10
Animal Exam Rooms	8	8		

Type of Space	Supply Rate	Return Rate	Exhaust Rate	Remarks
Biochemistry Lab	12		12	

Note 1 Storage areas will be supplied only if temperature or humidity control is required. Storage areas will be returned or exhausted depending upon materials stored.

Note 3 Dark room equipment generally requires special exhausts to remove chemical fumes, heat, and humidity.

Note 4 Color developing dark rooms require precise control of temperature and humidity.

Note 5 Sterilizing areas should be heavily exhausted. Exhaust ventilation rate should be 250 to 1500 CFM per sterilizer, depending upon size and type.

Note 6 Relief to adjacent instruments and facilities room as required for fume hood exhaust air make-up. Excess air will be returned.

Note 7 Exhaust air through fume hood(s) as applicable. Volume to maintain slightly negative room pressure.

Note 8 Relieve air from the Lab to meet the exhaust requirements of support lab.

Note 10 All animal rooms will be exhausted slightly more than supplied to provide a negative pressure within the space.

Note 11 Cage washing room has high latent load from washing apparatus.

Note 12 Exhaust air directly from room in volume to maintain slightly positive pressure. Room ventilation should conform to applicable NFPA requirements.

Note 13 Relieve air from corridor into toilets and janitors' closet for exhaust make-up.

Note 16 All ventilation rates above meet or exceed PHS, NIH, ASHRAE and University of Minnesota Standards.

Note 17 An exhaust hood mounted on a track with flexible tubing so hood can be positioned behind a particular tank being used. This room should be kept under negative pressure.

VII - AUTOMATIC TEMPERATURE CONTROL

A. General Description

1. A pneumatic automatic control system will be used for the control of all air temperature and humidity conditions.

2. Room humidity will be controlled on a zone basis, except in special isolated cases. A zone will consist of all rooms supplied by a single air handling unit.

3. Room temperature will be controlled on an individual basis.

4. Radiation convertor temperature will be controlled by a modulating steam valve with reset control feature.

5. Reheat convertors will be controlled by a modulating steam valve with reset control feature.

6. Chilled water system will be controlled from primary loop temperature control.

7. To accommodate planned future central control and surveillance of the mechanical systems of this building, all features and devices necessary for remote central control shall be provided.

8. Pneumatic temperature control system will include compressor, dryer, piping, thermostats, valves, gauges and connections as required for individual and central control. A separate compressor, dryer will be provided for Unit "F" with interconnection to Unit A-B/C System.

B. System Installation

1. Motorized Dampers:

a. For 100% outdoor air units, automatic motorized dampers to open and close with supply fan operation will be provided.

b. For units using a mixture of outdoor and return air, automatic modulating motorized outdoor and and return air dampers will be controlled by a mixed air duct stat set to maintain 55°F. Minimum open position of outdoor air dampers shall be maintained to provide the outside air percentages of supply air units. Enthalpy control will be provided to return the outdoor air dampers to the minimum open position when outdoor air total heat excees that of the system return air.

c. Motorized dampers will be used with all exhaust fans and controlled to open and close with fan operation.

2. Steam Preheat Coils (Heating coils with integral face and bypass Dampers). Preheat coil control will be provided on each unit to result in a leaving air temperature of not less than 55°F at minimum winter design temperature.

3. Cooling Coils:

a. Cooling coil controls will be provided to regulate the volume of dhilled water supplied to the coils. The control instruments will be located in

the discharge duct from the supply unit set to control at approximately 55°F depending upon design air volumes.

b. A freeze stat will be installed on cooling coil inlet to shut-down fan operation when temperature drops below 40°F.

4. Humidifiers located in supply air units will be controlled from a space or duct located humidistat operating a modulating steam valve supply on a manifold type humidifier. The control shall be piped to prevent operation of the humidifier when the supply fan is off and when the cooling valve is open. Each duct type terminal humidifier shall be controlled by a room located humidistat positioning humidifier valve to maintain stat setting. Humidifier valves shall close on fan shut-down.

5. Forced Hot Water Radiation System.

a. The water temperature in the system will be controlled automatically and varied inversely with the outdoor air temperature to compensate for the transmission heat loss. The water flow rate in the system will be constant. Individual self contained valves will regulate flow through radiation.

6. Forced Hot Water Reheat System. Pumps will operate 100% of the time. Water temperature will be controlled same as above except at a smaller temperature range variation.

7. Individual Room Temperature Control

a. On the summer cycle each room or space thermostat will position dampers in its respective variable air volume box to maintain space temperature. On laboratory floors where combination variable air volume boxes and reheat coils are used, the thermostat will modulate the reheat coil to maintain space temperature at the 100% or 50% position of the VAV control unit damper. Reheat coil valves will be selected to meet static head and differential heads imposed upon them by the design of the system piping and pumps. These valves need not be positive positioning type.

b. In certain instances of identical offices, i.e. same exposure, same area, etc., it may be possible to group several of these rooms on one thermostat and VAV box or VAV box with reheat coil. Care will be taken in having identical air volume to each room where this scheme is employed.

8. Variable Air Volume Boxes

a. The VAV boxes will have a modulating control sequence with an adjustable minimum volume setting.

b. When fume hoods located in laboratory area are switched to low speed operation the variable air volume boxes that serve that laboratory will be set to 50% of air capacity automatically.

9. Radiation heat output will be controlled by self contained modulating valves in individual perimeter offices or laboratories.

VIII - ENERGY CONSERVATION

A. The following steps have been taken mechanically on the Unit "F" project towards energy conservation.

1. A Variable Air Volume System has been selected as the air distribution system for the major portion of the building. Variable inlet vanes on supply and return fans will allow horsepower savings by supplying only that amount of air required to handle the heat gains of the building spaces.

2. Fume hoods will be supplied with two-speed fans. Low speed will allow horsepower savings during unoccupied periods of laboratory spaces while still providing adequate ventilation for integral flammable storage cabinets.

3. Canopy and specialty exhaust serving laboratory areas have been individualized into separate systems where possible to allow more shut down possibilities when not in use.

4. Fan systems have been designed on a 12-hour and a 24-hour basis allowing shut down of equipment not absolutely necessary on a 24-hour basis.

5. High efficient motors will be used where applicable on all mechanical equipment.

6. Chilled water system will employ variable speed secondary pumps, pumping only that amount of chilled water needed to handle the air conditioning required at a particular time.

7. Heat recovery equipment will be employed in major exhaust systems (general exhaust and toilet) and in 24-hour animal area exhaust system.

8. Supply fan systems employ Enthalpy or total heat control over mixed air to minimize energy usage to condition incoming air.

9. The insulation thickness on heating and plumbing piping systems and on fresh air ductwork will be increased to meet the new State Energy Code.

10. An Environmental Room cooling tower system will be provided to eliminate city water usage for this requirement.

11. High pressure steam fired absorption chillers are used for building air conditioning allowing 40% energy savings over low pressure machines.

12. Where reheat systems have been used for constant air volume applications (laboratories) supply fan discharge temperatures will be automatically reset upwards as spaces served are satisfied to minimize the amount of energy usage.

13. Emergency generators employ closed loop cooling water systems with radiators.

14. Multiple pumping is used in the chilled water primary system. Circulating pumps run only when their associated chiller is called on to operate.

15. Providions will be made on all mechanical systems for the future connection to the remote data center in Unit "A" basement. This system will control all equipment running time to minimize energy usage in the building.

IX. FIRE MANAGEMENT (MECHANICAL SYSTEMS)

A. The following steps are being taken within the mechanical systems of this project for fire protection. The steps are necessary to comply with the requirements of Section 1807 of the Uniform Building Code for high-rise building construction.

1. The complete building is fire sprinklered. Every floor of the building is a fire zone and is complete with its own flow switch device and alarm.

2. A wet standpipe system exists in all stairways for Fire Department use. This standpipe system serves 2-1/2" valves in the stairways at all floor levels.

3. A diesel engine fire pump will be provided to serve the pressure and flow requirements of the combination sprinkler and standpipe system within the building.

a. This system shall be interconnected on the discharge side of the fire pump with the fire pumps of Unit A, B and C, each providing standby for the other.

b. With the installation of another 12" water main to Harvard Street, another loop system is now completed within the Unit A-B-C-F complex providing a very dependable water source for fire pumps and hence fire protection systems.

4. Ventilation systems are part of an engineered smoke removal system.

a. Supply air systems are capable of introducing 100% outside air for emergency exhaust air. Return-Exhaust fans go to full exhaust on a fire emergency. All building exhaust fans continue to run on a fire emergency.

b. Stairways are pressurized and exhausted to maintain safe routes of emergency egress.

c. Elevator shafts and lobbies are pressurized on fire emergency to control smoke migration.

5. Rooms or areas with electronic equipment which might be affected adversely by accidental sprinkler operation will be protected by CO_2 systems. Actual rooms to be determined during construction drawing process. On-Off type sprinkler heads, as a part of the fire sprinkler system will also be used where applicable in critical areas.

6. Fire dampers in ventilation system ductwork will be employed as per Code requirements; at core walls, fire partitions and duct penetration of floors.

7. Typically fume hood ductwork will have no fire dampers. Where situation arises where fume hoods must have a fire damper, fume hoods shall have automatic extinguishing system added. (Fog nozzle type device tied into building fire sprinkler system is University of Minnesota approved for this use.

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

ELECTRICAL K

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UNIT F - OUTLINE SPECIFICATION

I. ELECTRICAL SYSTEMS

A. Codes and Standards

1. Electrical systems and equipment designed in accordance with the 1978 National Electric Code, University of Minnesota Standards and Minnesota Energy Code in addition to the following listed codes and standards.
   a. (UL) Underwriters Laboratories
   b. (NEMA) National Electrical Manufacturers Association
   c. (UBC) Uniform Building Code
   d. (SBC) Minnesota State Building Code
   e. (NFPA) National Fire Protection Association

B. Electrical Services

1. Dual feed, 13,800 volt, 3 phase power source from Owner's system at 13,800 volt switching center at Unit A and extended to the new Unit F substations.
2. One feeder connects to an existing primary switch at Unit A switchcenter and second feeder connects to a new primary switch.

C. Primary to Secondary Power Transformation

1. Double ended unit substations primary and secondary selective.
2. 13,800 volt delta to 277/480 volt grounded wye silicone liquid 65°c transformers.
3. Primary switches to be 15 KV, 3 phase, 200 amperes.
4. Automatic zero sequencing ground fault detection at main, tie and feeder switches with zone selective interlocking and restraint wiring between ground fault relays.

5. Tie switch allows connection between secondary sections of unit substations; tie switch condition is normally open.
6. Secondary switches at unit substation to be fused shunt trip bolted pressure contact type, for single phase and ground fault protection.
7. Unit substations to be provided with watthour metering indicating demand, and ampere and voltage meters with test blocks for recording watthour meters. Ammeter and test blocks will be provided at all switches. Watthour and voltage metering will be provided at each main switch of each substation only. Metering current and potential transformers will be provided.
8. Current limiting fusing to be Class R rejection type at substation secondary main and feeder switches for system coordination.

D. Secondary Power Systems

1. Secondary Distribution
   a. 277/480 volt, 3 phase, 4 wire grounded basic system.
   b. 120/208 volt, 3 phase, 4 wire grounded subsystem from dry type transformers connected to the 277/480 volt panelboards of the basic system.
2. Dry Type Transformers
   a. Dry type transformers shall be indoor type, 3 phase, 480 volt to 120/280 Y, Class H insulation for 150°c rise with fan primary taps for 2-2½% and 5% above and below normal.
3. Panelboards
   a. All panelboards to be circuit breaker bolt-in type, 3 phase, full capacity neutral and with a separate ground bus.
   b. Circuit breaker to be as scheduled below:
      - Branch Circuit Panelboards, 120/208 volt.

Amps.	Volts	Sym. I.C. - RMS - 240V
15-100	240	10,000

- Distribution Panelboards, 120/208 volt.

Amps.	Volts	Sym. I.C. - RMS - 240V
15-100	480	18,000
125-225	600	25,000
250-600	600	42,000

- Panelboards 277/480 volt.

Amps.	Volts	Sym. I.C. - RMS - 277 or 480V
20	277	14,000 (277V)
15-100	480	14,000 (480V)

c. Panelboards to be door-in-door type construction keyed alike.

d. All panels sized for future 50% load increase.

E. Grounding

1. Main ground bus in each substation and primary switchgear room.
2. Ground bus tied to water main and ground grid and extend through the electrical shafts for dry type transformer service ground.
3. Branch circuits provided with separate ground conductor run with circuit conductors for all receptacle and equipment circuits.
4. Ground conductor provided with circuit conductor for all flexible conduit installations.

F. Emergency System

1. Generation
   a. Diesel, 1-750 KW, 480 volt, 3 phase, 60HZ motor generator set serving emergency motor loads.
   b. Diesel, 1-300 KW, 480 volt, 3 phase, 60HZ motor generator set serving emergency and life safety loads.

Note: Studies are in progress to develop a compressed natural gas storage system for serving natural gas engines in lieu of diesel fuel system for diesel engines.

2. Distribution

a. 277/480 volt, 3 phase, 4 wire grounded basic distribution system.

b. 120/208 volt, 3 phase, 4 wire grounded subsystem from dry type transformers connected to 277/480 volt panelboards of the basic system.

3. Automatic Transfer

a. Automatic transfer capability from preferred source to emergency source. Transfer switches will separate life safety loads from motor and equipment loads.

b. Time delay before transfer on test and retransfer to normal provided to motor loads to shut down and restart through motor starting sequence equipment provided with motor control centers.

G. Basic Material and Systems

1. Wire and Cable

a. All conductors, 98% conductivity copper. Branch circuit wire to be XHHW or THHN insulated and wire for distribution feeder to be THW.

b. All primary service high voltage cable to be 15KV compound insulated cable.

c. Secondary distribution and branch circuit wiring to be color coded to identify each ungrounded phase, neutral and ground conductors.

d. All interior wiring to be installed in metallic conduit or enclosed metal raceways.

2. Conduit and Fittings

a. Conduit in building to be 3/4" or larger except 1/2" conduit to be used where for applications where future branch curcuit wiring requirements are not anticipated.

b. Intermediate steel conduit (IMC) to be used in concrete and where required for mechanical protection.

c. Electric metallic tubing (EMT) to be used in exterior walls, partition walls, furred ceilings and all other concealed locations where additional mechanical protection is not required.

d. Conduit buried in earth to be protected against corrosion.

e. Fittings for (IMC) to be threaded type and for (EMT) steel compression type.

f. Flexible conduit to be used for final connection to recessed lighting fixture, motor and equipment connections as allowed by code.

g. Liquid tight flexible conduit to be used at damp or wet locations.

3. Wiring Devices

a. Switches shall be 20 ampere, A.C. rated, quiet mechanical type.

b. Duplex receptacles shall be 3 wire grounded type rated 15 and 20 amperes.

c. Special receptacles to be NEMA "U" ground type.

d. All wiring devices to be heavy duty specification grade.

e. Wiring device color to be brown except certain special receptacles to be black.

f. Ground Fault Interrupter (GFI) receptacles to be provided at code required locations.

g. Plates to be satin finish #302 stainless steel.

4. Plug-In Raceways

a. Surface metal raceway #G3000 with duplex 15 and 20 ampere grounding type receptacles approximately 36" o.c. with stainless steel plates.

b. Separate ground wire to be included with in each raceway.

c. Raceway color to be special to coordinate with casework or wall surface.

H. Communications Systems

1. Telephone System

a. Empty conduit and outlet distribution system with zone junction boxes to telephone cabinets and telephone cores.

2. Television CCTV System

   a. Empty conduit and outlet distribution system to communications cores.

   b. Cables and equipment installations by University.

3. Computor/CRT System

   a. Empty conduit and outlet distribution system to communications cores.

   b. Cable and equipment installations by University.

I. Fire Alarm and Environmental Control System

1. Fire Alarm System

   a. Multiplexed dedicated logic, zoned, annuciated, electrically supervised system with voice communication, manual fire stations, fixed temperature detectors, rate of rise detectors and smoke detectors located as required by the NFPA 90A NFPA No. 101 and UBC 1807.

   b. System to be connected and activiated by the automatic sprinkler system.

   c. System to provide for visual fire alarm indication with visual instruction graphic provided at each visual alarm indicating light.

   d. System to activate a smoke removal system zoned on a per floor basis and utilizing the mechanical air handling equipment for smoke removal.

   e. System to provide for manual control of smoke removal system from the Unit F fire control center.

   f. System to include complete graphic display of fire zoning, smoke control and fire control instruction.

   g. System to activate elevator fire return sequence.

   h. System to include automatic taped message sequence via fire speakers to instruct occupants upon alarm and manual emergency paging via fire speakers from Unit F fire control center.

   i. System includes a dedicated firemans intercom system from Unit F fire control center to remote stations at stairlanding elevator lobbies and elevators.

2. Environmental Control System

   a. System to include all temperature control and pneumatic piping system to accomplish the temperature control of mechanical equipment systems as described under the Mechanical Outline Specifications.

   b. System to interface with the fire alarm system for fire control programmed sequences.

3. Central Processor and System Equipment

   a. System to utilize the central processor of Unit B/C Building for event initiating commands.

   b. Centralization for monitoring and control of Unit F mechanical equipment to interface with Unit A central control station equipment.

   c. Voice communication & visual alarm, equipment, operators terminal, graphic display and printer to be provided at Unit F fire control center.

   d. Data transmission system to be extended into Unit F to interconnect remote data panels for data collection and transmission.

J. Lighting Systems

1. Fluorescent

   a. In general, primary lighting system for task areas to be 1' x 4' recessed fluorescent fixtures with injection molded acrylic lens utilizing 2 or 3 lamps to attain the required lighting levels.

   b. Fluorescent lamp to be 40 watt rapid start standard white lamp per University's standard for general application.

   c. Fluorescent lamp to be 40 watt rapid start deluxe cool white or other special color lamp to be provided where special critical color evaluations are a function of the programmed space.

2. Mercury Vapor

   a. Recessed mercury vapor downlight fixtures with deluxe cool white lamps to be used in addition to fluorescent lighting at certain limited corridor and lobby applications.

   b. Exterior lighting with utilize mercury vapor type fixtures and lamps

3. Incandescent

   a. Incandescent recessed light fixtures to be utilized for certain special applications relating to audio/visual presentation areas and other areas requiring a special lighting environment.

4. Lighting Standards

   a. Lighting levels to be in accordance with the latest Illuminating Engineering Society (IES) recommendations as minimum average levels of illumination at identified task locations.

   b. Lighting sytems to be designed in conformance with University Standards and the Minnesota Energy Code.

   c. Typical areas identified with recommended light levels (Footcandles - FC). Complete room by room proposed light level plans (Drawings E5 through E13) are included with D.D. Drawings.

Animal Rooms:	50 - 100 FC
Classrooms:	
Reading Tasks/Pencil Writing	70 FC
Conference/Seminar:	
Reading Tasks/Pencil Writing	70 FC
Conferring	30 FC
Note Taking for Audio/Visual	0 - 15 FC (variable)
Corridors: (1/2 level control = 10 FC)	20 FC
Examination Rooms:	
General	50 FC
Exam Table	100 FC

Utility Rooms:	
General	20 FC
Work Counter	50 FC
Laboratories:	
General	70 FC
Research/Student w/Close Work Tasks	100 FC
Lobbies/Waiting:	
General	20 FC
Local/Reading	30 FC
Locker Rooms:	20 FC
Offices:	
General/Secretarial	70 FC
Manufacturing	70 FC
Storage	30 FC
Toilets:	30 FC
Stairways:	20 FC

5. Lighting Control

   a. Room Fluorescent lighting systems to have 2 level light switch control where required by the Minnesota Energy Code.

   b. Incandescent lighting systems to have 2 level switch control except where variable level SCR dimmer control is programmed.

   c. Central low voltage relay and switch control system for corridor, stairway and lobby lighting.

   d. Exterior building lighting to utilize relay and photo-electric control.

6. Emergency Lighting

   a. Exit lights, selected corridor lighting, stairwell lighting, and lighting in other critical areas to be on the emergency power system.

   b. Certain laboratories to have partial lighting connected to the emergency power system.

K. Lightning Protection

1. Complete lightning protection system to meet U.L. master label requirements.
2. System will interconnect to Unit A system.

L. Motor and Equipment Connections

1. Motor and Motor Control
   a. Motor control centers 480 volt, 3 phase with front mounted combination fused switch and magnetic starters.
   b. Magnetic starters to be full voltage across-the-line type except magnetic starters for cooling tower motors to be 2 speed 2 winging magnetic across-the-line starter.
   c. Motors to be high efficiency and high power factor type.
   d. Motor control centers constructed for 40,000 amperes RMS symmetrical short circuit withstand.
   e. Starters to be provided with pilot light, pushbutton or selector switch, overload reset, control transformers for 480V to 120V and auxiliary contacts.

M. Power Factor Correction

1. Capacitors to be provided for improvement of electrical system power factor to above 90% as required by the Minnesota Energy Code.
2. Application to be at motor control centers, motor terminals and at distribution switchboards as required to accomplish the effective correction.

N. Snow Melting System

1. Electric matts at 277 volts for 60 watts per square foot.
2. Controlled by a solid state temperature-moisture sensing detector.
3. System to be installed at stairs and entrance only to 2nd Floor Concourse from Harvard Street.

APPENDIX L

APPENDIX ITEMS L-3 - L-10 WILL BE COMPLETED AND INCORPORATED INTO THE REPORT DURING THE DESIGN DEVELOPMENT REVIEW PERIOD.

CASEWORK STANDARDS L-1

The following are standards developed for Unit F Casework and Equipment. These standards are employed in the deveoopment of the casework elevations, Appendix L-2, which follows. Sectional notations on the elevations relate back to this section.

I. INTRODUCTION

This document, "CASEWORK COMPONENTS" has been prepared to assist University of Minnesota Department Representatives in determining the required casework components for each laboratory. This is the final programming phase for rooms which have casework and laboratory equipment. The components selected will be reviewed with the Architect as soon as a meeting can be scheduled after the 1/4" scale casework/equipment drawings have been approved.

II. COMPONENT SELECTION PROCEDURE

A large scale plan (1/4" = 1'-0") of each laboratory has been developed indicating the required equipment and its plan location within the room. The next step in the development of these laboratories is the selection and arrangement of individual components making up the indicated casework.

An elevation of this casework will be made in consultation with an appointed department representative. The selection of casework components and accessories will be made from the items indicated in Section III and IV of this document.

Additional equipment information which has not previously been described or identified will be secured at this meeting. This information will be recorded and made a part of the room requirements.

Individual room requirements will be reviewed to insure that all needs have been identified. An outline of Special Room requirements is provided in Section V, "Room Requirements", to assist in this review.

The above outlined procedure will complete the design development of the individual department laboratory and provide the tools necessary to develop the contract documents. Samples of the documents which will be completed for each laboratory are included in the Appendix, Section VI.

III. CASEWORK SYSTEM AND COMPONENTS

Conventional floor mounted casework will be used. The specific type of casework selected will be based upon program needs and will be either the metal laboratory type or the plastic laminate type.

The piped services will be racked behind the base cabinets. Service fittings such as vacuum, air and gas will be located as indicated on the drawings included in this section. These fittings will be located under the wall cabinets, on a reagent shelf, or on the countertop as determined by the program needs. Electrical Service will typically be provided in a continuous outlet strip. Individual outlets will be provided when required.

In the interest of uniformity, economy, and flexibility we have limited the suggested number and sizes of casework components. In general, the casework components selected should be of the following width; 18", 24", 36" or 48". Where dimensional variations are required by the overall length of the casework, the variation will be accommodated typically at a sink base unit or a knee space location.

The following outline, drawings and schedules describe the casework system and components from which selections should be made.

A. Component Materials:

Components are made in various materials and the selection of a component should be based upon its application and the material which is appropriate to its use. The range of materials has been reduced to as few as possible which meet the range of requirements necessary. Comparative test results on the materials selected are available upon request.

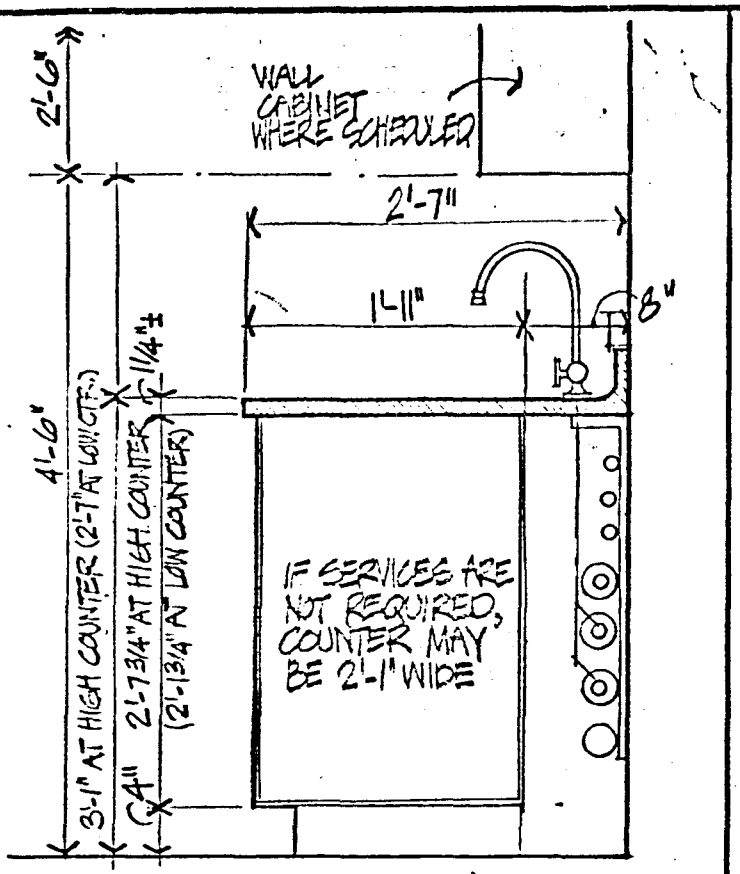
The following material descriptions are provided to aid in the selection of components.

1. Epoxy-Resin is a specially compounded and cured material to give optimum chemical and physical resistance to heavy duty use.
   a. Highest resistance to a wide variety of corrosive chemicals.
   b. High strength material and shock resistant.
   c. Recommended for General Laboratory use and in fume hoods.
2. Synthetic Stone is a monolithic cementitious sheet material, highly polished, but less impervious to corrosive chemicals than epoxy resin.
   a. Highly resistant to acid and alkali.
   b. Resistant to impact and abrasion.
   c. Recommended for General Laboratory use.
3. Stainless Steel, is fabricated from 16 gauge sheet metal identified as alloy No. 304.
   a. Good resistance to a wide variety of corrosive chemicals. Use alloy No. 316 for increased corrosion resistance.
   b. Excellent abrasion resistance and impact load bearing qualities.
   c. Recommend for food and radioactive labs, sterile areas, wash rooms, morgue and autopsy areas, and areas of high humidity.
4. Plastic Laminate has a thin layer of a heat, stain and acid resistant material laminated to hardwood core which is protectively treated on the underside.
   a. Good resistance to many corrosive chemicals.
   b. Good impact resistance but difficult to repair.
   c. Recommended for general use where chemicals and radioactive materials are not used.
5. Chemical Lead provides maximum resistance to acids but is subject to damage. Should not be used except as required for radioactive shielding.

B. Countertop (Working Surfaces) Materials:
1. Epoxy-Resin
2. Synthetic Stone
3. Stainless Steel
4. Plastic Laminate
5. Chemical Lead

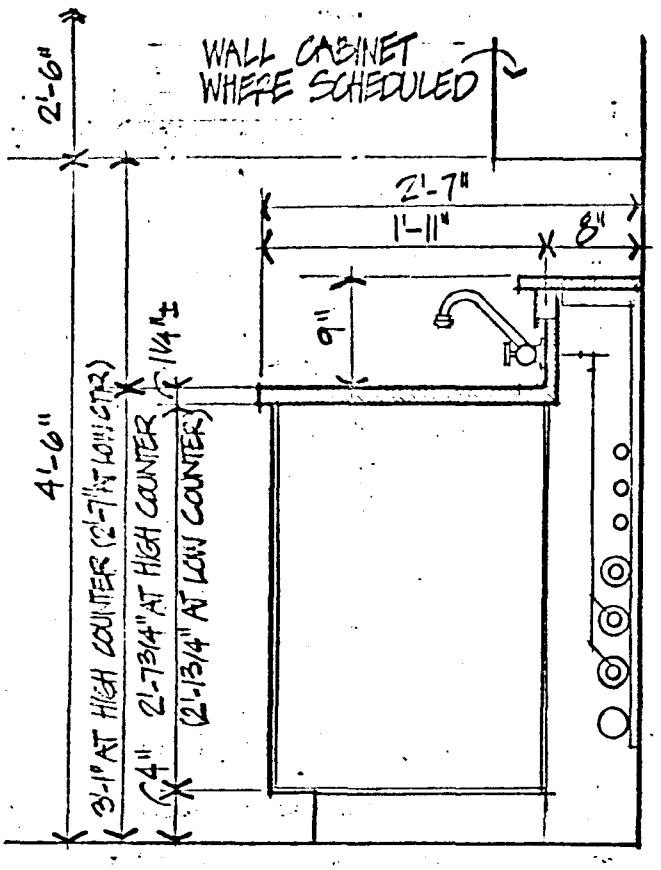
C. Types of Casework Units:

The following drawings indicate the various casework configurations and units available. Selections should be made from these units.



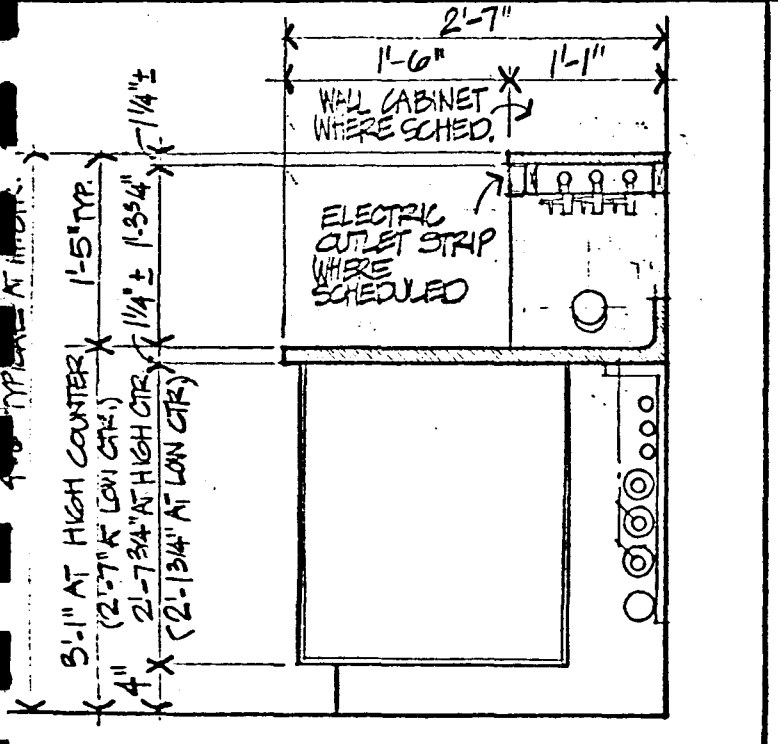
STANDING WORK AREA FOR DEEP COUNTER NEED

1/3



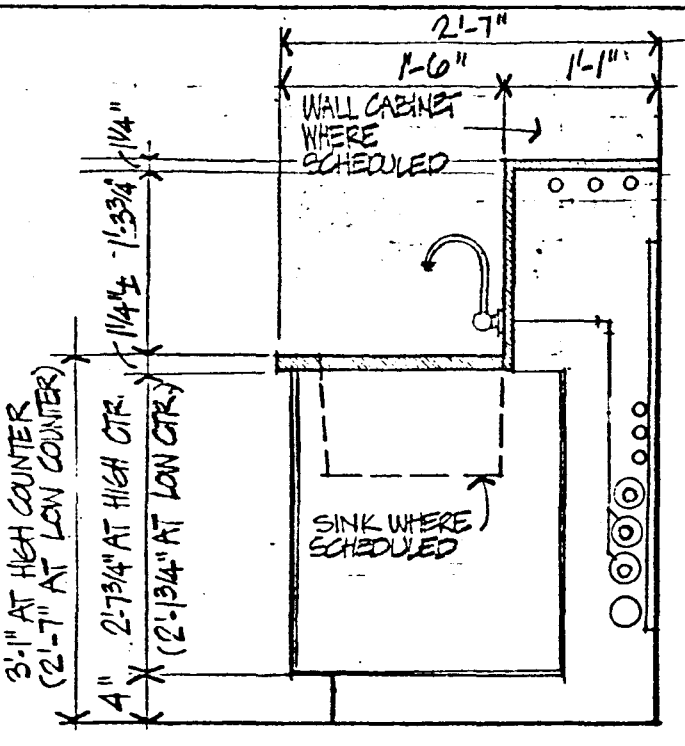
STANDING WORK AREA WITH REAGENT SHELF

2/3



BASE CABINET W/ SERVICES ABOVE (WITH REAGENT SHELF)

3/3



BASE CABINET W/SERVICES ABOVE (WITH REAGENT SHELF)

4/3

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DATE

CASEWORK COMPONENTS

SECTIONS THRU TYPICAL LAB. WALL BENCHES

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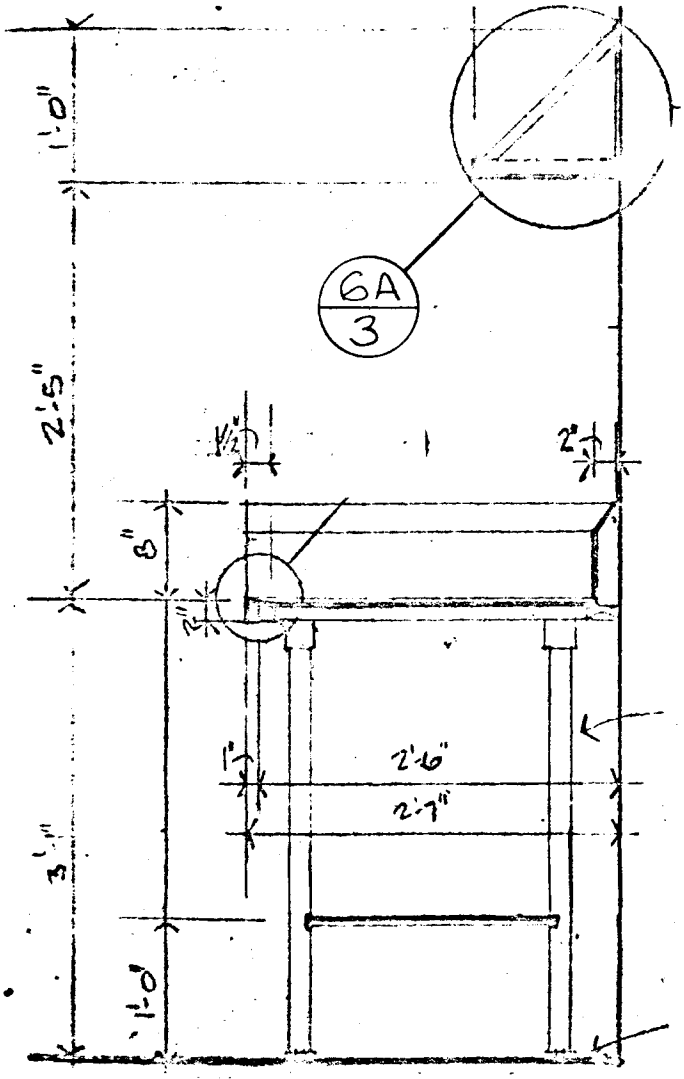
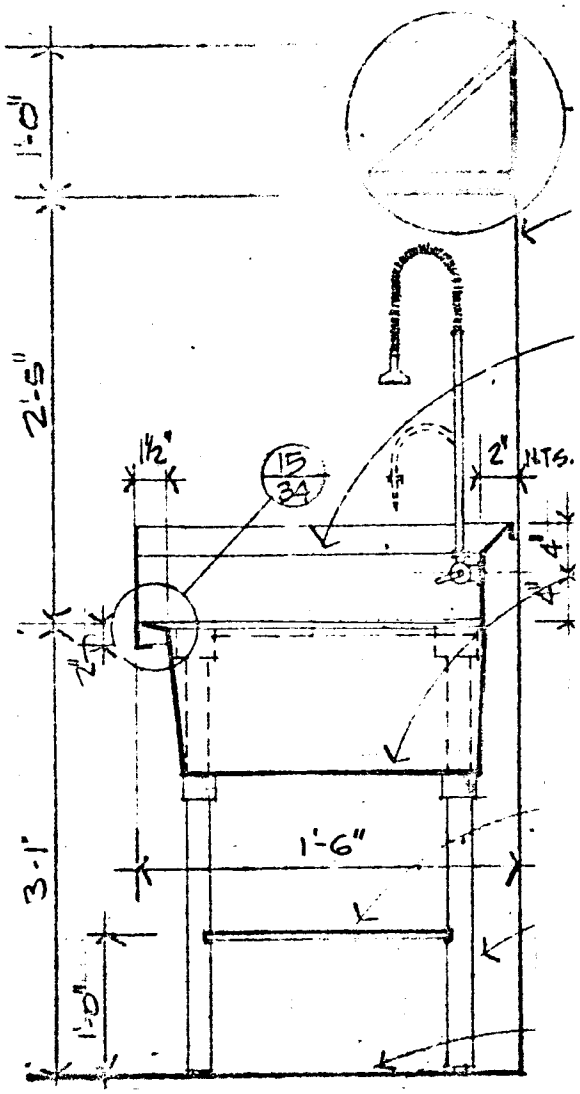
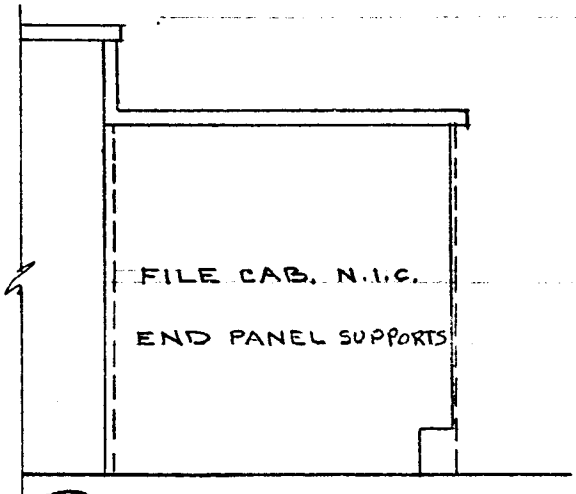


5/3 SECTION S.STL. COUNTER



6/3 SECTION S.STL. SINK



7/3 SECTION LOW COUNTER

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CASEWORK COMPONENTS
SECTIONS

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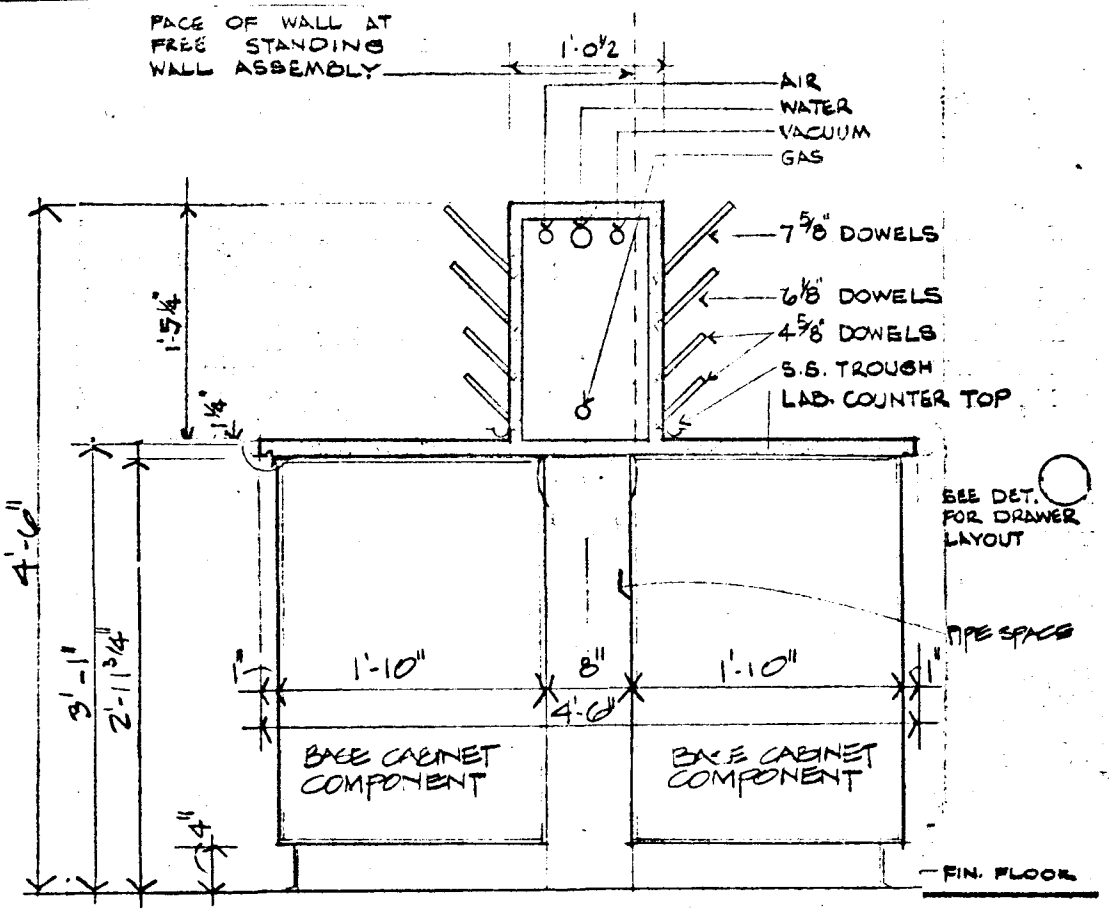
Page 4



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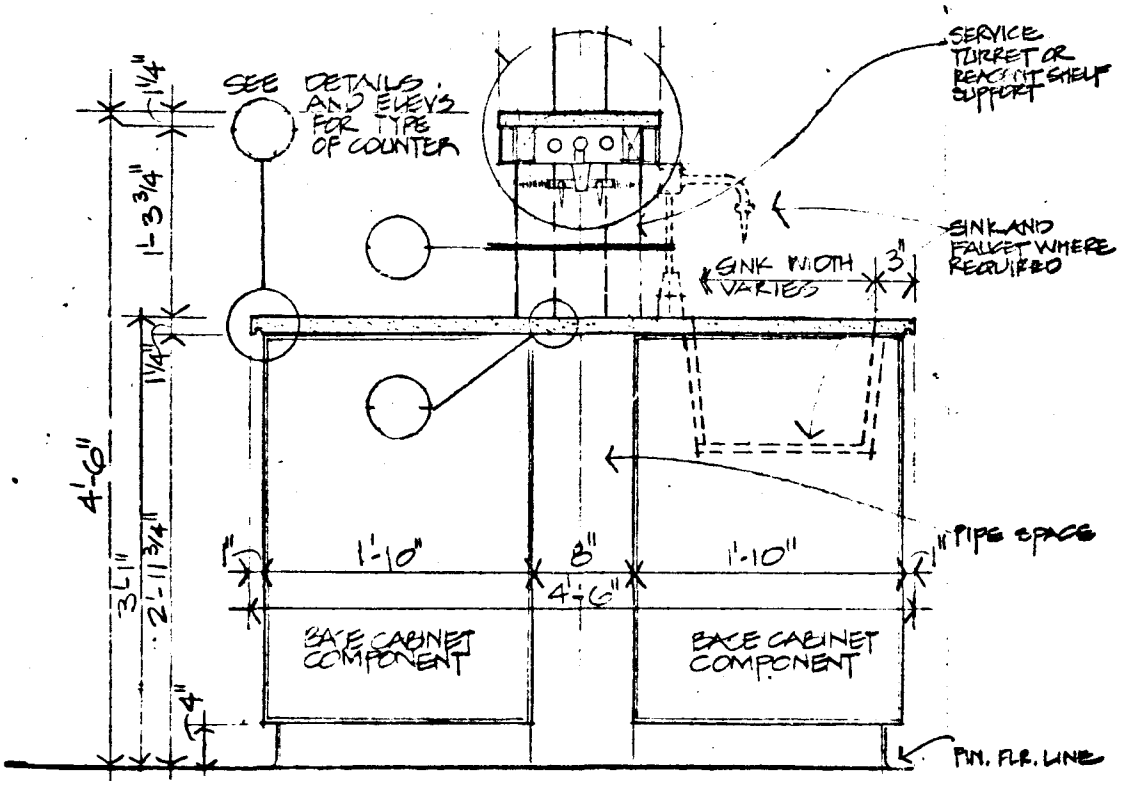

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CASEWORK COMPONENTS

SECTIONS THRU TYPICAL LAB. ISLAND BENCHES

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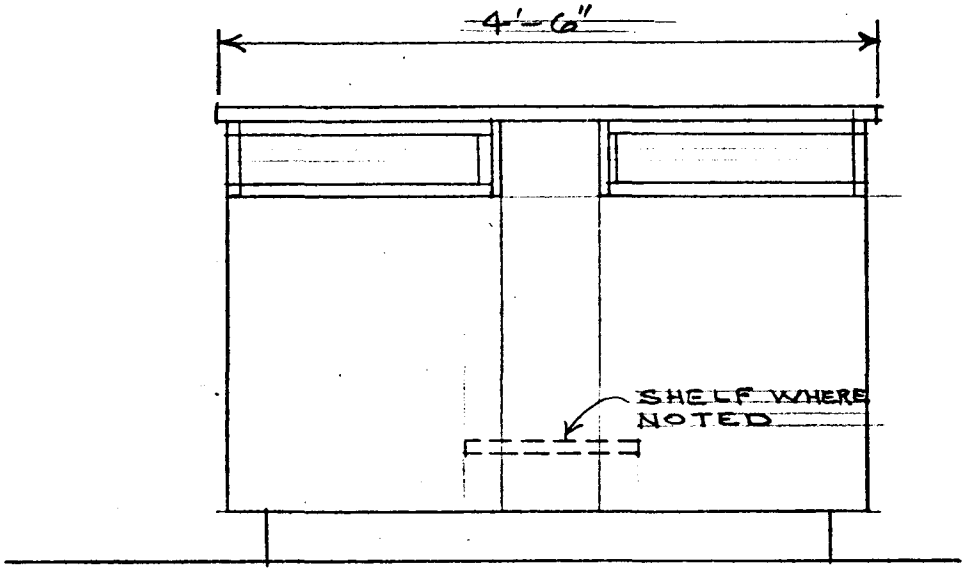

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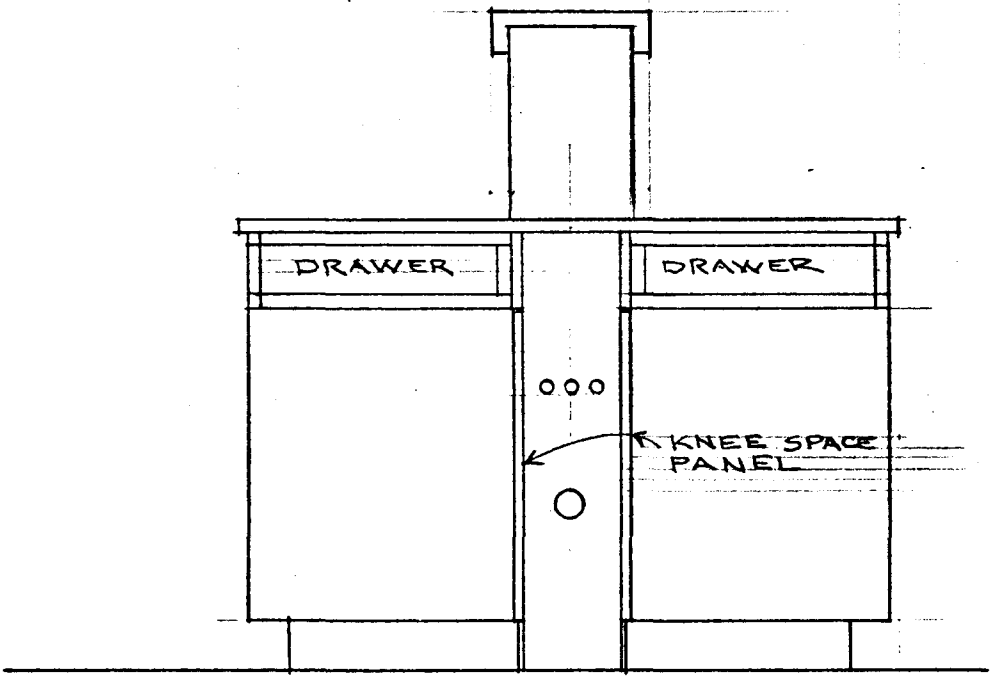

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CASEWORK COMPONENTS

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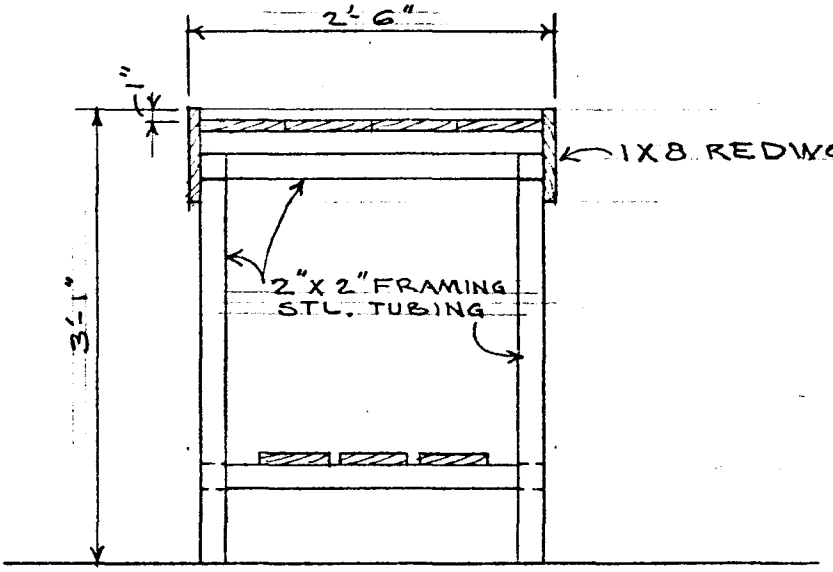
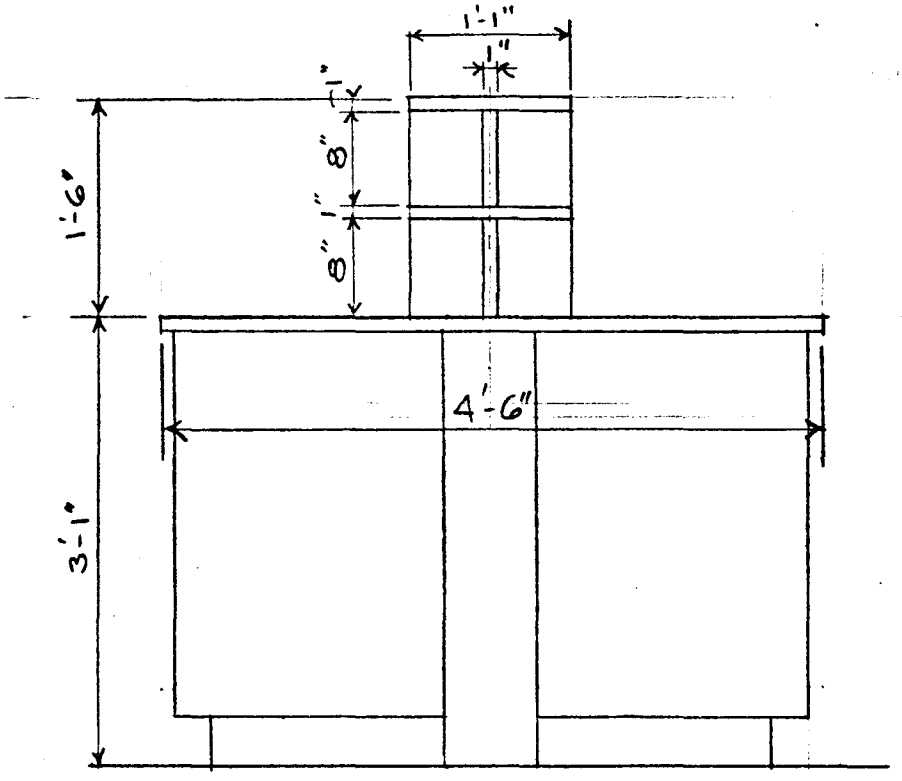


PLANTING BENCH 4'-6" LONG
18 REQ'D.

6/4



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CASEWORK COMPONENTS
SECTIONS

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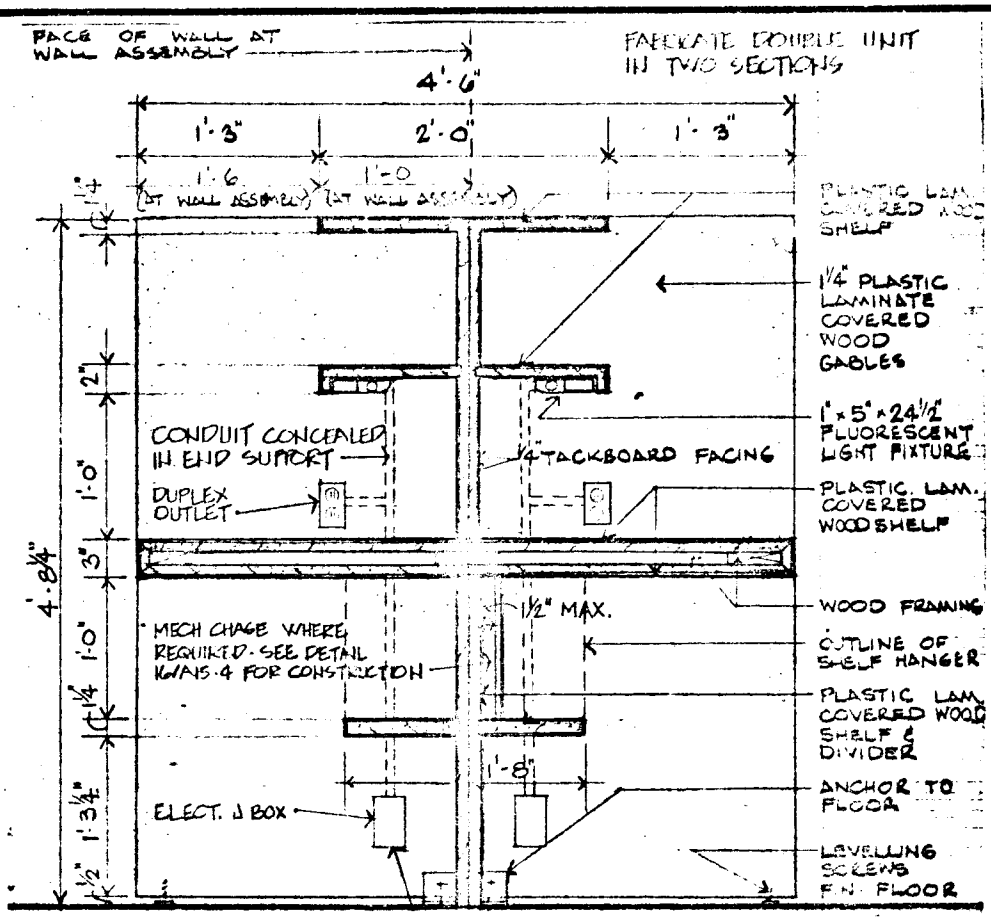

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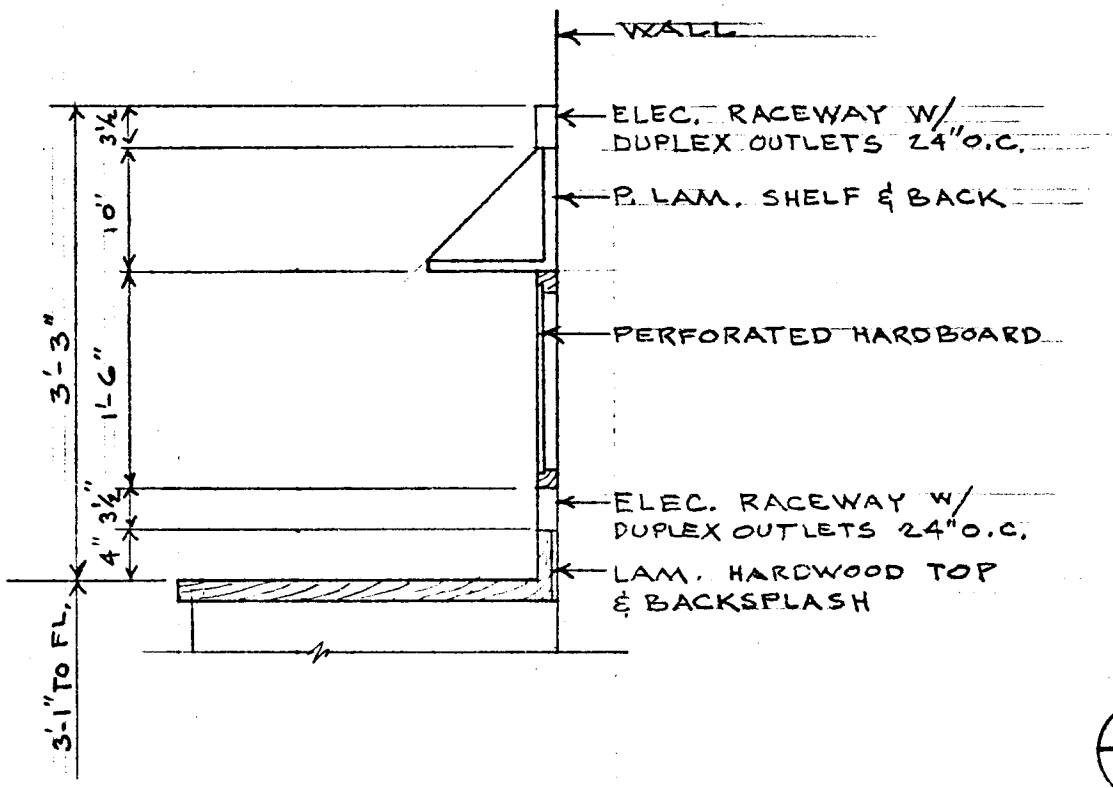

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CASEWORK COMPONENTS
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CARREL UNIT

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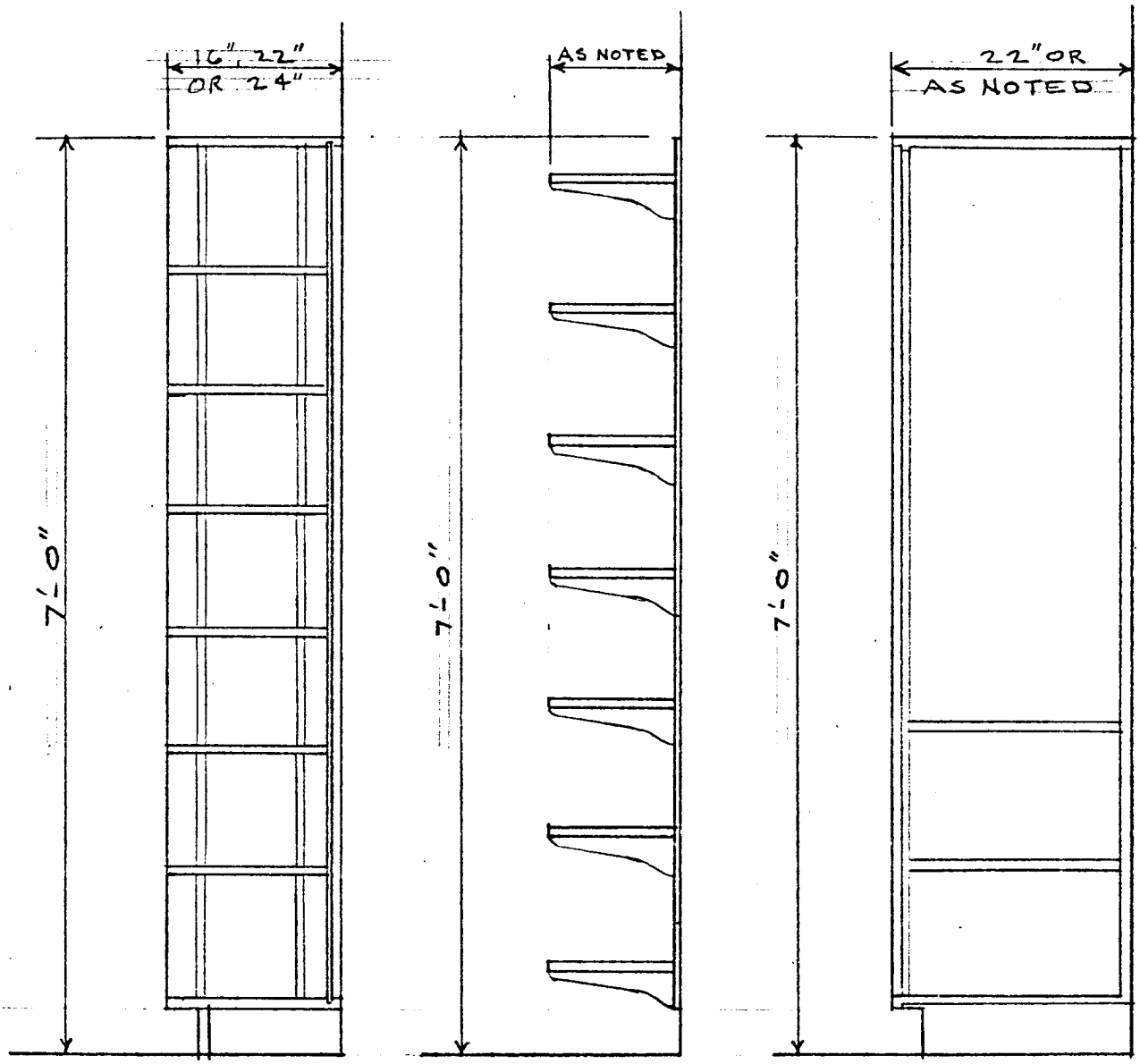

3/5 TALL STORAGE OPEN

METAL OR PLASTIC LAM.

4/5 ADJUSTABLE SHELVING

ST. STEEL PLASTIC LAM. OR WOOD

5/5 TALL STORAGE

METAL

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CASEWORK COMPONENTS

TALL STORAGE SECS

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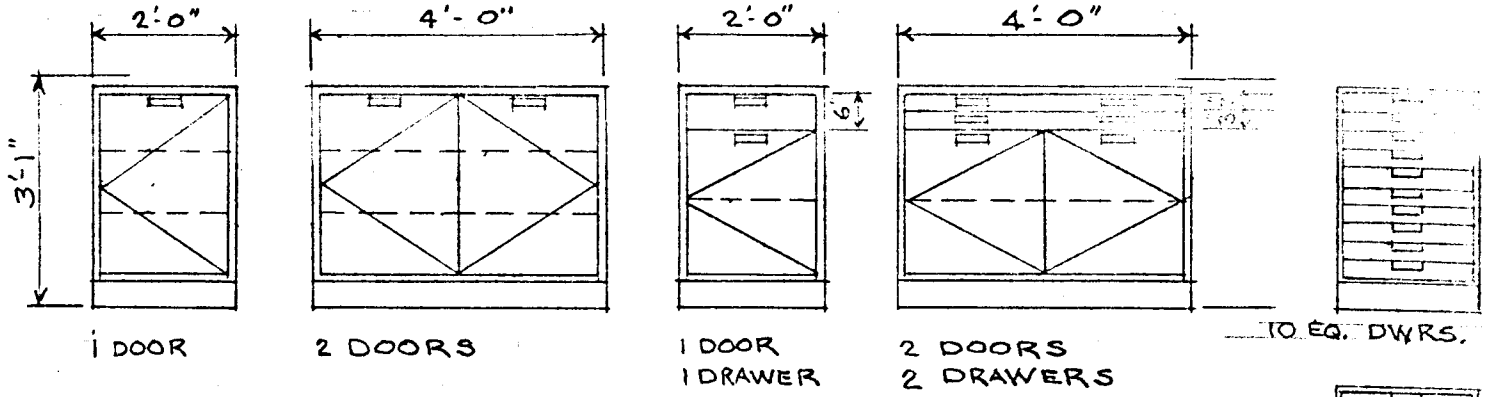
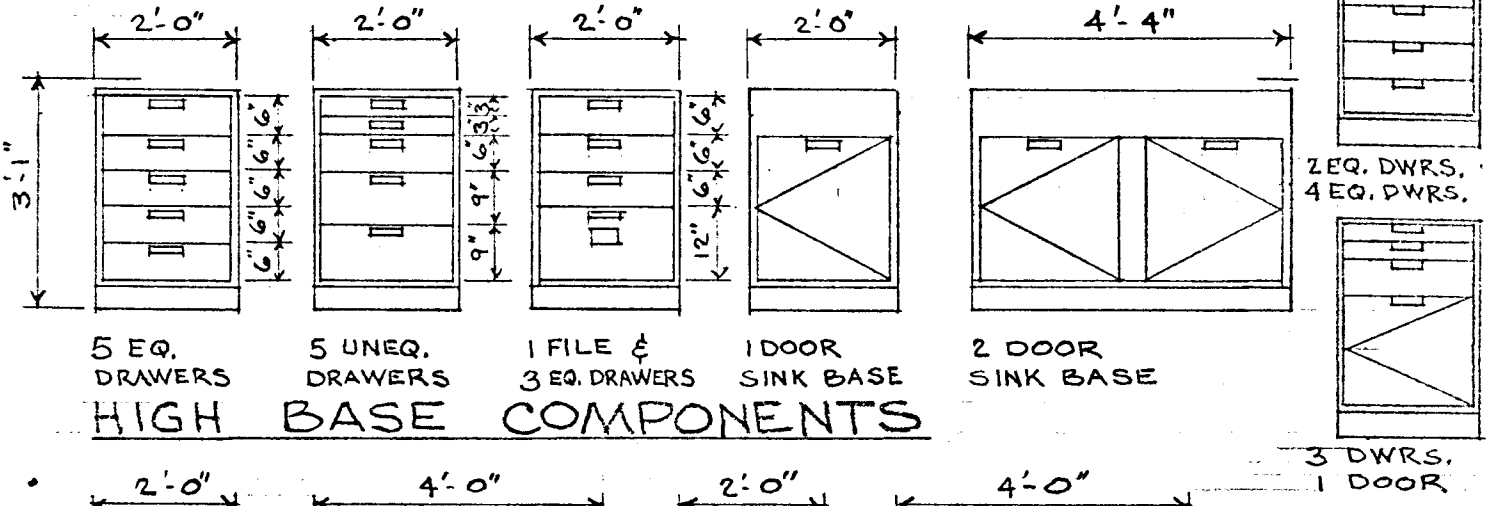
Page 9



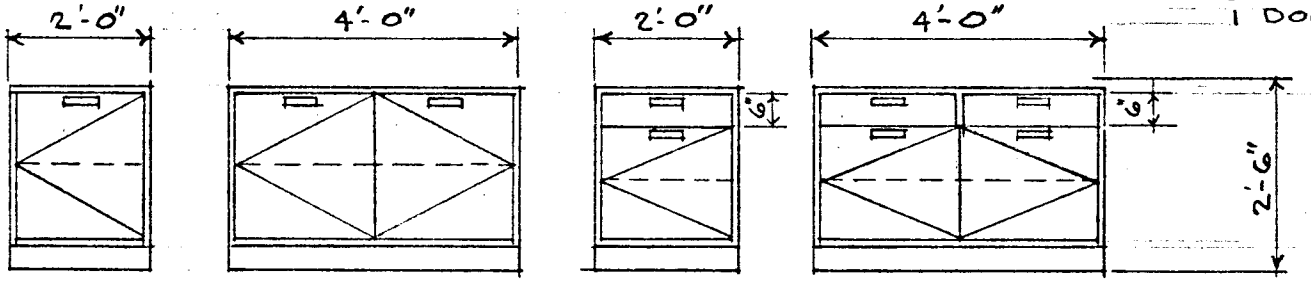
1 DOOR | 2 DOORS | 1 DOOR 1 DRAWER | 2 DOORS 2 DRAWERS

HIGH BASE COMPONENTS



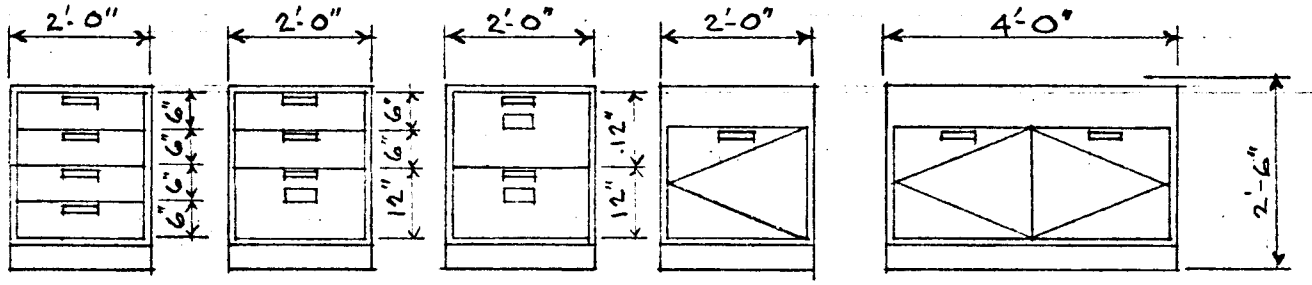
5 EQ. DRAWERS | 5 UNEQ. DRAWERS | 1 FILE & 3 EQ. DRAWERS | 1 DOOR SINK BASE | 2 DOOR SINK BASE

HIGH BASE COMPONENTS



1 DOOR | 2 DOORS | 1 DOOR 1 DRAWER | 2 DOORS 2 DRAWERS

LOW BASE COMPONENTS



4 EQ. DRAWERS | 1 FILE & 2 EQ. DRAWERS | 2 FILE DRAWERS | 1 DOOR SINK BASE | 2 DOOR SINK BASE

LOW BASE COMPONENTS

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CASEWORK COMPONENTS

METAL LABORATORY CASEWORK

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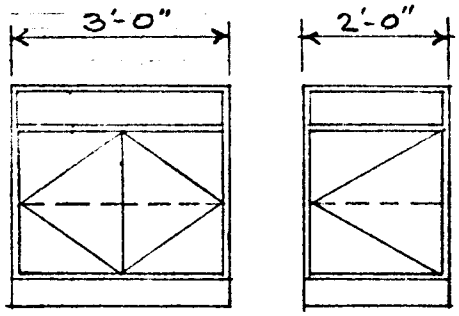
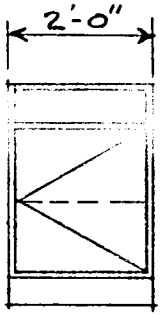
Page 10



1 PANEL
2 DOORS

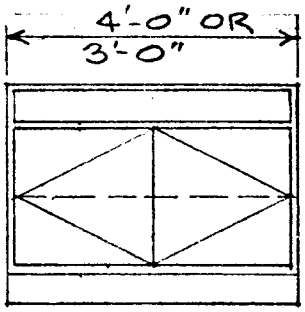
1 PANEL
1 DOOR

STANDARD F.H. BASE



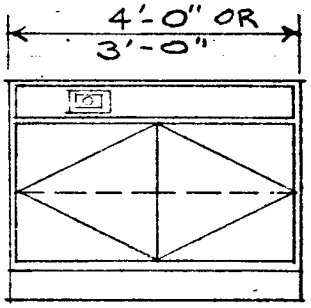
1 PANEL
1 DOOR

VOLATILE STORAGE



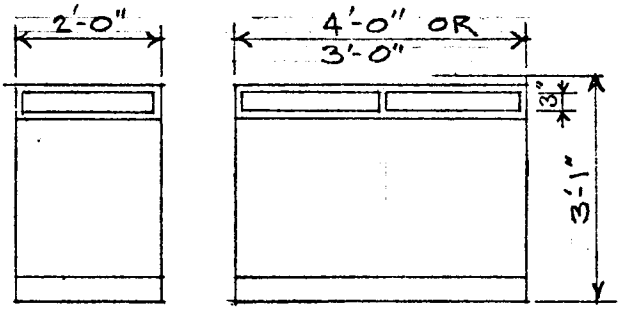
1 PANEL
2 DOORS

ACID STORAGE



1 PANEL
2 DOORS

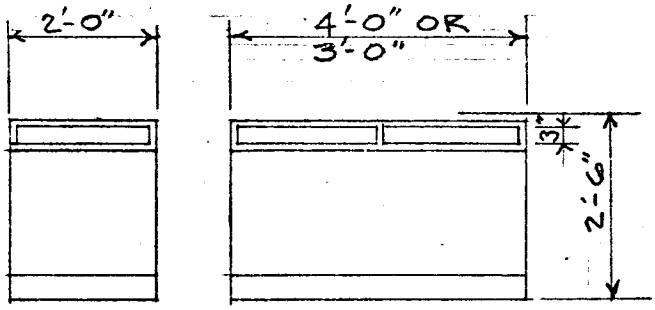
DRYING CAB. BASE



1 PANEL
1 DRAWER

1 PANEL
2 DRAWERS

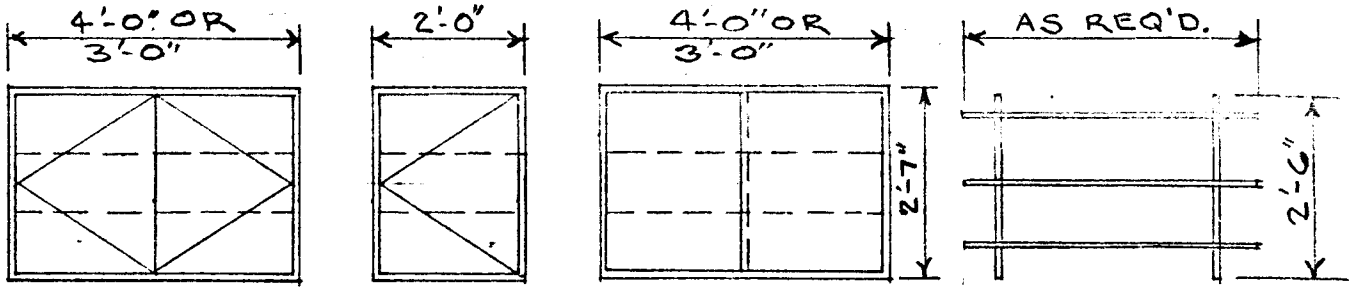
HIGH PANEL KNEE SPACE



1 PANEL
1 DRAWER

1 PANEL
2 DRAWERS

LOW PANEL KNEE SPACE



SOLID HINGED DOORS

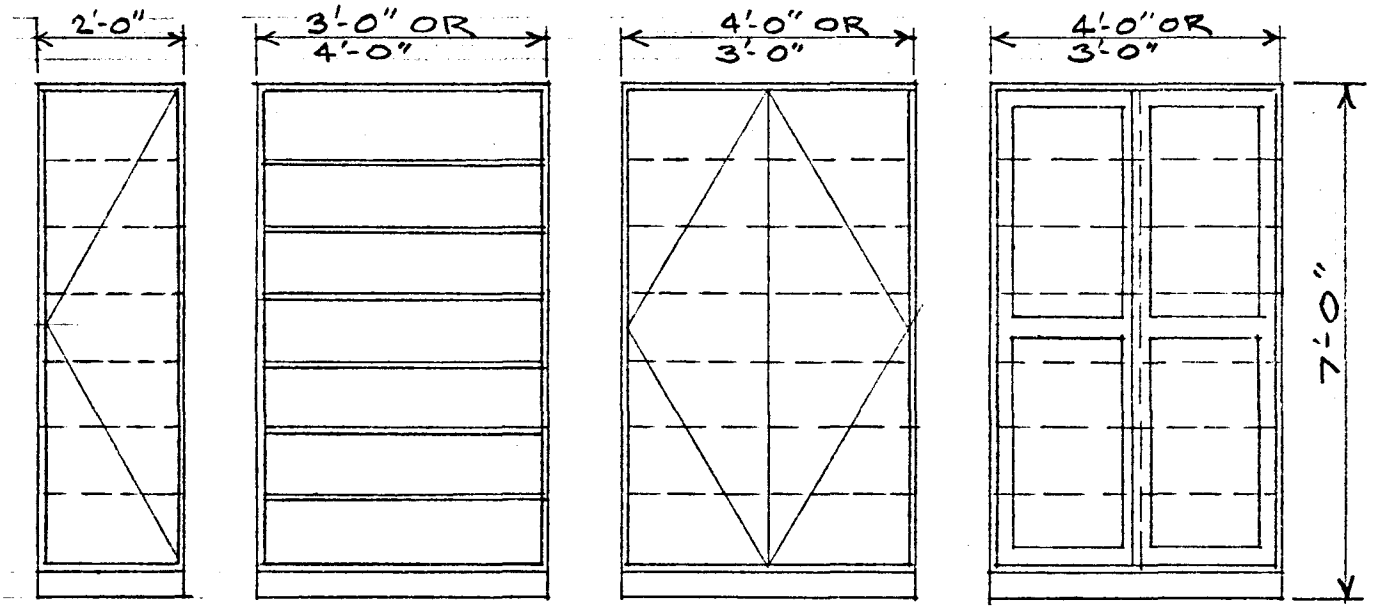
SOLID HINGED DR.

UNFRAMED GLASS SLIDING DOORS

OPEN ADJUSTABLE SHELVES

WALL CASES

SHELVING



SOLID HINGED DR.

OPEN FRONT

SOLID HINGED DOORS

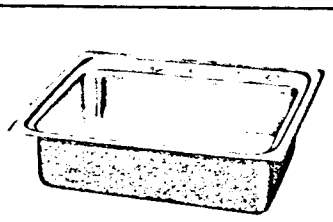
FRAMED GLASS SLIDING DOORS

TALL STORAGE CASES

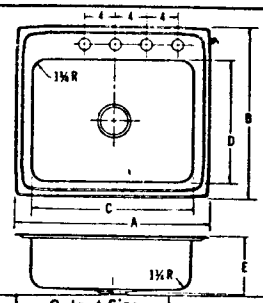
STAINLESS STEEL

Fabricated of Type 302, 18-8 stainless steel polished to a hand-blended finish on interior and top surfaces. Self-rimming feature simplifies installation and clean-up. Punched in center to receive basket type strainer, outlet and tail piece. Other drain cutouts available if required. All sinks sound-deadened.

SINGLE COMPARTMENT

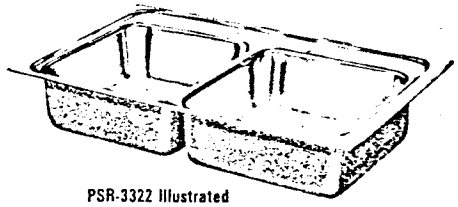


PSR-2522 Illustrated

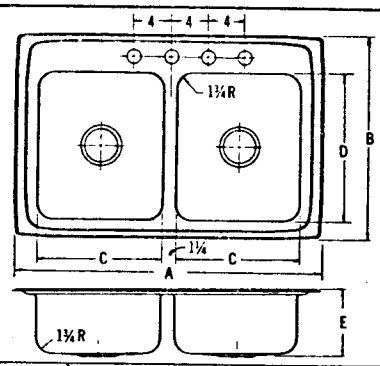


	A	B	C	D	E	Cutout Size			
LR-1522	15	22	11½	16	7½	14⅜	21⅜	3	12
LR-2521	25	21¼	21	15¾	7½	24⅜	20⅝	3 or 4	15

DOUBLE COMPARTMENT



PSR-3322 Illustrated

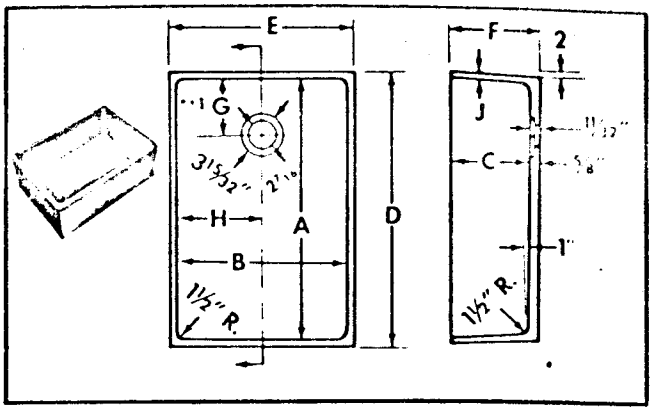


Model Number	A	B	C	D	E	L	W		
PSR-3319	33	19½	14	14	7¼	32⅜	18⅛	3 or 4	16

drop-in sinks

EPOXY RESIN UNDER TABLE SINKS

This is a modified Epoxy Resin material with many appropriate characteristics for laboratory applications. Highly resistant to acids, alkalies, solvents and salts and has excellent abrasion and heat resistance qualities, is virtually non-absorbent and light in weight. Cast in one piece with easy to clean coved corners at sides and bottom and a jet black finish.



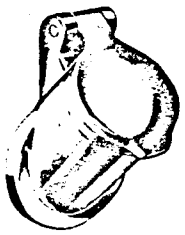
Sink Pattern Number	Net Weight	Inside Dimens. A Nom.	A Min.	B Nom.	B Min.	C Nom.	C Min.	Outside Dimens. D	E	F	G	H	J	Outlet Location**
- 30	43	18	18¾	15	15⅝	11	10¹⅝	19	16	11⅝	3½	3½	½	CORNER
- 59	63	28	27¹⅝	15	14¹⅝	12	11¹⅝	29	16	12⅝	11½	7½	½	END
- 72	138	43¾	43¼	15¾	15²¼	16	15²½	44¾	16⅝	16⅝	21⅝	7⅝	⅝	CENTER

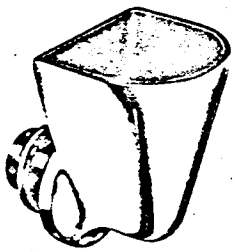
* DOUBLE COMPARTMENT SINKS MADE W/ TWO SINGLE SINKS

Cup Sinks

L-87 Brass service island drain for 1¼" I.D. lead pipe. Can be furnished with 1" IPS male thread on special order.

L-87

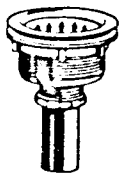




L-88-B

L-88-B Chrome plated brass panel mount cup sink W/ brass shank

OUTLET w/BASKET, STRAINER & TAILPIECE

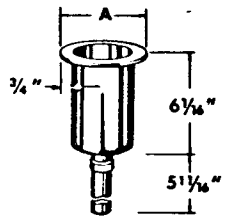


34L18
with 1½" tailpiece

OVERFLOW

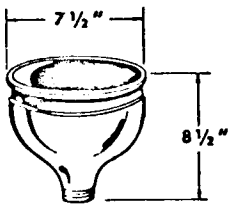
L.
34L204-4"
34L205-6"
34L206-8"

CUPSINK



	SIZE	A
34L182	4" diam.	5⅜"
34L183	5" diam.	6⅜"
34L184	6" diam.	7⅜"

CUPSINK



cupsinks •

under table sinks

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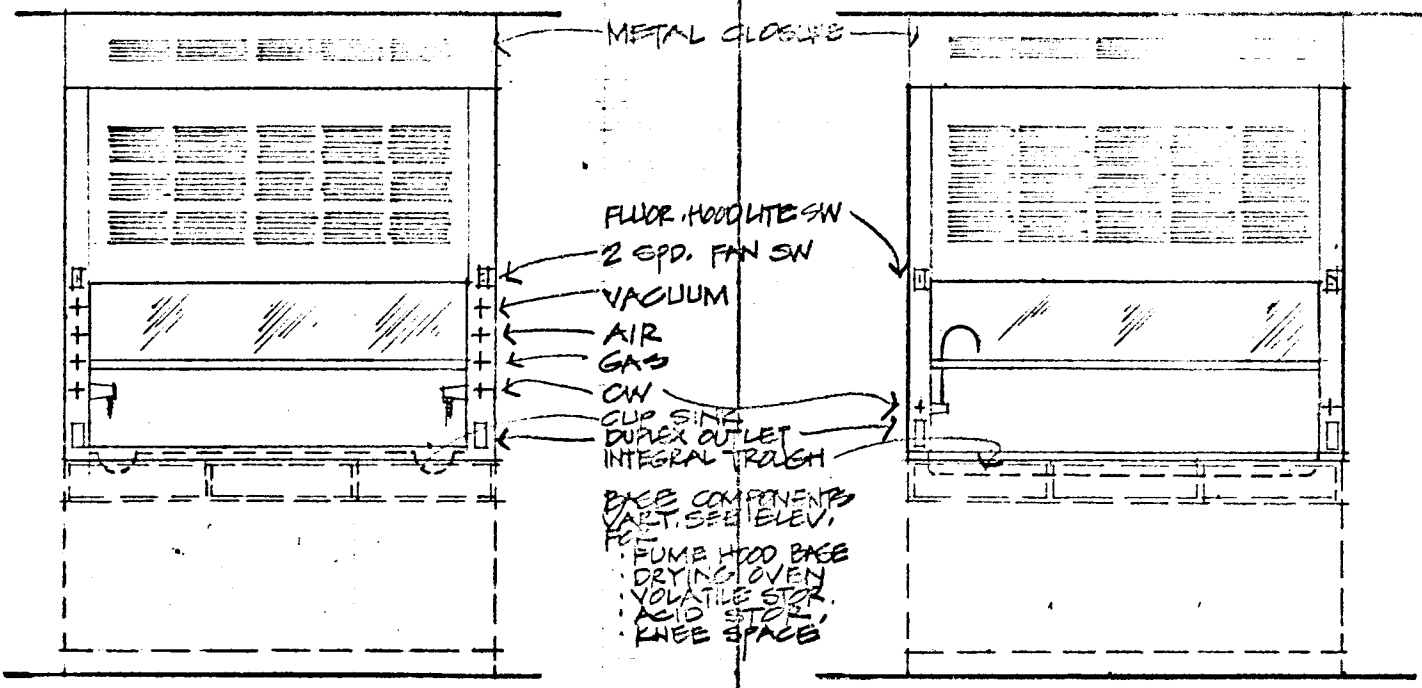
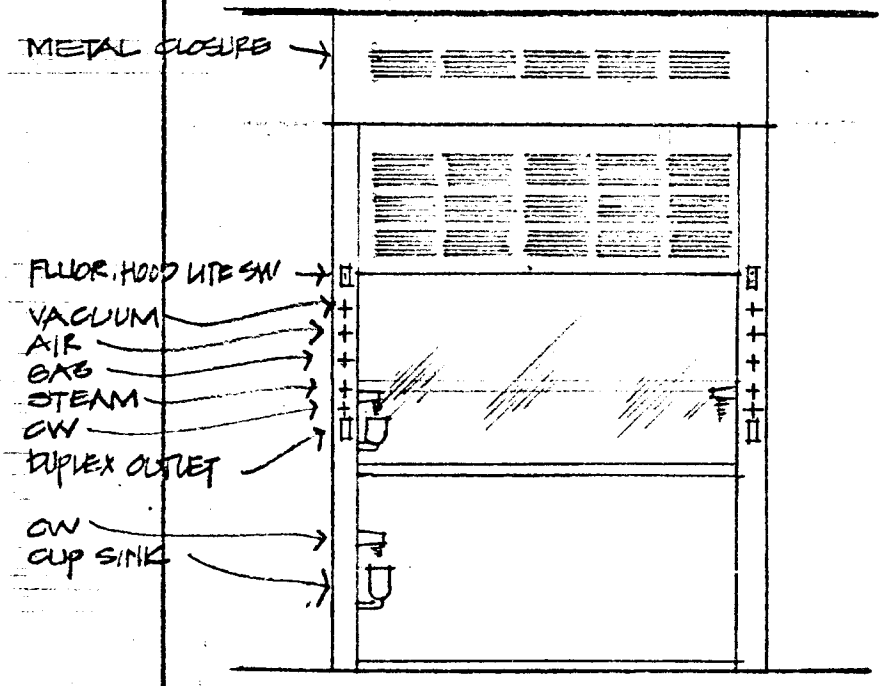


REGULAR TYPE A

RADIOISOTOPE TYPE B

PERCHLORIC ACID TYPE C



WALK IN TYPE D

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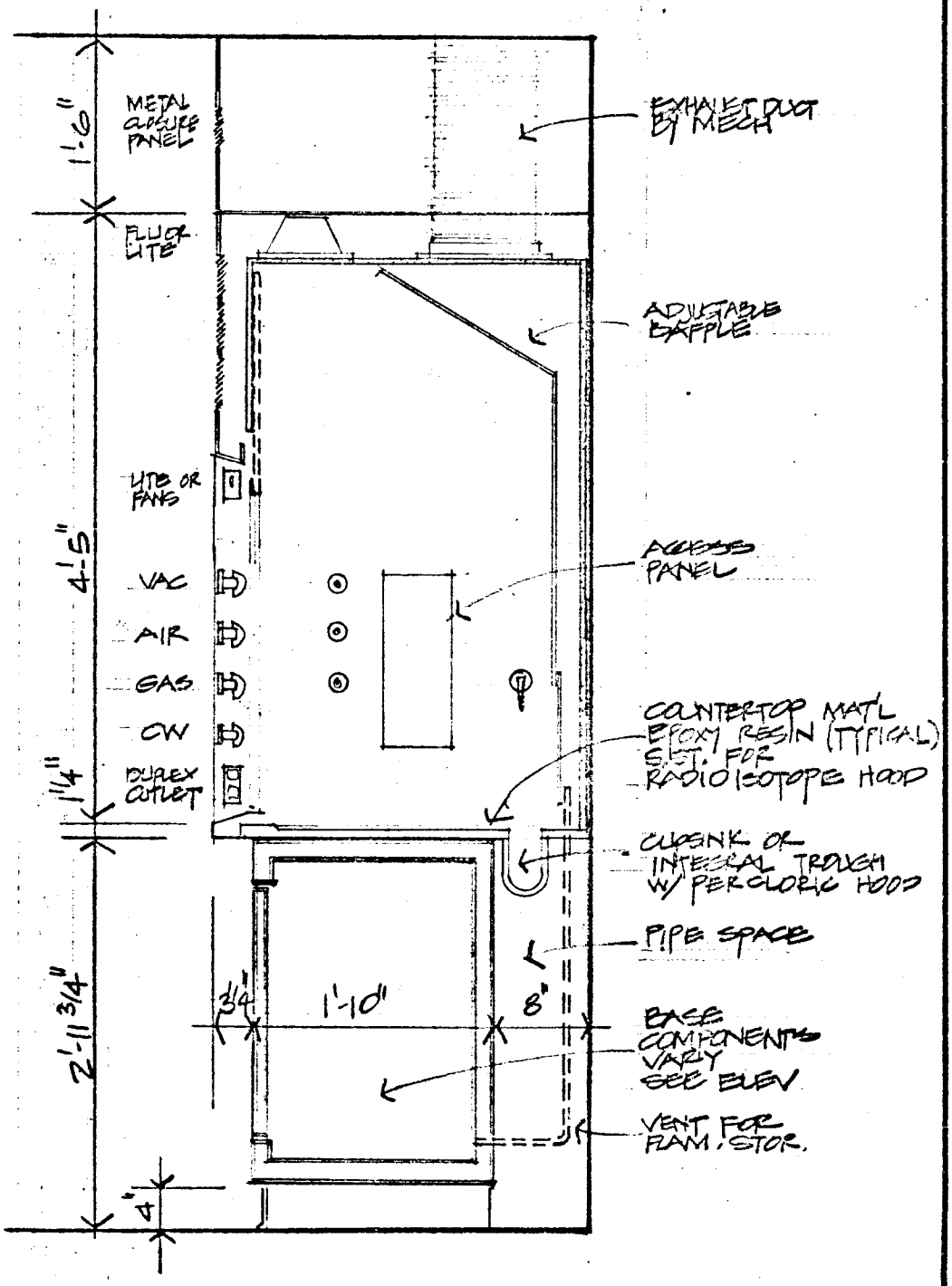
SCALE 3/8"=1'-0"
DATE

CASEWORK COMPONENTS

FUME HOOD TYPES

SHEET NO



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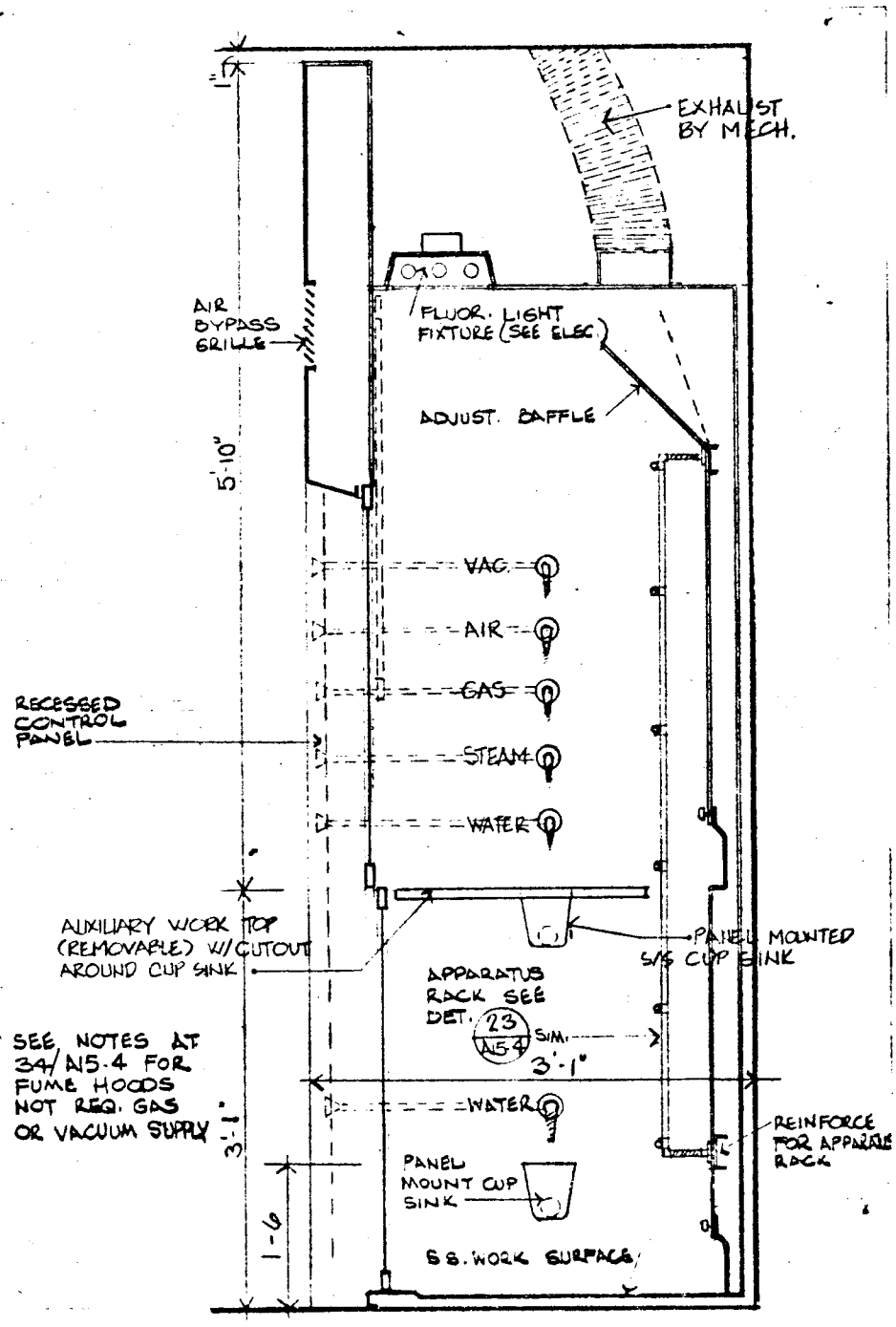
SCALE 3/4" = 1'-0"
DATE

CASEWORK COMPONENTS

SECTION THRU HOOD TYPES A, B, AND C

SHEET NO. 1.6



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DATE

CASEWORK COMPONENTS

SECTION THRU HOOD WALK IN TYPE D

SHEET NO.

IV. CASEWORK ACCESSORIES

The following types of Casework Accessories should be identified as a part of the casework requirements. The specific design and selection of the accessories will be based upon the selected casework components.

A. SECURITY LOCKS

B. MECHANICAL SERVICES

1. Water Faucets

   a. Type of Unit

      1. Single (Hot or Cold)
      2. Mixing (Hot and Cold)
      3. Gooseneck Spout
      4. Swing Spout

   b. Spout Outlet

      1. Plain
      2. Softflow
      3. Serrated Hose End
      4. Other

   c. Other Requirements such as Aspirators, Filters, Thermostatic Mixing Valves and etc.

2. Other Service Outlets

   a. Gas
   b. Air
   c. Vacuum, Clinical Vacuum, Oral Suction.
   d. Oxygen
   e. Nitrogen
   f. Nitrous Oxide
   g. Carbon Dioxide
   h. Distilled Water, Re-Distilled Water or De-Ionized Water
   i. Steam
   j. Pressure Regulators

C. ELECTRICAL SERVICES (Receptacles)

1. Voltages Required

   a. 120 Volt - Single Phase

   b. 208 Volt - Single Phase (Heating Element Loads)

   c. 208 Volt - Three Phase (Heavy Motor Loads)

2. Amperage Required

   a. Typical - 20 Amp

   b. Special - Equipment Load Amp Requirements.

3. Outlets

   a. Type

      1. "Electrical Outlet Strip (Typical)"
      2. Box

   b. Number and Location

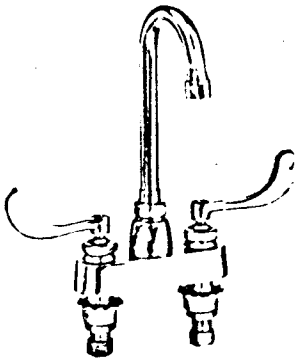
4. Emergency Power Outlets

   a. One - 120V Single Phase (N.I.H. Requirement)

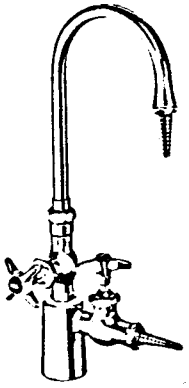
   b. Other

      1. Type (Voltage, Phase and Load Amperage)
      2. Number

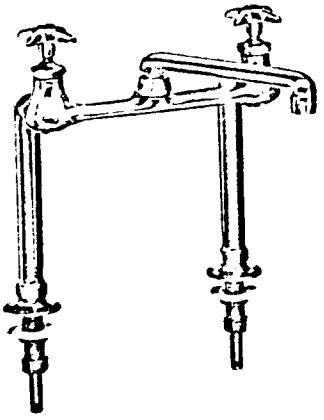
D. EXAMPLES OF FAUCET (Following Pages)



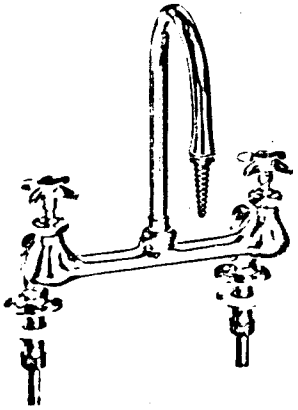
No. 895-317. Hi-Lite Quaturn fitting with No. 317 4" wrist blade handles. No. GN-1A-E3 rigid/swing convertible gooseneck spout. No. E3 Softflo.



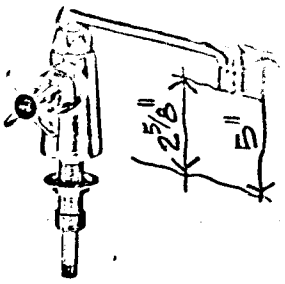
No. 996. Turret with No. 748-3KT shank with tailpiece assembly, one No. 937 valve with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle on top outlet and one No. 937 valve with No. E7 serrated nozzle on side outlet.



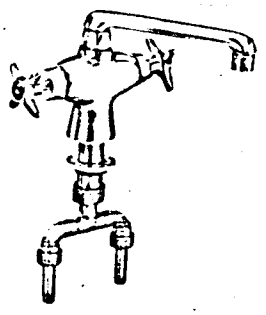
No. 941. Combination sink fitting with No. S6-6" swing spout with E3 Softflo. ¼" tailpiece inlets on 8" centers.



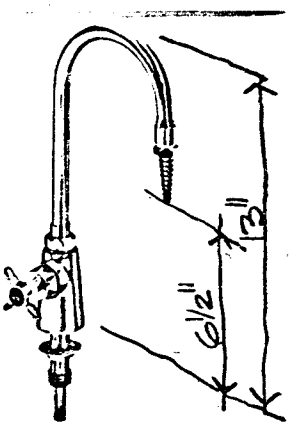
No. 946. Combination sink fitting with No. GN-2B rigid/swing convertible gooseneck spout and No. E7 serrated nozzle. ¼" tailpiece inlets on 8" centers.



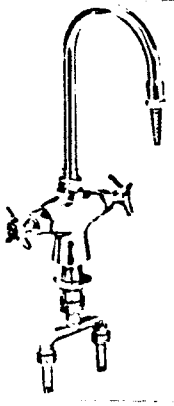
No. 926. Single sink fitting with No. S6-6" swing spout with No. E3 Softflo.



No. 931. Combination sink fitting with No. S6-6" swing spout with No. E3 Softflo. Furnished on 3½" centers.



No. 927. Single sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle.



No. 929. Combination sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle. Furnished on 3½" centers.

deck mounted laboratory fittings for water

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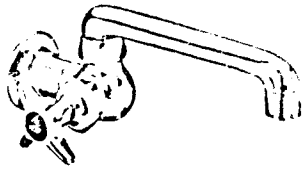
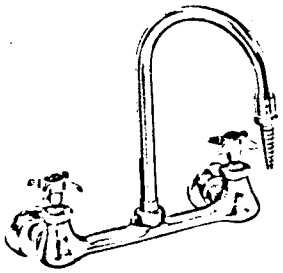
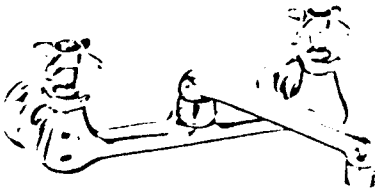
No. 938. Single sink fitting with No. E7 serrated nozzle, ½" I.P.S. female flanged inlet.



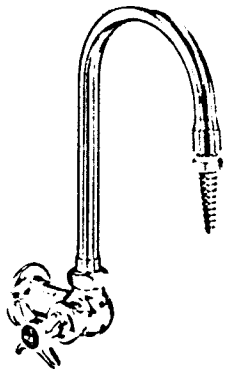
No. 932. Single sink fitting with S6-6" swing spout, and E3 Softflo. ½" flanged female inlet.



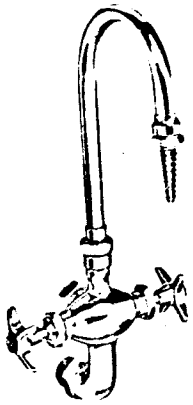
No. 942. Combination sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle. ½" I.P.S. female centers adjustable from 7¼" to 8¾".



No. 940. Combination sink fitting with No. S6-6" swing spout with No. E3 Softflo.

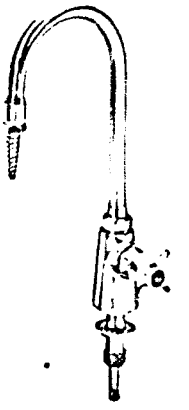


No. 933. Single sink fitting with with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle. ½" flanged female inlet.

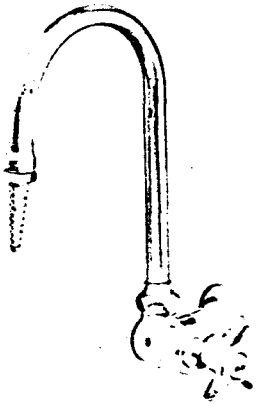


No. 935. Combination sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout with No. E7 serrated nozzle. ½" male union inlets on 3" centers.

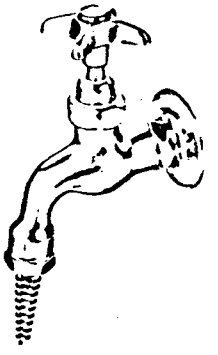
back mounted laboratory fittings for water



No. 969. Deck mounted single sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout and No. E7 serrated nozzle with self-closing unit. Silver plated. Furnished with ¼" I.P.S. tailpiece.



No. 970. Back mounted single sink fitting with No. GN-2B-E7 rigid/swing convertible gooseneck spout and No. E7 serrated nozzle with self-closing unit. Silver plated. ½" I.P.S. female inlet.



No. 972. Back mounted single sink fitting with ½" I.P.S. flanged female inlet and No. E7 serrated nozzle with self-closing unit. Silver plated.

Heavily silver-plated on all interior metal surfaces with a butler satin finish silver-plate with clear epoxy protective coating on exterior surfaces, No. 204 handle and No. 823-X Klo-Self (self-closing) operating unit.

distilled water fittings

GROUP "B" SPOUT ENDS
FURNISHED POLISHED CHROMIUM PLATE

No. E1-M. Single screen Quix-top with 3/8" I.P.S. straight male thread inlet. Also furnished in rough chromium plate.

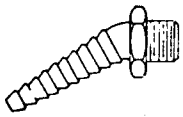
No. E3-2. Softflo with No. K2 adapter.

No. E4. 1 3/8" Rose spray with 3/8" straight I.P.S. male inlet and removable face plate. Also furnished in rough plate. Specify finish on order.

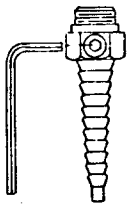
No. E7. 10-serration laboratory hose nozzle with 3/8" straight I.P.S. male inlet.

No. E7-T. Same as E7 except with 3/8" tapered I.P.S. male inlet.

No. E7-FC. 10-serration lab hose nozzle with integral flow control device in inlet limiting flow to 3/4 G.P.M. regardless of pressure.



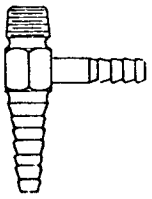
No. E7X-T. 10-serration 30° angle laboratory hose nozzle with 3/8" tapered I.P.S. male inlet.



No. E7-VC. 10-serration laboratory hose nozzle with integral volume control, 3/8" I.P.S. male inlet.

No. E7X-T-VC. Same as No. E7-VC except 30° angle type and with 3/8" tapered I.P.S. male inlet.

No. E11. Anti-hose nozzle with 3/8" straight I.P.S. male inlet.

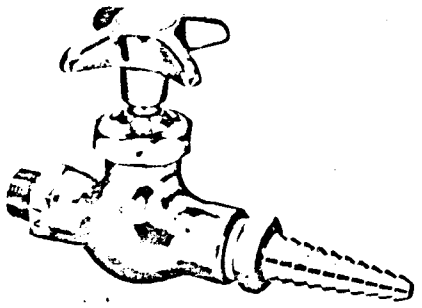


No. E17. Welch aspirator with 3/8" I.P.S. male inlet.

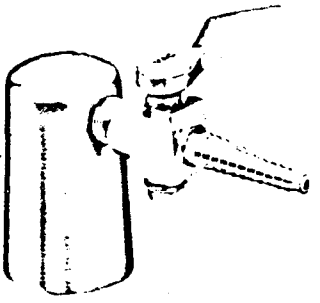
No. E18 Fisher Filter Pump with 3/8" T.I.P. male inlet.

No. E-20. Non-positive closing volume control valve. 3/8" I.P.S. male inlet 3/8" I.P.S. female outlet.

outlets and adapters



No. 937. Straightway water valve with No. 217-X-LH slow-compression unit, No. 204 cross handle and No. E7 serrated nozzle. 3/8" I.P.S. male inlet.



No. 907. For low pressure air, gas, or vacuum application. Ground key cock, 3/8" I.P.S. male inlet.

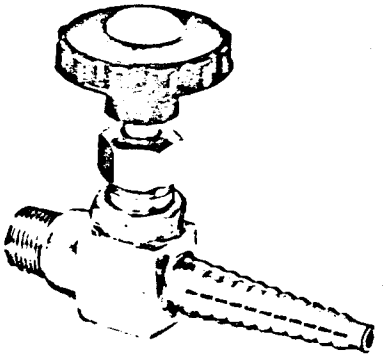
No. 980-907. Turret with, 3/8" I.P.S. female bottom inlet and No. 907 hose cock with serrated hose nozzle.

No. 981-907. Turret with two side openings on 180°, 3/8" female bottom inlet and two No. 907 hose cocks with serrated hose nozzles.

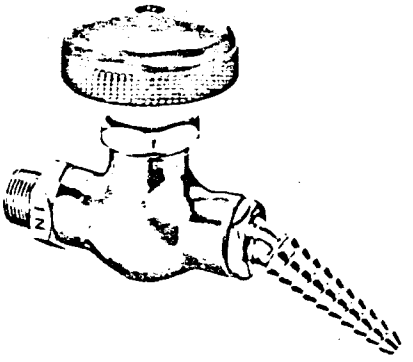
No. 982-907. Turret with two side openings on 90°, 3/8" female bottom inlet and two No. 907 hose cocks with serrated nozzles.

No. 983-907. Turret with three side openings, 3/8" female bottom inlet and three No. 907 hose cocks with serrated nozzles.

No. 984-907. Turret with four side openings, 3/8" female bottom inlet and four No. 907 hose cocks with serrated nozzles.

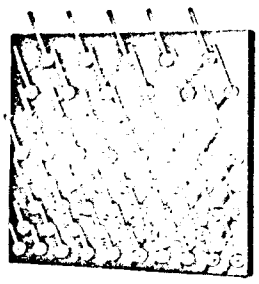


No. 901. For oxygen and other rare gases. Needle point cock with wheel handle. 3/8" I.P.S. male inlet.



No. 937-ST. Straightway steam valve with No. 217-X-ST-LH slow-compression unit with monel seat and special steam disc. No. 937-2 black plastic handle and No. E7X-T angle serrated nozzle. 3/8" I.P.S. male inlet.

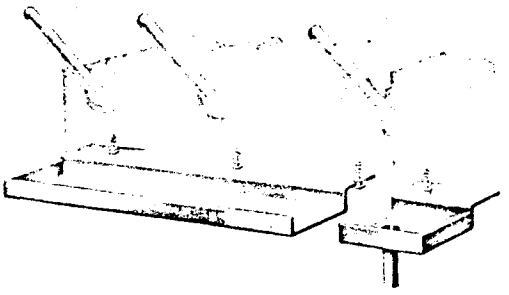
service cocks



GLASSWARE PEGBOARDS

Pegboards [redacted] accommodate a variety of lab glassware. Replaceable white pegs of solid Delrin are highly resistant to cold, heat, chemicals, impact and are moisture proof.

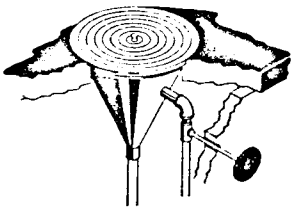
	NO. OF PEGS		
Bd Size	7-5/8"	6-1/8"	4-5/8"
18" x 24"	5	7	9
22½" x 24"	7	9	11
24" x 30"	7	14	17
30" x 30"	9	19	23
36" x 30"	11	23	29
36" x 36"	11	15	38
48" x 36"	15	21	50



DRIP-STOP TROUGH

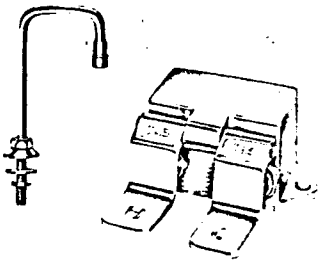
Stainless steel trough fastens to bottom edge of pegboards.

All steam baths have 8" dia. surface.



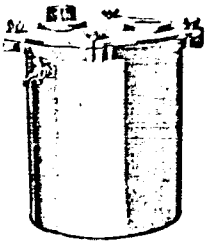
32L83

Conical steam bath mounted flush with working surface - control through panel.



32L88

Foot operated, self-closing hot and cold mixing control and gooseneck with anti-splash spout end.

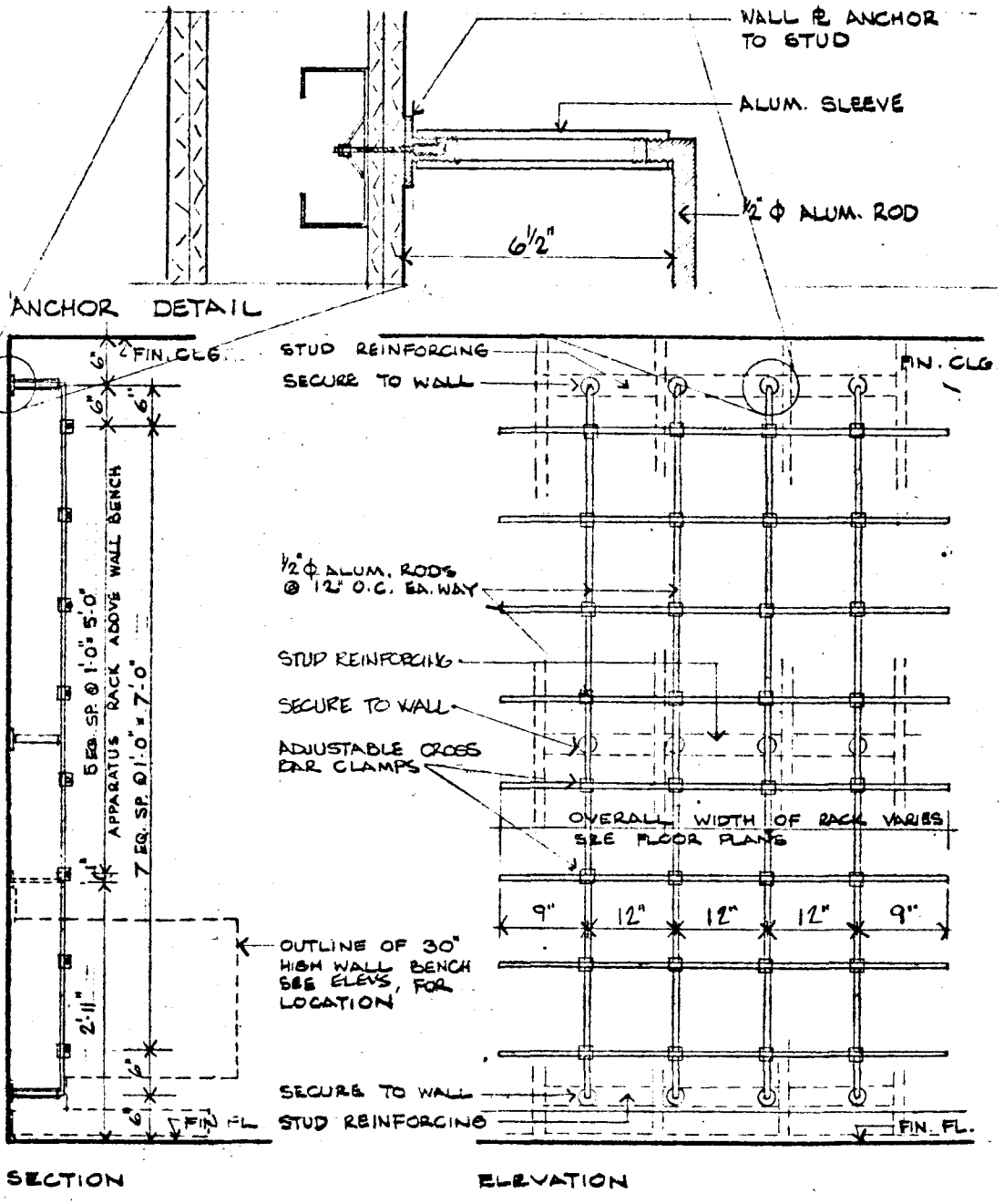


34L170

Sedimentation type plaster trap. A necessity in laboratories where plaster, metal, abrasive and other solids must be removed from waste water. Copper trap body drops for removal and cleaning without disrupting connections. Removable support is supplied with trap.

Removable trap support which rests on the cabinet bottom, or floor, must be used with this trap. Overall dimensions: 9" diameter, 11½" high.

miscellaneous



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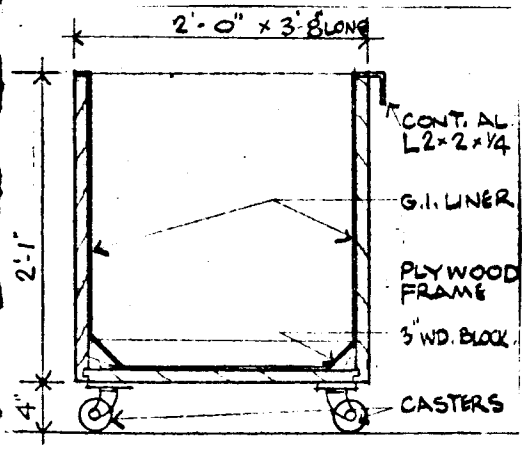
JOB NO.
DRAWN
CHECK
SCALE
DATE

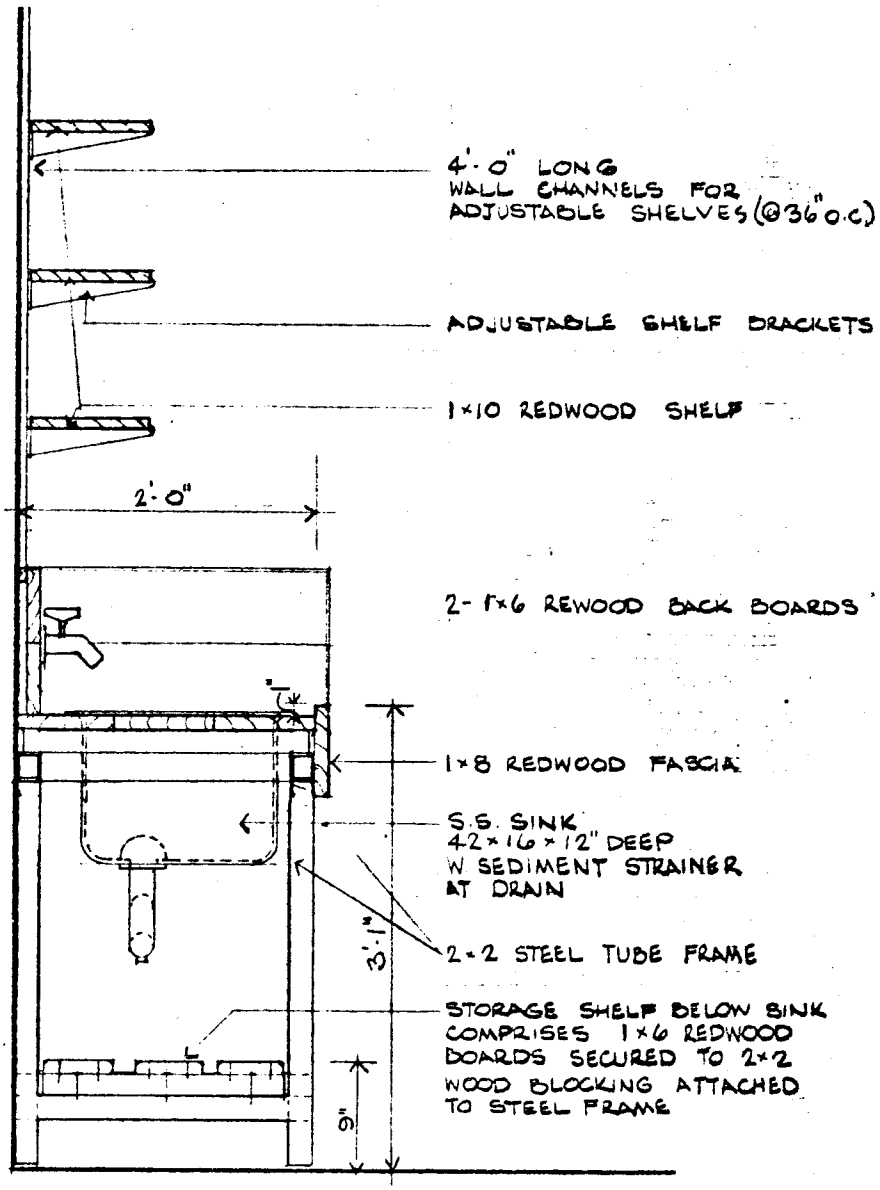
DETAILS

WALL APPARATUS RACK

SHEET NO.
Page 26
APPENDIX A



SOIL BIN



SECTION THROUGH POTTING BENCH

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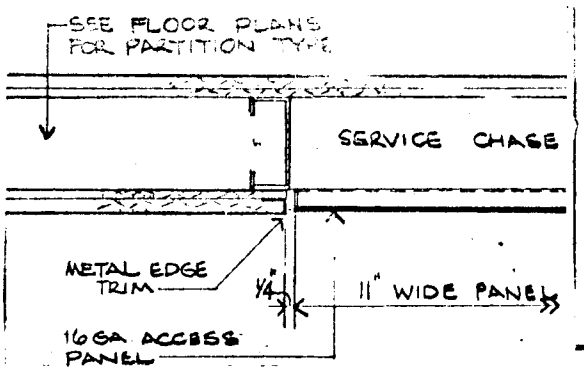
JOB NO.
DRAWN
CHECK
SCALE
DATE

DETAILS

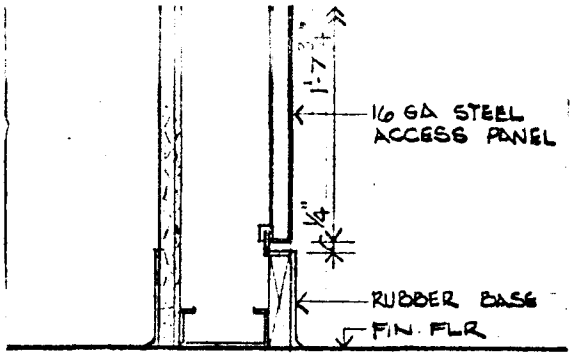
POTTING BENCH SECTION

SHEET NO. Page 27

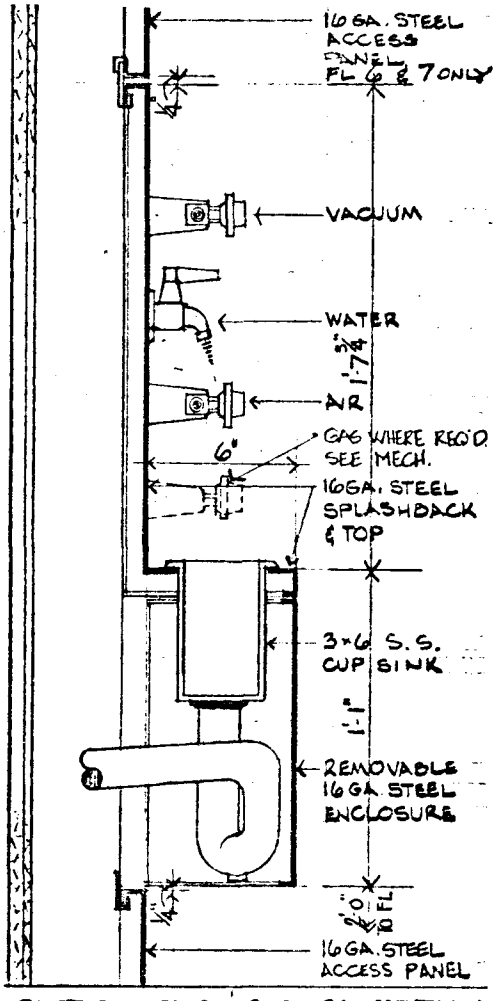
APPENDIX E



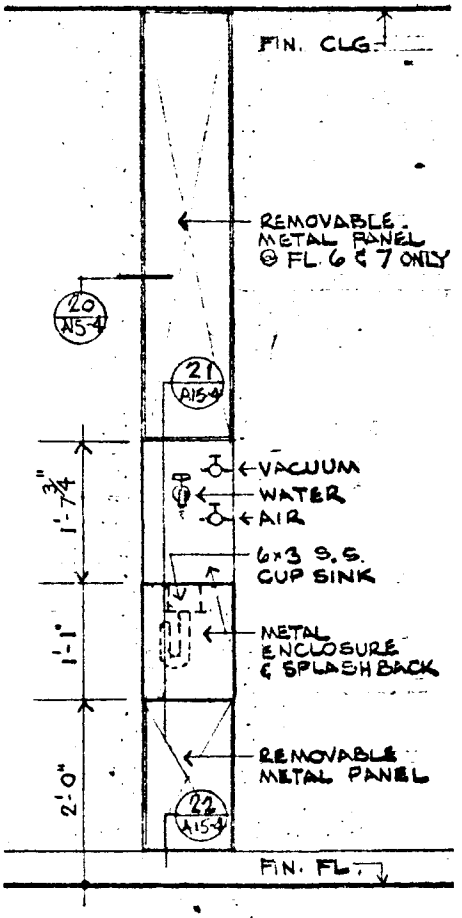
20 ACCESS PANEL DETAIL



22 BASE DETAIL AT SERVICE STATION



SECTION THRO SERVICE STATION



SERVICE STATION

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JOB NO.
DRAWN
CHECK
SCALE
DATE

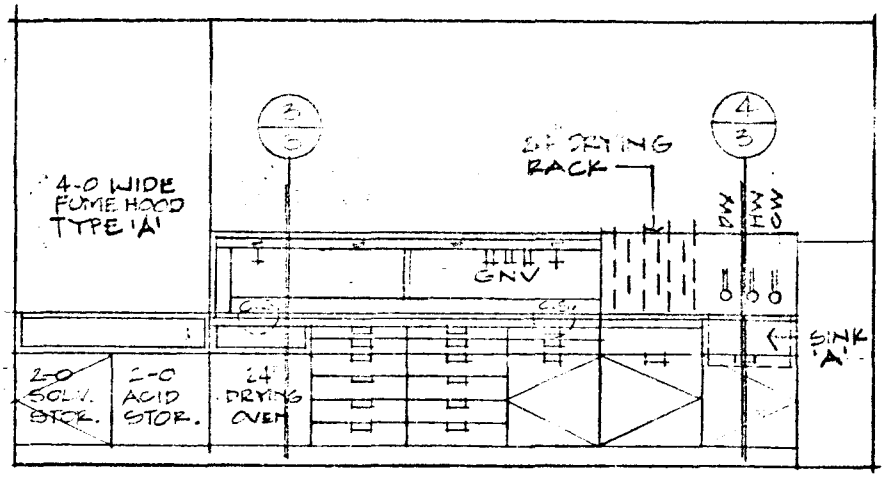
DETAILS
SERVICE STATION

SHEET NO
Page 28
APPENDIX C

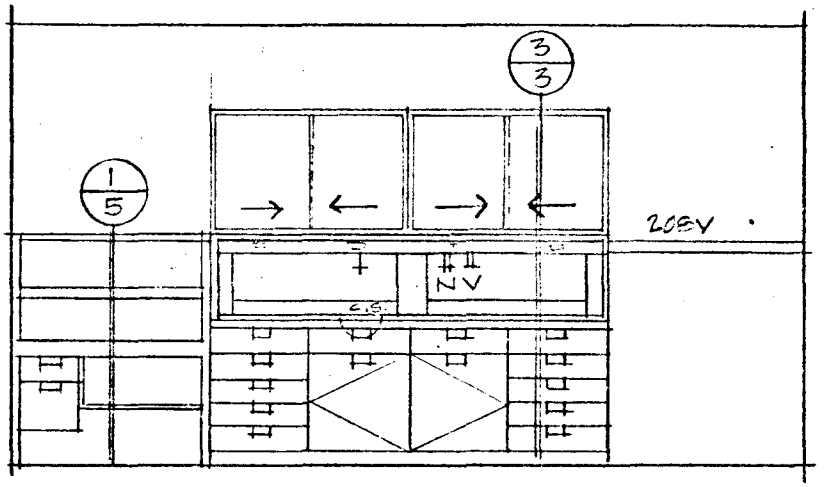
INTERIOR ELEVATIONS

The following interior elevation drawings have been developed in sections related to the Pharmacy and Nursing Schools. The series 1-99 relates to Pharmacy, the series 100 + relates to Nursing. Elevation bubble notations are keyed on 1/4" scale equipment plans and relate back to these elevation drawings.

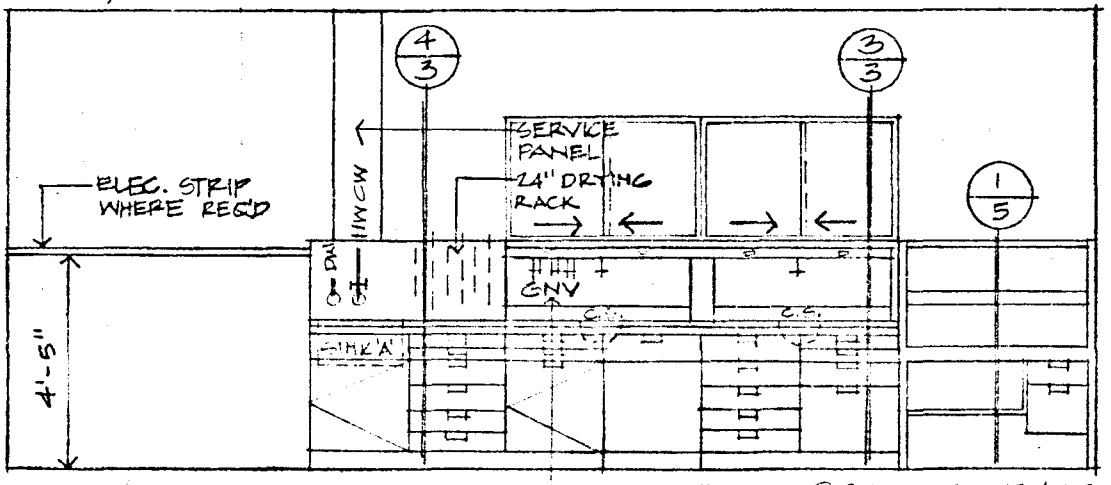
Casework elevations have been developed using the standards indicated in Appendix L-1. Sectional notations on the elevations relate back to those standards.



1 FACULTY LAB
RM. 9-155, 156



2 FACULTY LAB
RM. 9-155, 156



AIR IN LIEU OF N @ RMS. E-126, 117 & 118

3 GRAD. LAB.
RM. 9-101, 103, E-104, 109, 117, 118, 125, 126

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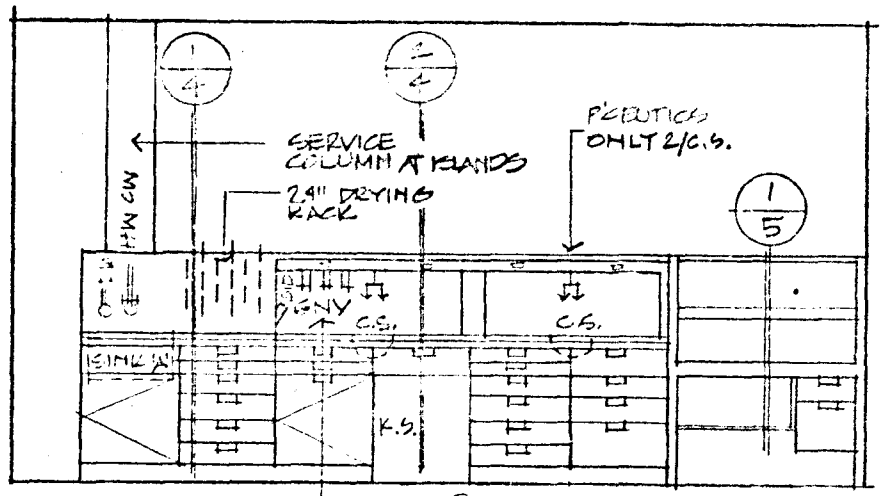
JOB UNIT F
DRAWN
CHECK
SCALE
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

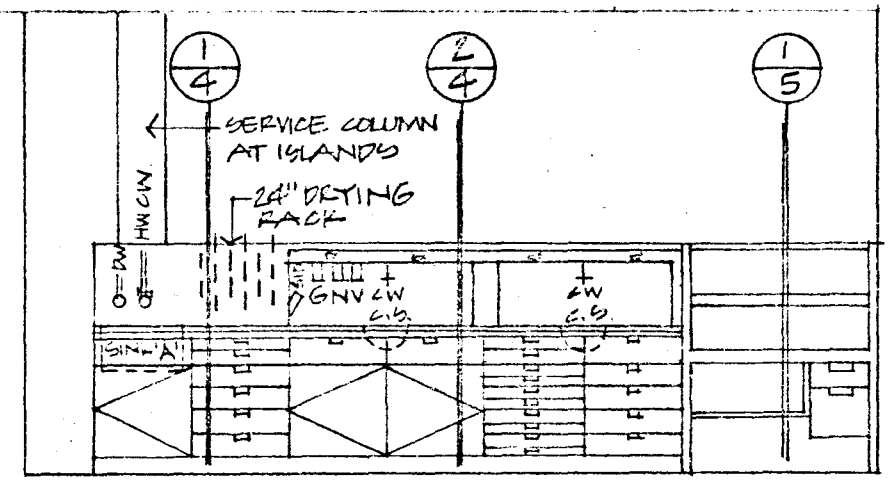
SHEET NO P1 OF 33



AIR & PHARMACOGNOSY ONLY

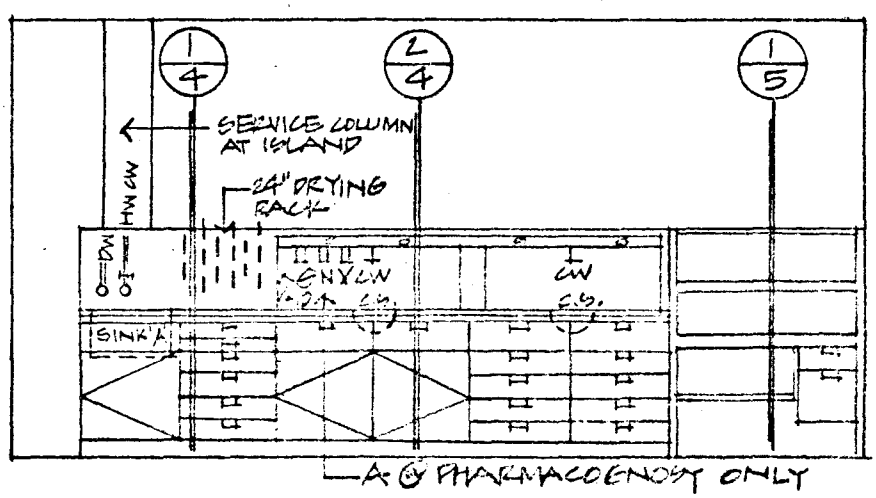
(4) GRAD. LAB.

RM. 9-101, 103, 119, 125, (PHARMACEUTICS) 146 (PHARMACOGNOSY).



(4A) GRAD. LAB.

RM. 8-104, 106, 109, 125 (MEDICAL CHEMISTRY)



A & PHARMACOGNOSY ONLY

(4B) GRAD. LAB.

RM. 8-104, 106, 109, 125 (MED. CHEM.), 117, 116, 126 (PHARMACOGNOSY)

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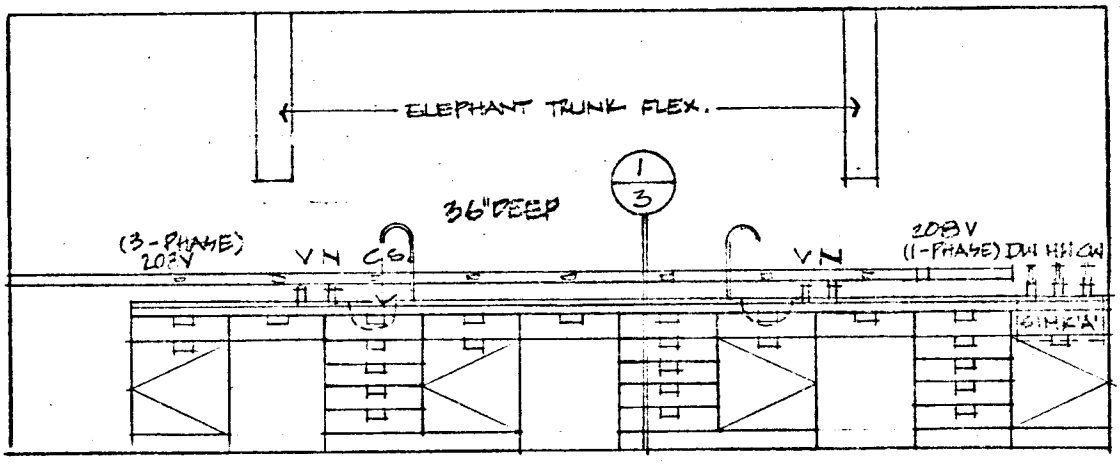
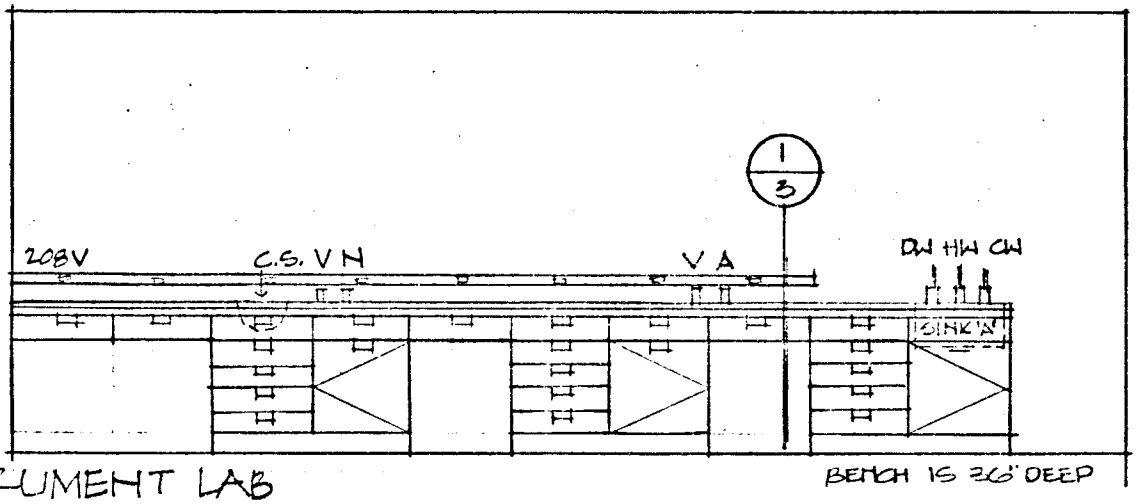
JOB NO UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

SHEET NO P2 OF 33



5 INSTRUMENT LAB.
RM. 9-102



6 INSTRUMENT LAB
RM. 9-102

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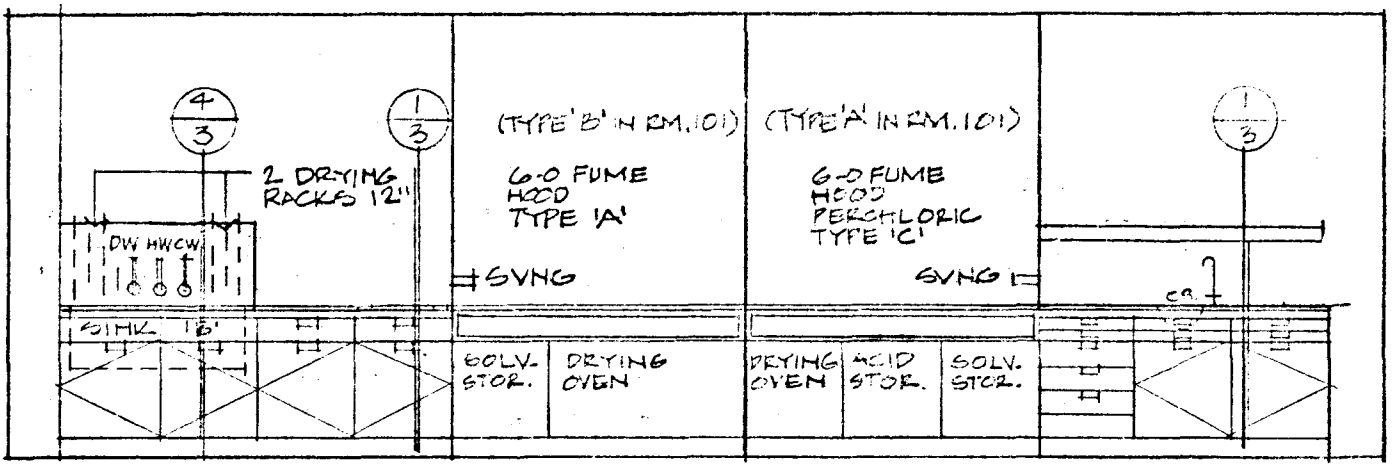
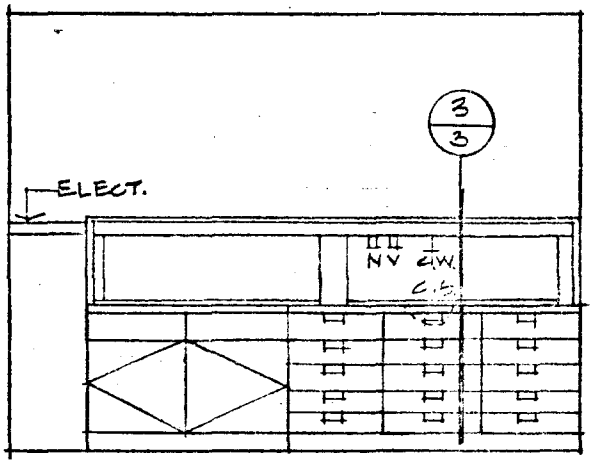
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

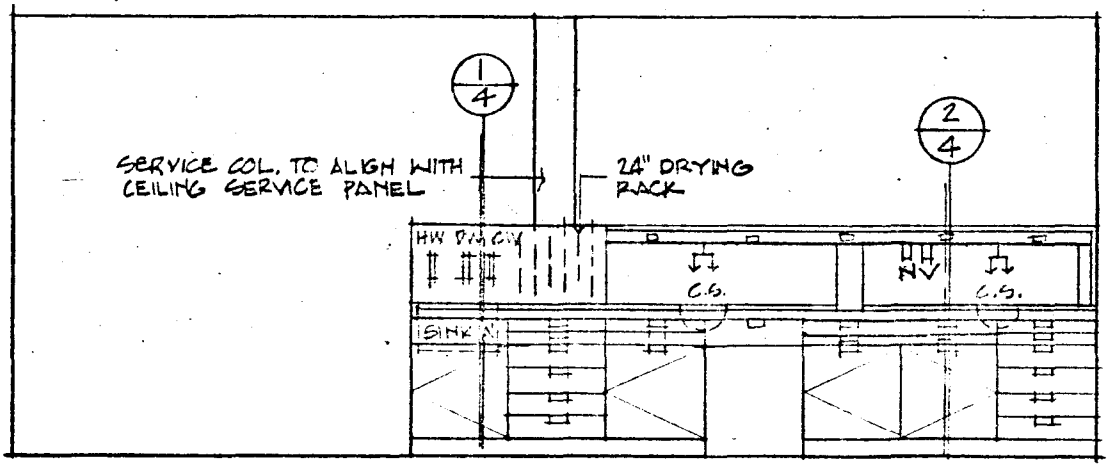
SHEET NO. P3 OF 33



7 GRAD. LAB.
RM. 9-101, 103



8 FACULTY LAB
RM. 9-104, 105



9 FACULTY LAB.
RM. 9-104, 105, 112, 117

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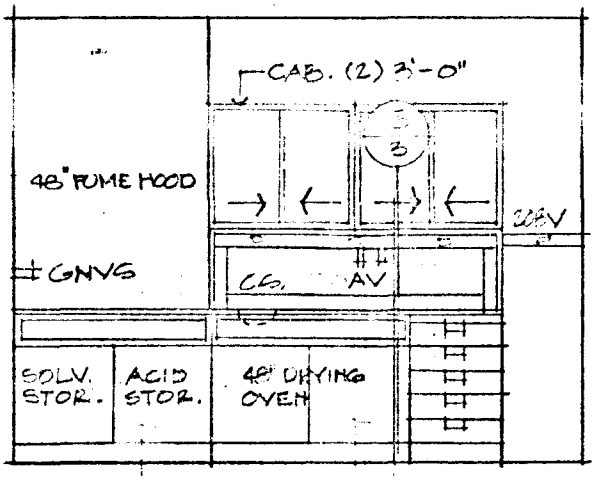
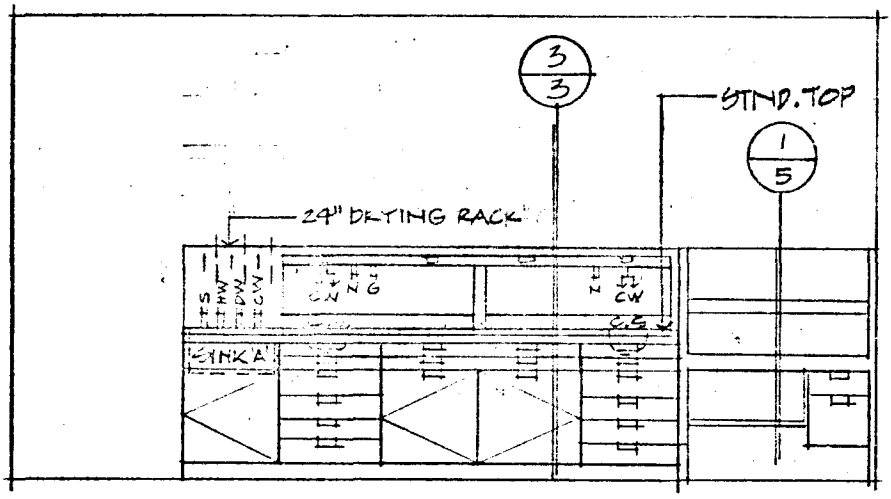
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

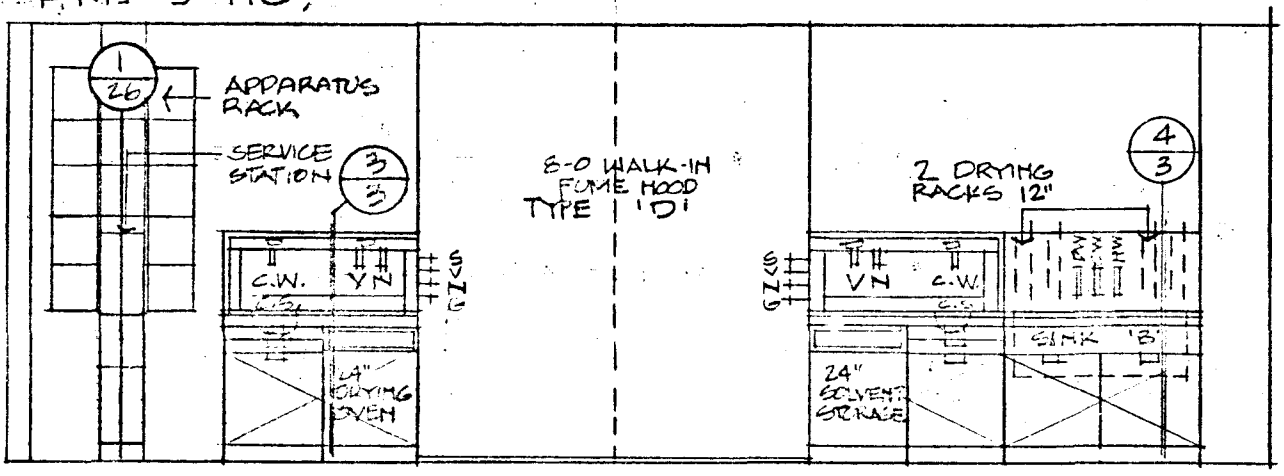
SHEET NO. P4 OF 33



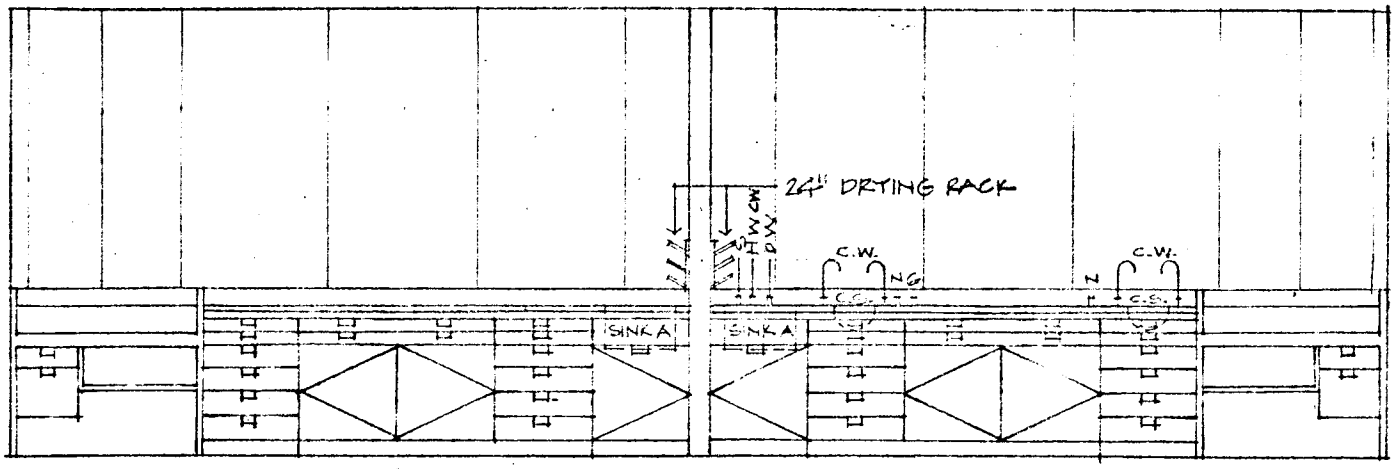
(10) FACULTY LAB
RM. 9-104, 105



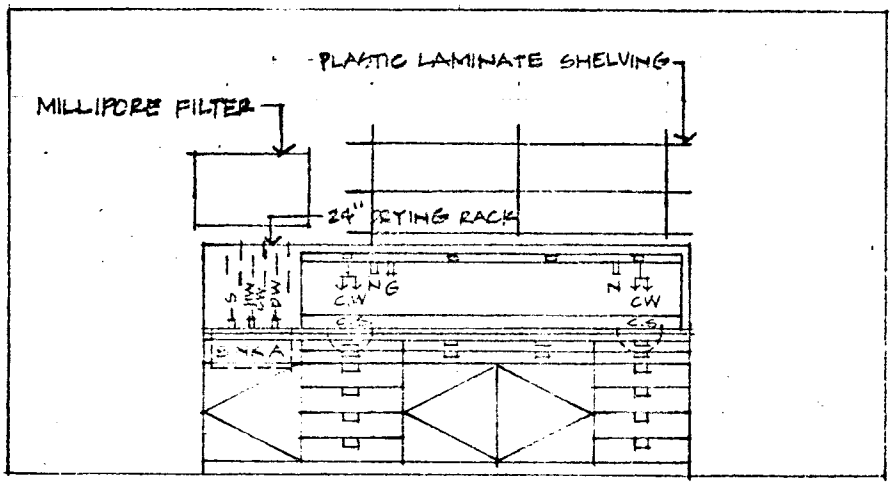
(11) GRAD. LAB
RM. 9-110,



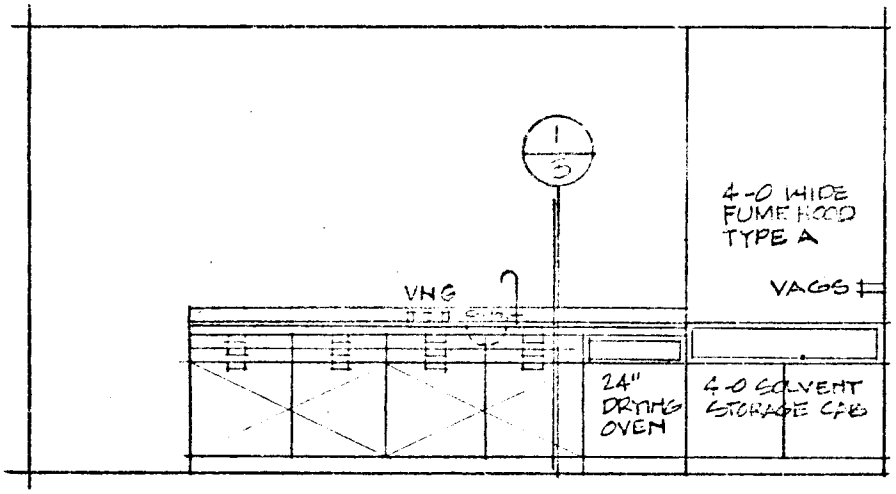
(12) GRAD. LAB
RM. 9-110



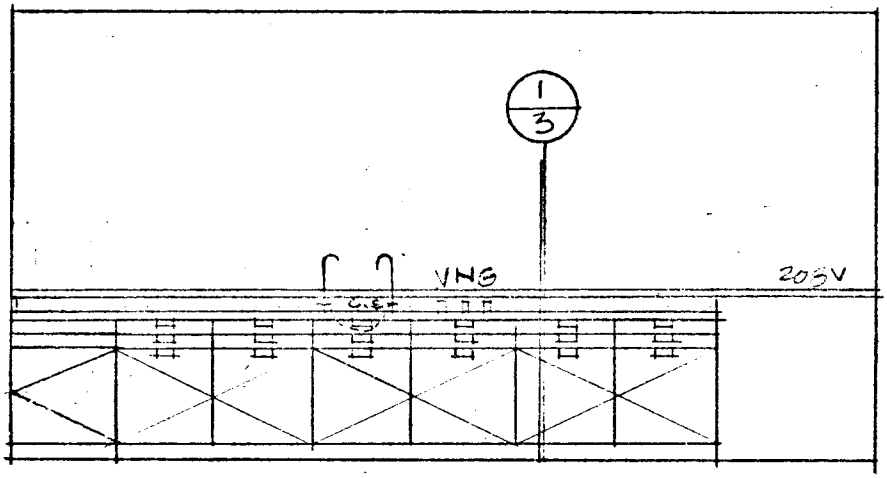
12A GRAD. LAB.
RM. 9-110



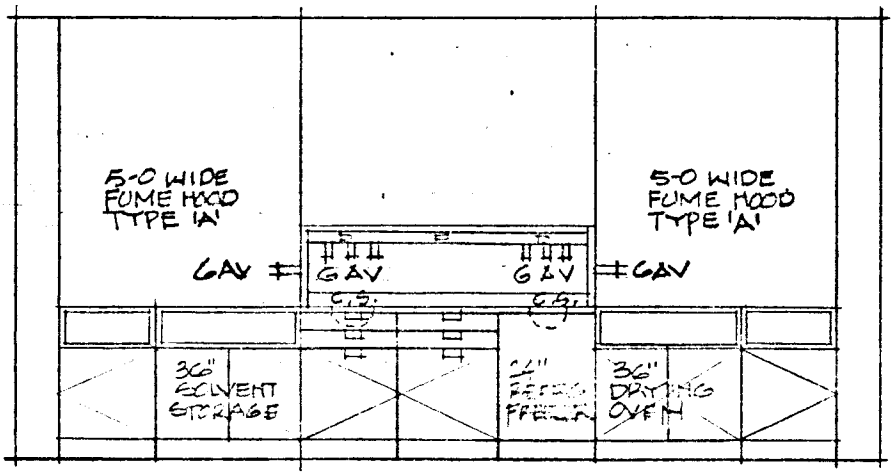
12B GENERAL PURPOSE LAB.
RM. 8-140



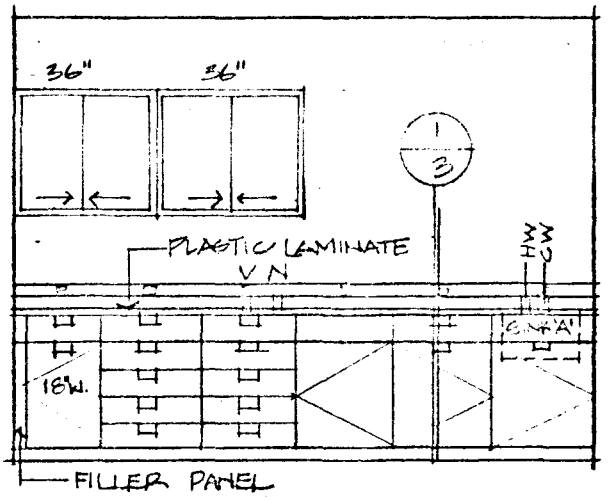
13 FACULTY LAB.
RM. 9-112, 117



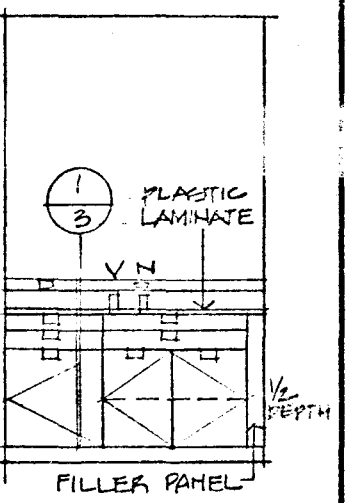
14 FACULTY LAB.
RM. 9-112, 117



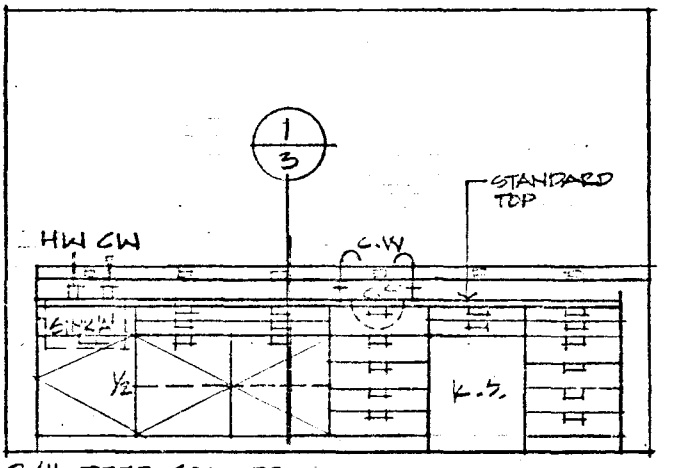
15 GRADUATE LAB (BIOPHARM.)
RM. 9-125



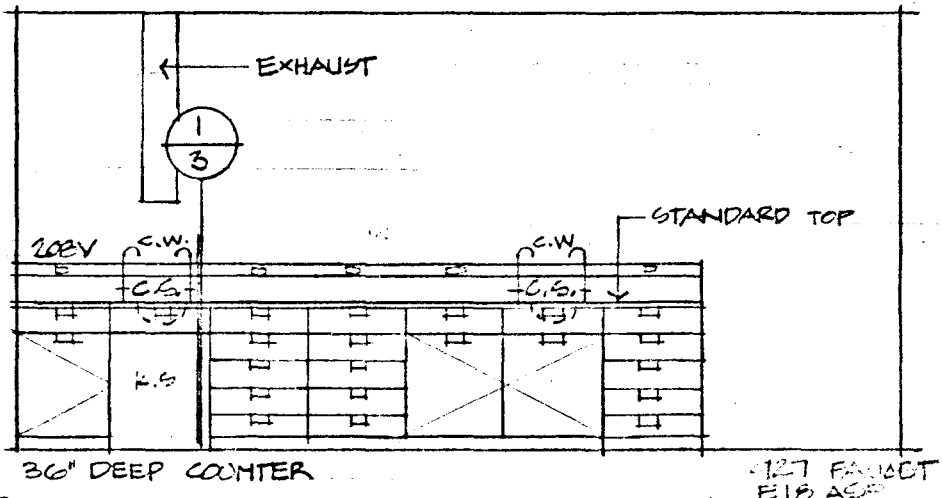
16 COLD ROOM
RM. 9-122



17 FREEZER
RM. 9-123



18 TESTING & CONTROL
RM. 9-124



19 TESTING & CONTROL
RM. 9-124

UNIVERSITY OF MINNESOTA
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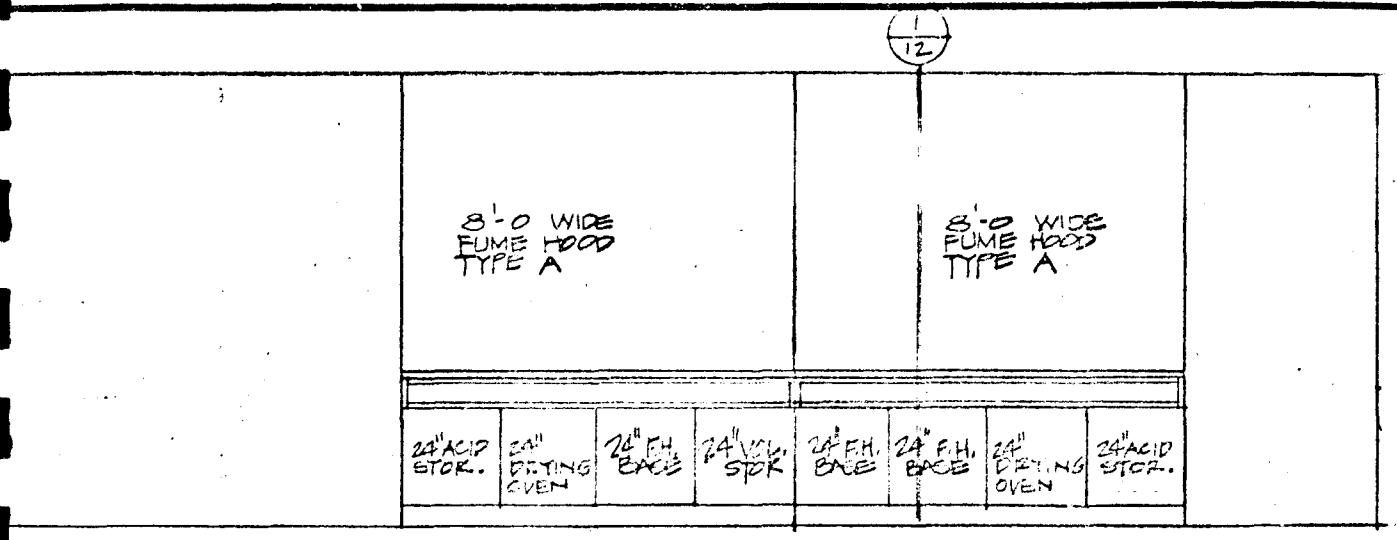
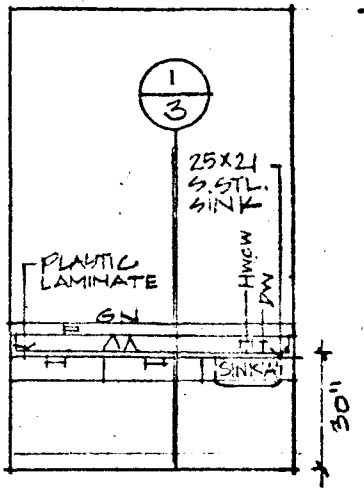
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4"=1'-0"
DATE 1 NOV. 1977

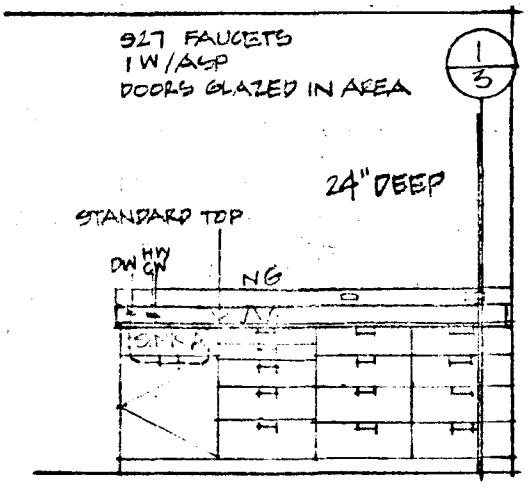
INTERIOR ELEVATIONS

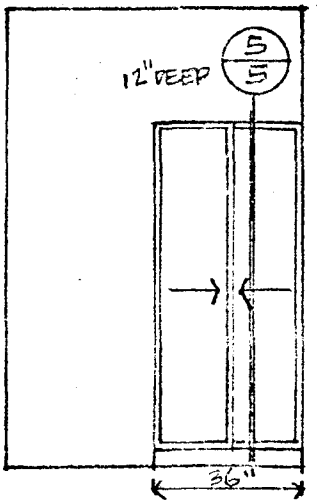
SHEET NO. P8 OF 33



(20) GRAD. LAB.
RM. B-104, 106, 109, 117, 118







(22) MICRO. WK. RM.
RM. B-131, 132

(23) CONSTANT TEMP. LAB
RM. B-133, 135

(21) MICRO. WK. ROOM
RM. B-131, 132

UNIVERSITY OF MINNESOTA
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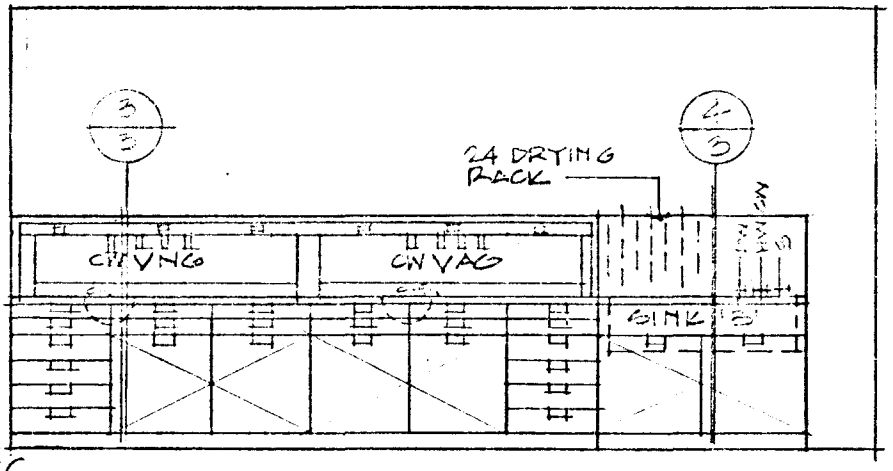
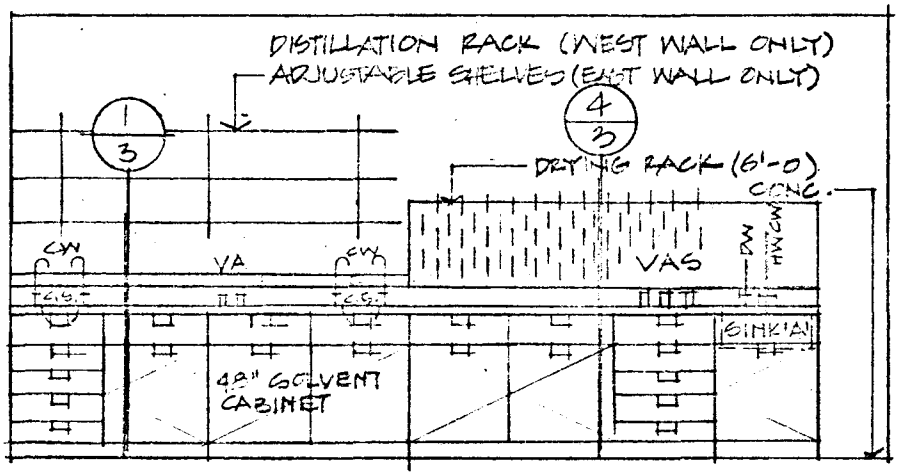
UNIT F
DRAWN
CHECK
SCALE 1/4"=1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

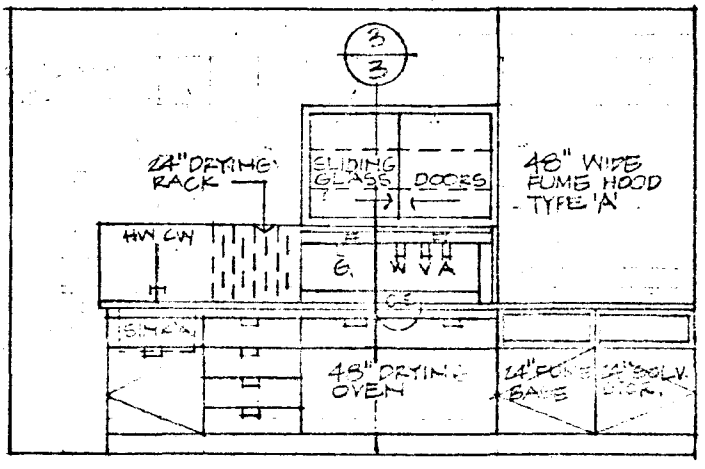
SHEET NO
P9
OF 33



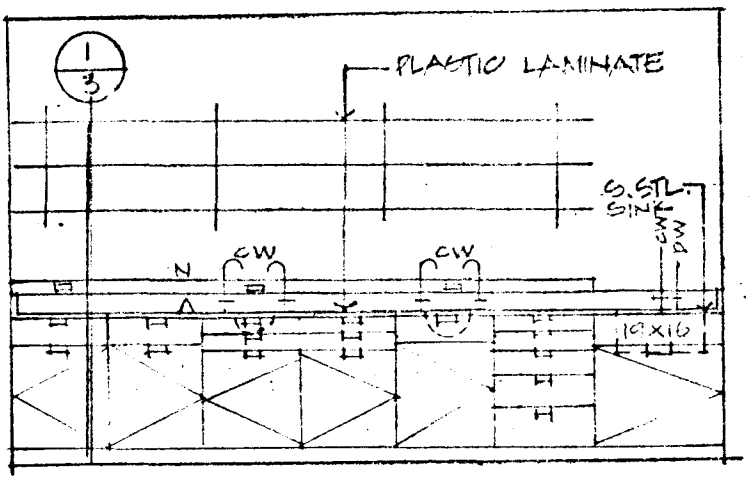
(24) DRYING & MILLING
RM. 9-146



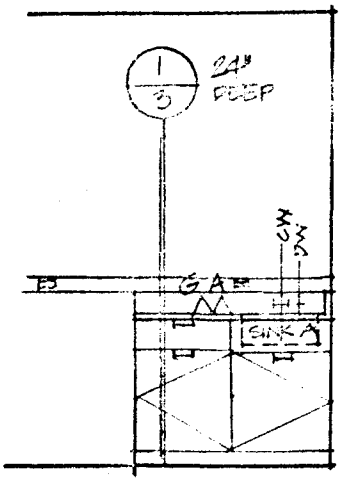
(25) EXTRACTION LAB
RM. 9-147



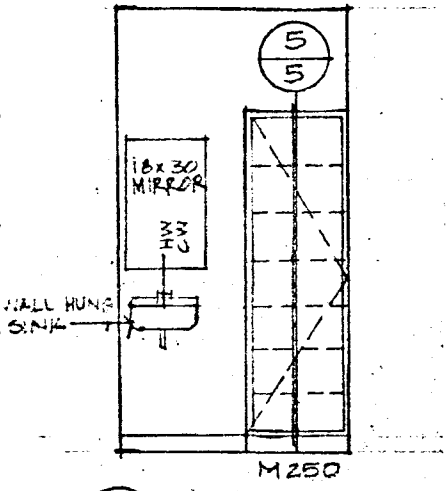
(26) POST DOC. LAB.
RM. 9-146



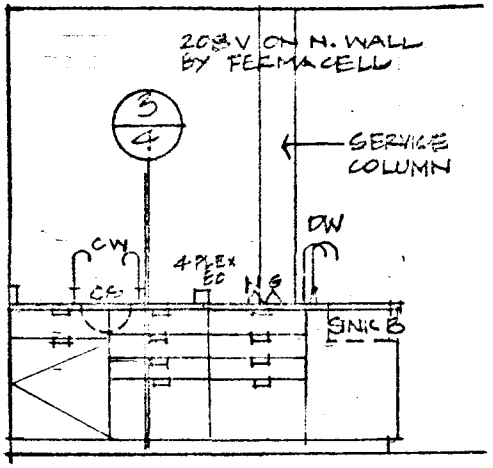
27 COLD RM.
RM. B-127



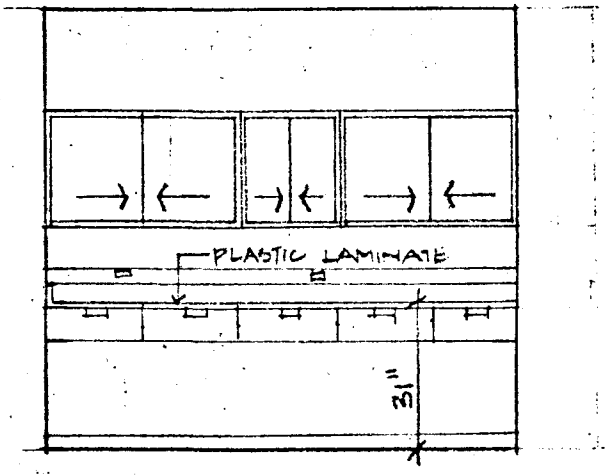
28 CLEAN RM.
RM. B-135



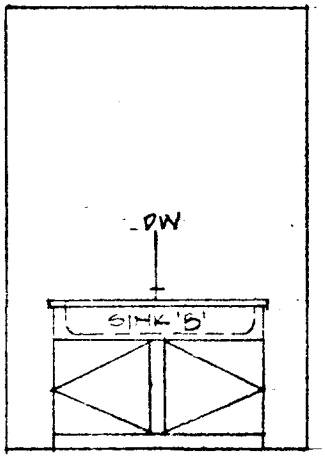
29 GOWN RM.
RM. B-134



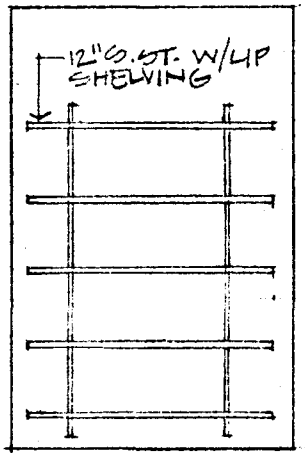
31 FERMENT. LAB.
RM. B-137



32 COUNTING RM.
RM. B-138



32A FERMENT. LAB.
RM. B-137



32B ENVIR. RM.
RM. B-126

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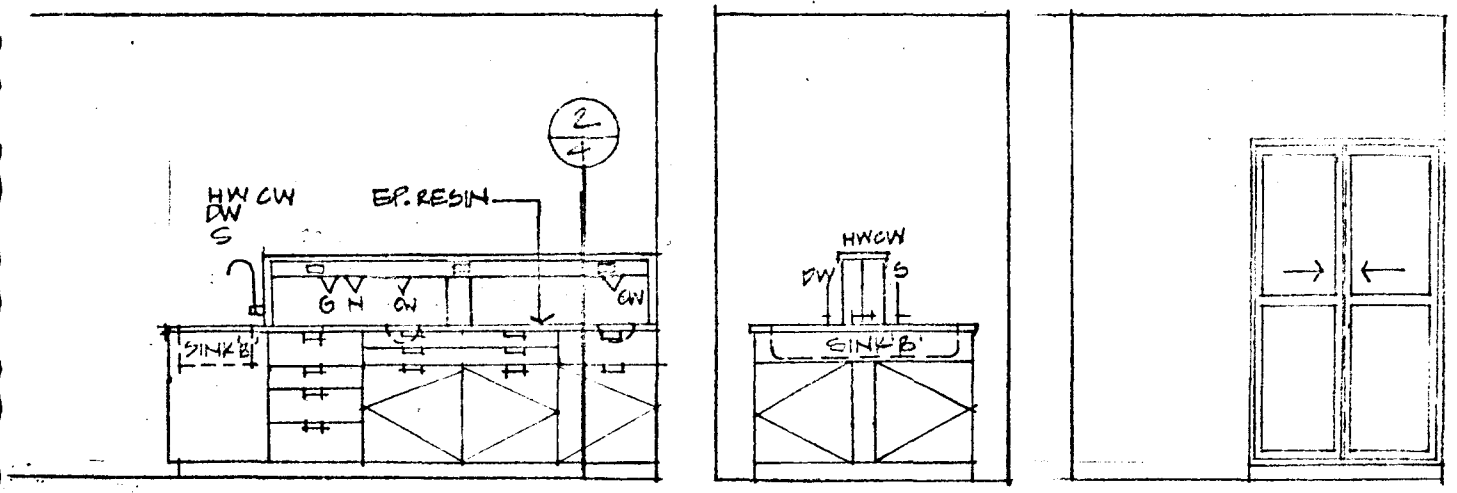
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/2" = 1-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

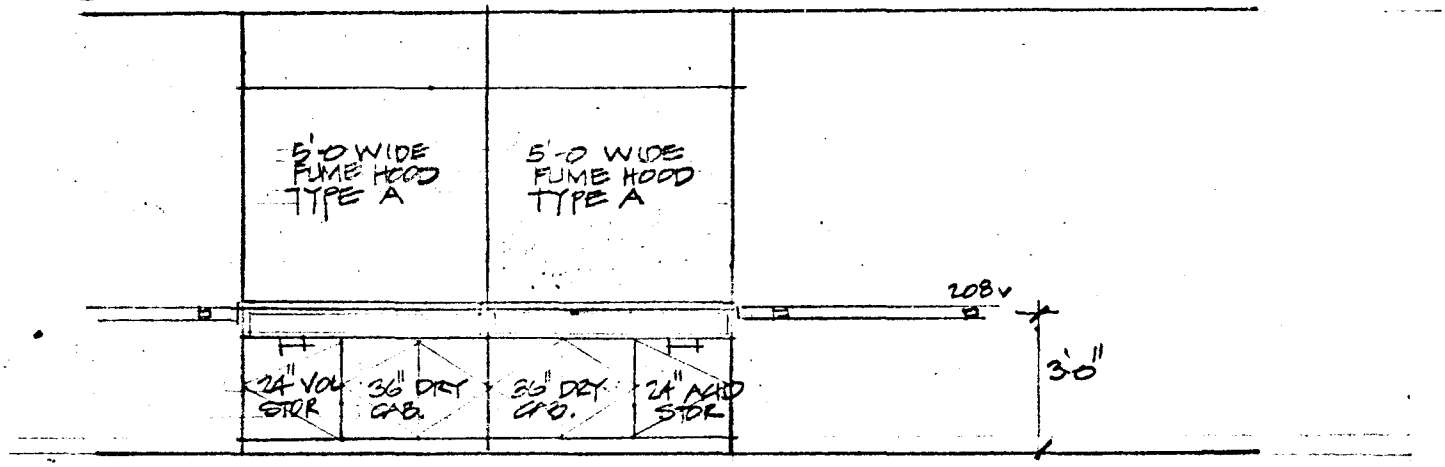
SHEET NO. P11 OF 33



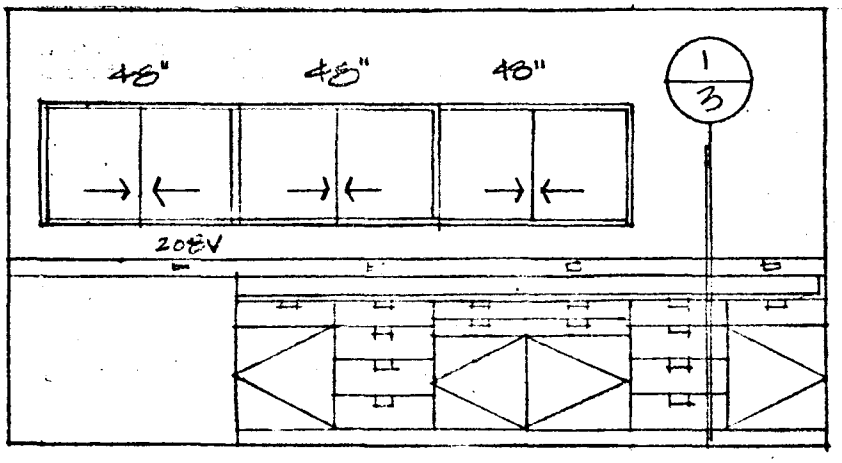
33 GENERAL PURPOSE LAB. RM. 8-140

33A RM. 8-140

33B GEN. PURPOSE LAB. RM. 8-140



34 SIX-MAN GRAD. LAB. RM. 8-126



35 INSTRUMENT RM. RM. 8-123

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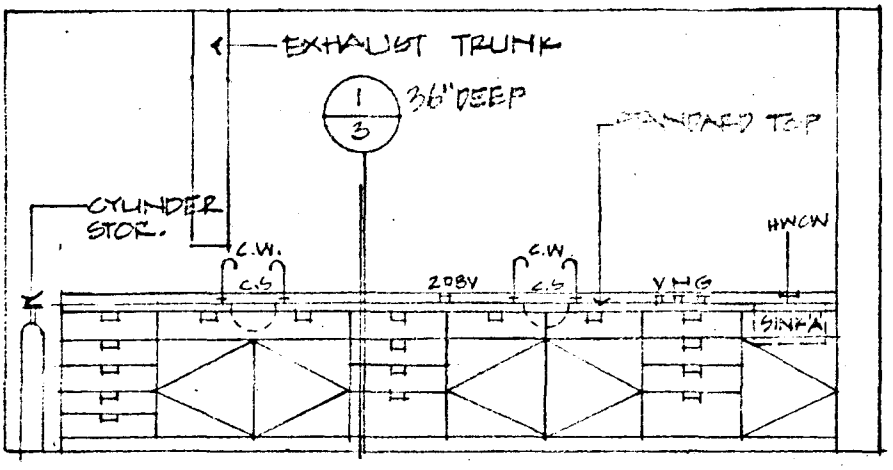
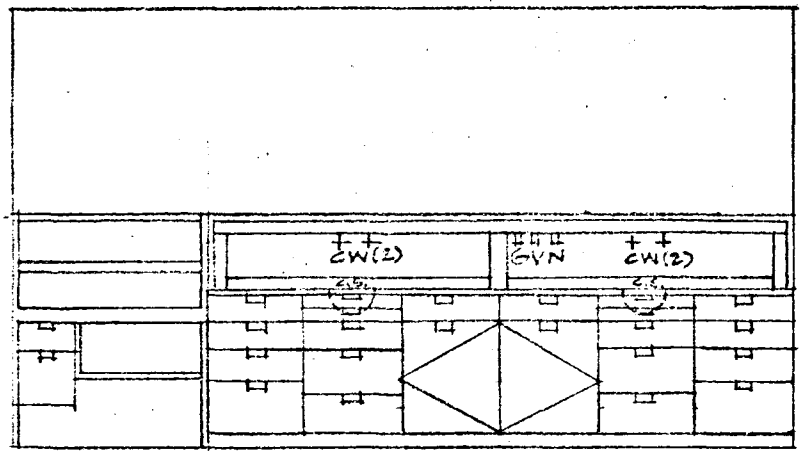
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

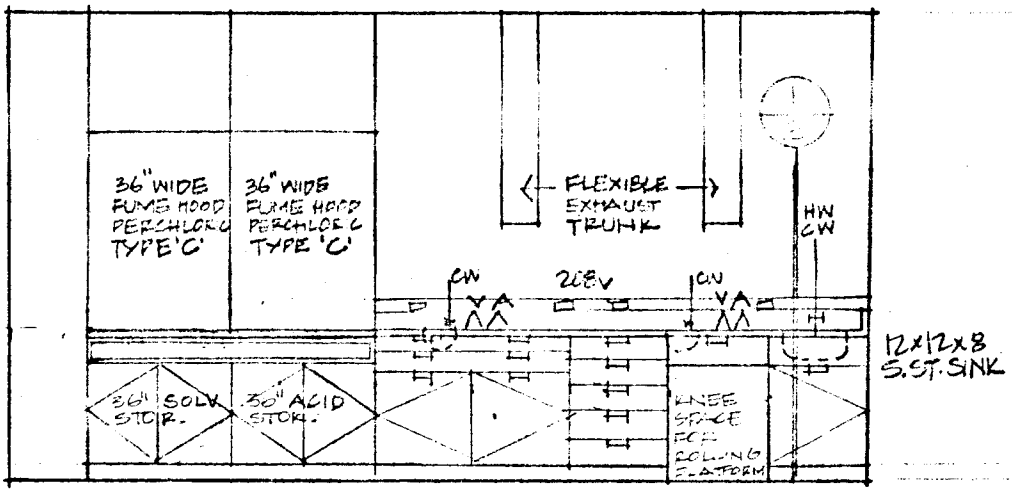
SHEET NO. P12 OF 33



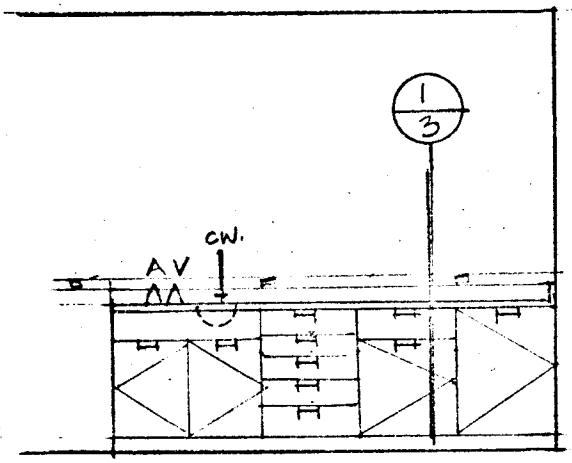
36 INSTRUMENT ROOM
RM. 8-123

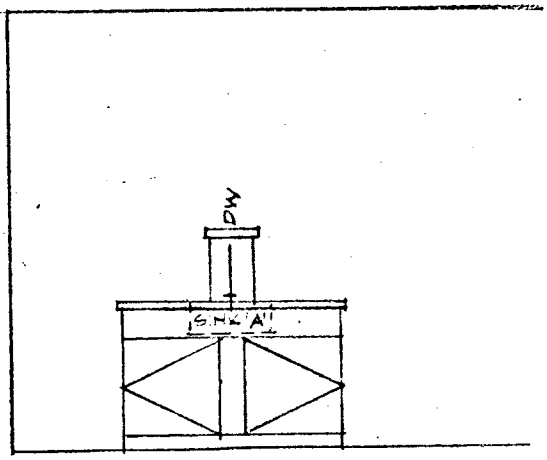


36A

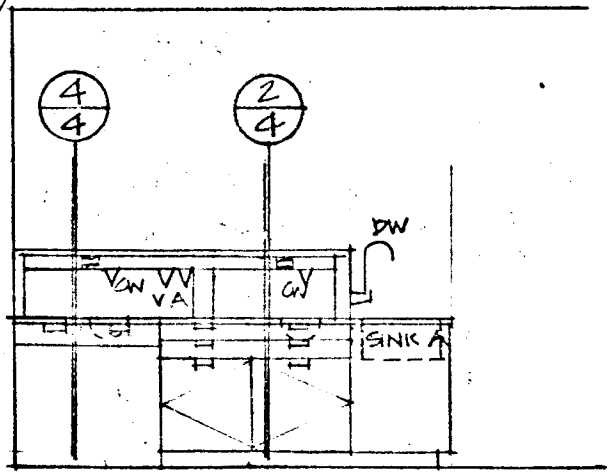


37 CHROMATOGRAPHY LAB
RM. 8-124

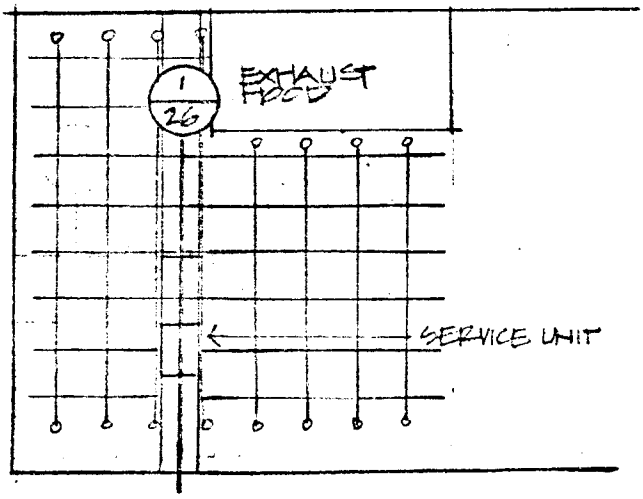




38 CHROMATOGRAPHY LAB



41 CHROMATOGRAPHY LAB.



39 CHROMATOGRAPHY LAB
RM. 8-124

40 CHROMATOGRAPHY LAB
RM. 8-124

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UNIT F

DRAWN

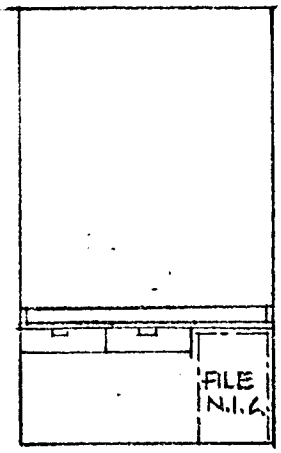
CHECK

SCALE 1/4" = 1'-0"

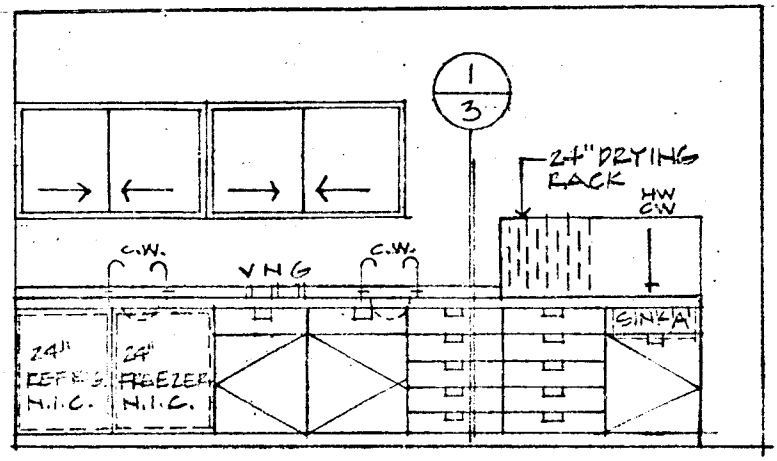
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

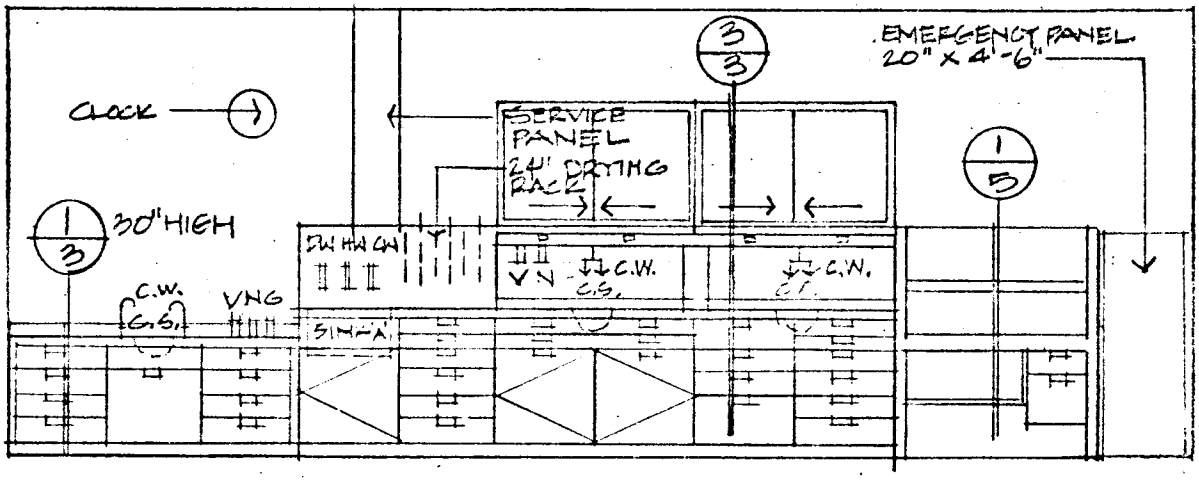
SHEET NO. P14. OF 33



(42) DRUG STORAGE
RM. 9-143



(43) POST-DOC. LAB.
RM. 9-146



(44) SPECIAL PROJECTS LAB.
RM. 9-119

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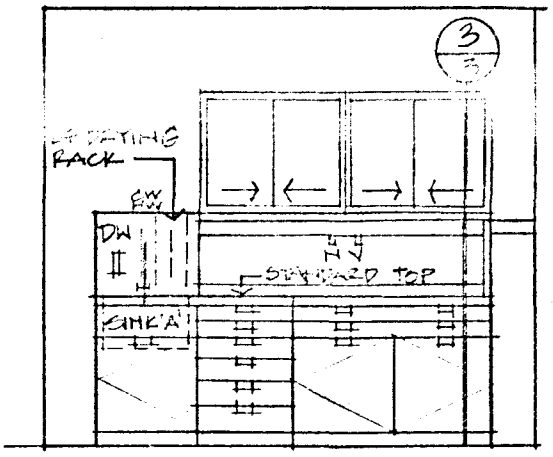
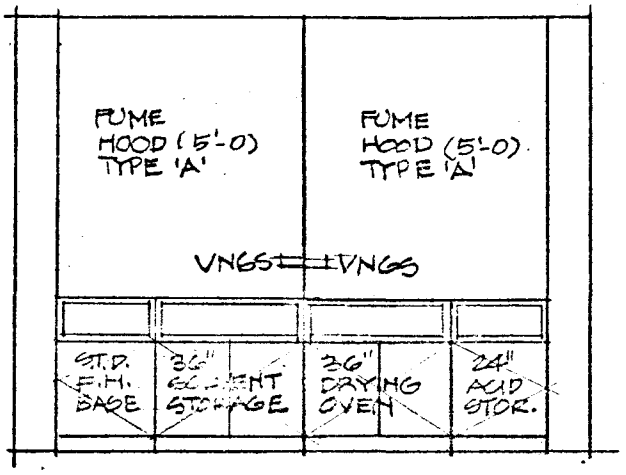
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

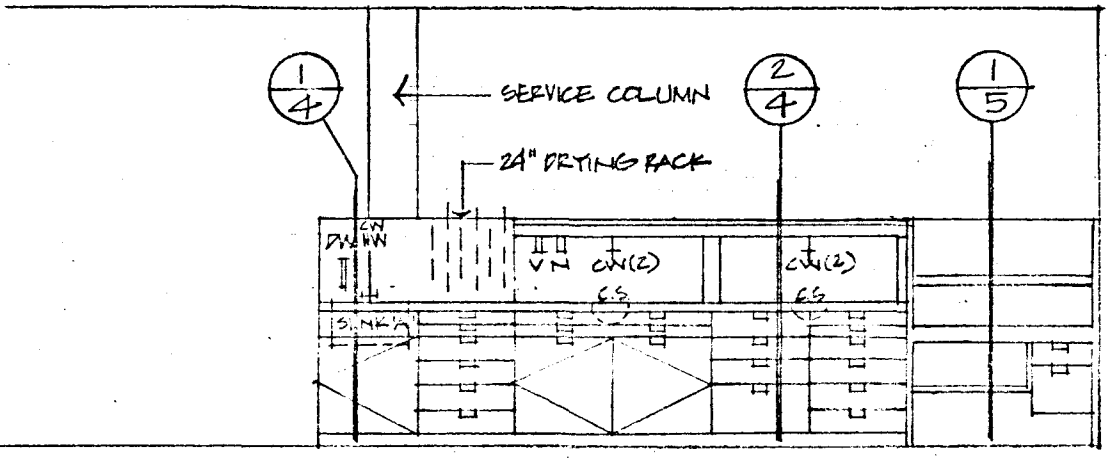
SHEET NO. P15 OF 33



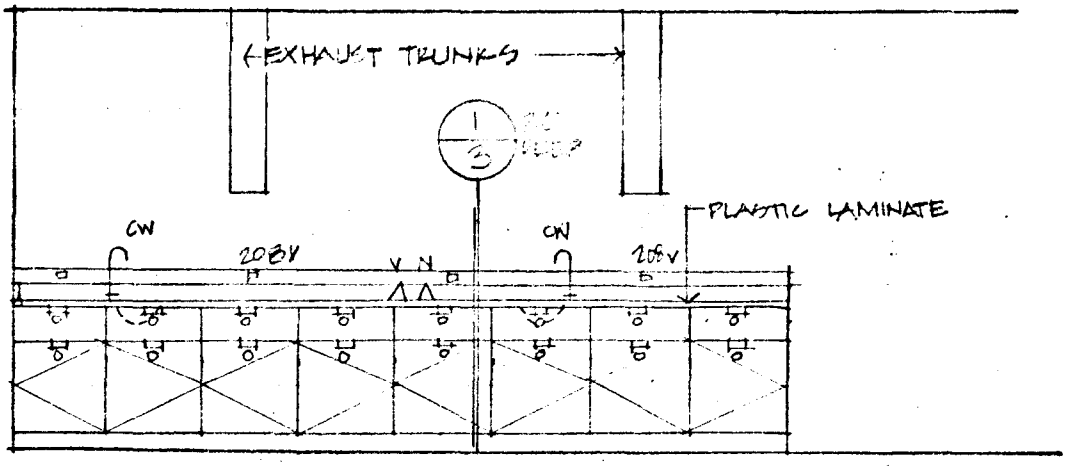
45 C.P. OFF./LAB
RM. 9-118



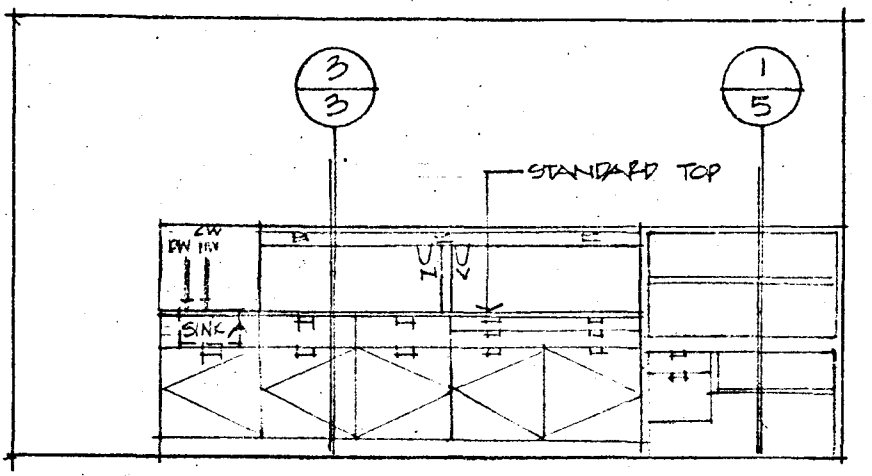
49 SPECIAL PROJECTS LAB.
RM. 9-119



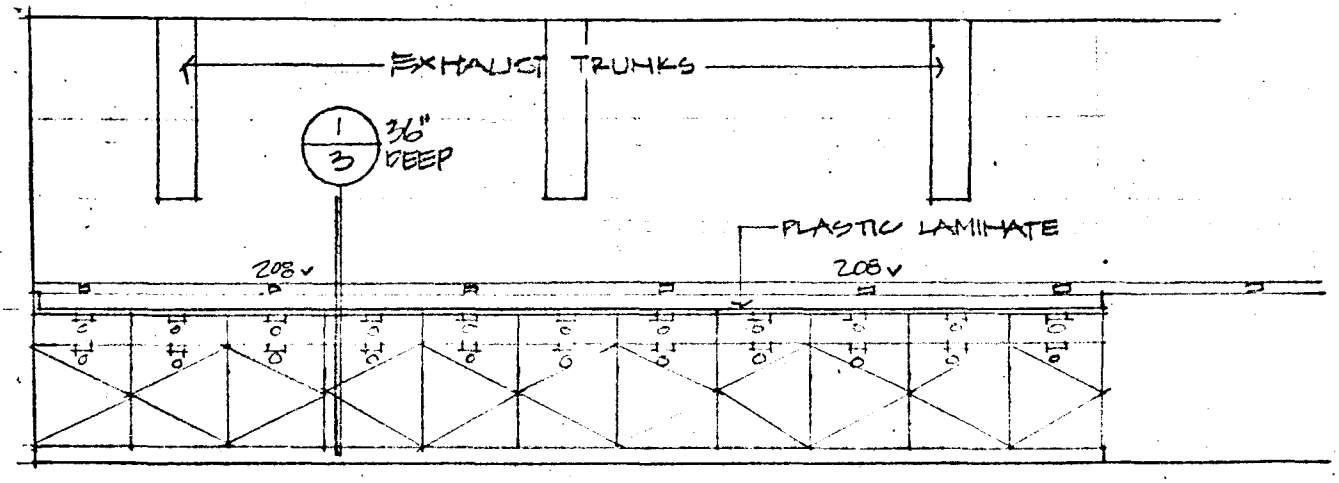
44A SPECIAL PROJECTS LAB.
RM. 9-119



46 CENTRAL INSTRUMENT ROOM
RM. 8-113



47 CENTRAL INSTRUMENT ROOM
RM. 8-113



48 CENTRAL INSTRUMENT ROOM
RM. 8-113

UNIVERSITY OF MINNESOTA
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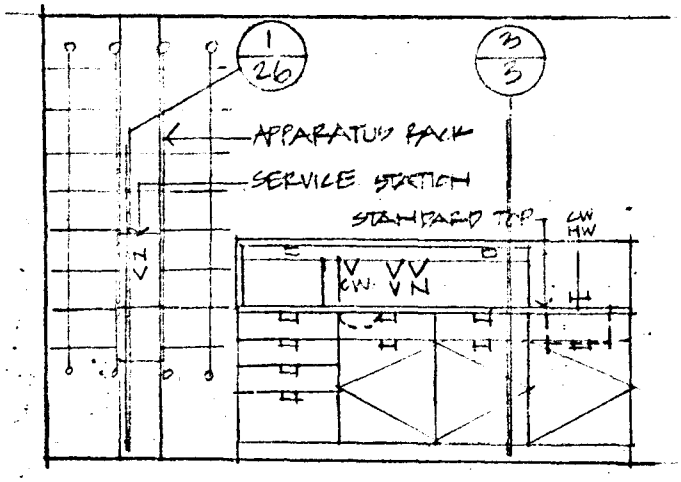
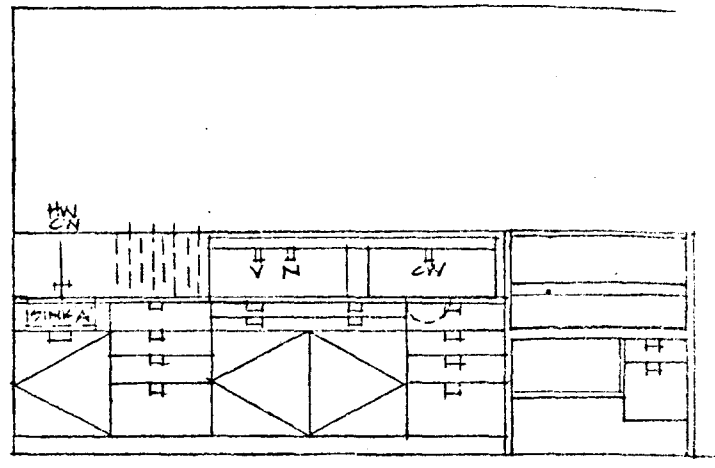
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

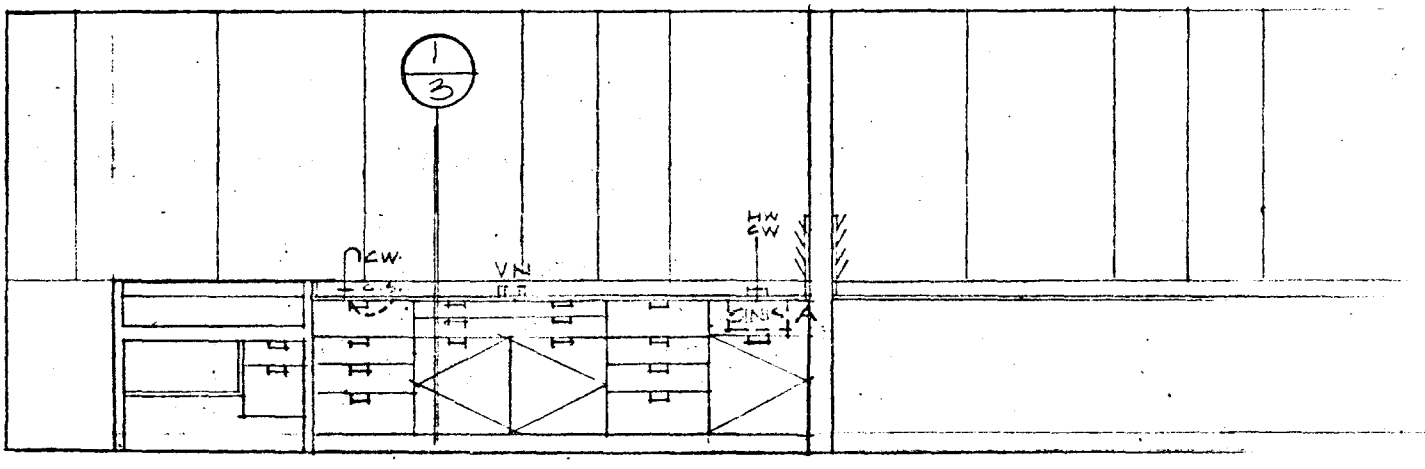
SHEET NO. P17 OF 33



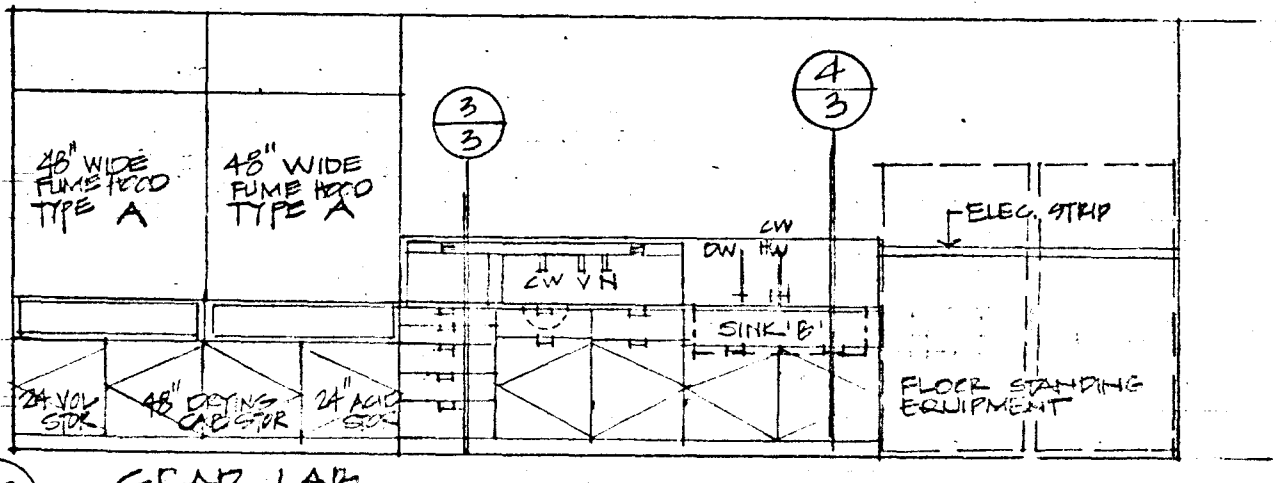


50 COLD RM. / LAB.
RM. 8-116

51 GRAD. LAB.
RM. 8-110



51A GRAD. LAB.
RM. 8-110



52 GRAD. LAB.
RM. 8-110

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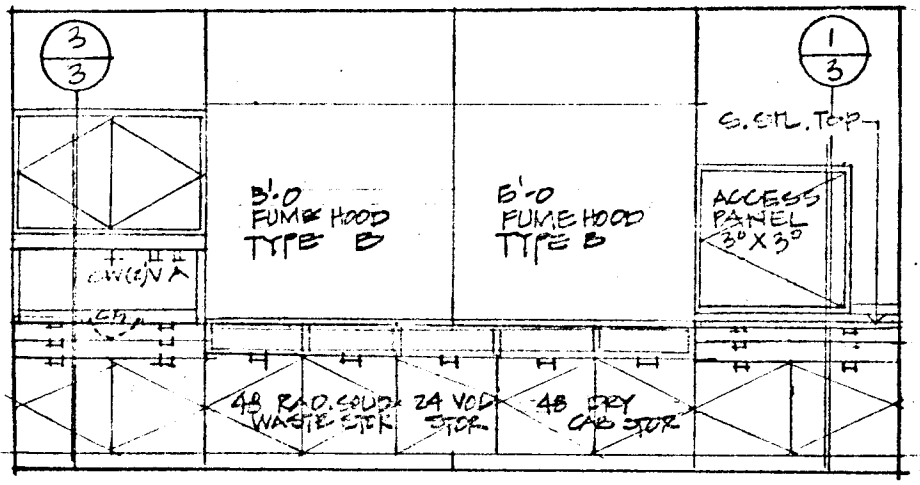
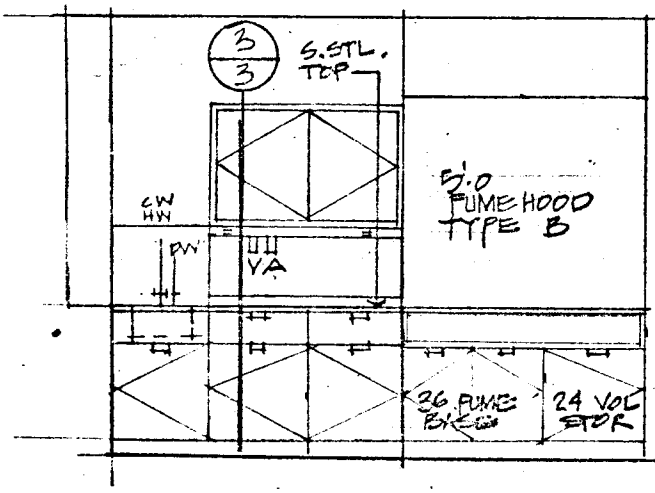
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4" = 1-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

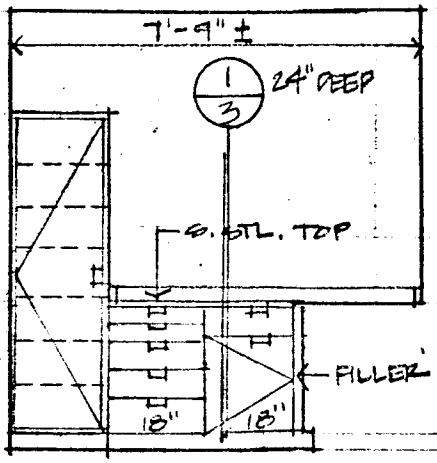
SHEET NO. P18 OF 33



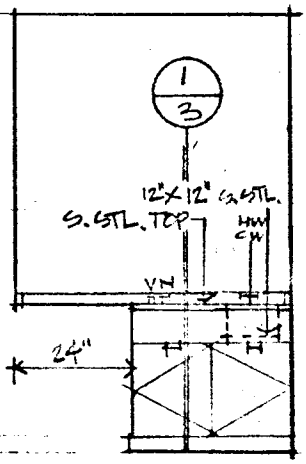
53 RAD. GYN.
RM. 8-111



54 RAD. GYN.
RM. 8-111



55 AUTORADIOGRAPHY ROOM
RM. 8-112



56 AUTORADIOGRAPHY ROOM
RM. 8-112

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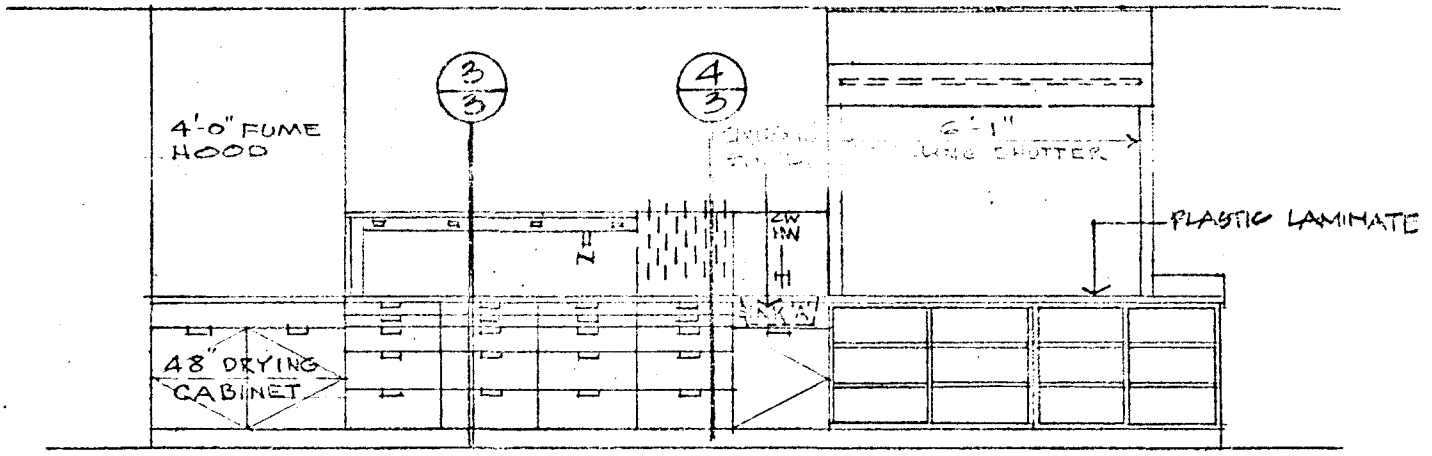
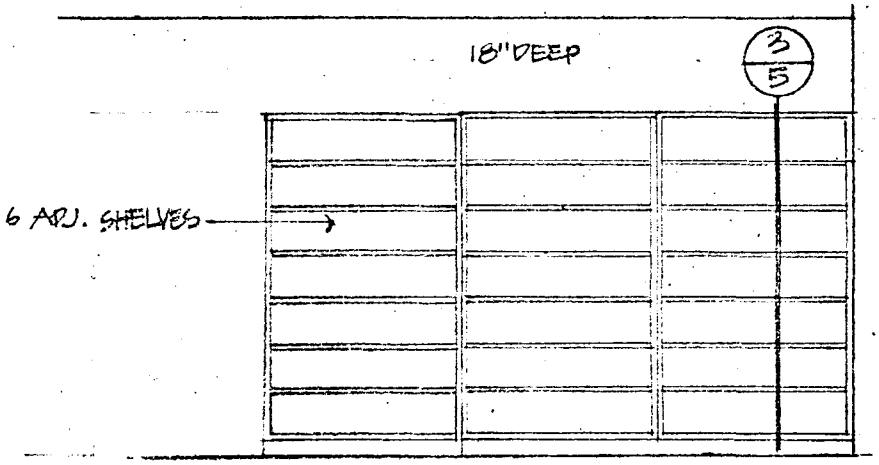
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/2" = 1-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

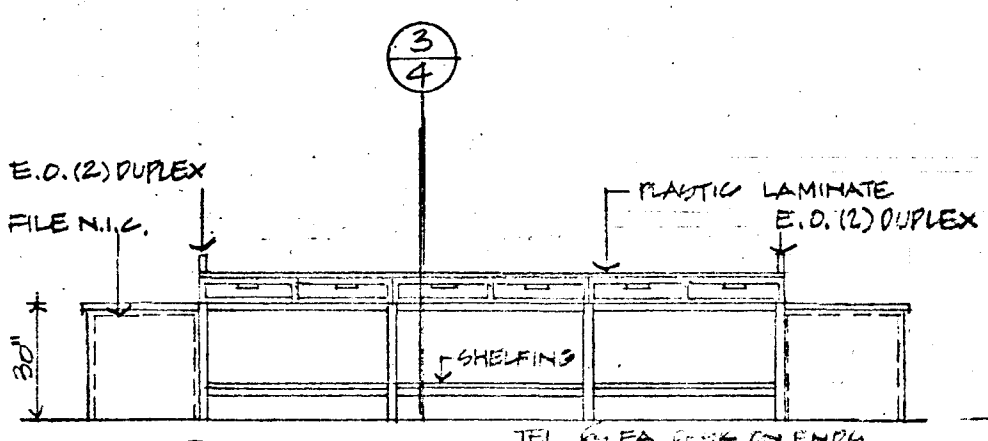
SHEET NO. P19 OF 33



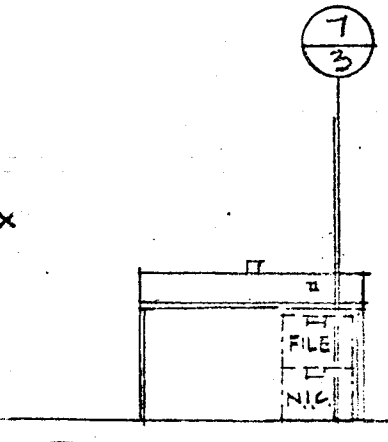
57 CENTRAL SUPPLY RM.
RM. F1-114



58 CENTRAL SUPPLY RM.
RM. F1-114



59 CENTRAL SUPPLY RM.
RM. F1-114



59A CENTRAL SUPPLY
RM. 1-114

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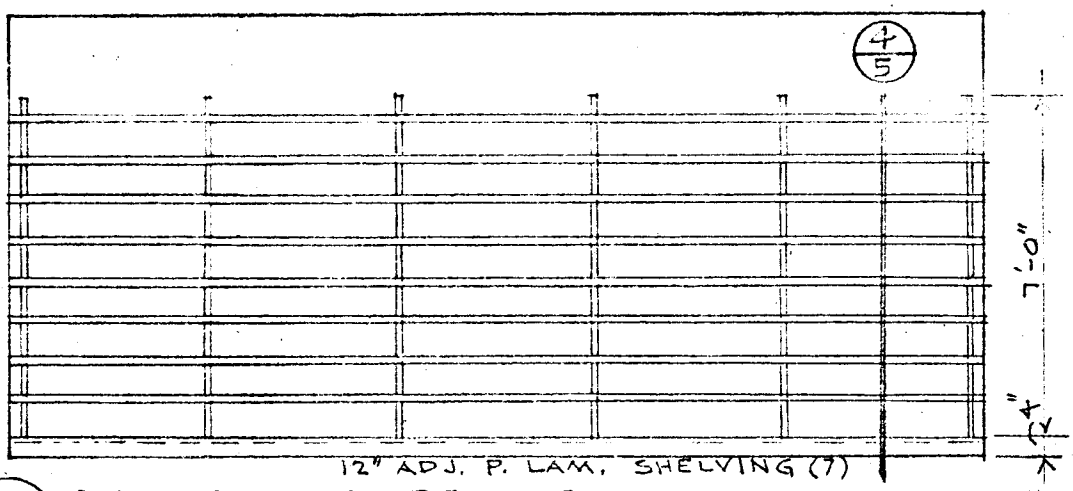
THE CERNY ASSOCIATES INC — MINNEAPOLIS MINNESOTA
HAMMEL, GREEN & ABRAHAMSON INC — ST. PAUL MINNESOTA
SETTER, LEACH & LINDSTROM INC — MINNEAPOLIS MINNESOTA

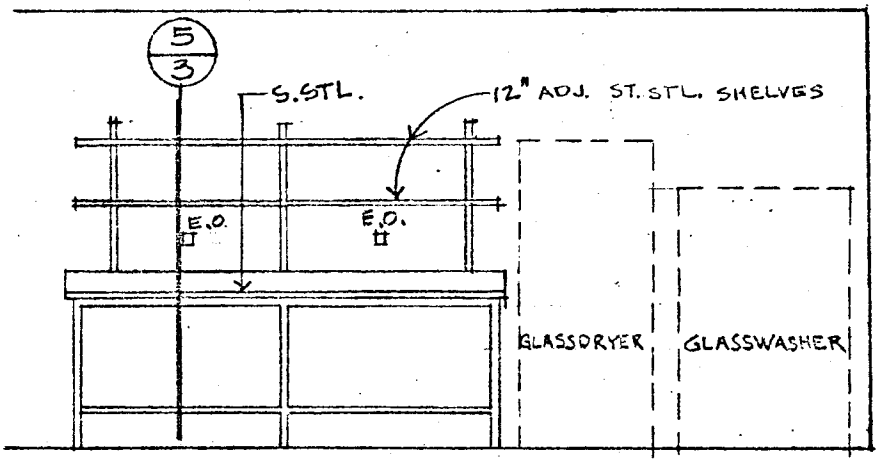
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4 = 1-0
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

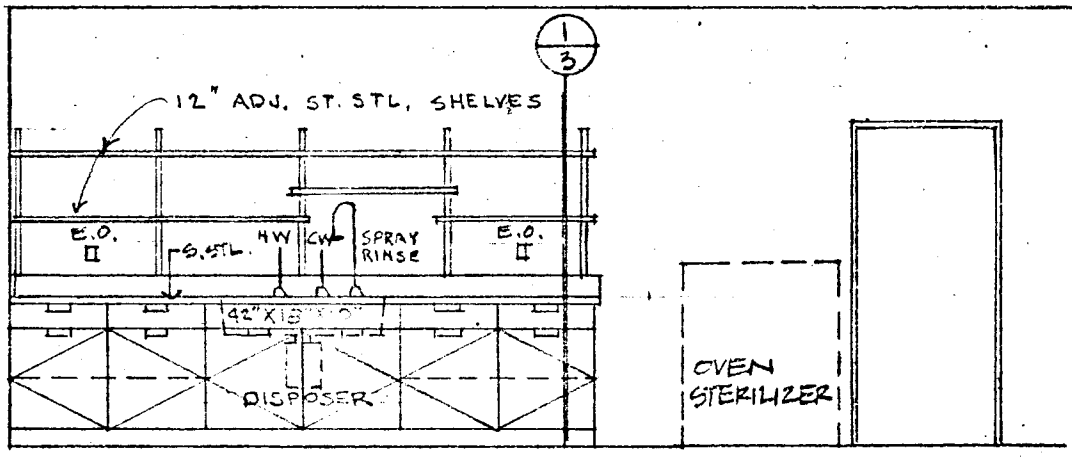
SHEET NO. P20 OF 33



60 CENTRAL SUPPLY RM.
RM. F1-114



61 GLASS WASH
RM. F1-116



62 GLASS WASH
RM. F1-116

UNIVERSITY OF MINNESOTA
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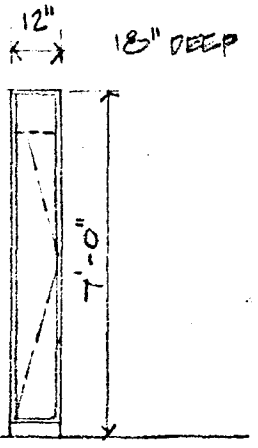
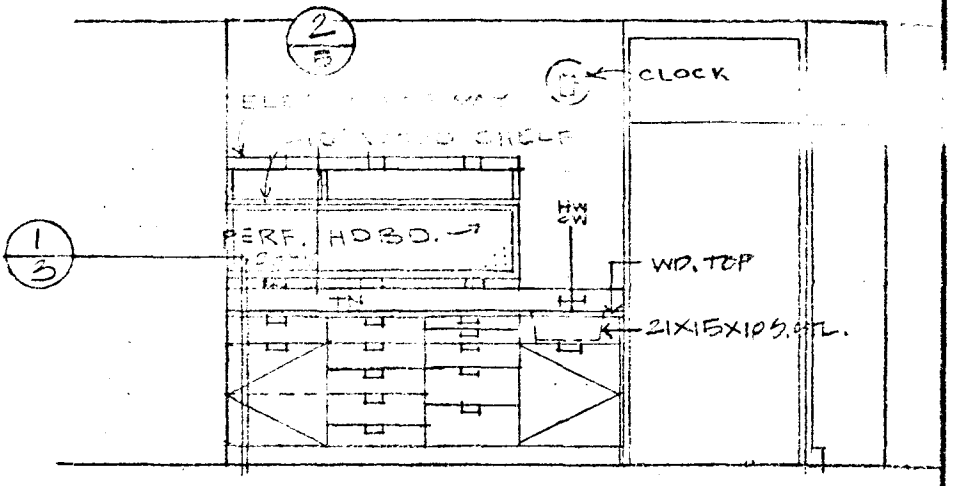
JOB NO. UNIT F
DRAWN
CHECK
SCALE 1/4 = 1'-0"
DATE 1 NOV. 1977

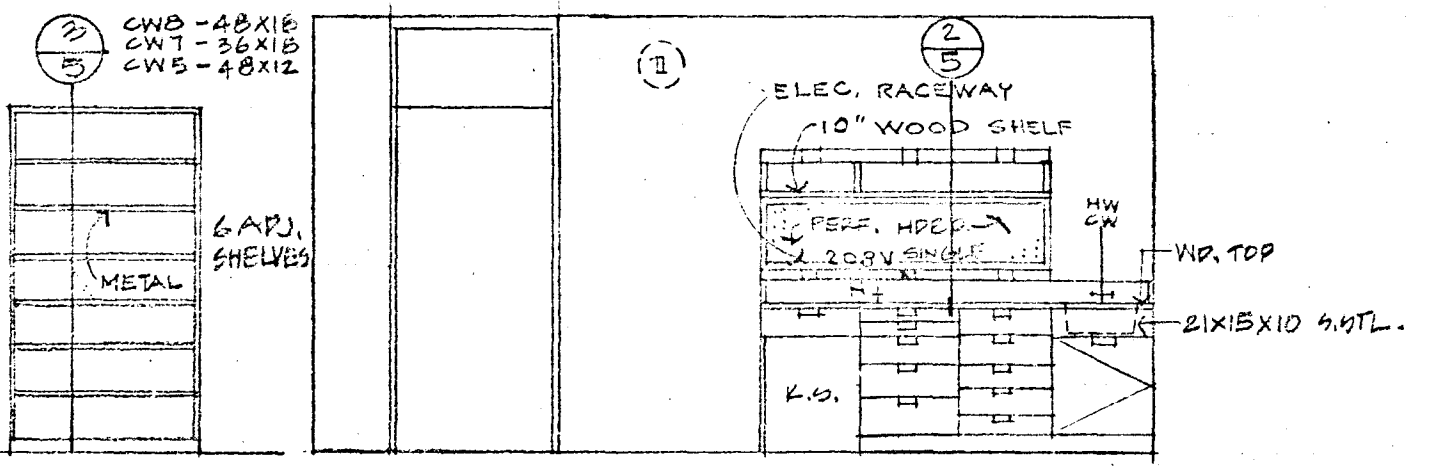
INTERIOR ELEVATIONS

SHEET NO. P21 OF 33

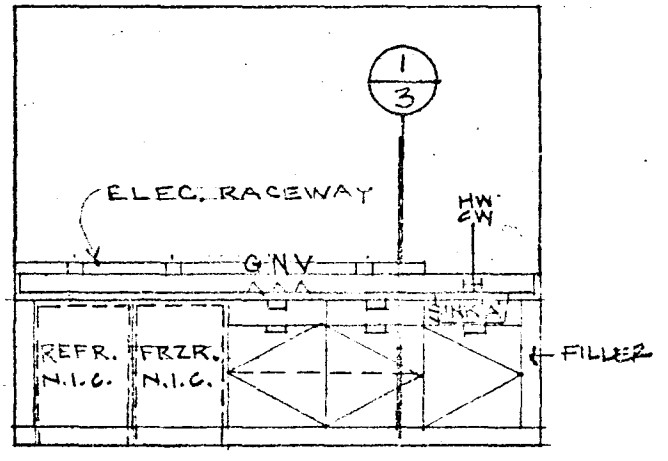




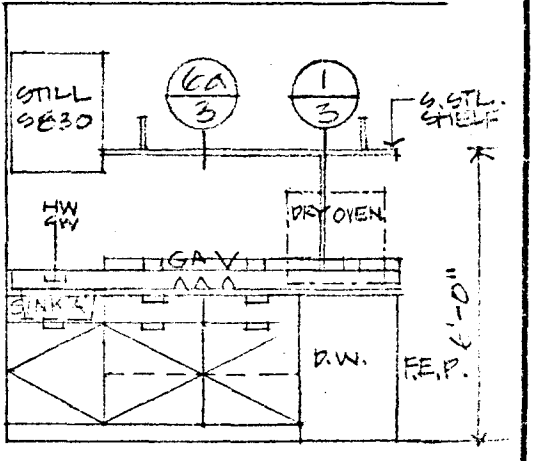
(64) (63) MECHANICAL SHOP
RM. 1-112



(63A) (64) INSTRUMENT SHOP
RM. 1-111



(65) STERILE RM.
RM. F2-114



(66) PARENTERAL PRODUCTS
RM. F2-113

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JOB NO. UNIT F
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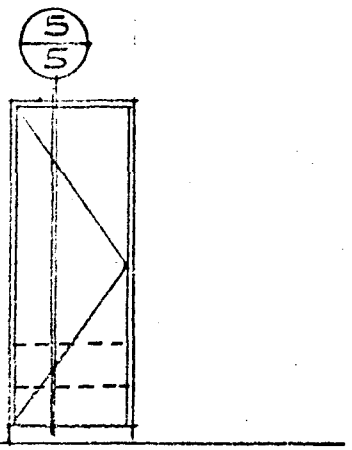
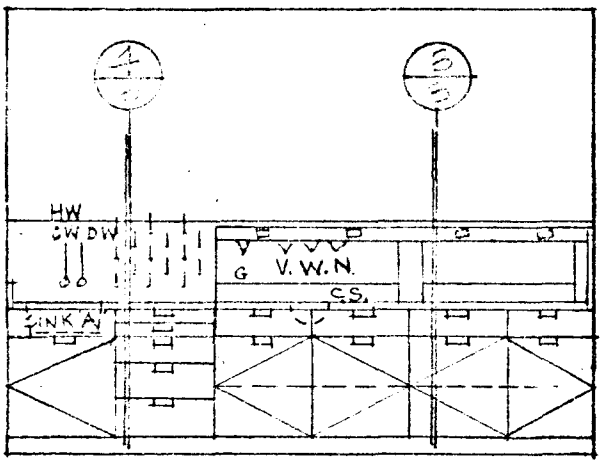
CHECK
SCALE 1/2" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

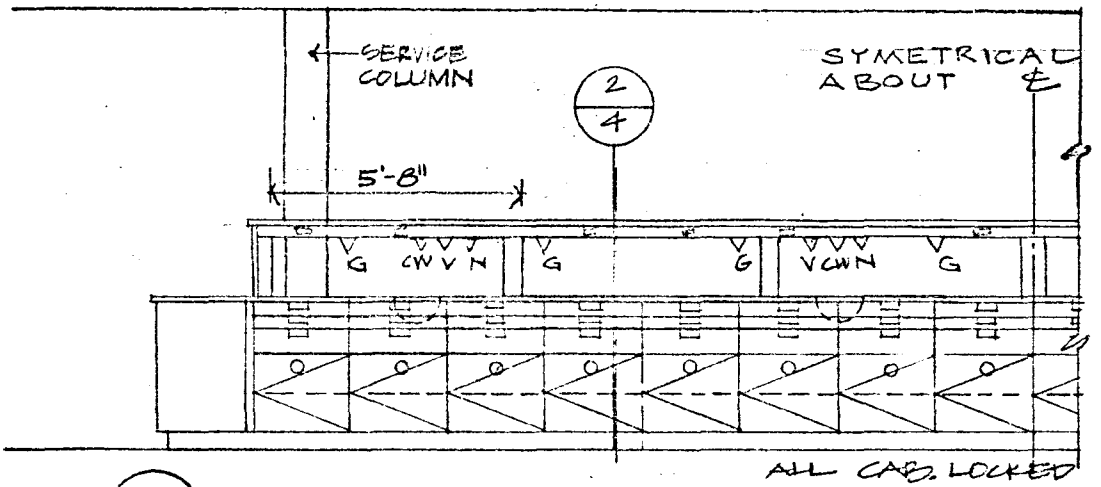
SHEET NO. P22 OF 33



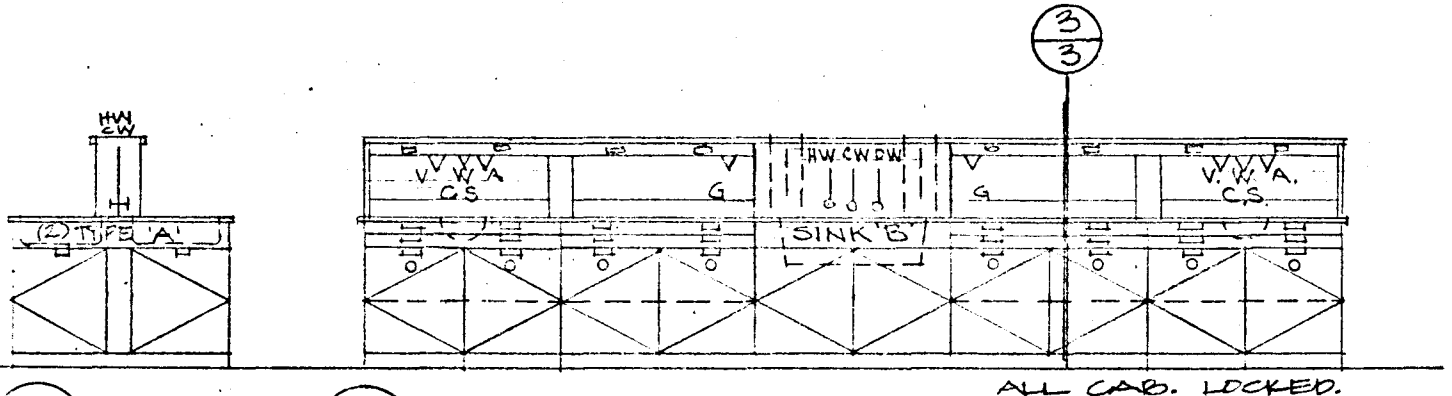
66A PARENTAL PRODUCTS
RM. 2-113



67 PREP. LAB.
RM. 2-116



68 UNDERGRADUATE LAB.
RM. F3-101/114



66A 69 UNDERGRADUATE LAB
RM. F3-101/114

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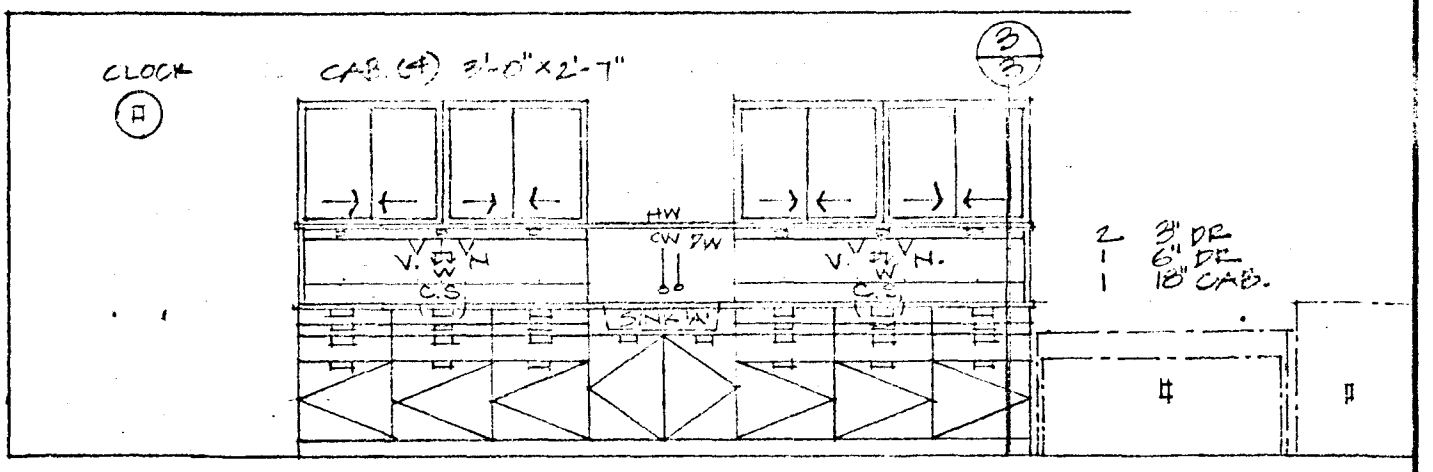
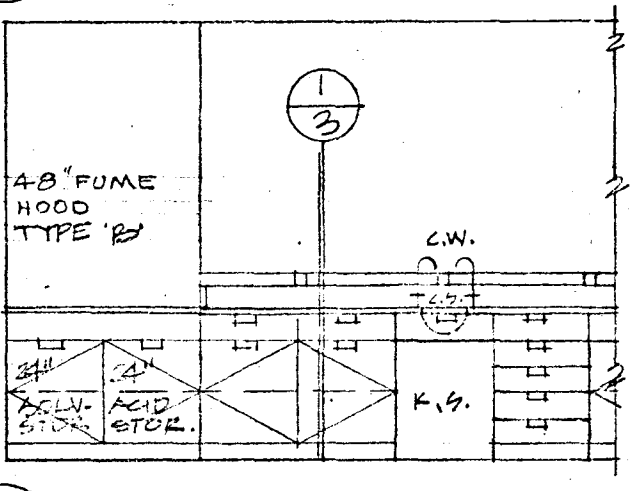
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

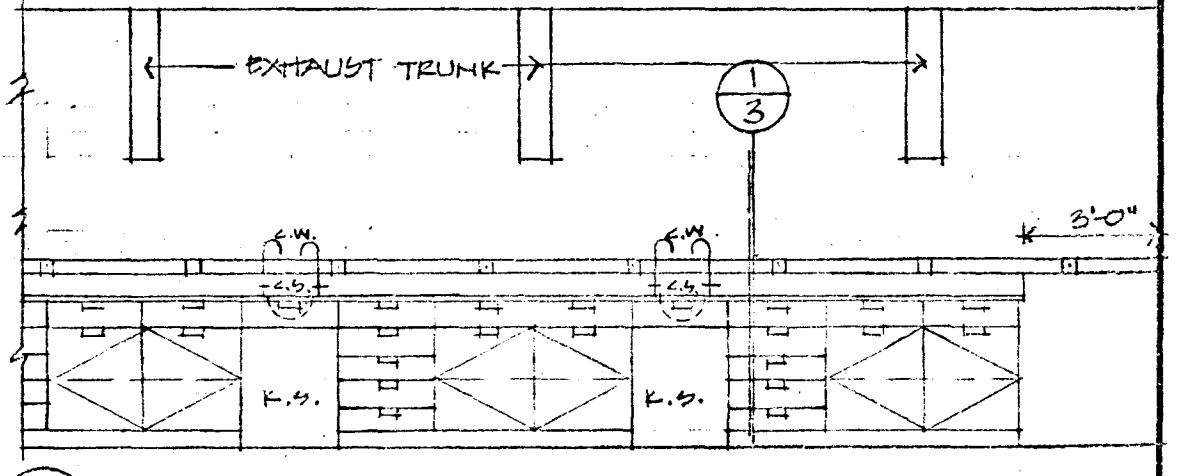
SHEET NO P23
OF 33



70 PHARMACOKINETICS LAB RM. F3-105



71 PHARMACOKINETICS LAB RM. F3-105



71 PHARMACOKINETICS LAB RM. F3-105

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CHECK
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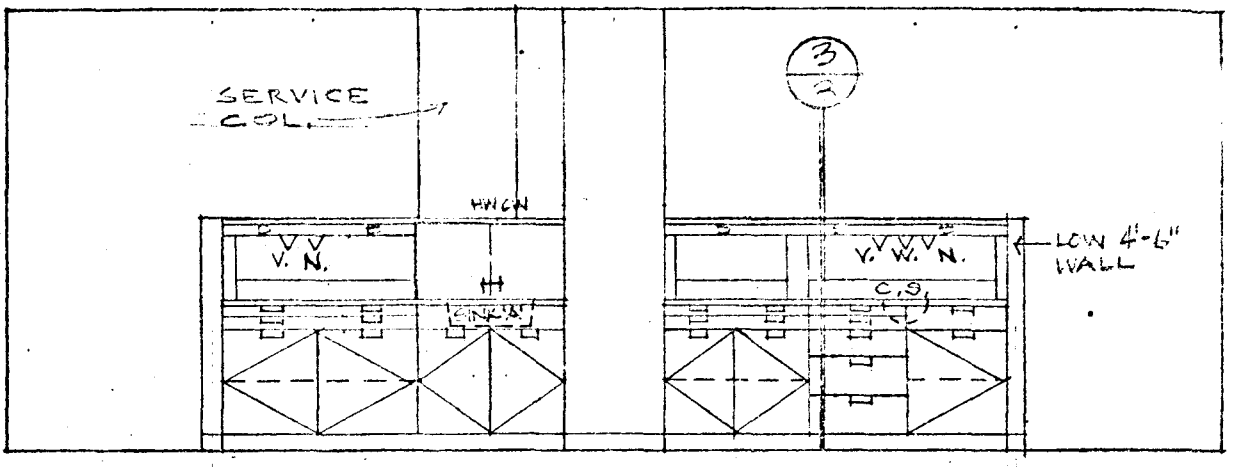
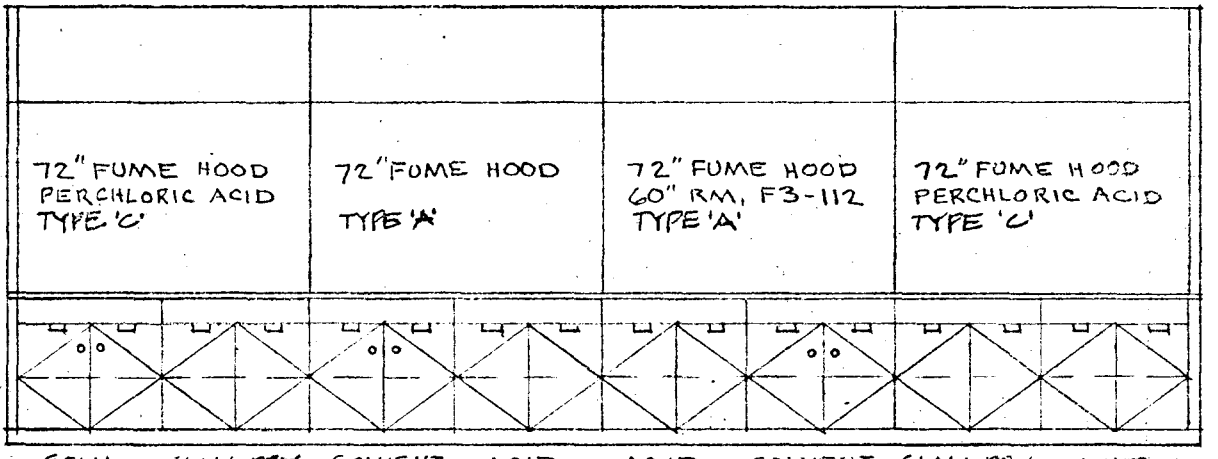
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

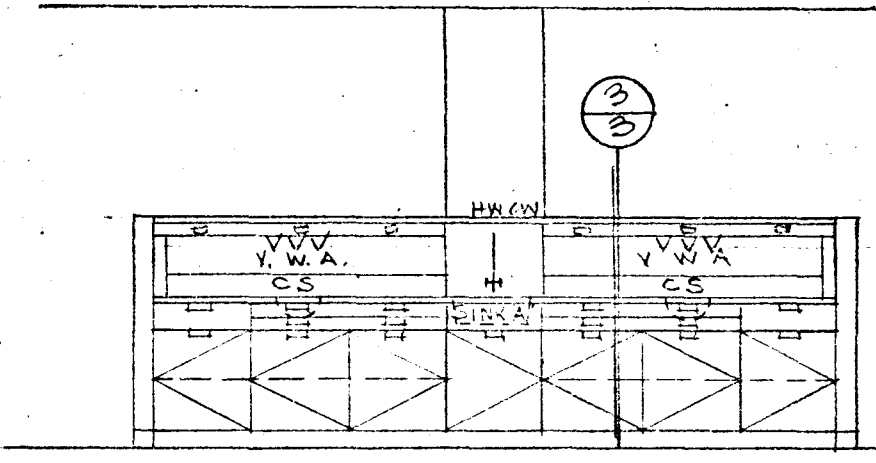
SHEET NO. P24 OF 35



72 FUME HOOD LAB
RM. F3-103



73 FUME HOOD LAB.
RM. F3-103 (F3-112 SIM.)



74 FUME HOOD LAB.
RM. F3-112

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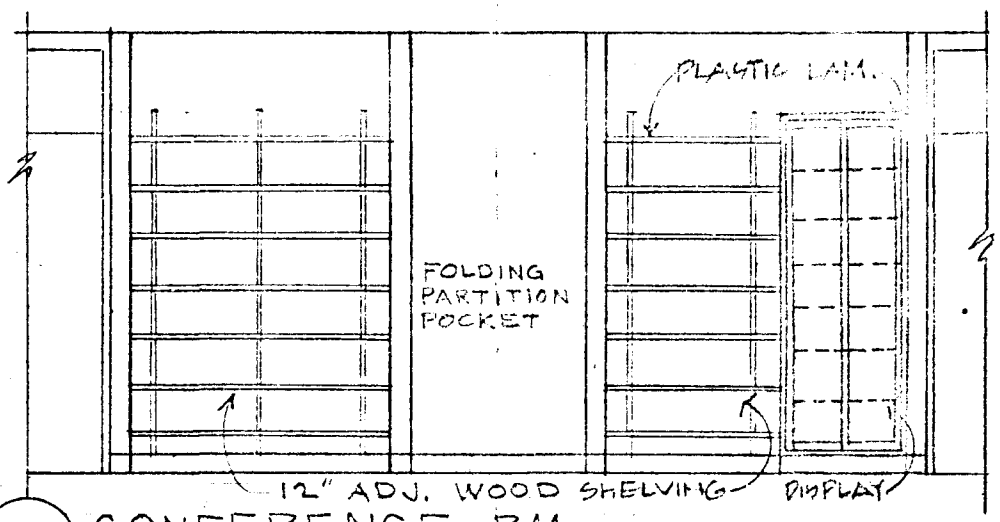
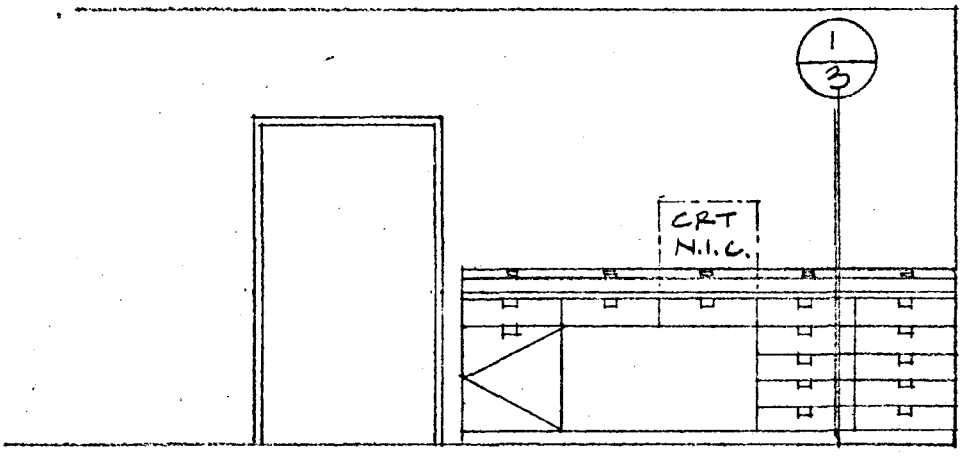
JOB NO UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

SHEET NO P25 OF 33



75 CONFERENCE RM.
RM. F3-113



75A DISPENSING LAB.
RM. 2-117

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JOB NO. UNIT F
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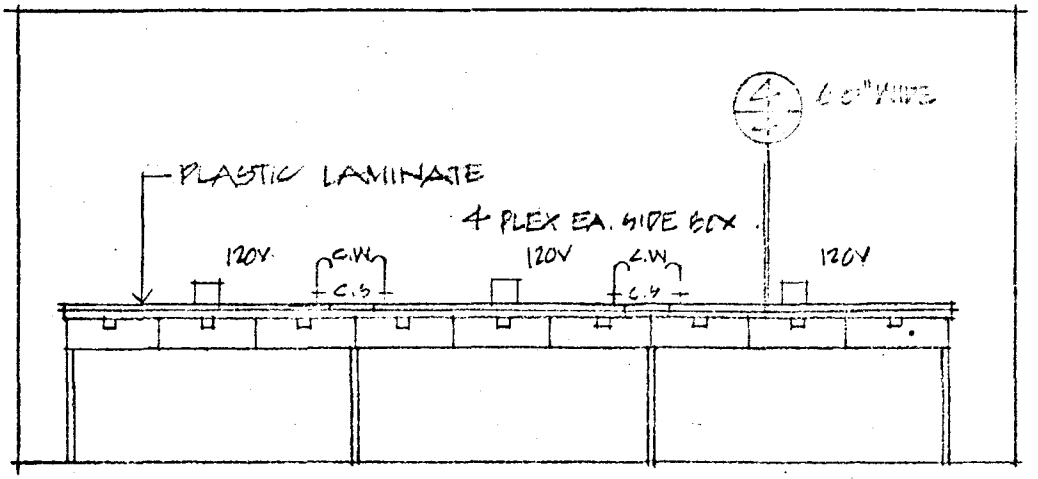
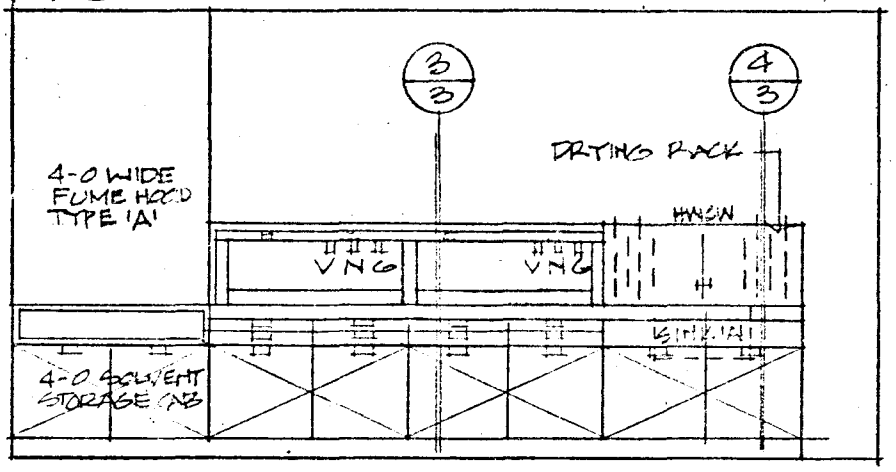
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

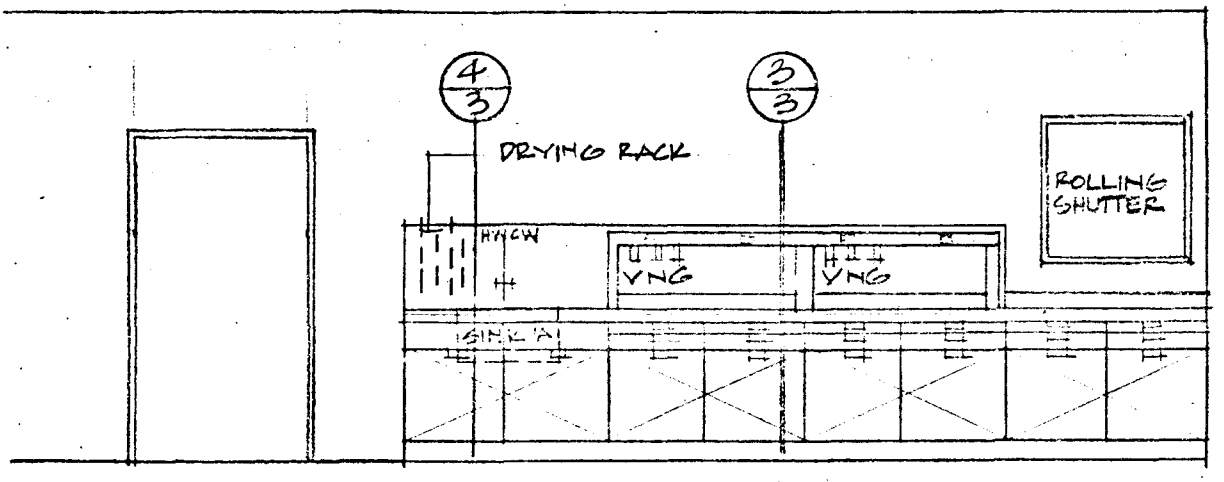
SHEET NO. P26 OF 33



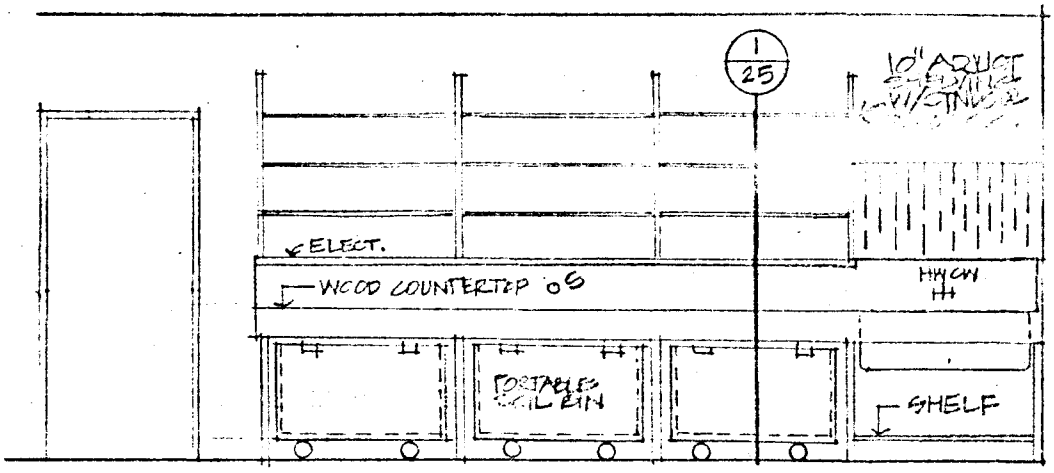
76 INSTRUMENT LAB. RM. F3-110



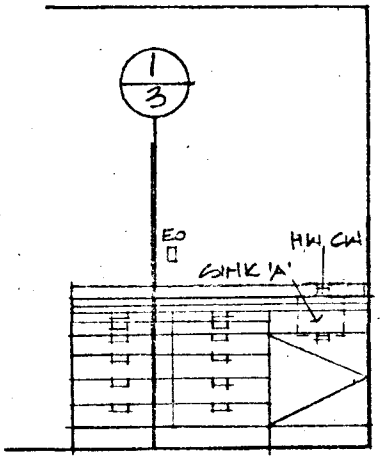
77 PREP. LAB RM. F3-106

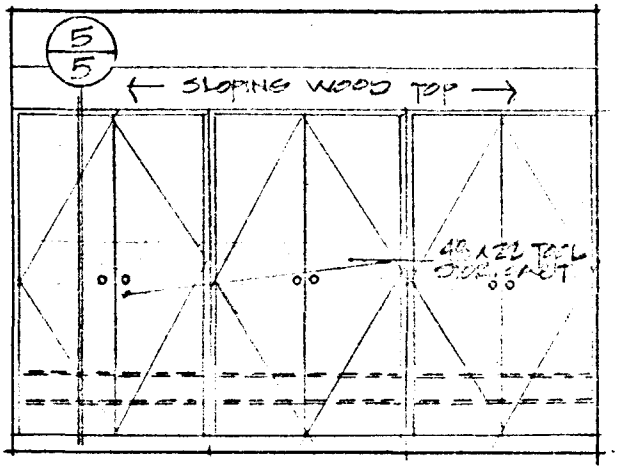


78 PREP. LAB RM. F3-106



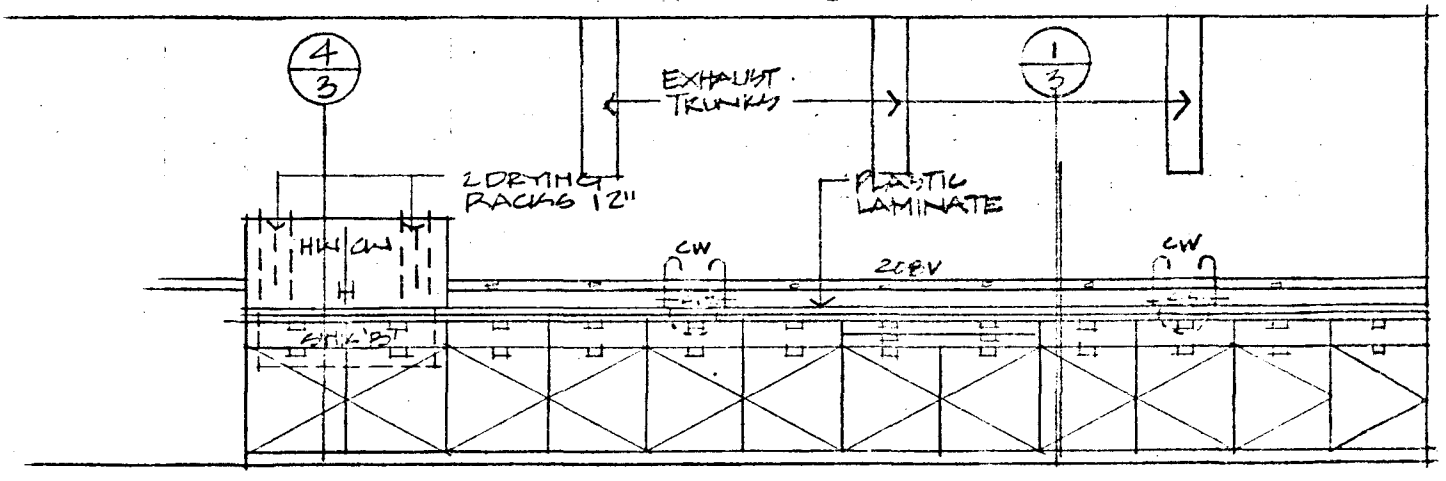
79 POTTING RM.
RM. F10-101





80 STOCK RM.
RM. F3-108

81 POTTING RM.
RM. F10-101



82 INSTRUMENT LAB
RM. F3-110

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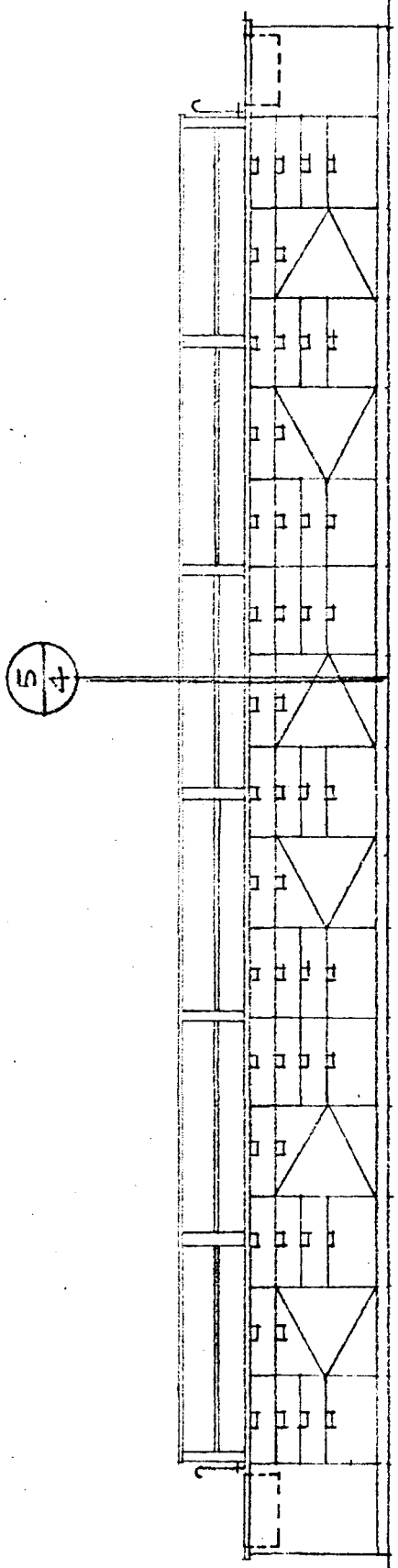
JOB NO UNIT F
DRAWN
CHECK
SCALE 1/8" = 1'-0"
DATE 1 NOV. 1977

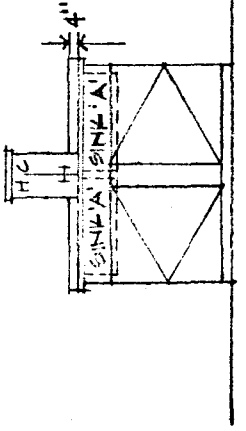
INTERIOR ELEVATIONS

SHEET NO P28 OF 33



DISPENSING LAB.
RM. 2-117

83



65

DISPENSING LAB.
RM. 2-117

84

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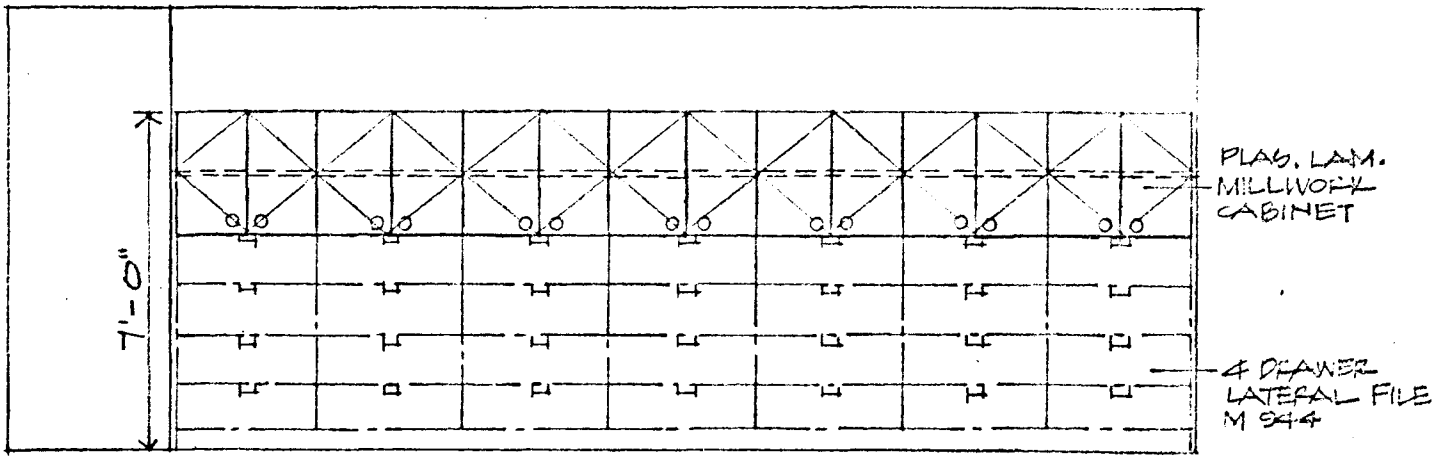
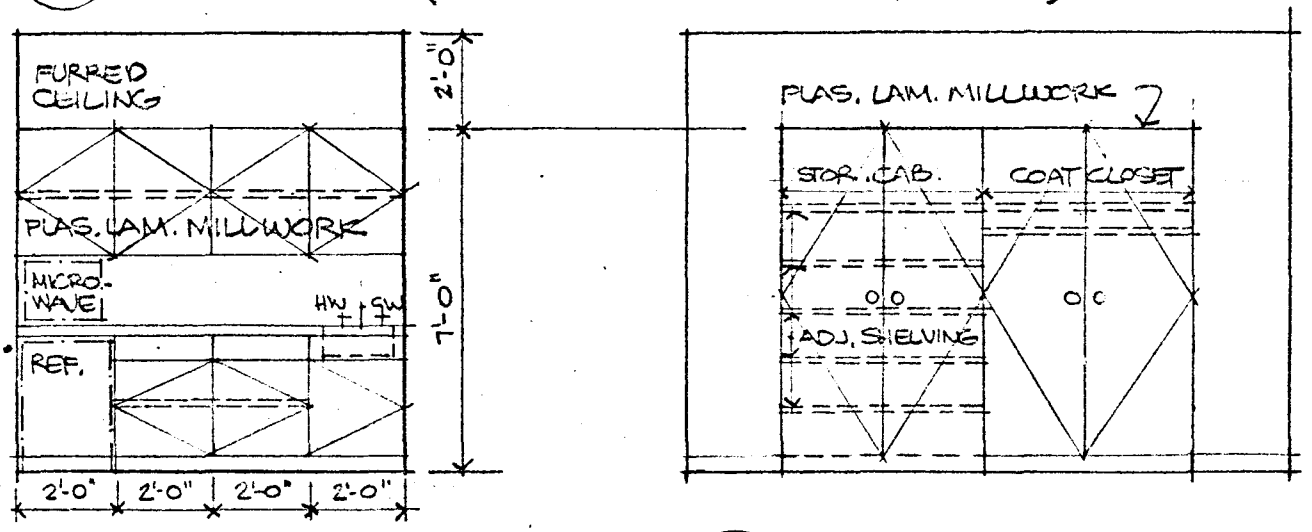
JOB NO UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

SHEET NO
P29
OF 33

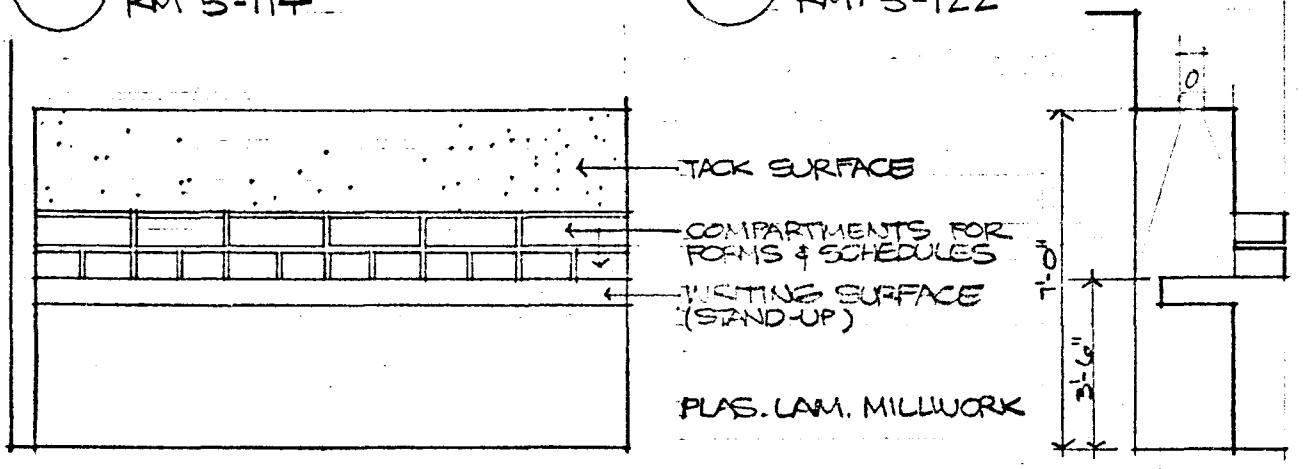


86 DRUG INFORMATION CENTER
RM. 3-111 (SIM. IN RMS 5-109 & 5-115)



87 KITCHEN
RM 5-114

88 SEC. STOR.
RM. 5-122



89 STUDENT WAITING
RM 5-101

SECTION

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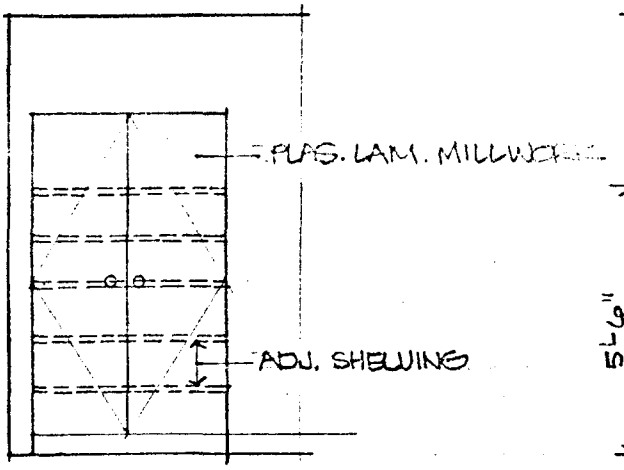
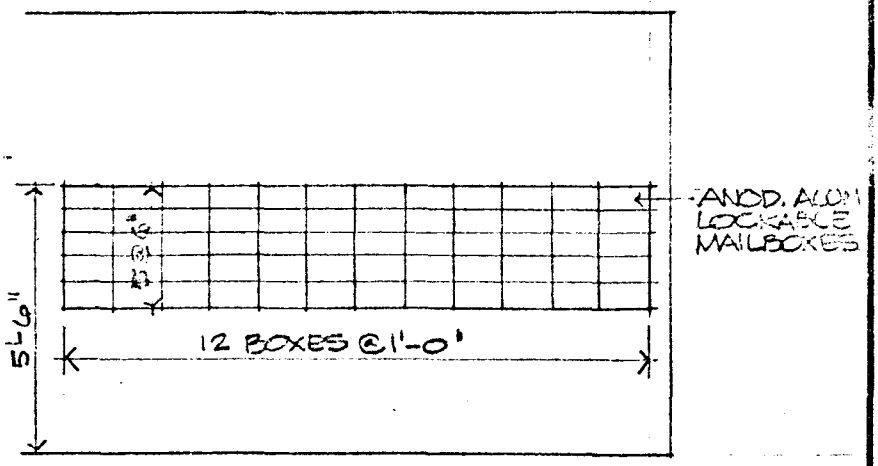
JOB NO UNIT F
DRAWN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

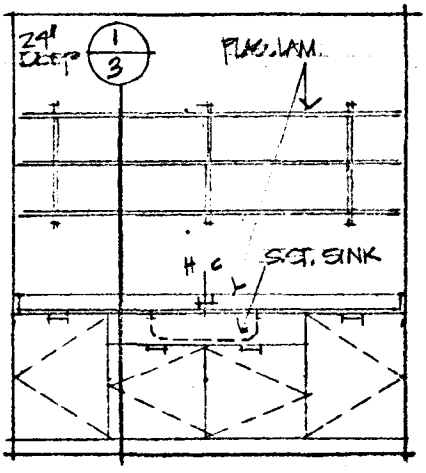
SHEET NO P30 OF 33



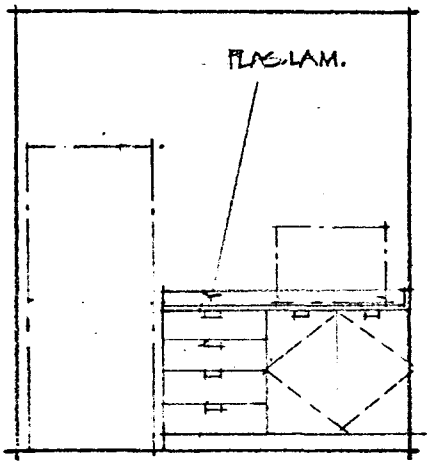
90 SEC. STORAGE
RM 5-122



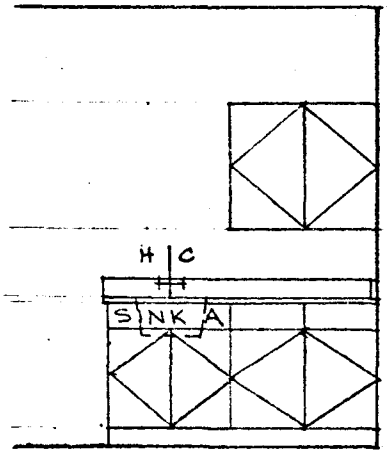
91 FAC. MAILBOXES
RM. 5-097



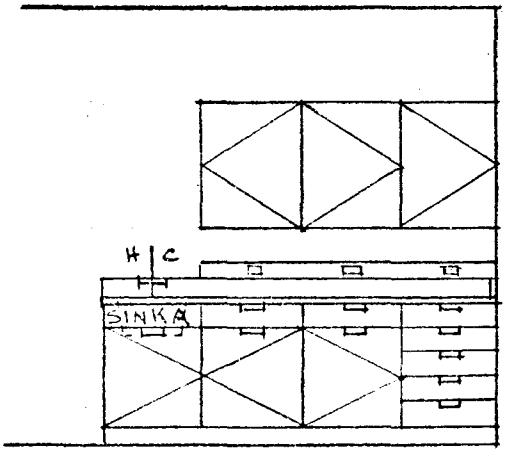
92A FACULTY KITCHENETE
RM. 7-119



92B FACULTY KITCHENETTE
RM 7-119



93A ANIMAL RM.
RM. 9-127, 128 REV.



93B ANIMAL RM.
RM. 9-130

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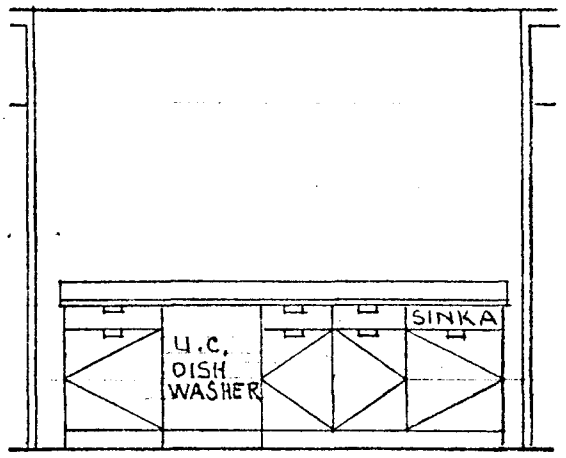
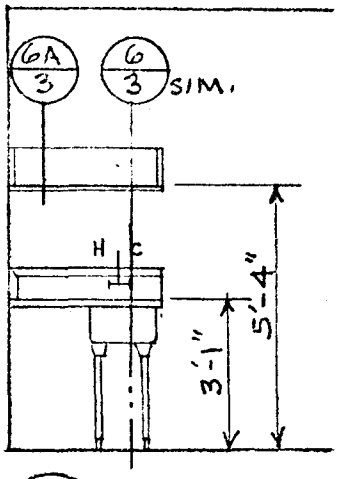
JOB NO. UNIT F
DRAWN B.N. AN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

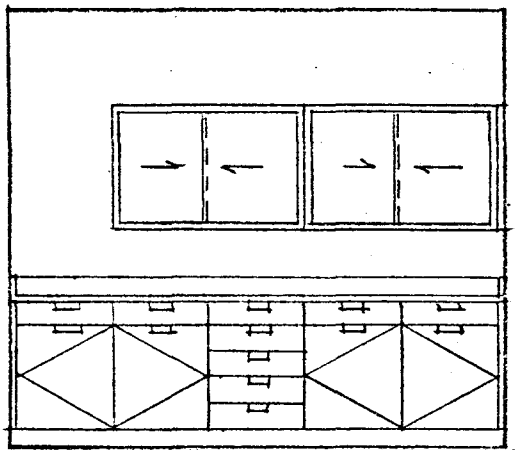
SHEET NO. P31
OF 33



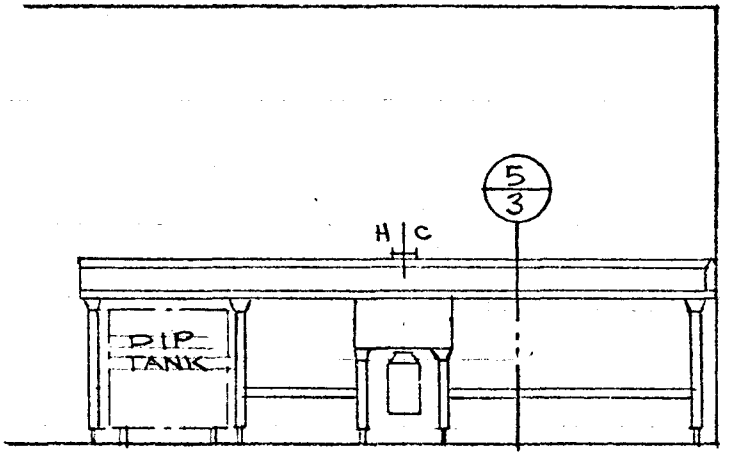
93C CAGE WASH
RM. 9-131



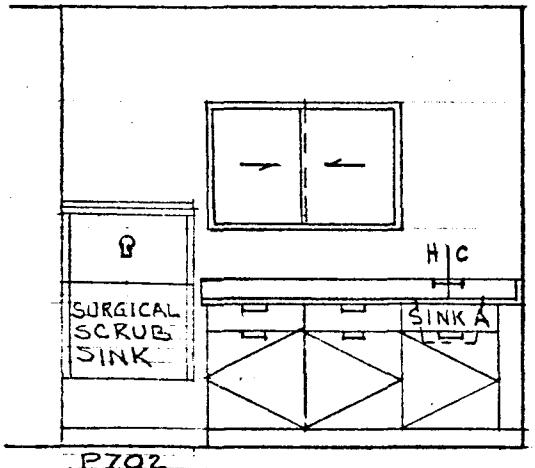
93D ANIMAL RM.
RM. 9-133, 135; 134 & 136 REV.



93E BEDDING
RM. 9-137



93F PREP. RM.
RM. 9-140



P702

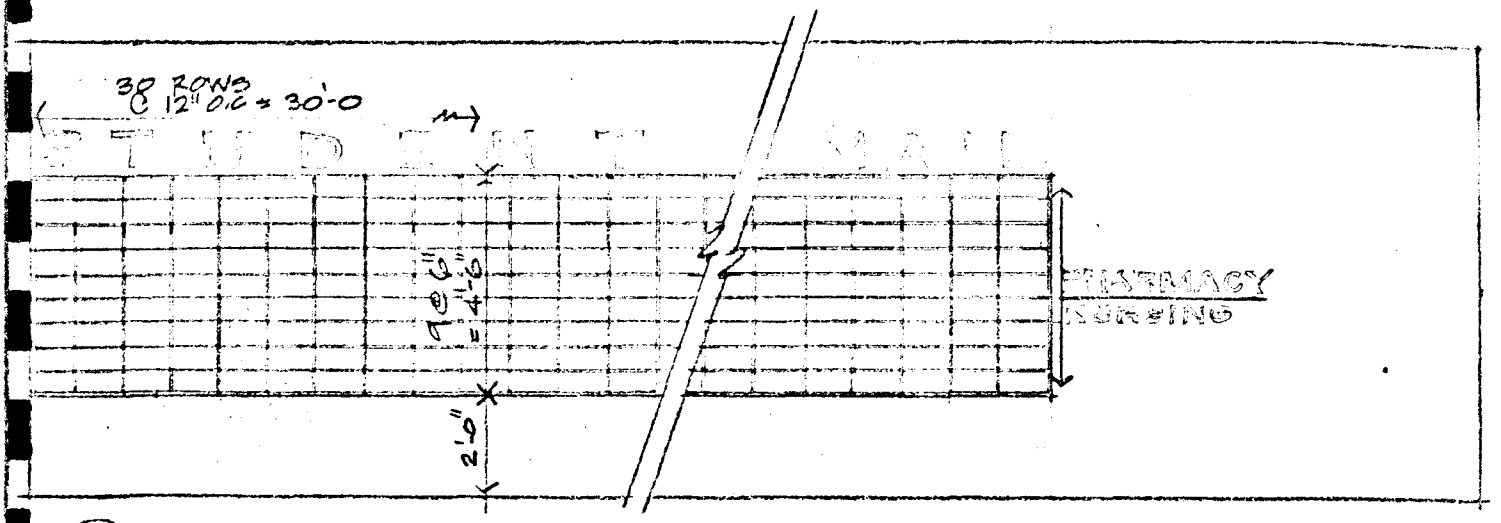
93G SURGERY
RM. 9-141

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION
THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

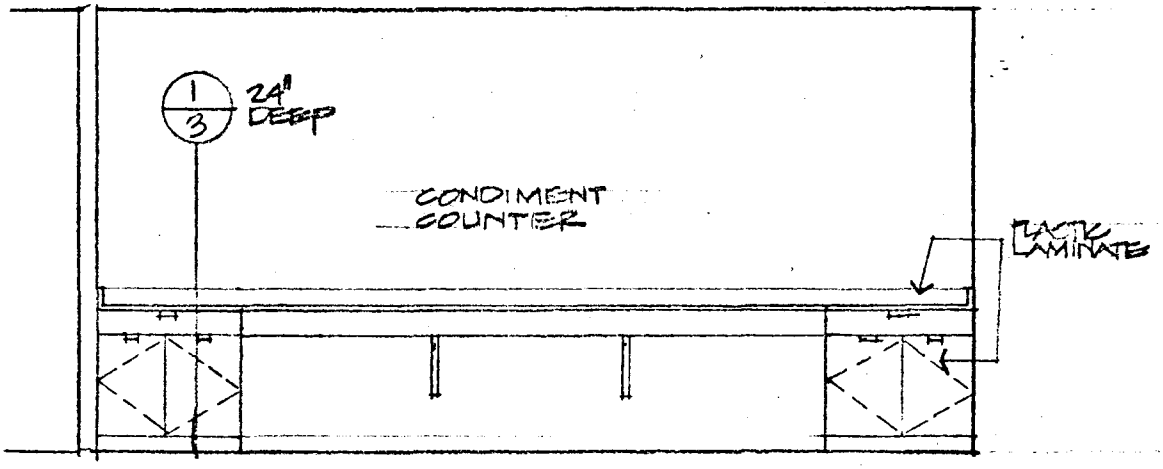
JOB NO UNIT F
DRAWN AN
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

SHEET NO P32 OF 33



94 STUDENT MAIL
CORRIDOR 1-96



95 VENDING
RM 1-102

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

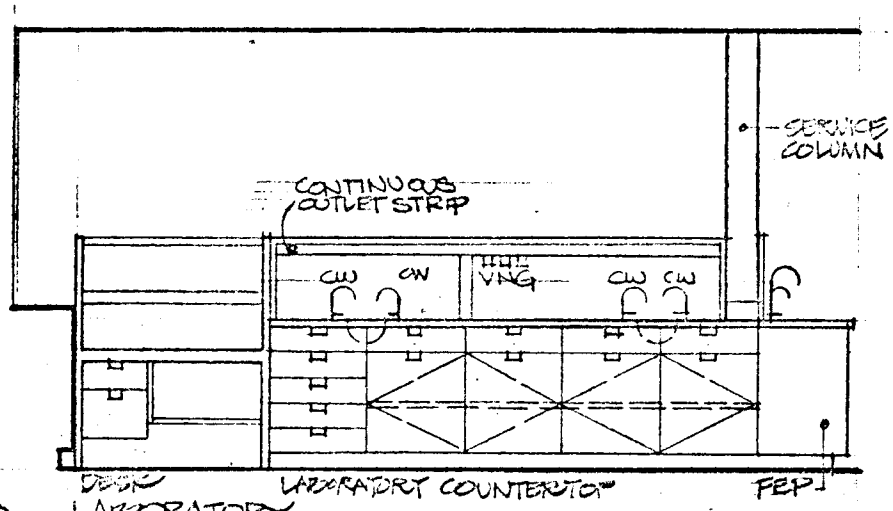
THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

THE CERNY ASSOCIATES INC. MINNEAPOLIS MINNESOTA
HAMMEL GREEN & ABRAHAMSON INC ST. PAUL MINNESOTA
SETTER LEACH & LINDSTROM INC MINNEAPOLIS MINNESOTA

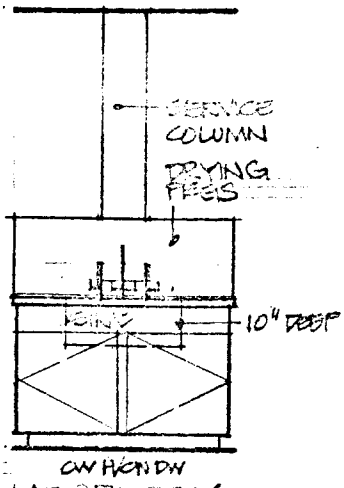
JOB NO. UNIT F
DRAWN BJ
CHECK
SCALE 1/4" = 1'-0"
DATE 1 NOV. 1977

INTERIOR ELEVATIONS

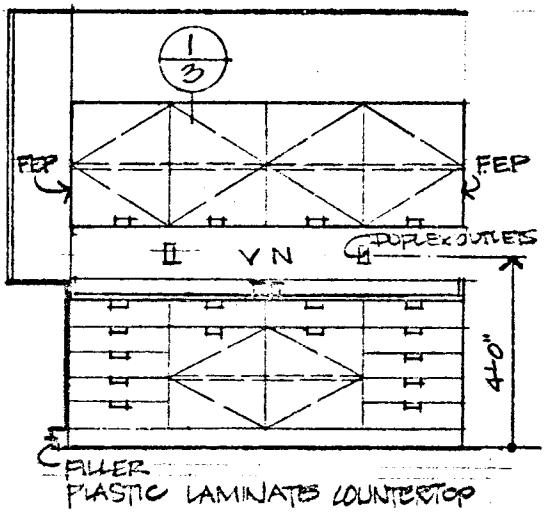
SHEET NO. P33 OF 33



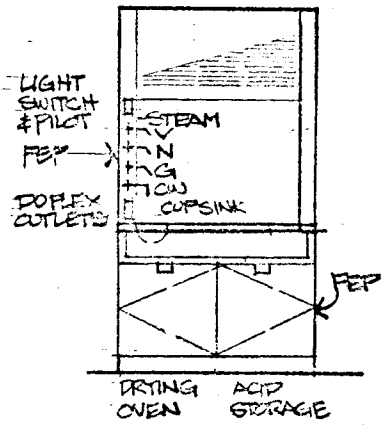
1 LABORATORY
ROOM F9-152



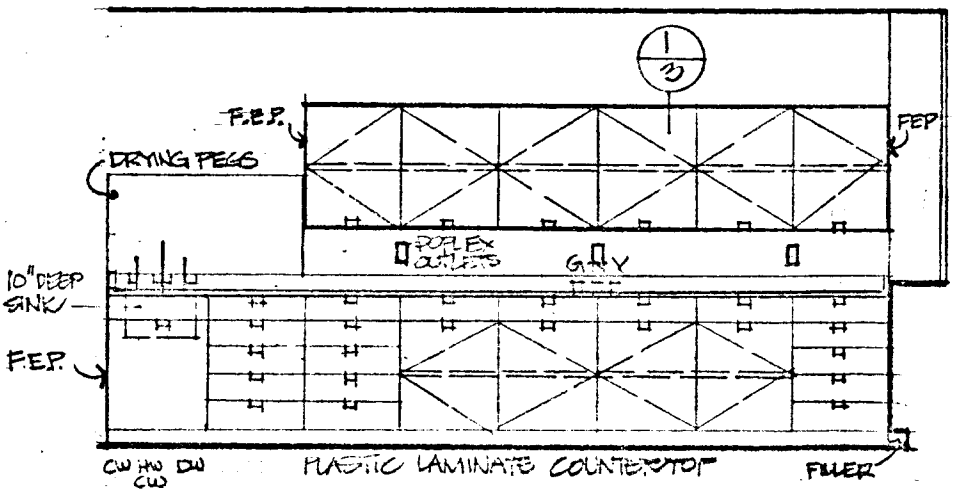
2 LABORATORY
ROOM F9-152



3 LABORATORY
ROOMS F9-149 & F9-152



4 FUME HOOD (TYPE A)
ROOM F9-152



5 LABORATORY
ROOM F9-149

UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
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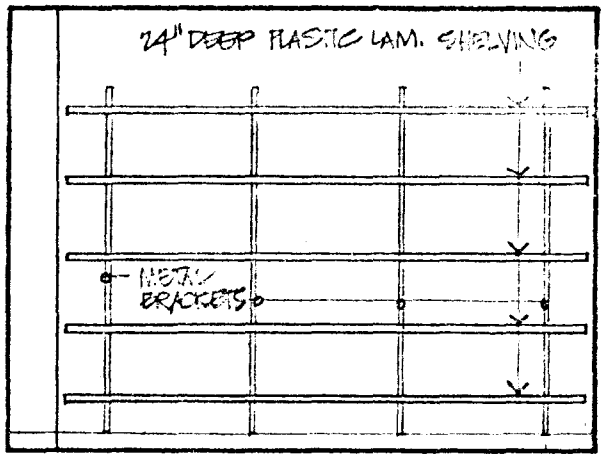
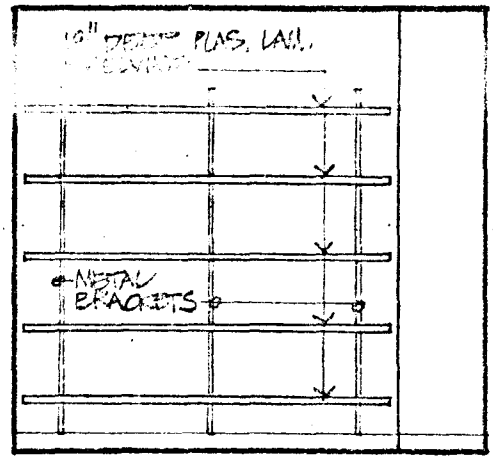
JOB NO. F DV
DRAWN
CHECK
SCALE 1/2" = 1'-0"
DATE 1 NOV 77

NURSING RESEARCH LABS
FLOOR 9

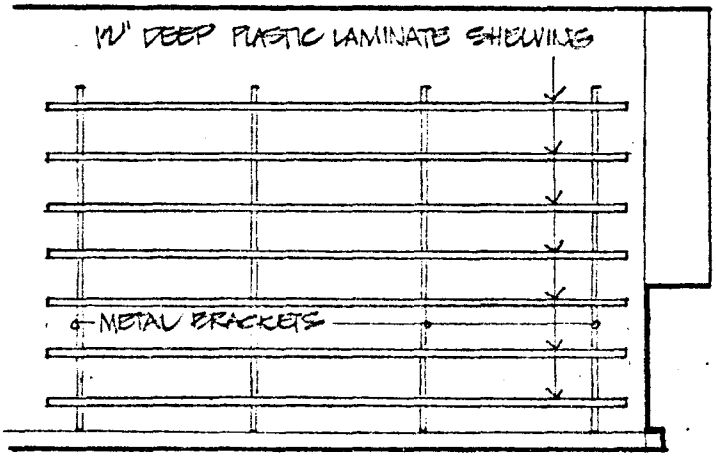
SHEET NO. 100



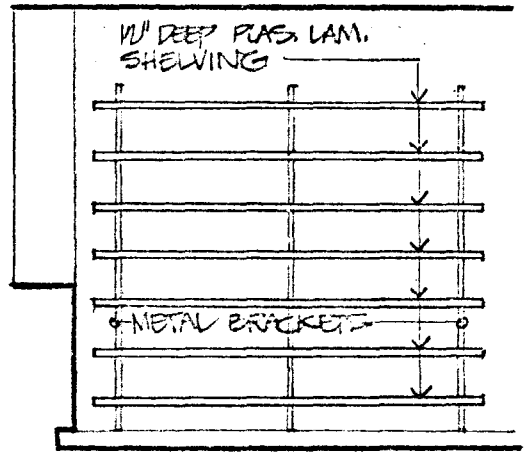
1 OFFICE
ROOM 9-151



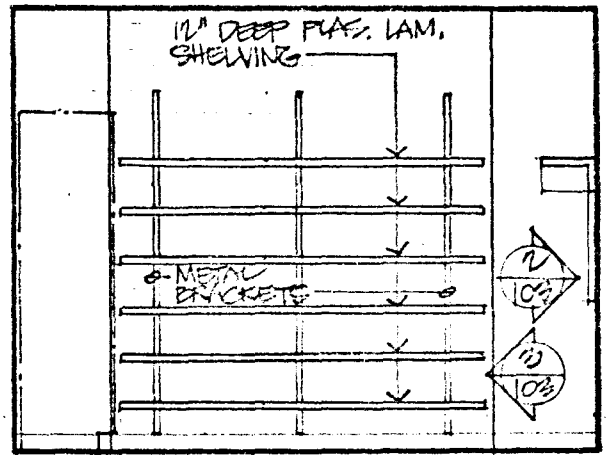
2 OFFICE
ROOM 9-150



3 REFERENCE ROOM
ROOM 6-131



4 REFERENCE ROOM
ROOM 6-131



5 A/V WORKROOM
ROOM 4-129

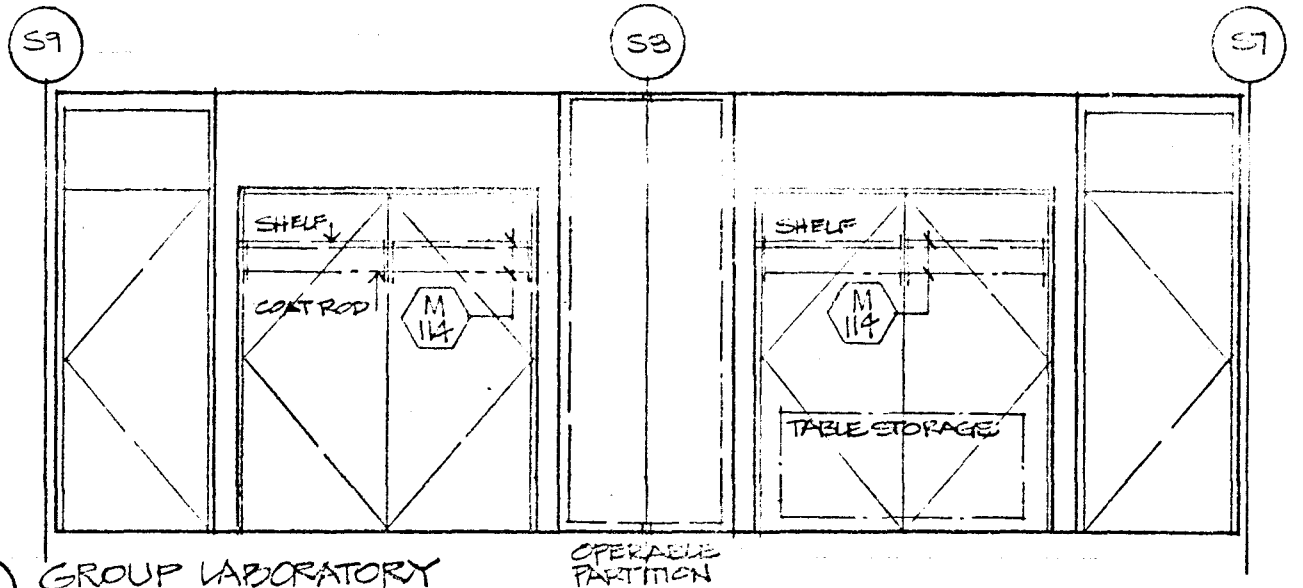
UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

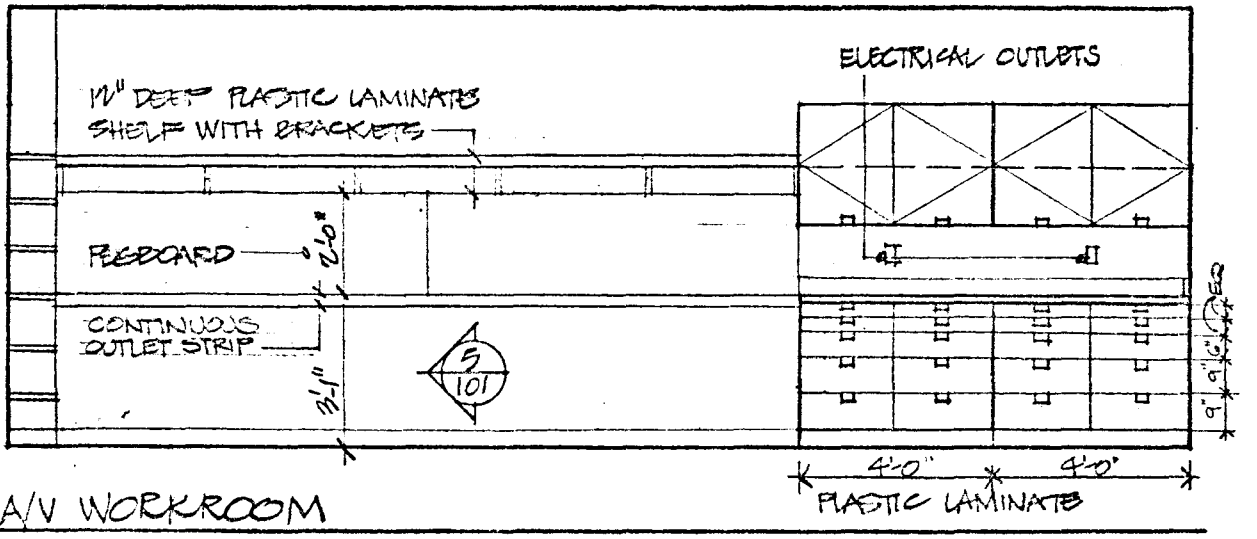
JOB NO 7722
DRAWN HE
CHECK HE
SCALE 1/2" = 1'-0"
DATE 1 NOV 77

ADJUSTABLE SHELVING
FLOORS 4, 6, 9

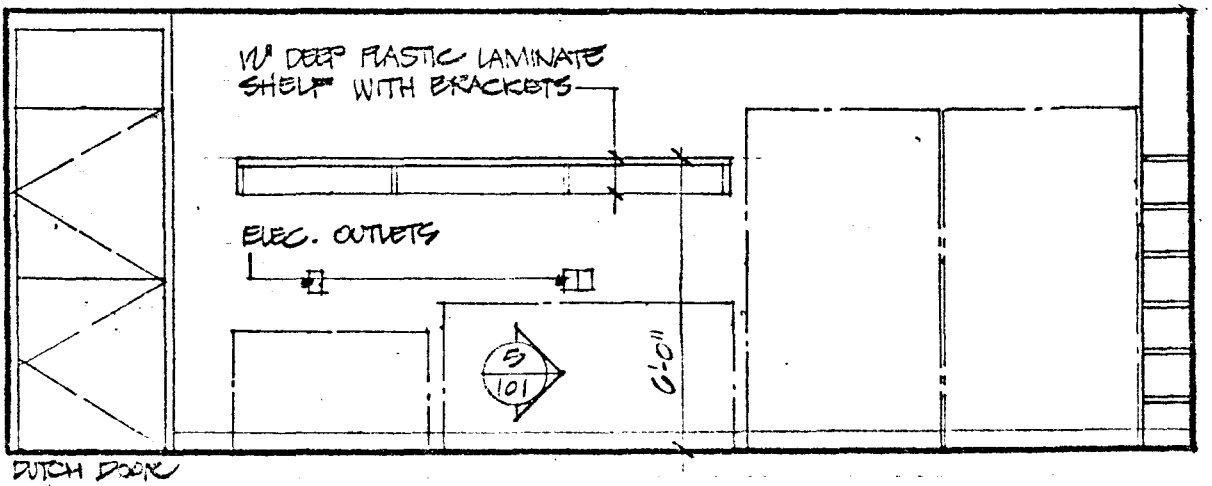
SHEET NO
10.1



1 GROUP LABORATORY
ROOM 4-190



2 A/V WORKROOM
ROOM 4-129



3 A/V WORKROOM
ROOM 4-129

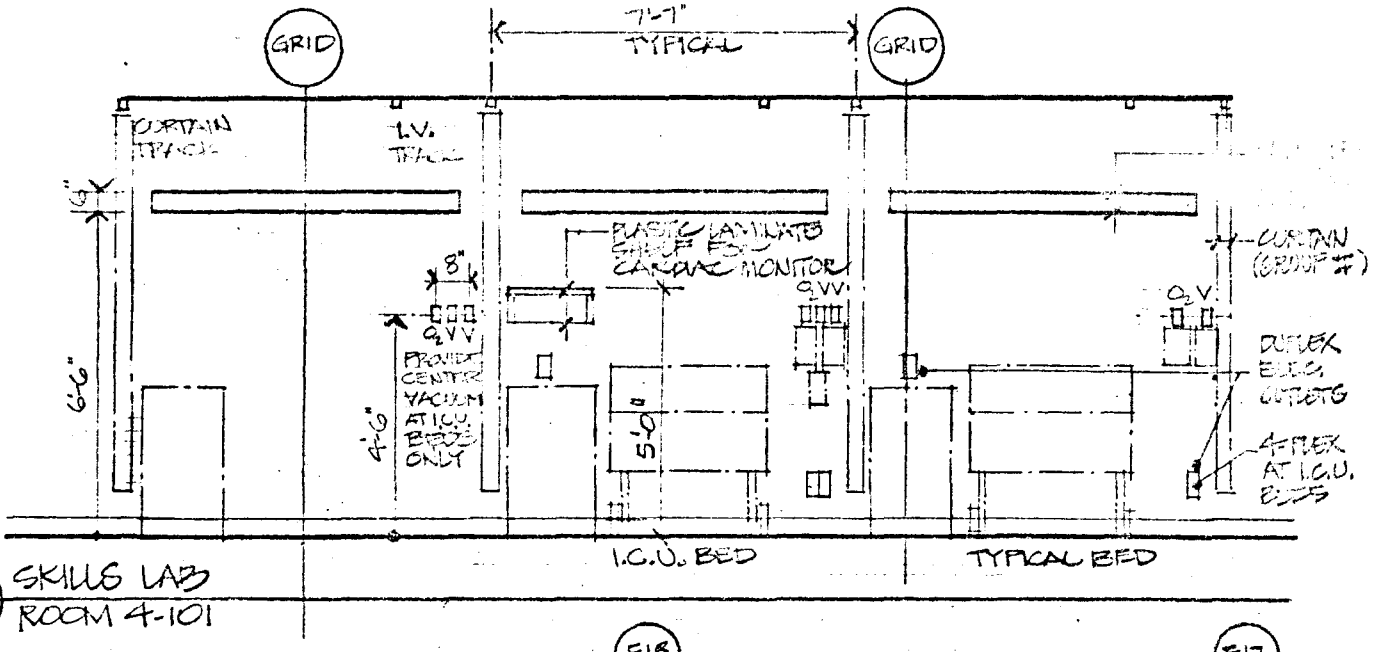
UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

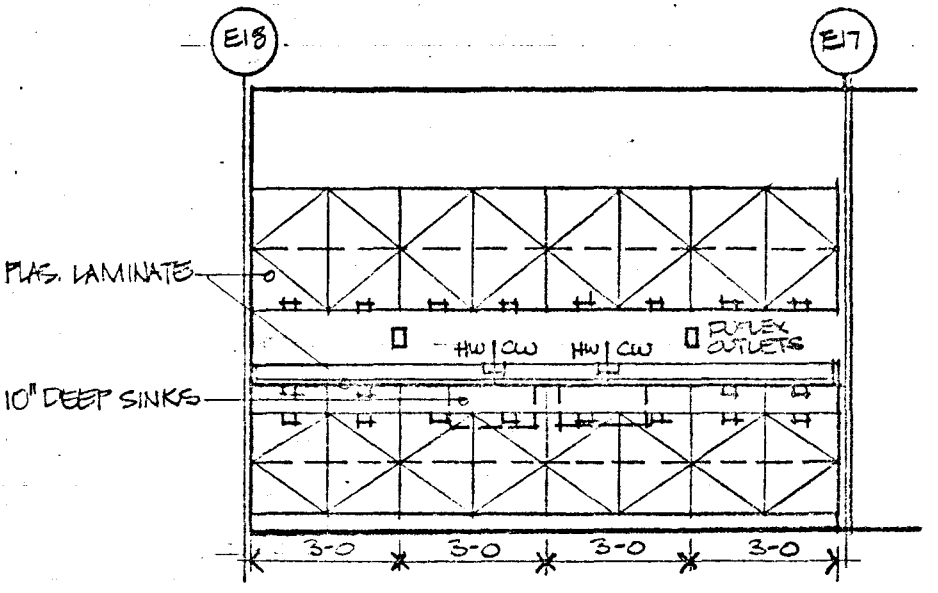
JOB NO
DRAWN
CHECK
SCALE
DATE 1 NOV 77

HELPING RELATIONSHIPS
FLOOR 4

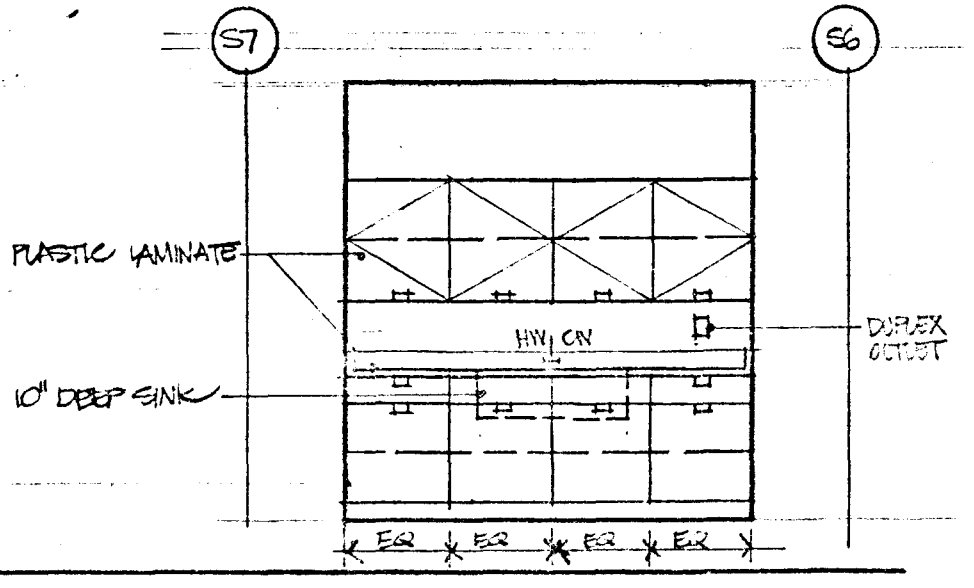
SHEET NO
10%



1 SKILLS LAB
ROOM 4-101



2 NURSES STATION
ROOM 4-106



3 STORAGE
ROOM 4-105

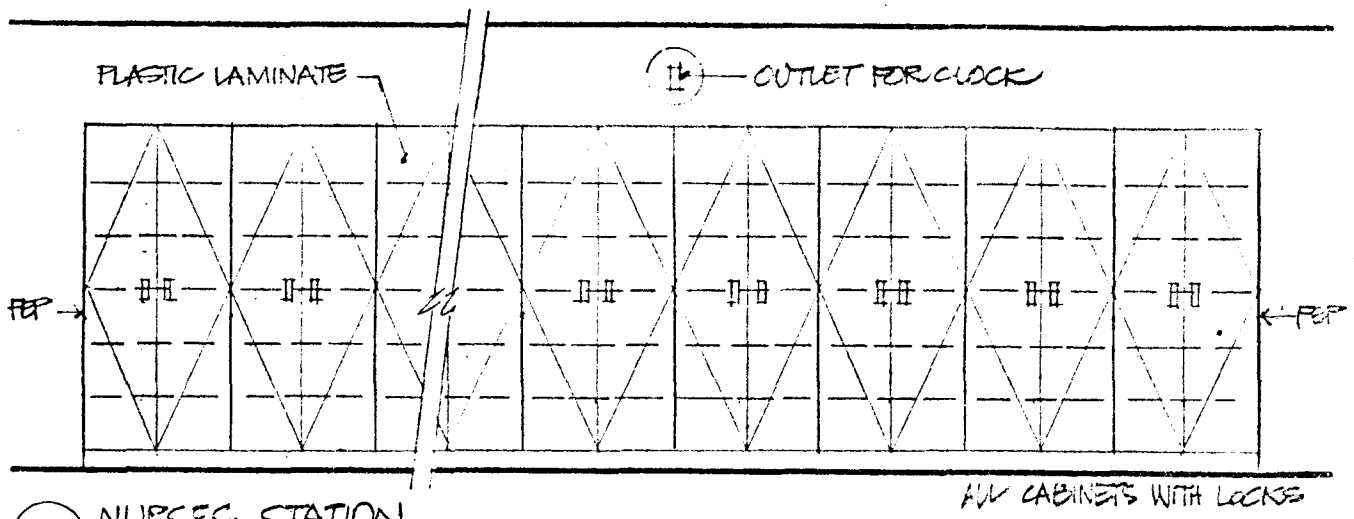
UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

JOB NO.
DRAWN
CHECK
SCALE 1/4"=1'-0"
DATE NOV 77

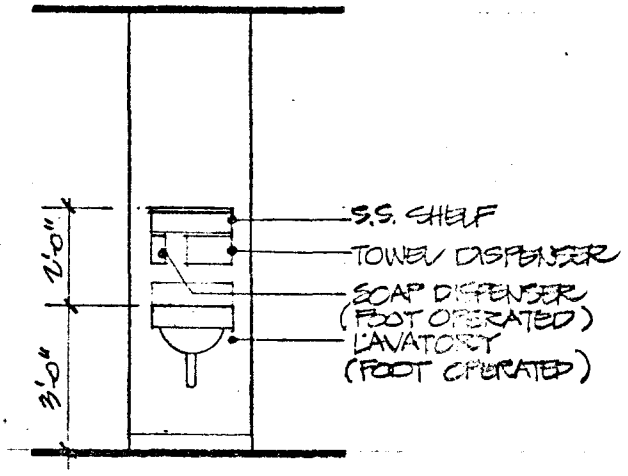
NURSING SKILLS LABORATORY & SUPPORT ROOMS
FLOOR 4

SHEET NO. 103

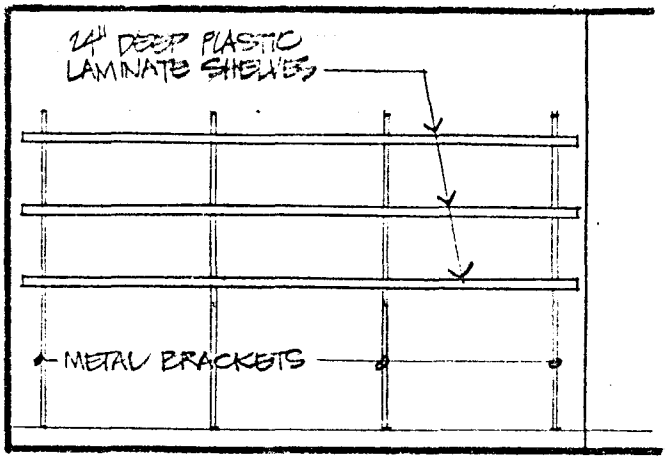


ALL CABINETS WITH LOCKS

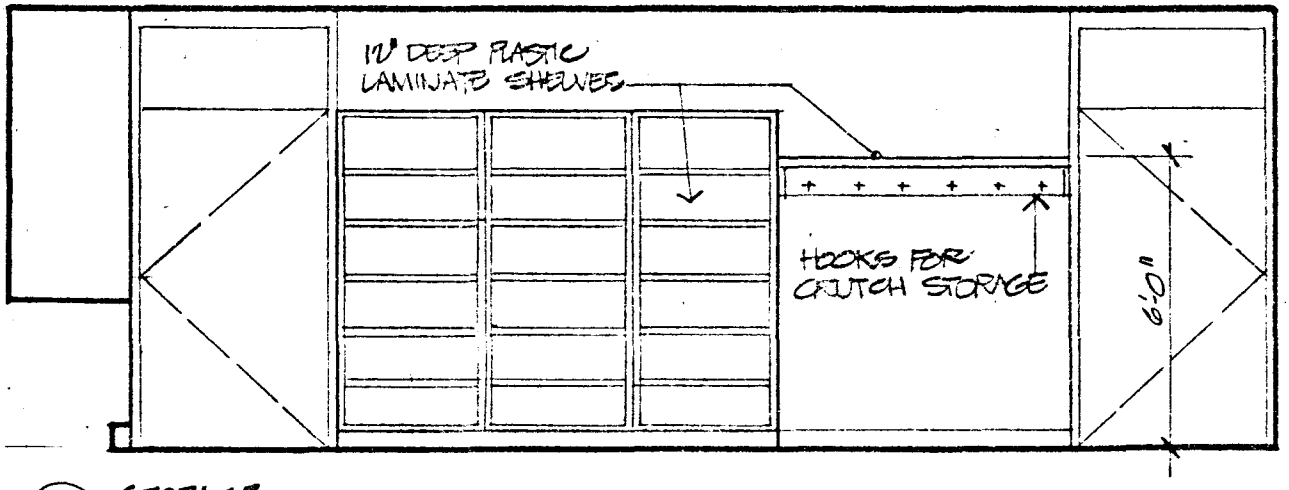
(1) NURSES STATION
ROOM 4-106



(2) SKILLS LAB
ROOM 4-101

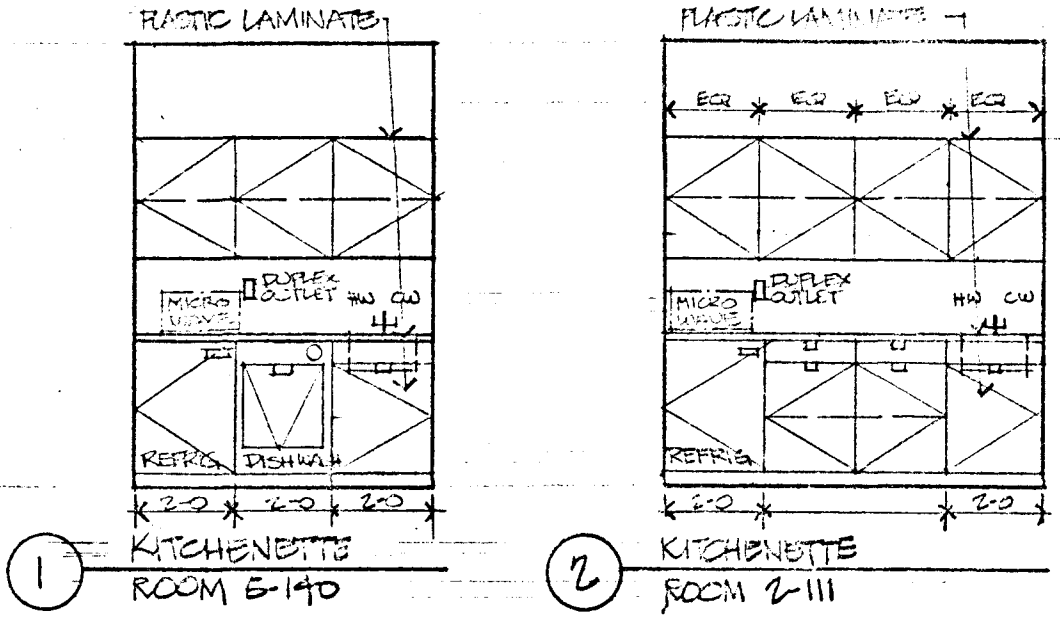


(3) STORAGE
ROOM 4-105



(4) STORAGE
ROOM 4-105

UNIVERSITY OF MINNESOTA HEALTH SCIENCES EXPANSION THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. & THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.	JOB NO UNIT #102 DRAWN CHECK SCALE DATE 1 NOV 77	NURSING SKILLS LABORATORY & PATIENT ROOMS FLOOR 4	SHEET NO 104



UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

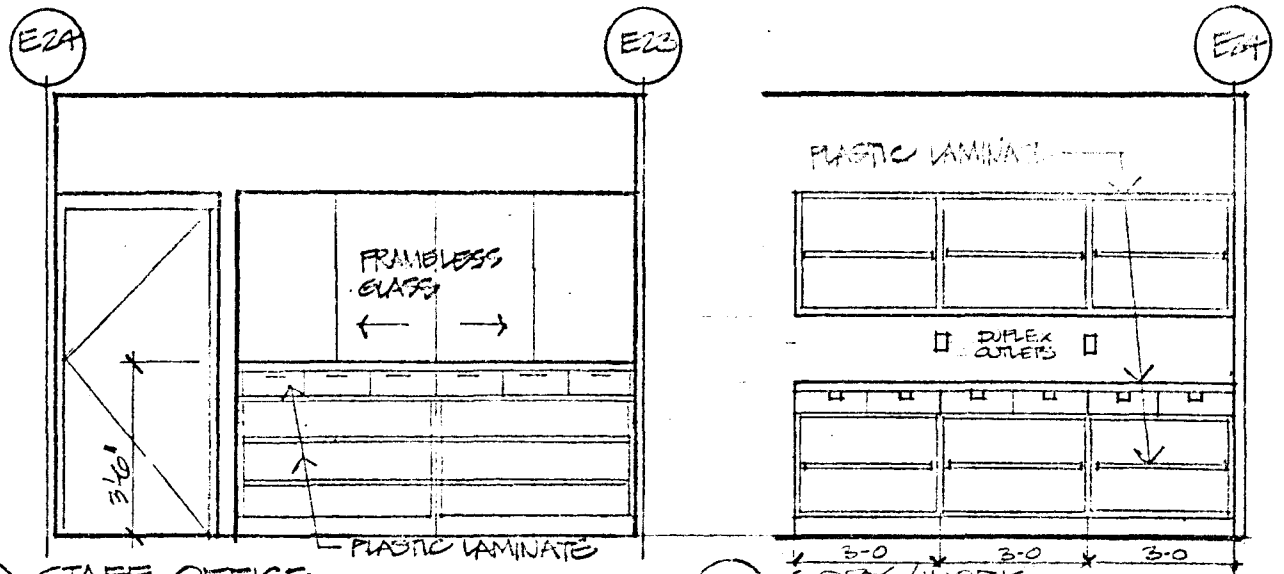
THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

JOB NO UNIT F D-
DRAWN MB
CHECK HV
SCALE 1/4" = 1'-0"
DATE 1 NOV 77

KITCHENETTES

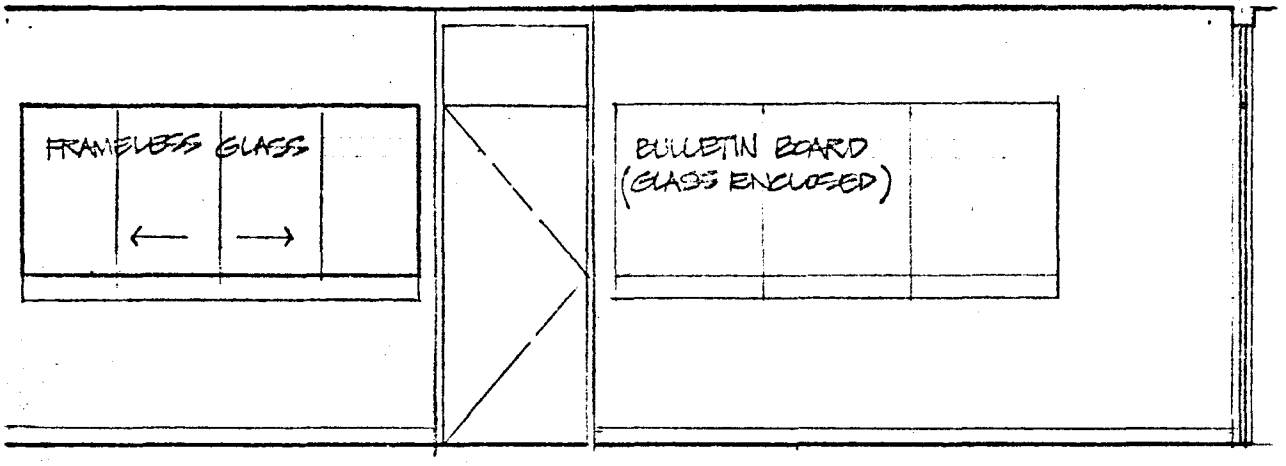
FLOORS 2+5

SHEET NO
105

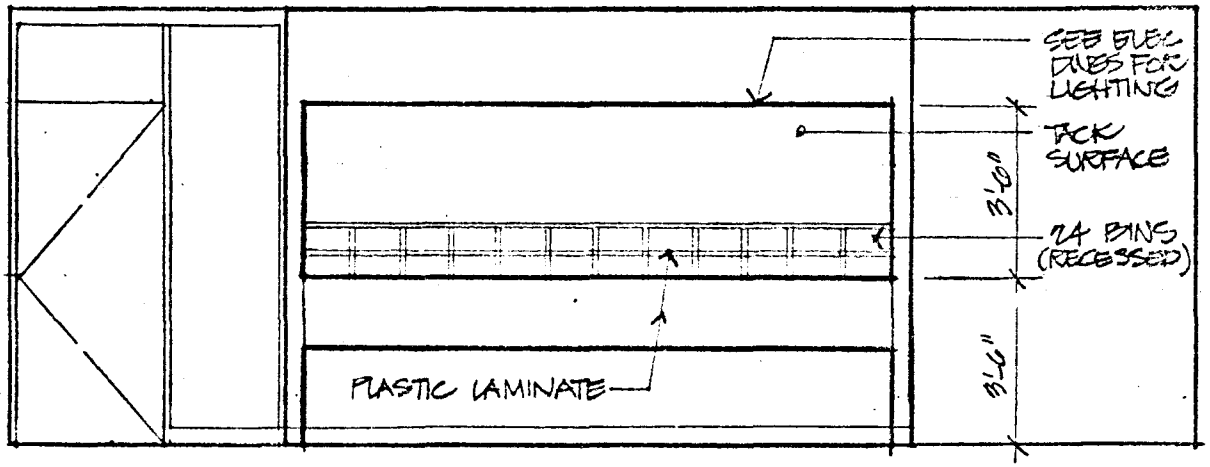


1 STAFF OFFICE
ROOM 5-134

2 COPY/WORK
ROOM 5-137



3 ADMISSIONS (REGISTRATION WINDOW)
ROOM 5-160



4 ADMISSIONS (WRITING DESK)
ROOM 5-160

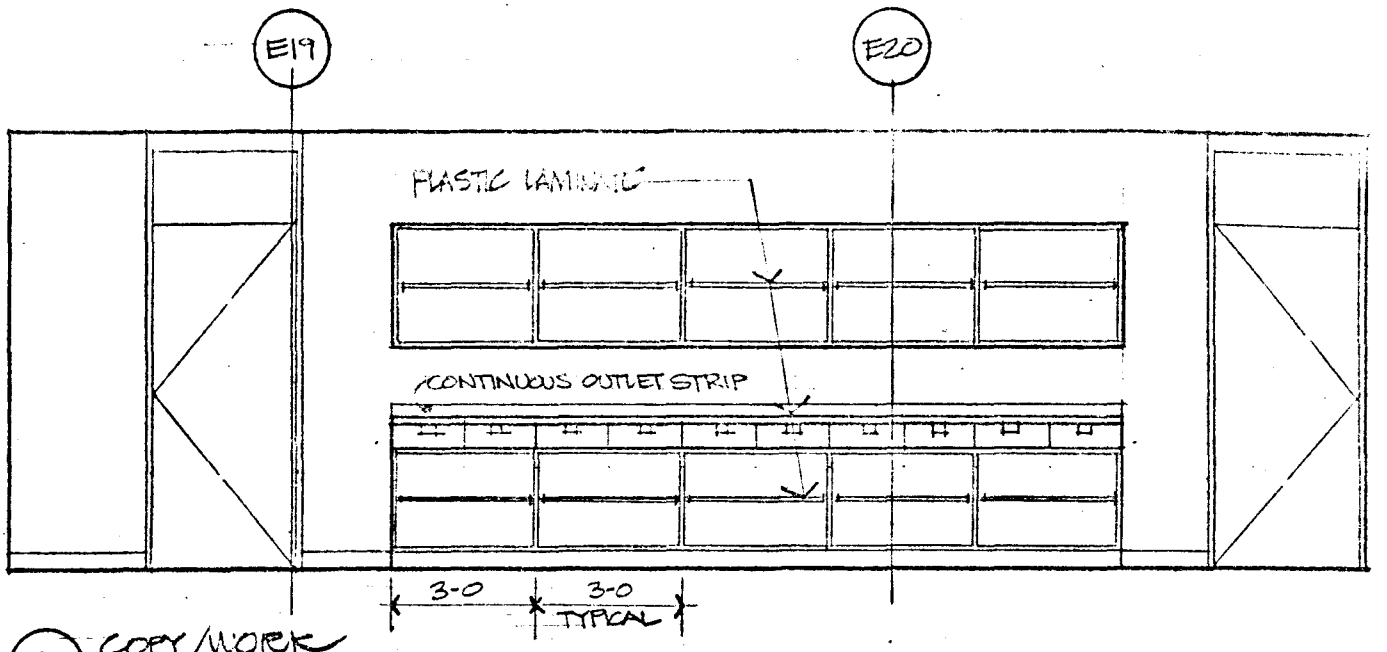
UNIVERSITY OF MINNESOTA
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. &
THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

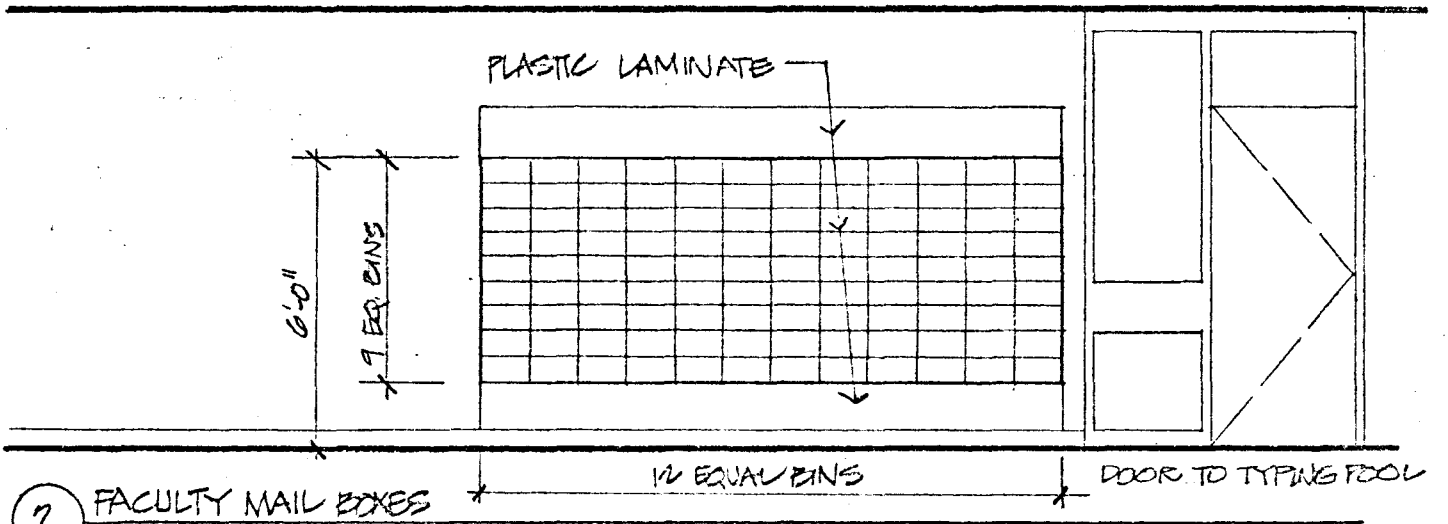
JOB NO. [illegible] FDD
DRAWN [illegible]
CHECK [illegible]
SCALE [illegible]=1'-0"
DATE 1/20/77

NURSING
ADMINISTRATION &
ADMISSIONS
FUMC 5

SHEET NO
106



1 COPY/WORK
ROOM 6-140



2 FACULTY MAIL BOXES
ROOM 6-97 CORRIDOR, LOOKING EAST