

SECTION XIV - RESILIENT FLOORS

14.01 SCOPE OF WORK: Work under this section of the contract shall include furnishing and installing of resilient flooring materials as indicated on the room finish schedule and as specified.

14.02 MATERIALS: Where called for, base shall be black rubber cove with preformed external corners.

Vinyl asbestos tile shall be "Excelon Travertex" tile as manufactured by Armstrong Cork Company, or approved equal. Tile shall be 1/8" thick, 9" x 9" squares, in colors selected by the Architects.

Tile shall be set in mastic over concrete in accordance with manufacturer's specifications.

Sheet rubber flooring shall be 1/8" thick "Flexi-Flor" as manufactured by the R.C.A. Rubber Company, Akron, Ohio, or approved equal. Flooring shall be first quality in 36" wide rolls, fully homogeneous and uniform throughout the sheet, and comply with the requirements of Federal Specification ZZ-F-461a.

Subfloors receiving rubber flooring shall be smooth, clean and dry, and shall be inspected, approved and accepted as satisfactory before installing material.

Clean and remove dirt, grease and other foreign matter from surfaces to be covered to insure complete adhesion. Fill all cracks, expansion joints etc. with an approved crack filler material. For leveling small depressions, rough or uneven surfaces, apply an approved floor fill compound.

Rubber flooring shall be installed in a workmanlike manner with tight seams and with an adhesive recommended by the manufacturer. Immediately after installation, rubber flooring shall be thoroughly rolled in both directions with a 150 pound sectional roller. Thoroughly roll sheet rubber flooring before cutting seams. Overlap edges of sheet rubber so all seams can be double cut to insure tight seams, then thoroughly roll seams. Furnish and install rubber stair nosing and risers in band room as shown.

Furnish and install appropriate rubber carpet and/or tile reducer accessories where adjacent floor finishes are of different materials, except where marble saddles are specified. Rubber flooring accessories shall be as manufactured by Johnson Rubber Company, or approved equal, installed in accordance with the manufacturer's specifications.

Furnish and install #85 - 5/16" ^{Thick} long nose treads with 3/4" black abrasive strips in stair towers. Stair treads shall match 9" x 9" x 1/8" rubber tile to be installed at floor and intermediate stair landings. Treads and tile shall be as manufactured by the R. C. A. Rubber Company, Akron, Ohio, or approved equal, installed in accordance with the manufacturer's specifications.

14.03 APPLICATION OF MATERIALS: Installation shall not begin until the work of all other trades, including painting, has been completed, and all rooms and subfloors are maintained at a minimum of 70 degrees F. for at least 48 hours before, during, and 48 hours after application. Tile shall be laid starting at the center of the room and worked toward the walls.

Cove base shall not be applied until the backing material is thoroughly dried out.

14.04 CLEANING AND WAXING: When, in the opinion of this contractor, the resilient flooring has sufficiently seated itself to permit cleaning and waxing, flooring shall be thoroughly cleaned with a neutral cleaner as recommended by the manufacturer of the material used. Floors shall then be given one coat of a wax approved by the flooring manufacturer, and machine buffed.

After the floors have been waxed, the General Contractor shall protect the floors, either with building paper or by keeping traffic off the floors until the building is ready for occupancy.

*Use Sealer
per C. Abate*

SECTION XV - ACOUSTICAL TILE

15.01 SCOPE OF WORK: The work under this section of the contract shall include the furnishing of all labor, materials and appliances required to install all acoustical ceilings, suspension systems, wire hangers, moldings and hold door clips, as noted on the drawings and specified herein.

15.02 MATERIALS: For the purpose of establishing quality, style and texture, all products noted hereinafter, unless specifically noted otherwise, shall be as manufactured by Armstrong Cork Company. Other manufacturers' products may be used only upon approval of the Architect and must be obtained before receiving of bids.

Fire guard or fire-resistive acoustical ceilings shall be required where no plaster ceilings occur above the acoustical, material, and shall meet the ratings as hereinafter specified.

Acoustical Tiles shall be Travertone and Travertone Fire Guard with Sanserra design, 12" x 12" x 3/4" thick, square edge, and shall be kerfed for concealed mechanical mounting or cementing to plaster. Tile shall be Class A (incombustible) and Type III, Class 25, carrying Underwriters Laboratories, Inc. label. Units shall have a factory-applied, washable, white paint finish.

Acoustical Boards shall be Celtic design lay-in units, 24" x 48" x 5/8" thick for installation on exposed tee suspension system. Tile shall be Class A (incombustible) and Type III, Class 25, carrying Underwriters Laboratory Inc. label. Surface shall have a factory-applied finish of washable paint.

Recessed Tee System shall be lay-in Tegular Travertone ceiling system with fissured design, 24" x 24 x 3/4". Units shall be Type III, Class 25, carrying Underwriters Laboratory Inc. label, and shall have a factory-applied white paint finish. Recessed tees shall have black exposed surfaces.

Suspension Systems These systems shall be concealed spline or exposed tee systems as recommended by the manufacturer for installation, as detailed on the drawings.

15.03 PREPARATION: Examine building before beginning work to determine that the building is properly enclosed and the structure is in proper condition to receive acoustical material and/or suspension systems. The contractor will note that this structure has been designed to maintain a relative humidity of 44% to 54%. Areas shall be broom clean before installation of acoustical material.

15.04 INSTALLATION: All acoustical materials and suspension systems shall be installed by a subcontractor thoroughly experienced with this type of installation and approved by the manufacturer. Acoustical materials shall be installed under conditions as outlined in the current bulletin of the Acoustical Materials Association, Section on "Job Conditions".

The ceiling systems shall be installed in the patterns as shown on the drawings or as directed by the Architects, and shall be installed in strict accordance with the manufacturer's recommendations, in such a manner to achieve the specified fire-resistive time-design rating.

The system shall be installed to permit border units of the greatest possible size. All members shall be aligned for true, level surface and straight lines.

The work shall be such as to insure rigidity and prevent sagging and buckling.

Provide and install splines, where required, at all cross joints between butted tiles and spring spacers at perimeters to maintain tight joints over the entire ceiling.

15.05 CLEANING: Following installation, clean soil or discolored surfaces of units and remove and replace units which are damaged or improperly installed.

15.06 FIRE-RESISTIVE RATINGS: All ceilings shall conform to the minimum fire resistive requirements as listed in Building Regulations for Protection from Fire and Panic, Pennsylvania Department of Labor and Industry, Table II, for Type II Fire Resistive Construction, and to the types as tested and classified by The National Boards of Fire Underwriters.

The minimum requirements to be obtained by ceiling designs are as follows:

- a) Girders - 3 hours
Girders supporting roof only - 1 hour
- b) Floor panels including beams - 2 hours
- c) Roof panels including beams and joists - 1 hour

Where discrepancies may occur on the drawings and do not conform to the foregoing requirements, this contractor shall inform the Architect during bidding so that a Bulletin may be issued to all contractors. Any corrections after awarding of the contract shall be at the expense of this Contractor.

SECTION XVI - GLASS AND GLAZING

16.01 SCOPE OF WORK: The work under this section of the contract shall include all glass and glazing for sash, doors, marked "Glazed" on door schedule and other items as shown on the drawings and specified to complete all glass and glazing. It shall also include the furnishing and installing of all other items as hereinafter specified.

16.02 MATERIALS: Designations on drawings indicate the following types of glass which shall conform to Federal Specification DD-G-451 currently as amended:

- SG Laminated or tempered safety glass, thickness as required
- PPG Polished plate glass 1/4 inch thick
- OBS Obscure glass, 1/8" Factrolite
- PWG Polished wire glass 1/4 inch thick, welded wire type Mississippi Glass Company's "Misco" or equal.
- DSA Double strength - "A" Quality
- INS Insulating glass as manufactured by Libby, Owens, Ford or Pittsburgh Plate Glass Company. Insulating glass shall be metal edged consisting of two sheets of 1/4" polished plate glass and 1/2" air space. Glass shall be furnished in sizes and shapes indicated and shall be installed in strict accordance with printed instructions of manufacturer.

16.03 GLAZING: Insulating glass shall be set in structural zipper type glazing gaskets as manufactured by F. H. Maloney, or approved equal. Gaskets shall be installed in a neat workmanlike manner in accordance with the manufacturer's recommended procedures. All joints shall be injection molded and each corner shall incorporate a secondary lip seal to provide added watertightness between sash and gasket. Gaskets shall be provided with separate filler strips, approximately 10 points harder than the gasket body. Gaskets shall be provided with weep holes 2 per panel sill at quarter points.

Furnish shop drawings to millwork contractor showing exact dimensions and locations of rabbeting to receive channels.

Insulated glass shall be glazed strictly in accordance with manufacturer's directions.

16.04 ALUMINUM ENTRANCE DOORS: Provide aluminum entrance and vestibule doors where shown. Doors shall be West Tension Doors arranged as indicated on the drawings. Doors shall be glazed with 1/2" herculite plate glass. All aluminum exposed to view shall have a Duranodic 313S finish or Kalcolor #5245 to match finish of frames and mullions. Frames shall be compatible with mullion system. All doors shall be center pivoted. Interior vestibule doors shall be type 7X and exterior doors shall be type 8X. Provide flush bolts at inactive exterior doors. Provide Rixson hinges at all doors. Provide aluminum thresholds at exterior entrance doors. Provide panic hardware at door No. A101 only.

16.05 MIRRORS: Furnish and install polished plate glass mirrors where indicated on the drawings. Mirrors shall be of size and type as hereinafter specified, unless otherwise shown on the drawings.

Provide at each single lavatory a 18" x 28" high mirror with polished chromium frame.

Provide at all studios and practice rooms with 24" x 48" chromium framed mirror, located as directed by the Architects.

16.06 ACOUSTICAL DOORS: All special acoustical doors indicated to be glazed shall be glazed by the door manufacturer.

16.07 SAFETY GLASS: Provide safety glass in all areas required by Labor and Industry regulations, unless specifically noted otherwise.

SECTION XVII - SPECIALTIES

17.01 SCOPE OF WORK: The work of this section includes the furnishing of all labor, materials, equipment and services required for the complete installation of all of the miscellaneous work and specialty items shown or inferred by the drawings and specified herein.

The contractor or subcontractor shall consult, in detail, sections General Conditions, Supplementary General Conditions, and all other sections of the specifications relating to any of the items hereinafter specified for conditions that affect the work of the specific item.

All equipment herein specified shall be installed by the General Contractor, his subcontractors or by experienced personnel approved by a specific manufacturer, in strict conformance with all of the manufacturer's recommendations, and shall all be under the direct supervision of the General Contractor.

The list of items covered under this section shall include, but not necessarily be limited to the following:

1. Hollow-metal doors and frames
2. Toilet partitions
3. Toilet accessories
4. Fire extinguisher cabinets
5. Bulletin boards
6. Chalk boards
7. Projection screens
8. Drapery tracks
9. Rolling aluminum grilles
10. Rolling steel fire doors
11. Operable walls
12. Plastic laminate partitions
13. Mats and frames
14. Lecture Room seating
15. Steel lockers
16. Access panels
17. Cast stone treads
18. Exterior wall paneling
19. Elastomeric roofing
20. Waterproof floor covering
21. Terrazzo floor
22. Vibration isolators
23. Sound absorption insulation
24. Miscellaneous caulking
25. Carpet
26. Concrete plank
27. Steel floor forms

17.02 SHOP DRAWINGS: Before proceeding with any work, submit shop drawings, in triplicate, for Architects' approval, showing in detail the construction, gauges, kinds of material, methods of application and attachment, dimensions and all other pertinent information.

17.03 HOLLOW METAL DOORS AND FRAMES: All doors indicated "hollow metal" in the door schedule shall be of type indicated, consisting of 18-gauge (minimum) stiles, rails and panels. All joints shall be welded full length. Proper moulding frames shall be furnished for all glazed and louvered openings indicated. Doors indicated "flush" shall be properly reinforced. Doors indicated "label" shall bear Underwriters Label specified in Door Schedule. All doors shall be cut for hardware at factory. Materials shall be primed with primed with rust-resisting primer so that interior, as-well as exterior, surfaces are completely covered.

Furnish and install steel combination frames for all door openings and for several window openings shown on the drawings, in plans and elevations. Frames shall be fabricated of stock sections, mortised and properly reinforced to accept all necessary hardware. Reinforcing plates at the butts shall be not less than 9 gauge by ten inches long, with #26 gauge galvanized plaster guards, spot welded to protect tapped holes from mortar.

Frames shall also be reinforced at head for door closer. Frames shall be formed of #16 gauge U.S. Standard Best Grade commercial furniture stock steel. Corners shall be mitered, fitted, welded the full length of joint and ground smooth. Not less than three anchors shall be provided for each jamb to suit wall condition.

Provide floor angle clip with two holes for sill anchorage. Frames shall have prime coat of an approved rust inhibitive paint. All combination frames for doors shall be provided with three soft rubber silencing pads, mounted at top, center and bottom of stop. Pads shall be Glynn-Johnson or equal and shall be removable type, inserted in holes drilled in stop.

17.04 TOILET PARTITIONS: Where indicated on the drawings, furnish and install flush metal toilet partitions with flush doors hung on gravity hinges. Metal partitions shall be of "Porcena" finish in colors selected by Architects. Partitions shall be one inch thick consisting of two sheets of 20-gauge metal assembled over rigid sound-deadening core. Doors shall correspond to sizes indicated on the drawings and dimensions shall be modular. Partitions shall be supported by means of flush pilasters extending from floor to tubular steel headrail furnished by this contractor. All partitions shall be similar and equal to the product of Sanymetal Products Company as described.

17.05 TOILET ROOM ACCESSORIES: Provide toilet room accessories in number indicated of types listed below at locations called for.

At each ladies large toilet compartment provide:

(1) Architectural Metal Craft Corp. (A. M. C.)
No. 1043 robe hook - double.

(1) A. M. C. #1030 paper holder, chrome roller

(1) A. M. C. #8026 feminine napkin dispenser for coin operation with disposal unit.

At each toilet room wash area provide:

(1) A. M. C. #861 recessed combination paper towel dispenser/disposal

(Small TRAYS) — JMC. #610 Chrome paper towel dispenser & #1030 paper holder

At each janitor's closet provide:

(1) A. M. C. #230 mop strip

(1) A. M. C. #261 rag bar

17.06 FIRE EXTINGUISHER CABINETS: At all locations shown on drawings, furnish aluminum fire extinguisher cabinets equal and similar to #AL-1501-~~P~~ with wire glass door, as manufactured by Elkhart Brass Mfg. Co., Inc., complete with extinguishers type No. EASH.

17.07 BULLETIN BOARDS: Furnish and install Korok sliding door bulletin board case in Corridor 105, where shown on the plans and elevations. All exposed metal shall be extruded 6063-T5 alloy, anodized satin finish. Doors shall be 1/4 inch plate glass with extruded aluminum "E" moulding at top and bottom, and shall be provided with lock. Each door shall have finger slot; doors shall slide smoothly, easily and quietly and shall have fiber wheels at the bottom and rubber guides at the top. The rear wall shall be fitted with TAX-TEX vinyl. Tackboard in standard TAX-TEX color to be selected. Series "M-E".

Furnish and install open bulletin board in Corridor 100 ^{and Bank Room} for student use, where shown on plans and elevations, similar to Korok "AZ" Series, but with tackboard insert only, of size and location as shown on drawings. Preframed boards shall be installed with concealed hangers at the top, sides and bottom.

17.08 CHALKBOARDS:

General: All chalkboards shall be KOROK porcelain enamel steel chalkboards as manufactured by Korok Division, The Enamel Products Co., Cleveland, Ohio. The writing surface shall resist wear and damage from shock and abrasion; shall not dent, shatter or crack; shall retain its original color, writing and erasing qualities; shall not become glossy or slimy in normal classroom use.

The reflectance factor shall not be less than 15% nor more than 20%, as recommended by the American Illuminating Engineering Society and American Institute of Architects Report No. 32F-28. The manufacturer shall furnish a written guarantee to the owner which states that the above characteristics are guaranteed for the life of the building, and that defective chalkboards will be replaced and installed free of cost.

Installation of the two various types of chalkboards shall be under the supervision of the manufacturer of the chalkboard, tackboard and trim. Refer to drawings for location of the various types as hereinafter enumerated.

Standard Prefab Chalkboards: Chalkboards and tackboards shall be factory laminated and pre-framed. Grounds are not required. Facing sheet shall be factory-laminated to 1/2 inch fiberboard core and balanced with moisture-proof backing sheet, and the backing sheet shall be bonded to the core material by means of special flexible adhesive with no unbonded area. Pre-framed boards shall be "AX" series, with completely concealed continuous hangers, no face fastening. Color of board as selected by the Architects.

Vertical Sliding Chalkboards: Furnish and install Korok vertical sliding chalkboard series E model as detailed in latest Korok catalog. Chalkboard to be Korok Mark 1, 22-gauge in standard colors, with honeycomb core and backed with 24-gauge galvanized steel sheet, or .015 aluminum as required to provide a rigid panel.

Panels shall be staved with music staff, per requirements of the Director of Music. Panels shall be trimmed with 6063-T5 aluminum channels, anodized satin finished, corners reinforced with steel. Housing shall be of heavy extruded anodized satin finish, tempered, 6063-T5 aluminum and designed to carry the complete load independent of the walls. Panels shall be equally counter-balanced with lead weights using heavy duty aircraft type steel cable with ball bearing sheaves and lead counterweights. Each panel shall be equipped with 8 ball-bearing neoprene end rollers and shall run free and easy without rattles. Sizes of boards as shown in typical room elevations on drawings.

Horizontal Sliding Chalkboards: Furnish and install Korok horizontal sliding chalkboards with panel units and track as detailed in the latest Korok catalog. Chalkboard to be Mark 1, 22-gauge in standard colors, as selected by the Architects. Frame and exposed metal members to be of 6063-T5 satin finished anodized aluminum. Extrusions with all corners reinforced with steel angles to form a rigid frame of sufficient strength to eliminate all vibration and chatter. Rolling hardware to be of nylon tipped, ball bearings of sufficient size and number to enable smooth and easy operation of the panels.

17.09 PROJECTION SCREENS: Provide and install projection screens in sizes indicated, electrically operated 115 volt A.C. 60 cycle. Three wire quick reversal motor especially designed for the purpose; to be ball bearing and oiled for life, with automatic thermal overload cut-out and integral interlocking gears. To have pre-set but accessible limit switches to automatically stop screen surface in the "up" and "down" positions. Stop action to be positive to prevent "coasting". Case to be of good grade lumber, with double top for extra rigidity and sound-deadening. Motor compartment to be metal-lined.

A section of the bottom panel of the case shall be equipped with piano hinges and connected to the drive mechanism so that it opens and closes automatically with the lowering and raising of the screen surface. Balance of the bottom panel shall be pegged for manual opening to provide access. Hinges shall be mounted to allow matching of the bottom panel to the ceiling by cementing ceiling tile to face of bottom panel. Case to be finished with primer coat.

Screen furnished complete with three position control switch in box with coverplate. The roller to be of rigid metal at least 5" in diameter. Roller to be mounted on two cast aluminum brackets equipped with self-aligning bearings. Screen surface to be flame and mildew resistant glass beaded, with 2" black masking borders. Screen to be Executive Electrol, as manufactured by Da-Lite Screen Co., Inc., Warsaw, Indiana, 46580 or approved equal.

Two existing screens, wall hung type, presently in use, shall be installed one each in Choral Room and Band Room, where shown on drawings. This contractor to provide labor and hardware necessary to install same as directed by the Architects. This contractor shall notify Architect when ready for this work, so that Architect may notify college personnel of the transfer of this equipment to the new building.

Standard frame sections used for window frames shall be furnished complete with removable stops for double glazing. Glazing of steel frames shall be by others. Stops shall be rectangular or channel sections - of such size as to retain glass in plastic glazing strip against standard stop section normal to standard buck. Provide method for anchoring to adjacent frame or wall, whichever may be the condition of the particular installation.

17.10 ACCESS PANELS: Provide and install aluminum access panels at locations called for on the drawings. Frame shall be #11 gauge extruded aluminum 6063-T5. Door shall be #14 gauge aluminum 1100-H 14, with continuous hinge reinforcing, hinge side of door. Lock shall be flush screwdriver type-operating steel cam. Cylinder locks shall be provided only in special areas. Doors and frames shall be furnished complete with proper anchors. Sizes shall be as noted or called for on the drawings.

17.11 DRAPERY TRACK: Track to be No. SG-6170 surface mount as indicated on drawings. Track to be continuous length up to 24 feet without splicing, using No. SG-3001 mounting levers, No. SG-6006 eyelet carriers for draperies at 6" o.c. and No. SG-6008 screw stops or removable No. SG-6032 spring stops as distributed by Angevine Co., Freeport, Illinois, or Drapery Hardware Mfg. Co., Monrovia, California. Track to be installed as recommended by distributor. Track designed by Silent Gliss, Inc., Switzerland.

17.12 ROLLING ALUMINUM GRILLES: Furnish and install Rolling Aluminum Grille in "Butterfly" design, as manufactured by The Cornell Iron Works, Inc., Wilkes-Barre, Pennsylvania. Grilles shall be complete with all necessary channels, access panels, painting, etching.

Hoods over grille coils shall be formed of 24-gauge galvanized steel (removable type). Since grilles are located in Corridors 100 and 105, and are less than 120 square feet in area, they shall be furnished with pole hook for manual operation. Cylinder locking device shall be provided for operation from either side of grille curtain.

Lock cylinder to be furnished by Hardware Contractor under another Section of these specifications. Aluminum grille shall be etched to a silvery satin finish followed by anodizing. Alumilite 204- R1 guides shall be recessed type extruded aluminum with pile lining and snap on moulding to provide neat appearance and quiet operation.

17.13 ROLLING STEEL DOORS: Furnish standard rolling steel doors where shown on drawings, complete with guides and hoods mounted on steel frames furnished by others. Curtains shall be of open hearth or copper-bearing cold-rolled steel, hot dip galvanized before being formed. Galvanizing shall consist of a high-grade pure zinc coating of not less than 1.25 ounces per square foot of flat metal applied in accordance with A.S.T.M. Designation A93.

Galvanized slats shall be chemically treated, phosphated and cleaned with a chromic acid solution to provide for lasting paint adhesion. All ferrous metal surfaces shall receive one coat of rust-inhibitive metal primer (not machinery or galvanized parts). Slat gauge to be #18.

Doors shall be spring counter-balanced and chain gear driven. Door shall be "A" label construction and shall be equipped with fusible link and governor to control closing of door.

17.14 OPERABLE WALLS: Operable walls shown on plans shall be Acousti-Seal 51 Model 511, as manufactured by New Castle Products, Inc. New Castle, Indiana, furnished and installed by an authorized representative. Acousti-Seal Model 511 partitions shall be top-supported individually operating panels. All hardware, track and switching necessary for the installation shall be included.

A Sound Transmission Class (STC) of 48 per Geiger and Hamme Acoustical Laboratories full scale (14' x 9') test in accordance with ASTM E90-66T shall be required. (48 STC per Geiger and Hamme Test NC-86 ST). All partitions shall have 11 ga. cold-rolled steel track, size 2" x 2-3/4" with 3/8" diameter steel track bolts and adjustable track brackets spaced no further than 2' apart. Brackets shall be supported by pairs of 1/2 inch diameter threaded hanger rods.

Each panel shall have four flanged steel trolley wheels with steel ball bearings. Wheel diameter at flange, 1-3/4 inches and at tread 1-1/2 inches. Trolleys shall be fastened to each panel with 3/4 inch diameter adjustable threaded rods having thrust bearings. The floor guide shall be extruded aluminum designed for continuous light and sound seal with maximum recess of 3/16" wide. Removable coverplates for convenient dirt removal shall be supplied. Partitions shall be top hung, individual panels shall be manually operated by sliding the panels along the overhead track. The closing action of the last panel shall affect the vertical sound seal between panels. Horizontal seals at both bottom and top shall be of continuous contact type.

Panels shall be factory assembled units approximately 2-3/4 inches thick and insulated with mineral wool. Panels shall be standard widths determined by New Castle Products Engineering. Panel construction consists of steel panel faces with interior stiffeners.

The stacking jamb shall be 4 inches long. The jamb opposite the stack shall vary from 5 inches minimum to 10 inches maximum and shall have a built-in adjustment of plus or minus 3/4 inch.

Vertical seals between panels shall be extruded P.V.C. Horizontal seals, top and bottom shall be extruded P.V.C. with multi-fingered continuous contact. All panels shall be factory finished with vinyl coated fabrics. Colors and textures shall be chosen by the Architects from the current selection of approved Acousti-Seal finishing materials.

Hardware: Flush pulls shall be located in the back panel and shall be of anodized aluminum. The General Contractor shall provide and install overhead support, blocking, header enclosure, baffling and jamb trim as detailed on the plans. Overhead support shall be pre-punched or otherwise prepared to receive hanger rods in accordance with layout for the job. New Castle Products shall provide shop drawings for approval, and for the information of the General Contractor to prepare for the installation of the operable walls.

All filling, sanding and painting of wood members, as detailed in the plans, shall be by others. The General Contractor shall provide a smooth, straight, level floor area for sound seal contact.

Cylinder locks to be furnished - cylinder by HDWE Supplier. (#1)
INCLUDED FIELD TESTING & SEALING ABOVE PARTITION. (#2)

17.15 MOVABLE PARTITIONS: ^{Plans.} Furnish and install in areas shown on drawings in details, ~~plans~~ and elevations, partitions of the Peerage Series as manufactured by Circle Steel Partition Company, Inc., Port Chester, New York.

Peerage partition shall be supplied in heights and layouts as shown in the interior elevations of particular areas. Basic post dimensions shall be 2" x 2". Plastic laminate panels used within partition system may not exceed 2" in thickness. Glass may not exceed 5/8" thickness. Glass as specified under another section shall be furnished by the partition manufacturer, and installed by his agents.

Glazing shall be the manufacturer's standard dry glazing comprising of polyurethane plastic foam of suitable color. All aluminum members shall be anodized in bronze finish with color inserts as selected by the Architects.

Upon completion, all exposed surfaces shall be free of blemishes and tool marks. Fastenings throughout shall be of the concealed type. Panels shall be laminates, comprising two faces and core, face and core material as specified by the Architect and furnished by others to this erector for installation upon ten day's notice of need of material.

17.16 MATS AND FRAMES: Furnish and install Cocoa mats of the extra brush grade as manufactured by American Floor Products Co., Washington, D.C. in sizes as shown on plans. Recesses for mats shall be edged with 1-1/4" x 1-1/4" aluminum angle set 3/8" above adjacent concrete slab area to finish flush with final floor finish.

17.17 LECTURE ROOM SEATING: Furnish and install in Lecture Room 101 seating for not less than 50 seats. Seating shall be Peabody Model 940 pedestal tablet arm chair. ~~Seat shall incorporate swivel 60° each way from center for easy access.~~ Swivel shall be ball-bearing type with torsion-spring-assisted return. Seat understructure and pedestal support and base are to be satin finish chrome-plated. Contoured seat and back shall be walnut plywood, with walnut melanime work surface. Furnish shop drawings of arrangements for this particular installation. Seating shall be as manufactured by the Peabody Seating Company, Inc., North Manchester, Indiana 46902. ^{ON EACH SEAT.} ~~PROVIDE BOOK BACKS.~~

17.18 STEEL LOCKERS: ^{18" x 15" x 72" (#2)} Furnish and install lockers where shown in plans and elevations. Lockers shall be 15" x 18" x 6'-0" high and shall be by an approved manufacturer, in color as selected by the Architect. Lockers shall be complete with shelves, coat hooks, louvered doors, and all necessary hardware. Lockers shall be as manufactured by the Berger Division of the Republic Steel Company, or approved equal. Lockers shall be set on flush bases as detailed. Provide each locker with a Master "Champ" #1525 key controlled combination padlock. For bidding purposes, consider furnishing 200 lockers as enumerated above, with shop drawings for layout and arrangement.

^{PROVIDE NECESSARY FILLERS. (#2)}

17.19 CAST STONE TREADS: Provide and install cast stone treads and landings where indicated on the drawings, with cast in nosings and sleeves.

Cast stone shall have a compressive strength minimum of 7000 lbs. per square inch and an absorption of not greater than 5% when tested in accordance with the American Concrete Institute Spec. #704-44. A small piece of the stone will be selected from the stone delivered to the job to be sent to E. L. Conwell & Company, 2024 Arch Street, Philadelphia, Pa., or a similar testing laboratory. This test will be made at the cost of the cast stone manufacturer.

Cast stone shall be as manufactured by W.N. Russell & Co., Westmont, New Jersey. Approval of cast stone samples must be obtained prior to the awarding of the contract as to shade and finish.

Cast abrasive safety nosings shall be cast into treads and risers where indicated on drawings. Nosings shall be Style A, 3" wide x 5/16" thick, cast-on-anchor, Bronzalun as manufactured by American Abrasive Metals Company. Steel sleeves with anchors shall be cast in as detailed on the drawings.

17.20 EXTERIOR WALL PANELING: Furnish and install factory formed wall panels at spandrels between windows, where indicated on the drawings.

Panels shall be "Granowall" panels as manufactured by Granart, 26765 Fulleton Ave., Detroit, Michigan 48239. Panels shall be of size indicated and constructed of 1/4" transite panels with an undercoat of black marble dust applied to surface of panel. Undercoater shall provide a dark charcoal textured finish.

Panels shall be erected by means of countersunk flat head stainless steel screws secured to wood frame and shall be of size and spacing as recommended by the manufacturer. After erection of paneling, screw holes shall be filled with black marble dust to match prefabricated panel in color and texture.

After panels are erected, the entire surface shall be sealed with one coat of "Granoseal" followed by a second coat of dull "Sealrite".

Before awarding this contract, the General Contractor shall submit a sample panel of this material with the sealers applied for the Architect's approval.

The manufacturer shall warranty each panel against cracking, crazing, spalling, delamination or any other defect in the panel itself, for a period of two years after installation has been completed and approved.

17.21 ELASTOMERIC ROOFING: Provide and install Promdek roof decking and cove base of an elastomeric compound over roof of Band Room to a thickness of 1/4" and to height of base as indicated on the drawings. Decking material shall be as manufactured by Selby, Battersby and Company, 5220 Whitby Ave., Philadelphia, Pa. 19143.

Materials shall be first quality, freshly compounded, and shall consist of powders and liquids clearly marked and delivered to the job in unopened containers and bags.

The material shall meet all requirements set forth in the Technical Data Sheets as published by the manufacturer, and shall be installed in strict accordance to the manufacturer's application instructions, and only by a factory trained and approved Franchised Applicator.

The General Contractor shall provide a steel trowel finish on concrete deck and same shall be cured 28 days before application of Promdek.

Color of the finish roof material shall be as selected by the Architect.

Deck shall be guaranteed for one year from date of completion, to perform satisfactorily and to meet the requirements of quality standards set by the manufacturer's standard specifications.

17.22 WATERPROOF FLOOR COVERING: Provide and install 1/8" thick Selbatex seamless floor covering, and 2" high cove base, over waterproof membrane where indicated on the drawings. All materials shall be as manufactured by Selby, Battersby Co. and applications shall be by skilled personnel, approved by the manufacturer. Applicator shall apply all materials in strict conformance with the manufacturer's specifications. Applicator shall coordinate his work with the General Contractor and inform him of all requirements to install and complete his work.

17.23 TERRAZZO FLOORS: Provide and install 3/8" thick "Novatraz" floors, where indicated on the room finish schedule, as manufactured by Selby, Battersby Co. and installed by a Franchised Applicator. Floors shall be installed with as few divider strips as possible. Provide terrazzo angle strips at door openings to receive carpet and wherever else required to produce a complete floor.

17.24 VIBRATION ISOLATORS: Floating floor slabs above structural slabs, where indicated on the drawings, shall be isolated with Kinetic Fiber-glas Isolation Panels, Type FLP-1, as manufactured by Consolidated Kinetics Corp., 249 Forno Lane, Columbus, Ohio, 43207, or approved equal. Panels shall consist of 1" thick isolation pads, 12" o.c. each way, and low density fiberglass insulation all bonded to 1/8" hardboard panels. (SEE BULLETIN #2)

17.25 SOUND ABSORPTION MATERIALS: Provide and install all sound absorption insulation, in walls and ceiling, and floor isolation strips about perimeter of floor slabs, where indicated on the drawings, except where specified in other sections.

Wall and ceiling insulation shall be standard type rock wool blankets of the thickness and density as indicated on the drawings. The 3" cavity between new and existing building shall have 3" thick rock wool blankets installed on existing wall surface before new walls are erected. All voids above top of partitions shall be packed with fiberglass.

Perimeter isolation about floor slabs shall be 1" fiberglass insulating boards, 6 lbs. per cu. ft., #705 as manufactured by Owens-Corning. Same shall be held down 1" from top of slab to receive caulking as hereinafter specified.

wrap in 1 mil thick. Mylar. (#2)
17.26 CAULKING: Provide and install all caulking required by the drawing for interior and exterior work, unless specifically noted under another section.

Caulking compound for all exterior work and interior joints about perimeters of floors with 1" wide joints above fiberglass isolators shall be an approved type elastomeric caulking and sealing compound.

Interior caulking, unless noted otherwise, shall be Tremco Caulking and Pointing Compound, or approved equal.

The work shall include, but not necessarily be limited to, caulking of all window and door frames, wall panels, expansion and control joints, bedding of metal thresholds and angle at waterproof floor, sealing of reglets, joints about sills and any other locations required or inferred by the drawings.

Pack expansion joints and control joints in masonry with untarred oakum or fibreboard as backing, and fill balance of joint with caulking material. The depth to width ratio of the caulking material in each joint shall be as recommended by the manufacturer and in no case shall be less than 1/4" deep x 1/4" wide.

Where exterior foundation walls abut existing walls, the formed joint shall be filled with Igas joint filler. Joints shall be 3/4" wide by 1" deep.

17.27 CARPET: Furnish and install carpet at all locations shown on the drawings or called for in the room finish schedule.

The Carpet Contractor shall inspect the subflooring before starting his work. He shall notify the General Contractor, in writing, with copies to the Architects, of any condition which will prevent him from satisfactorily completing his work. He shall not proceed with any work until such defects are entirely corrected.

The application or installation of carpet by the carpet contractor shall be an indication of his acceptance of the subfloor.

The Contractor shall carefully check all dimensions and other conditions in the field and shall be responsible for proper fitting of carpet in areas designated.

Carpet shall be woven through the back as manufactured to American Seating Company specifications and standards or approved equal.

Quality - Zenith

Color - to be selected

10-row/inch

223 pitch

.150 pile height

3-ply

16-ozs. backing yard weight per square yard

16 ozs. yarn weight per square yard

78 ozs. sponge bonded pad by B. F. Goodrich

111 ozs. total weight

15 pound tuft bind pull

100% commercially texturized and spun continuous filament high-density nylon as manufactured by Allied Chemical Corp. with the trade name of Caprolan.

Tuft bind backing yard must be strongest high tenacity tire cord yarn available.

Backing material must be treated with a plasticizer coating.

Carpet shall be permanently bonded to the finest quality 3/16" sponge rubber as manufactured by the B.F. Goodrich Company. Sponge base shall be guaranteed resilient for the life of the carpet. Color is to be black with carbon compound to prevent deterioration.

Tuft bind backing yarn must be guaranteed not to wither, stretch or shrink during the installation or during the life of the installation.

In general, installation shall be delayed until all surrounding work has been completed. Subfloor must be smooth, firm and clean. Fill in all cracks in floor, as well as expansion joints, with a good grade crack filler.

Recommended procedures for installation furnished in each roll of carpet shall be closely followed. Unsatisfactory installation resulting from work performed not in accordance with manufacturer's recommendations shall be the responsibility of the carpet contractor and may result in removal and relaying of said carpet at the expense of the contractor or installer. Particular attention should be paid to recommendations for application of floor covering adhesive, seam cement and cross joining.

Since sponge bonded carpet does not require sewn seams, manufacturer's recommendation for the use of the seam cement must be strictly followed: Adhere adhesive furnished by Commercial Carpet Corporation must be used.

All rubbish, wrapping paper, salvages shall be removed from the job site. All excess pieces of usable carpet shall be left with the owner for future repairs.

Waterproof latex base cement X-500 by Commercial Carpet Corp. shall be used.

Adhere adhesive furnished by Commercial Carpet Corporation shall be used for joining seams and cross joints. No substitutes.

Contractor will furnish a written guarantee that all work required by this section shall be free from defects in material and workmanship, and subject to correction, provided the Contractor is notified, in writing, by the Owner, of any defect within one year from the date of installation.

Carpet binder bar and/or edging strip shall be supplied and installed as required at doorways and other openings adjoining hard surface materials.

Each bidding contractor shall provide evidence to the Architects of having furnished carpet on project of similar size and scope. The Architects shall retain the right to reject bids from suppliers who, in his judgment, "do not have the necessary commercial experience. The successful bidder will submit a shop drawing to the Architects with seams indicated in red dotted lines, and, where reducer strip or metal is required, a solid red line. Upon Architect's approval, retain one copy on the job site for foreman's reference.

Successful bidder must provide exact samples and shop drawings to owner and/or architects for approval within 30 days.

~~Lomaloom NuNyl 10, Bigelow Weldpoint, Magee Nylcraft, Roxbury Jet Nyl, shall be considered equal to specified carpet.~~

REVISE

17.28 VINYL WALL COVERING: This Contractor shall furnish all material, equipment and services necessary to install vinyl wall covering equal and similar to "Vicrtex" as manufactured by L. E. Carpenter & Co., as detailed on the drawings, and listed in the room finish schedule.

Vicretex Travatex shall be used as a basis for bidding. Colors shall be as selected by the Architects. Vinyl wall covering shall be applied in strict conformance with the manufacturer's printed instructions.

Vinyl wall covering shall meet the following minimum requirements:

Total weight (oz. /lin.yd. 54 width)	32
Average thickness (inches)	.025"
Flame spread	25
Fuel contributed	10
Smoke developed	10
Fabric backing	drill
Fabric backing count	68x40
Fabric weight (oz. per lin.yd. 54" width)	7.2
Coating weight (oz. per lin. yd. 54" width)	24.7

17.29 SPECIAL FINISHES ALLOWANCE: The General Contractor shall include the sum of (\$20,000.00) Twenty thousand dollars to cover the cost of furnishing and installing special finishes in Collection Rooms, in accordance with Article 36 of the General Conditions. This allowance shall apply as a credit against a separate order for this work, and shall be for finishes in addition to those shown on the drawings and Room Finish Schedule.

17.30 ACOUSTICAL CEILINGS: Where acoustical ceilings are called for on the drawings or in the Room Finish Schedule, furnish and install a complete suspended acoustical tile system.

Acoustical tile shall be 12" x 12" x 3/4" painted, square edged, mineral wool, kerfed for spline suspension, with a factory applied washable white paint finish.

Tiles shall be Santaglio design as by Armstrong.

Tile shall be kerfed and back-cut for mechanical suspension.

Mechanical suspension system shall be H & T, Z spline, C spline, or approved equal, to properly install tiles without any metal showing except wall mouldings. Tiles shall be installed on flanges of suspended members, and patterns shall be as shown on the drawings.

Entire system shall be dead level, with straight even joints.

Perimeter trim shall be low sheen baked white enamel. Provide special 6" wide tiles at ends of light runs as shown.

17.31 LIGHTWEIGHT CONCRETE ROOF PLANK: Reinforced lightweight structural concrete plank shall be provided in areas indicated on the drawings. The plank shall be of the thickness indicated on the drawings, and shall be designed to carry the indicated design live and dead loads with a maximum deflection of $1/240$ span length under full load. The plank shall be installed in accordance with the manufacturer's specifications. Bolts, shims, clamps, etc. required for attachment to the adjacent structure shall be by the plank vendor.

17.32 METAL ROOF DECK: Furnish and erect metal roof deck where shown on the drawings. Structural properties of the deck shall meet the requirements for the "Specifications for Design of Light Gauge Steel" by the American Iron and Steel Institute. Deck shall not be less than 22 U.S. Standard Gauge and of such shape as to safely support the dead and live load at a unit stress of not more than 18,000 p.s.i. Deck shall not deflect more than $1/240$ of the span under full load. The metal in contact with the supports shall be of sufficient width for proper attachment of the deck by means of welding.

Deck shall meet the specified design requirements of live load indicated on the structural drawings plus 10# per square foot for dead load. Design shall be based on a bending moment of $1/10$ W.L. for continuous spans for dead load and $1/8$ W.L. for single spans. Attachment to supporting members shall be by means of welds of sufficient size, quality and spacing to withstand safely an uplift pressure of 35# per square foot. Deck shall be shop coated with rust inhibiting paint or other approved coating. No ceilings or other appurtenances shall be supported from the roof deck.

All material shall be cut to proper length and bundled for easy handling.

17.33 STEEL FLOOR FORMS: Permanent steel floor forms where shown or called for on the drawings shall be Cofar units as manufactured by Granco Steel Products Company, with shear connectors, as shown.

Units shall be corrugated, hot-dip galvanized conforming to A.S.T.M. A446-68 Spec. Grade E steel. 1.25 ounces per square foot coating. Units shall be of thickness (gauge) pitch and depth as specified, and shall have a minimum yield strength (by 0.1% offset method), of 80,000 p.s.i. The T-wires shall be resistance welded to the steel sheet by the manufacturer. Size and spacing of T-wires shall be as shown on the drawings or as recommended by the manufacturer in accordance with recognized structural design practice.

Units shall be installed in accordance with the manufacturer's printed directions. All units shall have a minimum of 2" bearing and shall be attached by means of arc welding through curved welding washers 12" on centers. All units shall be edge lapped $1/2$ corrugation.

All negative reinforcement (top bars) shall be of size, length and spacing as shown. The reinforcement shall be supported at proper height in slab by continuous high chairs or other suitable supports.

All field openings shall be cut in an approved manner, and shall be reinforced. Openings over 12" in width parallel to bearing shall not be cut unless shown on drawings.

Before placing concrete, floor form units shall be supported by temporary shoring and ledgers (at right angles to slab span), where the clear span of form is 7'0" or greater. There shall be one row of continuous temporary shoring in each span which may be placed before the installation of the form. Temporary supports shall be so adjusted during concrete placement and curing as to prevent any settlement of the supports from working levels. Supports shall not be removed until concrete has reached sufficient strength and subject to the approval of the Architect.

Where steel floor form passes over partitions, the corrugations shall be sealed tight to prevent sound transmission, as indicated on the architectural drawings.

Calcium chloride admixtures containing chloride salts shall not be added to the concrete used over steel floor forms.

Shear connectors shall be 8 gauge steel conforming to A. S. T. M. Specification, Grade D steel made in accordance with Granco specifications.

Numbers of connectors to be used are shown on the structural drawings. They shall be placed along beams and girders in a single or double line or staggered. See drawings for details.

The connectors shall be fillet welded to the supporting steel. Welds shall be made on each side of the flat bottom portion of the connector, and shall extend the full length of the flat portion, extending approximately a quarter of an inch beyond each edge of the connector.

The quality of the connector weld shall be such that under the impact of a 2 to 4 pound sledge hammer struck against the connector at the top of the arch, the connector will tear outside the weld or undergo a horizontal movement of 1" at the top of the arch before failure in the weld.

Mixing, depositing and curing of concrete shall be in accordance with applicable sections of these specifications. Immediately prior to concreting, the floor form shall be cleaned of all dirt, debris, oil, water or any foreign matter. Supports for screeds shall be located directly over permanent or temporary supports. Construction joints shall be made at center of slab span and shall be keyed.

SECTION XVIII - PAINTING

18.01 SCOPE OF WORK: The work under this section of the contract shall include all labor, materials and equipment for painting the building, as shown on the schedules, and without restricting the generality of the foregoing, shall include all items as hereinafter specified.

18.02 WORK EXCLUDED: This section of the contract does not include painting of the following items except as otherwise noted on the room schedule or specified hereinafter: Precast concrete, non-ferrous sheetmetal work, mechanical and electrical equipment with a factory-finish, prime and shop coats for structural steel, etc.

18.03 MATERIALS: All materials used shall be high-grade products of well-known manufacture. Lists of all materials to be used shall be submitted for Architect's examination and approval. Materials, when approved, shall be delivered to the site in original, unbroken packages bearing the maker's name and brand. White lead, linseed oil and turpentine shall be pure refined products.

18.04 PREPARATION: All surfaces shall be clean and dry at the time any coating is applied. Base coats provided by others shall be in good condition. Touch up any bare spots. Base coats on work subject to close inspection shall be rubbed smooth. Woodwork shall be smooth and free from raised grain or other surface imperfections. Knots and pitch streaks shall be shellacked before painting. Nail holes, cracks and similar blemishes shall be neatly filled with plastic wood or wood putty and sanded smooth after priming or staining and before body or finish coats are applied. Paints and finished materials shall be free from skins, lumps, and all foreign matter when used, and pigments, fillers, etc. shall be kept well stirred while being applied.

All masonry and concrete surfaces contaminated with alkalies or alkali dusts should be neutralized prior to painting, using a 10% solution of muriatic acid in water. Use a 10% solution of sodium bicarbonate or ammonia water to neutralize acid surfaces. Surfaces contaminated with salt crystals should be scrubbed and flushed down thoroughly with fresh water, preferably hot water, and then allowed to dry prior to painting. Remove grease and oil from all surfaces to be painted with mineral spirits.

18.05 WORKMANSHIP: All workmanship shall be of the best and work must be neatly done. Paints shall be given proper time to dry between coats. Care must be taken to keep from daubing hardware and glass with paint. This contractor will be held strictly accountable for painting any surfaces not in suitable condition, or for painting or otherwise injuring hardware or for daubing paint on glass. Finished shades shall be of exact colors and textures selected. The finished work shall be free from runs and sags, defective brushing, and clogging of lines or angles.

Work not to be finished under this contract shall be protected against spatters, stains or soiling, and each type finish shall be protected against similar defacements by other finish and shall be left clean.

Open grained woodwork to be varnished shall first be filled thoroughly with natural paste filler. Filler shall be of such consistency as to be applied with a short bristle brush. Filler shall be well rubbed into the grain and when set, the rubbing shall continue across the grain until a hard, non-absorbent surface is obtained.

Varnish shall not be thinned in any manner and shall not be applied in a temperature below 70 degrees F., or in any location not properly closed and protected from drafts and dust. Varnish shall be flowed on evenly, without runs, sags or brush marks.

No interior painting shall be done when room temperatures are below 50 degrees, and no enameling shall be done when the temperature is less than 60 degrees. In general, the temperature shall be 70 degrees or over, and the building has been thoroughly dried out by heat before any interior painting or finishing will be permitted.

No outside painting shall be done during damp or rainy weather, nor when the temperature is less than 50 degrees, and no painting shall be done in dusty weather. Applications of painted finished shall not be done until surfaces to be finished have thoroughly dried out.

Concrete floors specified to be painted shall be etched with a solution of one part commercial muriatic acid and two parts of clean water. Spill some of the mixture on a section of the floor and rub it in with a long handle brush or broom until it fizzes in every spot in the section. Keep area well ventilated. When the whole floor has been treated, hose with plenty of water. Any spots which feel slick shall be re-treated and hosed.

18.06 COLORS AND COATS: Colors and finishes will be determined by the Architects and samples shall be furnished for approval. The painter shall not apply any finishes without Architect's approval. Surfaces finished without approval shall be refinished as directed. Shop coats specified in other sections are in addition to coats specified under Painting.

Each succeeding coat shall be of a darker tint than that of the proceeding coat.

18.07 TOUCHING UP: At the completion of other branches of work, all painted and finished work shall be touched up and restored where damaged or defaced, and the entire work left free from blemishes. Contractor shall go over the entire building and clean off all paint or varnish spots from walls, floors, hardware, glass, etc. and leave all doors and all sash free to move, and all paint and other finishes clean and perfect.

18.08 SAFETY: Contractor shall clean up and remove, every night, all dirt, rags and waste materials caused by his work.

18.09 INTERIOR METAL WORK: All interior metal work except non-ferrous metals shall be painted with two coats of paint recommended for that purpose by the manufacturer. All prime coated panel boxes, junction boxes, etc. and grilles and registers, shall be painted to match walls or trim in which they are located.

Spaces back of grilles shall be painted black unless otherwise directed by the Architects.

All factory-prime coated mechanical and electrical equipment shall be painted with number of coats of paint as specified for interior metal work.

18.10 EXTERIOR METAL WORK: All exterior metal and sheetmetal work exposed outside, except non-ferrous metals, shall be painted with two coats of outside metal paint as recommended by the manufacturer.

18.11 SILICONE WATERPROOFING: All exterior masonry surfaces specified to be waterproofed with silicone shall be given one application of an approved colorless waterproofing material containing at least 5 percent solution of silicone. Waterproofing material shall be applied in accordance with the manufacturer's directions. Exterior brickwork only shall be waterproofed.

18.12 INTERIOR MASONRY: All interior masonry surfaces, where shown painted on the room finish schedule, shall be painted with two coats of an approved type interior vinyl paint recommended by the manufacturer for masonry surfaces.

18.13 INTERIOR CONCRETE: Unless otherwise specified, all exposed interior concrete surfaces, where shown to be painted on the room finish schedule, except concrete floors, shall be painted with paint as specified for interior masonry surfaces.

18.14 CONCRETE FLOORS: Concrete floors, where shown to be painted on the room finish schedule, shall be painted with two coats of heavy duty floor enamel of type recommended by the manufacturer for that purpose. Enamel shall be quick-drying and odor free and shall be a primer for itself.

18.15 PLASTER WALLS AND CEILINGS: Plaster walls and ceilings, where shown to be painted on the room finish schedule, shall be painted with two coats of vinyl flat type interior paint recommended by the manufacturer for plaster surfaces.

18.16 WALLBOARD WALLS AND CEILINGS: Wallboard walls and ceilings, where shown to be painted on the room finish schedule, shall be painted with paint and number of coats as specified for the plaster walls and ceilings.

18.17 PRIME PAINTING: All interior and exterior woodwork, except items of millwork which will be primed under another section, and woodwork specified to receive a stain or natural finish, shall be given a prime coat of a good grade of factory-mixed white lead and oil paint by this contractor immediately after erection.

18.18 INTERIOR WOODWORK (painted finish): All interior woodwork, except as otherwise noted, where finish on the color schedule is specified "painted", shall have all surfaces sanded smooth and clean and shall be given one coat of enamel undercoater.

After the enamel undercoat is thoroughly dry, all surfaces shall be given a second coat of enamel undercoater and a final coat of semi-gloss enamel. The second coat of enamel undercoater shall be tinted approximately three shades lighter than the finish coat. Sand lightly and clean between coats.

18.19 INTERIOR WOODWORK (natural finish): All interior hardwood woodwork and doors, where finish on the color schedule is specified "natural", the surfaces shall be sanded smooth and clean and shall be given one coat of natural wood sealer and two coats of waterspar varnish. Open grain woods shall be filled prior to varnishing. Varnish shall be pale satin finish, unless otherwise noted on the color schedule. Sand lightly and clean between coats.

18.20 INTERIOR WOODWORK (stained finish): All interior hardwood woodwork, where finish on the color schedule is specified "stained", the surfaces shall be sanded smooth and clean and shall be given one coat of stain and two coats of waterspar varnish. Open grain woods shall be filled prior to varnishing. Sample colors of stained finish shall be prepared for the Architect's approval prior to finish staining of woodwork. Varnish shall be pale satin finish, unless otherwise noted on the color schedule. Sand lightly and clean between coats.

18.21 VINYL WALL COVERING: This contractor shall furnish all material, equipment and services necessary to install vinyl wall covering equal and similar to "Vicrtex" as manufactured by L. E. Carpenter & Co., as detailed on the drawings, and listed in the room finish schedule.

Vicretex Travatex shall be used as a basis for bidding. Colors shall be as selected by the Architects. Vinyl wall covering shall be applied in strict conformance with the manufacturer's printed instructions. Vinyl wall covering shall meet the following minimum requirements:

Total weight (oz./lin.yd. 54 width)	32
Average thickness (inches)	.025"
Flame spread	25
Fuel contributed	10
Smoke developed	10
Fabric backing	drill
Fabric backing count	68x40
Fabric weight (oz.per lin.yd. 54" width)	7.2
Coating weight (oz. per lin.yd. 54" width)	24.7

18.22 PIPES AND CONDUIT: Unless otherwise specified, all piping, conduit and hangers exposed to view, except where nickel or chrome plated, shall be painted to match ceilings or walls where they are located. Insulated piping shall have covering sized prior to finish painting.

Piping, conduit and hangers in crawl spaces, tunnels, attic spaces and areas above hung ceilings (closed type) will not be considered exposed and shall not be painted.

Piping and conduit crossing walls or ceilings shall not be painted in areas where finished painting is not specified for walls or ceilings where they cross.

Except that piping in these spaces (except above closed type hung ceilings) shall be painted with identifying colored bands as hereinafter specified.

All piping in boiler room and throughout building shall be painted with bands in colors according to the following schedule. Bands shall occur where pipes enter and leave walls, floors and ceilings, and at intervals of not more than 30 feet. Bands shall be not less than 2" wide. Prior to banding of piping, piping shall be painted in color specified for the walls and ceilings unless specified otherwise. Valve hand wheels shall be painted to match band.

PIPE BAND PAINTING SCHEDULE

<u>Pipe Contents</u>	<u>Color</u>	<u>Pipe Contents</u>	<u>Color</u>
Steam L.P.	Orange	Condensate	Brown
Hot Water 140°	Turquoise	Freon Liquid	Purple
Cold Water	Green	Freon Suction	Purple-Red
Recirculating Water	Blue-Green	Steam 50 p.s.i.	Orange plus 1"
Hot Water 180°	Yellow		Black band
Sprinkler	Red	Air	Blue
		<i>GAS</i>	

All pipes shall be identified as to contents at each band by black stencilled letters. Size of letters shall be generally as follows: 3/4" high for pipes having outside diameter of covering up to and including 6 inches; 2" high up to and including 9 inches; and 3" high for all other piping having an outside diameter of covering 10 inches and larger.

18.23 CERAMIC GLAZE SURFACING: Ceramic glaze surfacing, where called for on the room finish schedule, shall consist of a first coat of a cement base material fortified with an organic binder, a second coat of an alkyd base cement stipple, and a third coat of clear ready-mixed Epoxy coating. Materials shall be as manufactured by the Arvon Company, or equal, to produce a tile-like finish and shall be applied in accordance with the manufacturer's specifications.

18.24 ACOUSTICAL PANELS: Where acoustical panels are required to be painted, as noted on the drawings, a non-bridging type paint must be used.

18.25 EXTERIOR CONCRETE SURFACES: The exposed surfaces of concrete canopies and precast concrete tees on the exterior of the building shall receive one coat of filler similar to P.&L. Primafil followed by two coats of flat latex paint. Contractor shall take care to fill any honeycombing or depressions and provide a smooth uniform base for painting.

SECTION XIX - HARDWARE

19.01 SCOPE OF WORK: The work under this section of the contract shall include furnishing of all finishing hardware as hereinafter specified or otherwise required to fully complete the hardware requirements of the building. The hardware shall be figured in sufficient quantities to fill the requirements of the contract drawings even though every item is not herewith specified.

If the hardware for any particular location is not described herein, it shall be provided and shall be like that specified for similar locations so far as practicable. If no similar locations are specified, such hardware shall be of plain, heavy pattern and of suitable type and ample size for the service required.

Hardware specified under other sections of these specifications to be furnished by the manufacturer of the article, shall not be included. It shall be the responsibility of this contractor to examine the other sections of the specifications and determine the hardware to be excluded.

The General Contractor shall receive, store, and install in a neat and workmanlike manner all finish hardware. It shall be his responsibility for checking and verifying all hardware lists for completeness and suitability intended for these specifications and the drawings.

19.02 ROUGH HARDWARE: All rough hardware, such as nails, spikes, bolts, screws, clamps, anchors, pulleys, etc., and necessary hardware for temporary door and window enclosures will be furnished under another section of these specifications and does not constitute finish hardware.

19.03 QUALITY: All hardware shall be high grade products of well-known and reputable manufacturers. In general, hardware shall conform to Federal Specification FF-H-106a and as currently amended. The Hardware Contractor, in making up schedules for approval, shall state manufacturer's name and shall furnish catalogs or cuts and samples, if required by the Architects.

19.04 TEMPLATES: The Hardware Contractor shall furnish to manufacturers, without cost or obligation, as directed by the General Contractor, templates required for fabrication of doors, frames, etc. Provide metal reinforcing units for installation of locks and latches in hollow metal doors. Templates and reinforcing units shall be furnished to the manufacturers as soon as the schedules have been approved by the Architects.

19.05 LOCK FUNCTIONS: The schedule in this specification makes no attempt to detail lock functions. Before submitting schedule, this contractor shall confer with the Architects to determine special types of locks for all locations.

19.06 SWINGS OF DOORS: Swing of doors can be determined generally by examination of the drawings. Before submitting detailed schedule, this contractor shall check over all doors with the Architects.

19.07 SCHEDULE: After having conferred with the Architects and established swings of doors, lock functions and keying, and having checked all door schedules, this contractor shall prepare a complete schedule listing each door and all hardware required by description, manufacturer, catalog number and when required by specific samples. This schedule shall be submitted promptly to the Architects for examination and approval. Horizontal schedules will not be acceptable.

19.08 BUTTS: Furnish butts of proper type in accordance with the standard practice and requirements for each door frame and trim condition. Size of butts shall be at least 2-1/2 times the thickness of the door. Butts shall have flat bottom tips with non-rising pins. Butts for interior doors shall be plain, except doors with closers shall be two ball bearing, and doors opening out, shall have non-removable pins.

All interior butts shall be wrought steel, plated to match finish as hereinafter specified. Butts for exterior doors shall be US 32 D.

19.09 LOCK AND LATCH SETS: Lock and latch sets shall be complete as specified in the Federal Specification, currently as amended. Lock and latch sets shall be cylindrical type with leveled fronts, Series 161.

Provide cylinders for rolling aluminum grilles and aluminum doors *and operable walls*

Knobs and roses shall be wrought metal in finish as hereinafter specified for finish of hardware. Design shall be similar to Luna, as manufactured by Schlage. Backsets shall be 5" unless otherwise specified.

19.10 KEYS: Two keys shall be furnished with each lock. Building shall be keyed individually or alike in groups as directed by the Architects.

Building shall be keyed at the factory to the College Great Grand Master-Locking System. Present system is based on Schlage cylinders. All keys shall be stamped with the words "Do not duplicate", and the door number or other symbol as directed. Three master keys for building shall be supplied.

The General Contractor shall turn over all keys to the owner. Keys shall be arranged in the key cabinet, tagged and numbered according to the schedule or as directed by the owner.

19.11 DOOR SILENCERS: Three silencers shall be provided for each pressed steel frame for single doors, and two silencers for frames for pair of doors. Silencers shall be pneumatic rubber type GJ 64 as manufactured by Glynn-Johnson or equal.

19.12 DOOR STOPS: Provide door stops wherever an item of hardware on the door might contact a wall or other part of the building construction. In general, door stops shall be wall type, except where it cannot be used to practical advantage, a floor stop shall be supplied. Wall stops shall be GJ-WB-55 or GJ-WB-60 and floor stops shall be GJ-FB-13 or GJ-FB-14 as applicable, as manufactured by Glynn-Johnson or equal.

19.13 PANIC HARDWARE: Provide panic type hardware for exit doors where noted in the hardware schedule. Panic bolts shall be Von Duprin 8827 x 8827 for double doors and 88 TP for single doors, finish U.S. 32D.

19.14 DOOR PULLS: Pulls shall be Cipco #2612.

19.15 ASTRAGALS: shall be Michaels Art Bronze Company Magnetic Type "A".

19.16 BOLTS: shall be of four types as follows:

- a) Surface bolt with chain 8" long, Stanley #1055
- b) Foot bolt 8" Stanley #1056
- c) Flush bolts 12" long - Baldwin #2050
- d) Surface bolts - Ives #453

19.17 DOOR CLOSERS: Closers shall be of size as recommended by the manufacturer to suit the door size and the contemplated use. Closers shall be as manufactured by Norton. Finish of closers shall be aluminum. Where necessary, closers shall be furnished with parallel arms in lieu of brackets.

19.18 THRESHOLDS: Furnish grooved thread thresholds for all exterior doors, and for certain interior doors where noted on the schedule or drawings. Thresholds shall extend full width between jamb members, cut to fit jamb and complete with screws, bolts, shields, etc. as required for the installation. Thresholds for exterior out-swinging doors shall be 5" wide with integral or applied weatherstrip.

19.19 HARDWARE FINISH: Finish of hardware, except butts and closers which are specified under their respective headings, shall be U.S. 28 or U.S. 26D.

19.20 DESCRIPTION OF HARDWARE FOR DOORS: The following is a description of hardware required for various types of doors designated by capital letters. Refer to door schedule for application of door types to specific doors. It is the intention of this description to indicate hardware requirements in order to establish contract price. For openings with double doors, hardware listed shall be furnished for both doors unless otherwise noted.

Type A

1-1/2 pair butts
lockset

Type B and B1

1-1/2 pair butts
lockset
door closer (unitrol B1 only)

Type C

4 pair butts
lockset
1 pair flush bolts (T&B)

Type D

8 pair butts
mortise cylinder
3 surface bolts with chain
3 foot bolts

Type E and E1

1-1/2 pair butts
pulls (unitrol E-1 only)
closer

Type F and F1

3 pair butts
2 closers (unitrol F1 only)
2 pulls

Type G

3 pair butts
mortise cylinder with thumbturn
2 closers (unitrol)
2 pulls
1 pair flush bolts (T&B)

Type H

3 pairs butts
lockset
1 pair flush bolts (T&B)

Type J

1-1/2 pair butts
panic bolt
closer
weatherstripping (ext. door only)

Type K

3 pair butts
panic bolts
2 closers
astragal
weatherstripping
threshold

Type L

1-1/2 pair butts
lockset (privacy type at toilets)

Type M

1-1/2 pair butts
surface bolt
1 overhead door holder
weatherstripping
drip cap
threshold

Type N

3 pair butts
3 surface bolts
2 overhead door holders
astragal
weatherstripping
drip cap
threshold

19. 21 KEY CABINETS: Provide a key cabinet of the wall type as manufactured by P. O. Moores, Inc. No. RWC-75-S., or equal, complete with file key tags, label sheets, pads receipt holders, cross index system etc., and all required accessories. Cabinet shall have hook capacity to house 25% more keys than needed, allowing a hook to each different keyed lock for the project.

SECTION XX - ELEVATOR

20.01 GENERAL: These specifications cover the complete installation of the elevator plant in a first-class workmanlike manner, in accordance with the drawings and as specified herein. The elevator contractor shall include all work and materials, except that listed under "Preparatory Work Not Included". All work shall be done in accordance with the requirements of any local codes which may govern the requirements of the installation and the A. S. E. Code.

In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

All work shall be performed during regular working hours of regular working days of the elevator contractor.

20.02 DRAWINGS: Before beginning the work, the elevator contractor shall prepare all drawings necessary to show the general arrangement of the elevator equipment. Drawings and other data which are submitted by the elevator contractor to the owner or architect for his approval shall be returned to the elevator contractor within 30 days (or sooner, if necessary) after submission. The materials so furnished by the owner or architect shall include the guarantee of hoist-way sizes and the confirmation of current characteristics.

20.03 PERMITS AND INSPECTIONS: The elevator contractor shall obtain and pay for necessary Municipal or State inspection and permit and make such tests as are called for by the regulations of such authorities. These tests shall be made in the presence of the authorized representatives of such authorities.

20.04 LIABILITY: The elevator contractor shall not be liable for any loss, damage or delay caused by acts of government, strikes, lockouts, fire, explosion, theft, floods, riot, civil commotion, war, malicious mischief, act of God or any cause beyond his reasonable control and in no event shall he be liable for consequential damages.

20.05 GUARANTEE: The elevator contractor shall guarantee that the materials and workmanship of the apparatus installed by him under these specifications are first-class in every respect and that he will make good any defects not due to ordinary wear and tear or improper use or care which may develop within one year from date of completion.

20.06 PAINTING: All exposed metal work furnished under these specifications, unless otherwise specified, shall be properly painted after installation by the elevator contractor, using his standard colors.

20.07 MAINTENANCE: The elevator manufacturer shall furnish maintenance on the entire elevator equipment described herein for a period of three (3) months after the completion of his work. This maintenance shall include systematic examination, adjustment and lubrication of all elevator equipment. The elevator manu-

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factorer shall also repair or replace electrical and mechanical parts of the elevator equipment whenever this is required and shall use only genuine standard parts produced by the manufacturer of the equipment concerned. All wire ropes shall be replaced as often as necessary to maintain an adequate factor of safety. Renewals or repairs necessitated by reason of negligence or misuse of the equipment or by reason of any other cause beyond the control of the elevator manufacturer, except ordinary wear and tear, shall not be the responsibility of the elevator manufacturer.

All work under this maintenance provision shall be performed by competent personnel under the supervision and in the direct employ of the elevator manufacturer. All work shall be done during the regular working hours and days of the elevator manufacturer, except that emergency callback service shall be available at all times.

The elevator manufacturer shall be able to show that he has had successful experience in the complete maintenance of elevator, employs competent personnel to handle this service, maintains, locally, an adequate stock of parts for replacement or emergency purposes and has qualified men available at such places to insure the fulfillment of this service without unreasonable loss of time in reaching the job site.

This maintenance service shall be performed solely by the elevator manufacturer and shall not be assigned or transferred to any agent or sub-contractor.

No work or service other than that specifically mentioned herein shall be provided by the elevator manufacturer. The elevator manufacturer shall assume no liability for injuries or damage to persons or property except those directly due to his own acts or omissions. The owner's responsibility for injuries or damage to persons or property while on or about the elevators shall not be affected by the furnishing of this maintenance service.

The maintenance indicated above shall not be performed in conjunction with any temporary use of elevators that might be required by trades during the building construction.

20.08 WORK NOT INCLUDED: Preparatory work in conjunction with the elevator installation will be done by other contractors and will consist of the following:

A. Providing a legal hoistway properly framed and enclosed and furnishing a pit of proper depth with pit ladder. Supplying drains and waterproofing for the pit, if required. Preparing a properly lighted and ventilated machine room including concrete floors and foundation for the pumping unit. Also access doors, ladders and guards as required.

Furnishing in place as located on the drawings all supports for the guide rail brackets and supports for the cylinder. Guarding and protecting the hoistway during the time equipment is being installed. Furnishing water, if required, for sinking cylinder well.

B. Supply electric feeder wires to the terminals of the elevator control panel and include necessary fused main line switch or circuit breaker. Provide hoistway outlet for the car lights and for light in the pit. Also, outlets in the machine room for light. Furnish the required electric power for illumination, starting, testing and adjusting the elevator equipment.

C. Doing all cutting walls, floors or partitions together with any repairs made necessary thereby.

D. Providing grouting as necessary under the hoistway entrance sills.

20.09 SCOPE OF WORK: The work shall consist of furnishing and installing one (1) passenger elevator.

PLATFORM SIZE: One car platform shall be about 5'-8" postwise (width) by 8'-8" front to back (depth) outside dimensions.

CAPACITY: 3,500 pounds exclusive of the weight of the car and plunger.

SPEED: 110 feet per minute in the UP direction with contract load. DOWN speed with contract load shall be 140 feet per minute.

TRAVEL: From Ground floor to 3rd floor, a distance of about 36'-0", stopping at 4 floors and serving 4 openings.

OPENINGS: Front openings at G, 1, 2, 3. - *4'-0" wide x 7'-0" high (#2)*

20.10 ELECTRIC SERVICE: (a) The power supply for the elevator apparatus will be 208 volts, 3 phase, 4 wires, 60 cycles, (A.C.) (b) The lighting supply will be 120 volts, 60 cycles, (A.C.)

Confirmation of current characteristics shall be furnished the elevator contractor before commencing work.

20.11 TYPE OF EQUIPMENT: The elevator shall be the plunger electric type with direct acting plunger, power unit, storage tank and magnetic control valves. Pumping unit and associated control equipment shall be located in a machine room (adjacent) to the hoistway located on the ground floor. The operating fluid shall be oil.

The pump shall deliver the oil directly into the cylinder at the necessary pressure and in sufficient quantity to lift the fully loaded elevator at the specified speed. The tank shall act as a storage tank only and the oil shall be pumped from the tank into the cylinder on the UP trip and shall be returned into the tank on the DOWN trip.

20.12 ELEVATOR CYLINDER AND PLUNGER: The elevator cylinder shall be constructed of steel piping of sufficient thickness suitable for a working pressure of 400 pounds per square inch. Cylinders of multiple section construction shall be thoroughly and substantially connected by means of external couplings. The bottom of cylinder shall be closed and the top provided with a cylinder head equipped with stuffing box and packing gland with self-adjusting packing that does not require external adjustment, so arranged as to effectively prevent leakage. The inside of the cylinder shall be coated with rust preventative and on the outside with superservice Black Bitumastic.

The plunger shall be constructed of selected steel tubing of proper diameter turned true and smooth with a fine polished finish. Plungers of multiple section construction shall be securely joined by means of internal couplings. Plunger shall be secured to car frame by means of a suitable platen. The plunger shall be provided with a stop welded to the bottom to positively prevent the plunger leaving the cylinder and shall be secured to the car frame by means of a suitable platen.

The plunger and cylinder shall be installed perfectly plumb and must operate freely with a minimum friction.

20.13 WELL FOR CYLINDER: The well for the cylinder will be sunk into the ground by the elevator contractor. He shall base his estimate upon the condition that the excavation for the cylinder can be made by the usual process of hydraulic sinking or handboring in earth or clay. Should any obstruction, including but not limited to sand, rock, boulders, water or quicksand, be encountered or should the nature of the ground require the use of special equipment, the elevator contractor shall be allowed an additional amount to cover the extra cost involved subsequent to encountering the obstruction.

When water or unstable soil conditions are present, the elevator contractor shall install a steel casing to contain the cylinder.

20.14 PUMPING UNIT: The pumping unit shall be of integral design and shall include an electric motor direct connected to a pump through a flexible coupling, a control valve assembly, a storage tank, necessary piping connections and a controller, all compactly designed and mounted on a structural steel bed-plate as a single self-contained unit. The motor and pump assembly shall be mounted on a rubber isolated inner base with removable drip pan, and the tank and controller shall be supported above on a structural steel frame.

Pump: Shall be a positive displacement, screw type to give smooth operation and shall be especially designed and manufactured for elevator service.

Motor: Shall be of the alternating current, polyphase, squirrel cage induction type and shall be of a design especially adapted to plunger elevator requirements.

Control Valve Assembly: Shall be of compact design suitable for operation under the required pressures. It shall contain a metered bypass valve, a check valve, a relief valve, manual lowering valve, metered lowering and leveling valves and pilot valves. An isolating seal and coupling device, designed to reduce the transmission of vibrations and noise to the elevator car, shall be provided. Operation of the manual lowering valve shall permit the car to be lowered at slow speed, in the

event the power fails.

Storage Tank: or oil reservoir shall be constructed of welded steel sheets and shall be provided with a cover, a protected vent opening, an oil level gauge, a filtering screen mounted over the suction inlet and a drain connection. An initial supply of oil sufficient for proper operation of the elevator shall be provided. Tank shall have a capacity equal to the volume of oil required to lift elevator to top terminal plus a reserve of not less than 10 gallons.

20.15 SOUND REDUCING ENCLOSURE: The lower area of the power unit where the motor, pump and valves are installed shall be enclosed with sheet steel panels lined with sound-deadening material to reduce air-borne noises.

20.16 MUFFLER: A blow-out proof muffler, designed to minimize the transmission of fluid pulsations, shall be furnished and installed in the pipeline between the pumping unit and the cylinder head.

20.17 PIPING: Piping shall be furnished and installed between the pumping unit and the cylinder head complete with necessary fittings. A gate valve shall be provided in the line to facilitate maintaining and adjusting the elevator.

20.18 CONTROLLER: An Electro-Magnetic Controller shall be provided including necessary starting switches of adequate size together with all relays and switches required to accomplish the operation specified.

Overload relay shall be of the manual reset type of suitable size for the motor furnished.

Two main-line switches shall be provided on the controller to avoid the possibility of the pump churning if one switch should fail.

20.19 REDUCED VOLTAGE STARTING: To reduce starting currents, resistance type of starting shall be provided for the pump motor.

20.20 TANK HEATER: A fused tank immersion heater shall be provided to maintain the oil temperature within favorable limits and improve stability of elevator operation.

20.21 WIRING: The elevator contractor shall furnish and install complete, all necessary insulated wiring to connect all parts of the equipment. All wire and travel cables shall have a flame retarding and moisture resisting outer cover and shall be run in metal conduit, metallic tubing, wire ducts, or raceways. Traveling cables shall be flexible and suitably suspended so that there is no strain on the individual conductors. All electrical material and work shall, as a minimum, comply with the requirements of the National Electrical Code.

20.22 LEVELING DEVICE AND AUTOMATIC RELEVELING: The elevator shall be equipped with a two-way floor leveling device which will automatically bring the car to a stop within 1/4" of level with any floor for which a stop has been initiated, regardless of load or direction of travel. An automatic releveling device shall be provided which shall be arranged to automatically return the elevator to the floor in the event the elevator should creep up or down a predetermined amount above or below floor level. This device shall be operative at all floors served, whether the hoistway door and (car door) is opened or closed or whether the emergency stop switch has been thrown.

20.23 OPERATION: The operation shall be Selective Collective Automatic having an operating device in the car with a surface mounted finished faceplate, and shall include a bank of buttons numbered to correspond with the landings served, a switch for the car light, an alarm button connected to a bell which serves as an emergency signal, and emergency-stop switch. Single push buttons shall be mounted at each terminal landing and "UP" and "DOWN" buttons at each intermediate landing.

The operation shall be such that momentary pressure of one or more car or landing buttons, other than those for the landing at which the car is standing, shall start the car, provided the interlock circuits are established, and cause the car to stop at the first landing for which a car or landing button is pressed corresponding to the direction in which the car is traveling. The car shall stop at all landings for which calls are registered and these stops shall be made in the order in which the landings are reached, irrespective of the sequence in which the buttons are pressed, provided the button for a given landing is pressed sufficiently in advance of the arrival of the car at that landing to permit the stop to be made.

If no car buttons are pressed and the car starts "UP" in response to several "DOWN" calls, the car shall proceed first to the highest "DOWN" call and then reverse to collect the other "DOWN" calls. "Up" calls shall be collected similarly when the car starts "Down" in response to such calls. If the car stops for a landing call and a car button is pressed within a predetermined interval after the stop for a landing corresponding to the direction the car was traveling, the car shall proceed in the same direction regardless of other landing calls registered.

If "down" landing buttons are pressed while the car is traveling "up", the car shall not stop at these landings, but these calls shall remain registered. After the highest car and landing calls have been answered and the door interlock Circuit is established, the car shall reverse automatically and respond to "down" car and landing calls. When traveling "down" the car shall not respond to "up" landing calls, but these calls shall remain registered and be answered on the next "up" trip.

A time limit relay shall hold the car for a few seconds at the landings at which stops are made to enable passengers to enter or leave the car. Pressure of a car button for another landing before this time elapses shall cause the car to start provided the car door and hoistway doors are closed. When the car has answered the farthest call, this interval shall permit a car button call to be registered to establish the direction of the car travel even though a landing button call may already be registered for the opposite direction of travel.

The emergency-stop switch shall interrupt the power supply and apply the brake independently of the regular operating device. Opening an emergency stop switch shall not cancel registered calls and, after the switch is closed, the car shall continue to answer these calls.

20.24 INSPECTION OPERATION: A manually operated knife switch on the controller shall be connected to the constant pressure "UP" and "DOWN" direction buttons in the car and this switch shall permit the car to be operated at slow speed for inspection purposes from the direction buttons. During the inspection operation the car shall not respond to landing calls.

20.25 STOP SWITCH IN PIT: A stop switch shall be provided in the pit of each elevator and this switch shall conform with rule 210.2g of the 1960 A. S. E. Code.

20.26 FLOOR MATTING: Floor matting shall be furnished extending the full length of all control and relay panels at front and rear as specified by State of Pennsylvania Code.

20.27 AUTOMATIC TERMINAL STOPS: The elevator shall be equipped with an automatic stopping device arranged to bring the car to a stop at the terminal landings independent of the regular operating device in the car.

20.28 GUIDE RAILS: The guide rails for the car shall consist of planed steel T's having a section of not less than 16 pounds per lineal foot, erected plumb and securely fastened to the hoistway framing by heavy steel brackets. The ends of the guides shall be tongued and grooved forming matched joints connected with steel splice plates.

20.29 CAR FRAME: A suitable car frame or sub-truss of structural steel shapes, bolted, welded or riveted together shall be provided. Structural members of suitable size shall be furnished under the platform to transmit the load from the plunger to the platform. Brace rods or structural members as required to form a thoroughly rigid structure of car frame and platform shall be provided. Roller guides shall be furnished at the top and bottom of each of the upright members of the car frame or sub-truss. Each roller guide shall be furnished at the top and bottom of each of the upright members of the car frame or sub-truss. Each roller guide shall be equipped with quiet, rubber-tired ball bearing rollers of ample diameter to run on the three finished rail surfaces. The roller guides shall run on dry unlubricated guide rails and each roller of the respective guides shall be maintained in uniform contact with the rail surfaces. The car shall be properly balanced.

20.30 SOUND ISOLATION: Rubber isolation shall be provided between the plunger platen and the car frame.

20.31 BUFFERS: Adequate spring buffers shall be provided, mounted on the pit floor or supported on the cylinder head. Buffers shall be blocked up as required to protect cylinder head and packing gland in the event the car should for any reason pass the bottom limit switch setting. Striking plates shall be provided on underside of car frame.

20.32 CAR PLATFORM: The car platform shall consist of a structural frame

filled with a wood sub-flooring and a top T & G yellow pine or exterior grade plywood floor. The underside of the car platform shall be covered with sheet steel. The platform shall be equipped with a bronze threshold plate.

Vinyl tile floor covering, not less than 1/8" thick, of approved design, color and quality, shall be laid on 1/8" thick asphalt felt all securely cemented in place.

20.33 SOUND DEADENING: Cabs shall have a sound deadening coating of 3/16" thick Insulmat or similar material on the sides and rear car panels.

20.34 CAR: The car shall be of the following design and construction and elevator contractor shall submit complete details for approval.

- a. The body panels on ²3 sides shall be of best grade cold rolled furniture steel not less than No. 14 U.S. standard gauge. The front return panels from finished floor to ceiling shall be of No. 14 ga. stainless steel with integral entrance columns. Car shall be provided with emergency exits as required by the A. S. E. Code. Top exit shall be held in place by suitable fastenings removable from inside and outside of ceiling. Side exit, when required, shall be flush panel hinged type and provided with electric contact to prevent operation of car when exit door is open. No hinges or door hardware all extend into the car interior. The car shall be securely fastened to platform.
- b. The body panels shall be of flush panel construction reinforced on the exterior with angles welded to sheet steel to insure rigidity.
- c. The ceiling shall be of No. 12 ga. steel and reinforced to form a working platform to withstand the weight of two workmen.
- d. Ventilation shall consist of a two-speed pressure blower mounted on top of a natural metal grille located in the car ceiling and concealed vent openings at top of recessed base.
- e. The base on 2 sides shall be baked enamel steel 2" high and recessed to conceal suitable vent perforations.
- f. The car lighting shall consist of a baked enamel light valance across the front of car containing two rows of fluorescent lamps to give direct and indirect illumination.

20.35 CAR DOOR: The car entrance shall be provided with two-speed horizontal sliding door with flush surfaces. Panel rigidity shall be obtained by suitable steel reinforcement. The car side surface of door shall be of baked enamel finish. Door shall be guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.

20.36 FINISH: All interior and exterior steel surfaces shall be Parkerized or given an approved rust-preventative process before the finish is applied. The interior steel surfaces shall be finished with three (3) coats of baked on enamel, in solid colors. Samples of the required colors to be furnished to the elevator contractor at his request after the contract has been awarded.

All stainless steel shall be type 302 with satin finish.

20.37 CRATING: Particular care must be taken in boxing and crating the cab to avoid damage in transit, as cab and accessories must be in perfect condition at the time of final inspection after installation in the building.

20.38 HOLLOW METAL ELEVATOR ENTRANCES: The elevator contractor shall furnish and install at a total of four (4) openings, metal entrances consisting of frames, doors, dust cover, toe guards, tracks, hangers and hardware. The following specifications shall apply:

20.39 UNIT FRAMES: Frames shall be welded or bolted for a one piece unit assembly and shall be made from #14 gauge steel and shall comprise head and jamb sections with integral casing or trim welded or bolted to form one piece unit frames. All frames shall be securely fastened to sills and hanger supports and shall be returned on the hoistway side to present a neat appearance.

20.40 DOORS: Doors shall be of the two-speed hollow metal type flush door construction and shall be filled solid with cellular asbestos filler. All door panels shall comply with the 1-1/2 hour B. O. C. A. requirements and have approved label attached thereto. The door panels shall be formed from not lighter than #16 gauge steel and all joints shall be welded. Bottom of doors shall be provided with removable laminated phenolic guides which run in the sill slots with minimum clearance. All doors shall be reinforced and provided with hoistway door unlocking devices and service keys as required to conform with code requirements. Doors shall be reinforced for separate hangers or built to include integral hangers.

20.41 SIGHT GUARDS: All hoistway doors shall be equipped with approved sight guards finished to match the doors. They shall be installed in a manner to reduce to a minimum the clearance between the doors of the hoistway and car and conceal the hoistway and car beyond the door openings.

20.42 SILLS: The sills shall be (1) piece narrow extruded aluminum with approved non-slip wearing surface. Grooves for the door guides shall have minimum clearance for the guides. The sills shall be supported on steel anchors securely fastened to the floor construction.

20.43 STRUT ANGLES: Steel angles shall be furnished of sufficient size, continuous and securely bolted to the sills and building beams above or bracketed from a point above the header to the guide rails.

20.44 HEADERS: Headers shall be constructed of sufficient size and thickness to provide support for the frame and hangers and shall be securely bolted to the strut angles.

20.45 HANGER COVER PLATES: Hanger cover plates shall be made of #14 gauge steel, shall be of the removable type, and shall be arranged to assure hanger accessibility from within the car.

20.46 FASCIA PLATES: Fascia plates shall be of #14 gauge steel reinforced to insure a flat even surface throughout and shall be securely fastened to hanger housings and sills above.

20.47 DUST COVERS: Dust covers shall be of #14 gauge steel and extend over the hanger support the width of the jamb opening plus the jamb flanges at the top landing for which fascia plates are not supplied.

20.48 TOE GUARDS: Toe guards, made of #14 gauge steel, shall be supplied for the lowest landing and they shall extend to the wall on a gradual bevel from the sill nosing.

20.49 HARDWARE: Entrances shall include service or emergency keyways to meet local code requirements. All hardware shall be satin finish.

20.50 FINISH: Frames, doors, fascias and other exposed parts shall be thoroughly cleansed of oil, grease, and other foreign substances in preparation for finishing. Materials shall then receive a rust preventing treatment such as "Bonderizing" or the equal followed by a baked-on primer coat.

All exposed surfaces of the doors and frames shall receive applications of mineral filler with each application baked and sanded to insure a smooth surface. This shall be followed by a heavy coat of baked enamel primer or surfacer which is sanded and rubbed smooth.

Three (3) additional coats of enamel in color selected shall be applied, each of which shall be baked on separately and made smooth and clean.

All structural members shall receive a shop coat of black paint.

20.51 INSTALLATION: Sills, struts, hanger supports and unit frames shall be installed prior to the erection of rough walls and set in proper relation to the elevator car guides. Doors, hangers, hanger covers, fascias, toe guards and dust covers shall be installed after the walls are finished. Unit frames shall have a protective covering for finished surfaces.

20.52 HOISTWAY DOOR HANGERS AND TRACKS: Furnish and install for each hoistway entrance necessary hangers and tracks complete. Hangers shall be of sheave type arranged for two point suspension of the doors. Hanger brackets shall be integral with the door or applied.

Sheaves and rollers shall be of steel or have resilient sound absorbing tires of approved material and shall include ball bearings properly sealed to retain grease lubrication. Adjustable ball bearing rollers shall be provided to take the upthrust of the doors. Tracks shall be cold drawn or cold rolled steel of smooth surface and the working section shall be cleaned and oiled with wick type lubricators.

An air cord drive, or other suitable arrangement, shall be used to transmit motion from one door panel to the other. Air cord sheaves shall be of steel and shall have flanges and grease sealed ball bearings.

20.53 CAR DOOR HANGERS AND TRACKS: Furnish and install for each car door sheave type two point suspension hangers and tracks complete. Sheaves shall be steel flanged groove and include resilient sound absorbing tires of approved material. Sheaves shall include ball bearings sealed to retain grease lubrication and shall be mounted on steel housing arranged for attaching to the doors. Hangers shall be provided with ball bearing adjustable rollers to take the upthrust of the doors. Tracks shall be cold drawn steel with surfaces shaped to conform to the tread of the hanger sheaves and rollers.

An air cord drive, or other suitable arrangement, shall be used to transmit motion from one door panel to the other. Air cord sheaves shall be of steel and shall have flanges and grease sealed ball bearings.

20.54 CAR AND HOISTWAY DOOR OPERATOR: Doors on the car and at each hoistway landing shall be operated quietly and smooth by an electric operator which shall open the car door and hoistway door simultaneously and close the car door and hoistway door simultaneously.

An electric contact for the car door shall be provided which shall prevent elevator movement away from the landing unless the door is in the closed position as defined in the American Standard Safety Code for Elevators, Dumbwaiters and Escalators.

Each hoistway door shall be equipped with a positive electromechanical interlock and auxiliary door closing device so that the elevator can be operated only after the interlock circuit is established. The interlock operation shall comply with American Standard Safety Code for Elevators, Dumbwaiters and Escalators.

The time required to open face, the two-speed 4'-0" x 7'-0" doors shall not be more than 3.3 seconds and the full closing time shall not be more than 4.6 seconds.

A protective device shall extend the full height of and project beyond the front edge of the car door. Should this device touch a person or object while the car door is closing, the car and hoistway doors shall return to their open position. The doors shall remain open until the expiration of a predetermined interval and then close automatically.

The doors shall open automatically as the elevator is leveling and close either after expiration of a time interval or the moment a car button call is registered. If desired, it shall be possible to stop or reverse the doors. In case of power interruption or failure of the operator, it shall be possible to open the doors manually from within the car.

20.55 MECHANICAL ILLUMINATED (CAR AND) HALL BUTTONS: Each (car and) hall push button shall be provided with round integral illuminated buttons arranged so that when a button is pressed the surrounding translucent plastic jewel shall illuminate to indicate that a call has been registered. The center of each button

shall be of opaque high impact plastic into which (white floor numerals and/or letters for car, and) UP and Down arrows (for hall) are permanently molded.

20.56 CAR POSITION INDICATOR: An electric position indicator shall be installed over the entrance in the car. Indicator shall consist of a surface mounted finished faceplate containing plastic floor numerals with a small shielded light behind each numeral. As the car travels through the hoistway its position shall be indicated by the illumination of the numeral corresponding to the landing at which the car is stopped or passing.

20.57 COMBINED LANDING BUTTON AND INDICATOR FIXTURES: A dual purpose landing fixture shall be mounted adjacent to each hoistway entrance, a total of 4 fixtures. These fixtures shall combine landing buttons and indicators and permit landing calls to be registered and position and movement of the car to be shown. The rotating indicator dial shall be driven by an electromagnetic device which translates electrical impulses into mechanical rotation.

20.58 TELEPHONE CABINET AND TRAVELING CABLE: A telephone cabinet shall be installed in the elevator car with a traveling cable from the car to a junction box at the center of the hoistway. Cabinet shall consist of a surface mounted finished faceplate with concealed hinges, catch and knob with a metal box to house the telephone instrument. Telephone instrument shall be furnished, installed and connected by others.

SECTION XXI - PLUMBING

21.01 SCOPE OF WORK: Work under this section of the Contract shall include all labor, materials and equipment, except as otherwise noted, for the installation of a complete plumbing system as shown on the drawings and described in these specifications.

It is the intent of these drawings and specifications to describe a complete and integrated system. Unless otherwise noted, all equipment and accessories, which are reasonably inferable from the drawings and specifications as being necessary for the completion and proper performance of the work shall be included, even though not specifically mentioned on drawings or in specifications.

What is called for on either the drawings or specifications shall be as binding as if called for on both.

21.02 CODES AND REGULATIONS: The National Plumbing Code, ASA-A 40.8, latest revision, shall be considered a part of this specification. Regulations of The State Department of Health and The City Plumbing Code shall take precedence in all cases where they differ from the National Code. All work shall meet the requirements of The Utility Companies serving the area. Nothing contained in these drawings and specifications shall be construed to conflict in any way with these codes or requirements. In design of the systems and sizing of all piping these Codes were followed. If any conflict appears to the estimator the provisions of the Codes shall be followed for the installation.

21.03 GENERAL: This Contractor shall comply with all state and local ordinances. Pennsylvania State Labor and Industry requirements shall be complied with as well as other controlling agencies such as The Department of Health and The Sanitary Water Board.

It is not intended that the drawings show every pipe, fitting and detail, and it is understood that while the drawings shall be followed as closely as circumstances will permit, this Contractor is held responsible for the proper installation of materials and equipment to the true intent and meaning of plans and specifications.

Should it be found that any equipment or piping cannot be installed as shown on the drawings, this Contractor shall consult with the Architect before making any changes in the piping.

Where reference is made to equipment by one manufacturer's name only, the Contractor may submit equipment of equal quality, size and capacity for the approval to the Architect. Where equipment must fit into limited areas substituted equipment shall not exceed the available space allocations.

The General Contractor will provide necessary chases and openings in walls, floors, ceilings and partitions to accommodate pipe lines, ductwork and equipment, insofar as it is possible to determine their exact locations. This Contractor shall inform the General Contractor of these items, and shall check the sizes and locations of such items so provided.

This Contractor shall furnish and set in place all sleeves required for piping passing through floors, partitions, walls and ceilings before such general construction work is in place, and shall place all clamps required for hangers and supports, in order to eliminate unnecessary cutting of construction work.

Should it be necessary to perform any cutting and patching, it shall be done at the expense of this Contractor. No cutting of bearing walls, beams, etc., shall be done without the approval of the Architect. All patching and finishing shall be done by workmen skilled in those trades.

Before submitting proposals for the work, each bidder shall be held to have examined all the specifications and satisfied himself as to conditions under which he will be obligated to operate in performing his portion of the work. This Contractor will be allowed no extras arising out of his failure to make the above examination or neglect to include all equipment, materials and labor required to complete the work. The bidder shall check existing utility connections on the site and with the various utilities concerned, providing a complete installation satisfactory to each utility.

The Contractor shall, at the completion of the job, furnish the Architect with a marked-up set of prints showing any changes for making "as-built" drawings. This applies particularly to underground work.

It is the intent of the Architects and Engineers that all piping be concealed, where piping is shown for clarity near walls it is intended that they be run within the walls or above ceilings.

The exact location for some items in this specification may not be shown on the Drawings. The location for such items will be established by the Architect and Engineers during the progress of the job.

21.04 APPROVALS OF MATERIALS: No materials or equipment shall be used in the work until they have been approved for such use by the Architect.

21.05 OPTIONAL MATERIALS AND EQUIPMENT: Equipment and materials specified shall be considered as the quality standard for base bidding, except where noted. Materials and equipment standard with individual manufacturers, but different from that specified, may be furnished, provided that all essential requirements of these specifications are strictly met. All such materials or equipment must be submitted to the Architect or Engineer and approved before installation is started. If material and equipment is offered in a bid, but does not comply with the essential requirements of the specifications, the bid shall be qualified to indicate the difference.

21.06 GUARANTEE: All work by this Contractor shall be guaranteed free from defects in materials or workmanship for a period of one year minimum from the date of final acceptance of the building as set forth in the Contract. Any such defective work developing during this period shall be replaced by the Contractor without cost to the Owner.

If any equipment normally and is advertised to have a guarantee period longer than one year, the Contractor shall turn over to the Owner proof of such guarantee and the longer guarantee shall hold.

21.07 SHOP DRAWINGS: Shop drawings, manufacturer's cuts, specifications and data sheets shall be submitted covering all apparatus in the manner set forth in the General Condition. Other shop drawings of equipment required for proper coordination shall be prepared and submitted at the request of the Architect.

21.08 PERMITS AND APPROVALS: All work under this Contract shall be performed in strict accordance with all the requirements of the State and Local Authorities. All permits and approvals required by such authorities shall be secured and paid for by this Contractor.

21.09 INTERFERENCES: It shall be understood that the Contract drawings are diagrammatic and the Plumbing Contractor shall work in cooperation with the General, Electrical and other Mechanical Contractors in determining the running of pipe lines and the exact arrangement of connections. The Contractor shall verify all measurements at the site. The Contractor shall verify the location and condition of all utilities at the site. On written request by the Architects, The Contractor shall prepare shop drawings showing the arrangement of piping at designated locations, and shall submit to the Architects for approval. Where there are intersections involving various ducts and piping, particular consideration shall be given to clearances.

The Contractor shall, if tight conditions develop, prepare in cooperation with other conflicting Contractors, a compound drawing showing suggestive solution and submit to the Architects for comment, and, if necessary, for approval. All Contractors in estimating their work, are deemed to have taken into consideration the fact that tight conditions will exist at various points and it shall be understood that extras for necessary variations required because of interferences will not be approved.

Before submitting proposals for the work, each bidder shall be held to have examined the premises and satisfied himself as to existing conditions under which he will be obligated to operate in performing his portion of the work. Contractor will be allowed no extras arising out of his failure to make the above examination or neglect to include all materials and labor required to complete the work.

This Contractor shall coordinate his work in all cases to provide a minimum of seven feet head room, and to clear all doors, windows and openings provided in walls and floors.

21.10 SUBMITTALS: This Contractor shall submit to the Architects, sets of loose bound pamphlets, cuts, shop drawings, or other manufacturer's descriptive literature describing in detail all major items of equipment. There shall be as many sets of these submittals as will be desired by the Contractor allowing for one copy to be distributed to the General Contractor and one copy to be retained by the Architects, and one copy to be retained by the Engineers, and one copy for the Owner. The owners copy shall be collected and delivered with the operating instructions.

Submittals on equipment for which capacities are specified shall have the capacity at the specified conditions indicated. Capacities and details of construction, which differ from the equipment specified, shall be clearly noted in red on the submittal by the Contractor. In the absence of such notation it shall be the responsibility of the Contractor to furnish equipment exactly as specified.

21.11 OPERATING INSTRUCTIONS: This Contractor shall furnish three sets of complete operating instructions shall be submitted to the Architects or Engineers for inspection and approval. After approval, two sets shall be submitted to the Owner by the Architects or Engineers. Manufacturer's advertising literature or advertising catalogs will not be acceptable for operating and maintenance instructions.

21.12 DISINFECTION OF WATER SYSTEM: Upon completion of all tests and adjustments, all water piping systems shall be disinfected in accordance with the following:

- a) All systems shall be thoroughly flushed with water to remove sediment.
- b) All systems shall be filled with a solution containing 50 parts per million of available chlorine and retained for a period of 4 hours and then drained.
- c) After draining, thoroughly flush with fresh water and return to service. Disinfection shall be executed so as not to affect existing street main or existing system.

21.13 TESTS: Tests for the various systems shall be in accordance with the following:

The entire drainage, venting system and storm water system shall have all necessary openings plugged to permit the entire system to be filled with water to the level of the highest vent stack above the roof. The system shall hold water for 30 minutes without showing a drop greater than 4 inches. Where a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system, except that vertical stack 10 feet above the highest horizontal line may be installed and filled with water to maintain sufficient pressure. A pump may be used to supply the required pressure which shall be maintained without drop for 30 minutes.

All water service piping shall be tested and proved tight in accordance with the Water Company's requirements. In the absence of specific requirements or requirements less stringent than those specified herein, the Sub-contractor for the water service shall test the piping at a minimum pressure of 125 p. s. i. g. maintaining the pressure for two hours without more than 2% drop in pressure. The system shall be filled with water which shall remain in the system until the water and piping are the same temperature. All tests shall be made in the presence of a representative of the Water Utility and the Architect.

All exterior and/or interior piping shall be tested and approved before backfilling or concealing. Failure to secure the approval of the Municipal Inspector, The Utility Company's Inspector and the Architect makes it mandatory for the Sub-contractor to completely expose the piping for testing. All expenses involved in the uncovering of the piping for the test shall be borne by the respective Sub-contractors at no additional cost to the Owner.

The Plumbing and Drainage Sub-contractor shall, upon completion of the systems, secure from the Inspector and/or the Municipality under whose jurisdiction the installation was made and inspected, certificates or letters of approval indicating that the system has been installed satisfactorily. The Sub-contractors shall certify that all inspection fees, permits and charges have been duly paid.

At the completion of the work, bubblers and faucets shall be adjusted for proper operation. All flush valves shall be adjusted for quiet, efficient operation.

At the completion of the work, the hot water system shall be adjusted for uniform circulation. All automatic control devices shall be adjusted for proper operation.

Before any section of sanitary or storm water drainage has been backfilled more than 6 inches above the top of the pipes, exclusive of the joint area, the system shall be tested. Wherever possible, the sections of the system shall be tested from manhole to manhole. The lower end of each section to be tested shall be plugged with a suitable device manufactured for this purpose and satisfactory to the Architect. The section being tested shall be filled with water and the leakage observed and gauged.

All pumps and motorized equipment shall be run and tested for proper performance, rotation, electrical voltage and current, lubrication and automatic control.

21.14 EXCAVATION AND BACKFILL: This Contractor shall do all excavation required for underground pipe work in connection with work of his Contract. The pipes shall be installed on solid undisturbed earth at bottom of trench and earth scooped out under valves, fittings and hubs so that pipes will be evenly supported throughout their length. After piping is installed and inspected trenches shall be backfilled to grade level with clean, compactable earth, placed in layers not over eight inches thick, and each layer shall be tamped solid. Walls of trenches shall not be caved into excavation for backfilling.

Where excavations are carried below the levels of adjacent wall or column footings, the soft earth, fill or other improper materials shall be removed until solid sides are found and the space filled with concrete to the level of the bottoms of the adjacent footings. Concrete for such fill shall be as specified under concrete section of The General Construction specifications.

Excavation shall be unclassified and the Contractor shall examine test boring information which is available at the Architects office to determine underground conditions at the site. Any rock or boulders must be removed before installation of piping.

Where earth is of such character as to be unstable, the Contractor shall provide shoring and sheet piling as may be necessary to support the banks and prevent movement of earth into trenches. All shoring shall be in accordance with the regulations of the Department of Labor and Industry, and shall be removed after installation and test of piping. The Contractor shall provide and operate pumping equipment where necessary to keep trenches clear of water. No pump discharge shall be introduced into plumbing piping already installed.

This Contractor shall remove all excess material from the site.

21.15 CONCRETE BASES: Concrete bases for mechanical equipment shall be furnished and installed by this Contractor. Bases shall be minimum six inch high, and have a sufficient mass to prevent transmission of vibration to building structure. Bases shall be isolated from building structure to prevent vibration. All foundation bolts shall be by this Contractor.

21.16 CONCRETE WORK: Where this Contractor is called upon to provide pits, manholes, bases or other concrete for his work, the paragraphs and sections in The General Construction specifications shall be referred to and followed in regards to concrete work, reinforcing and form work.

21.17 CONCRETE INSERTS: For reinforced concrete construction, this Contractor shall furnish and install malleable iron inserts of type approved by the Architect for suspending pipe and equipment. These inserts shall be installed under the supervision of The General Contractor.

21.18 STEEL SUPPORTS: Unless otherwise noted on the drawings steel supports necessary to support his equipment from main building structural elements shall be furnished and installed by this Contractor.

21.19 FLASHING FITTINGS: Furnish and install on each vent pipe passing through roof a Stoneman Stormtite No. 1100-6, or approved equal, four pound seamless lead flashing assembly. Flashing shall have steel reinforced conical boot and be complete with vandal proof hooded cast iron counterflashing and Permaseal waterproofing compound. Hood shall have minimum of 2 to 1 free area to vent pipe size. Vent pipes shall be increased one size going through roof but shall be not larger than 4".

21.20 PAINING: All exposed mechanical work shall be cleaned and prepared by this Contractor for painting. Painting shall be by General Contractor.

21.21 ELECTRICAL WORK: This Contractor shall furnish all electrical devices required for each item furnished by him including starters and overload protection. All disconnect switches, fused or unfused, required in addition to the safety disconnect switch furnished by the Electrical Contractor, shall be furnished by this Contractor. All electrical control devices or equipment, not an integral part of the Mechanical Equipment, shall be turned over to the Electrical Contractor for installation. Necessary wiring diagrams shall be furnished by this Contractor. The Electrical Contractor will make all necessary connections for the proper operation of the above equipment.

All magnetic starters shall be furnished with one N. O. and one N. C. auxiliary contact. Electrical equipment shall meet the standards of the N. B. F. U. and shall bear the U. L. label where applicable. All electrical equipment and/or control devices shall meet NEMA Specifications and shall fully comply with the electrical sections of these specifications. All motors 1/2 HP and larger shall be 208 volts, 3 phase, 60 cycle. All motors under 1/2 HP shall be 120 volts, single phase, 60 cycle, unless otherwise noted.

21.22 SANITARY DRAINAGE SYSTEM: This Contractor shall install a complete sanitary and waste drainage system, including vents and main piping to extend to the sewer main manhole. Where elevations are given, pipes must run in straight lines and have a uniform grade between elevations noted. Where elevations are not given, pipes shall be given a uniform grade of 1/4 inch per foot, except where such grade on overhead pipes would reduce the head room materially the grade may be reduced to not less than 1/8 inch per foot, if so directed by the Architect.

Cleanouts shall be installed at the ends off all mains, at changes in direction of piping and at a minimum of 100' apart. All cleanouts shall be extended to a partition wall or floor. Where any cleanout is not accessible; access panels shall be furnished and installed by this Contractor.

Provide and install test tee at base if all soil and waste risers. Test tees shall be arranged to finish flush with walls where they are furred in or access panels shall be provided.

21.23 RAIN WATER DRAINAGE SYSTEM: All rain water conductors and exterior piping to street main shall be furnished and installed by this Contractor.

Roof drains will be furnished and installed by The General Contractor. The Plumbing Contractor shall connect all rain water piping to the roof drains.

Maximum pitch of all rain water piping shall be maintained to meet end inverts.

Canopy drains and scupper drains shall be connected as other roof drains by The Plumbing Contractor.

All horizontal rain water conductors as well as the roof drains that extend below the roof deck shall be insulated as specified under insulation.

21.24 WATER SUPPLY SYSTEM: A complete water supply system including shut-off valve, shall be furnished and installed by this Contractor.

Rules and regulations of the Water Company shall be followed.

Water piping shall be valved on all branch and lateral mains so that any portion can be turned off without interrupting service to other points.

Water piping shall be installed throughout the building with drain cocks at low points so that the piping may be drained for service.

Valves shall be made accessible for maintenance and operation without cutting and patching or damage to the General Construction Work.

All hot and cold water lines within the building, concealed or unconcealed, shall be insulated according to the insulation specifications.

All piping throughout building including pipe spaces shall be run parallel with the lines of the building and arranged generally as shown in detail to provide the maximum access. Pipes shall be cut accurately and shall be worked into place without springing or forcing. All piping shall be reamed to remove burrs after cutting. Proper allowance shall be made for expansion and contraction of pipe. Pipe openings shall be closed with caps or plugs during installation.

All water piping shall be run concealed in finished areas.

Water piping exposed under fixtures in finished areas shall be chrome plated.

21.25 CONNECTIONS: The Contractor shall extend water, waste and vent piping to equipment installed under other contracts or furnished by the Owner. The owners equipment connections are limited to those shown on the drawings.

Connections shall be made to the following list of equipment, but shall not be limited to this list:

1) Heating equipment such as boilers.

2) Air Conditioning equipment.

All stop valves, traps, fittings and piping required for these connections shall be furnished and installed by this Contractor. All pieces of equipment shall have, in addition to the main line control valves, individual operating valves, so that any piece of apparatus may be removed for repair without interruption of the remaining apparatus. All sinks and plumbing fixtures shall have stop valves. All the valves shall be located at a point of greatest convenience for operation.

It shall be understood that outlet locations may vary 5'-0" plus or minus in any direction from the indications as shown on the drawings, without any additional cost. If connections vary more than 5'-0", the Contractor furnishing and installing the equipment shall compensate the Plumbing Contractor for any additional cost incurred.

21.26 PIPING MATERIALS: Soil and waste piping inside and under the building shall be extra heavy cast iron hub and spigot pattern pipe and fittings in accordance with the latest ASTM designation A74-42. Joints shall be firmly packed with braided tarred hemp and secured with molten lead, poured full at one pouring and caulked solid, flush with hub. Not less than twelve ounces of fine soft pig lead shall be used for each joint for each inch of pipe diameter.

Soil and waste vents shall be either galvanized steel pipe, standard weight with galvanized cast iron recessed drainage pattern fittings or galvanized malleable iron, or medium weight cast iron installed as specified for soil piping inside.

Rain water conductors inside above ground shall be galvanized steel pipe standard weight with galvanized cast iron recessed drainage pattern fittings or galvanized malleable iron. All rain water conductors underground shall be as specified for Soil and Waste piping inside.

Cold, hot and recirculation lines inside the building above ground, under 2 1/2" shall be Type "L" hard drawn copper tubing with cast brass solder end fittings. Cast brass fittings shall contain 85% copper and 5% each of lead, zinc and tin. Piping 2 1/2 inches and larger inside above ground shall be galvanized wrought iron with galvanized malleable fittings.

Cold, hot and recirculation lines inside, below ground shall be Type "K" soft temper copper tubing with cast brass solder end fittings.

Air conditioning drain piping above grade shall be Type "L" hard drawn copper tubing with sweat type fittings. Underground shall be as specified for soil and waste piping within the building.

21.27 PIPING INSTRUCTIONS: Piping, unless otherwise indicated, shall not pitch less than tabulated below:

Sanitary Drains	1 inch in 4 feet
Storm Water Drains	1 inch in 4 feet
Cold Water Lines	1 inch in 50 feet
Domestic Hot Water Lines	1 inch in 50 feet
Hot Water Re-circulating Lines	1 inch in 50 feet

All piping within the building shall be run concealed in the finished portions and exposed in the unfinished portions. The Plumbing Contractor shall locate all chases or openings that are to be provided by the General Contractor.

No piping shall interfere with any opening, door, or window. In no case shall the headroom in front of openings or doors be less than the top of the opening.

Wrapping threads or caulking screwed connections for tightness is prohibited. No horizontal piping shall be built-in or buried in partitions. No piping shall be run in cinder fills unless protected by a stone concrete envelope of 2 inch minimum thickness. Joints or fittings shall not be erected over any motors, switchboards, panels or other electrical equipment.

All pipes shall be cut accurately to measurements established at the building and shall be emplaced without springing, forcing, excessive cutting or weakening of the building structure. All pipes shall be installed in a manner permitting proper drainage and free expansion and contraction.

Sliding expansion joints are not permitted unless required by space conditions. Threaded pipe shall have full cleancut threads. All burrs in pipes shall be removed by reaming. All changes in direction shall be made with fittings. Cap or plug all open ends of piping and equipment during construction to keep dirt and foreign material.

The contract drawings are generally diagrammatic due to the small scale and it is not possible to indicate all fittings, offsets, valves or other items required for a complete operating system. However, the Plumbing Contractor shall provide all such valves, fittings and specialties. The Plumbing Contractor shall carefully investigate all conditions affecting his work and so coordinate this work with other trades to prevent interferences between Architectural, structural, electrical and other mechanical features, and shall furnish and install such offsets, fittings or other items as may be required to suit the conditions of the building. All piping shall be kept as close to walls, ceilings and columns as possible in order to take up a minimum amount of space. Where interference develops at the site, the Architect at the site shall determine which equipment shall be relocated regardless of which was first installed.

All piping, valves and fittings shall be kept a sufficient distance from other work to permit a clearance of not less than 2 inches between the finished coverings on the piping and fittings, and all adjacent work, whether installed under this or any other contract.

21.28 VALVES: For general water service valves gate valves shall be used. Globe valves shall be used only where specifically directed. Horizontal swing check valves shall be provided where required.

Valves shall be installed on all mains to close off various sections of building for repairs. They shall also be installed in all branches supplying toilet rooms and other rooms, and branches which supply more than one fixture. Each piece of apparatus and fixture shall be separately valved. All valves may not be shown in detail on the drawings.

All gate valves used on copper tubing shall be non-rising stem, solder sweat joints, bronze body similar to Walworth Co., Figure 4SJ, Jenkins Valve Co., Figure 1240, or Kennedy Valve Mfg., Co. 427-SJ.

All globe valves used on copper tubing shall be renewable disc solder sweat joints, bronze body, similar to Walworth Co., Figure 95SJ, Jenkins Valve Co., Figure 1200 or Kennedy Valve Co. 89 SJ.

All gate valves used on steel shall be non-rising stem gate, screw end, bronze body Figure 4, as made by the Walworth Co., Jenkins Valve Co., Figure 370 or Kennedy Valve Co. 427.

All globe valves used on steel piping shall be screw ends, bronze body, Figure #95, as made by Walworth Co., Jenkins Valve Co. 106-A or Kennedy Valve Co. 89.

All check valves used on copper tubing shall be swing check, solder sweat joints, bronze body, similar to Scott Mfg. Co., Figure #527, or approved equal.

All check valves used on steel piping shall be swing check, screw ends, bronze body, Figure 406 SJ as made by the Walworth Co., Jenkins Valve Co. Figure 1222 or Kennedy Valve Co., Figure 440 SJ.

21.29 VALVE TAGS: All valves shall be provided with a numbered metal tag chained to the valve. Valve tags shall be provided with a brass chain to secure it to the bonnet of the valve. This Contractor shall furnish in Frame, under glass, an index chart for the building showing valve numbers or code, location and purpose; this shall be supplemented with two typewritten copies of the information contained in the framed chart.

21.30 INSULATION: All cold water, hot water, hot water recirculating piping shall be insulated with Owens-Corning Fiberglas Corp., or approved equal, sectional heavy density low pressure glass fiber insulation. This insulation shall have the FRJ flame retardant jacket.

On cold line applications the jacket shall be adhered at longitudinal laps and joint seal strips with a white vapor barrier adhesive such as B. J. 82-07 or equal.

On hot line applications the jacket and 4 inch sealing strips shall be banded, cemented or stapled.

All elbow fittings shall be insulated with glass fiber insulation using P. V. C. covers as manufactured by Zeston Inc., 744 State Street, Perth Amboy, New Jersey, or approved equal. These covers shall be installed according to manufacturers recommendations. Fittings such as valves and tees shall be insulated according to the recommendations of the insulation manufacturer using insulating cement with vapor seal brush coat on cold water fittings and standard weight canvas sized with Lagfas on hot water fittings.

All horizontal rain water conductors, horizontal drains from water coolers or air conditioning units shall be insulated as specified for cold water lines.

21.31 FINISH PLATES: Finish plates shall be Fee and Mason, or approved equal. The figure numbers listed below have been taken from the Fee and Mason catalog, however, plates manufactured by other reputable manufacturers and conforming with the specifications will be approved. Floor plates shall be Figure 276, 284, or 286, and finish shall be nickel plated brass. Ceiling plates shall be Figure 275, 289, or 290, and finish shall be nickel plated brass. Pipes located in recessed enclosures or where otherwise concealed, shall not be provided with finish plates, except as specifically noted.

21.32 CLEANOUTS: Cleanouts shall be provided at the base of each interior vertical rainwater conductor and soil or waste stack, on all exposed or accessible fixture traps and each change of direction of horizontal run. Cleanouts shall be of the same nominal size as the pipes on which they occur, with the exception of piping larger than 4", in which case the cleanout shall be not less than 4". The maximum distance between cleanouts on horizontal runs of piping shall be 100 feet. A "Y" branch with cleanout extended to the finished floor shall be installed at each point adjacent to the foundation wall where the sewer leaves the building, unless a stack is located within 5'-0".

Cleanout plugs on cast iron hub and spigot pattern soil pipe shall be similar to Josam Series Y-30 or approved equal. Cleanout plugs shall be screwed into ferrules and ferrules shall be caulked into hub of pipe or fitting. The screw cap shall be cast brass with solid, square or hexagonal nuts. Graphite shall be applied to the threads.

Where cleanouts are inaccessibly located below the floor slabs, they shall be extended to finished floor by means of a long sweep 1/4 bend or two 1/8 bends. Cleanouts set in floor slab shall consist of a cast iron body with square nickel bronze rim and scoriated cover plate secured with screws and inside screw plug similar to Josam Series Y-530 or approved equal.

Where cleanouts are inaccessibly located with wall construction or pipe spaces, they shall be extended and made accessible with an access cover plate similar to Josam Series Y-130 or approved equal.

Where exterior cleanouts are indicated, extend to grade with cast iron extensions, iron body trap screw ferrules and in 18" square by 6" thick concrete pad at grade.

21.33 HANGERS AND SUPPORTS: All hangers and supports shall follow the recommendations of Standard Practice Pamphlet SP-69 of the Manufacturers Standardization Society of the Valve and Fittings Industry. Pipe hangers shall generally be adjustable steel clevis type 1 with Type 40 protection shield for insulated pipe. Where copper pipe is used the hangers shall be copper plated.

21.34 SLEEVES: All pipes passing through masonry construction shall be fitted with sleeves. Each sleeve shall extend through its respective floor, wall or partition and shall be cut flush with each surface unless otherwise required. Except where otherwise specified or shown, sleeves shall be two pipe sizes larger than the pipe when uncovered and of sufficient size to allow for the covering without binding.

Sleeves in bearing and masonry walls, floors and partitions shall be of standard weight steel pipe finished with smooth edges. For other than masonry partitions, through suspended ceilings, and for concealed vertical piping, sleeves shall be No. 22 USG galvanized iron.

All sleeves shall be properly installed and securely cemented in place.

Floor sleeves shall extend 1" above the finished floor in pipe spaces, toilet rooms and waterproofed floors.

Where pipes pass through waterproofed floor or walls, design of sleeves shall be such that water proofing can be flashed into and around the sleeves.

Where pipes pass through roofs, sleeves shall be flashed and made watertight by the General Contractor unless otherwise specified or shown on the drawings. Counter flashing fitting shall be furnished and installed by this Contractor.

Sleeves through exterior walls below grade shall have the space between pipes and sleeve caulked watertight.

21.35 ACCESS PANELS: Access panels shall be furnished and installed by this Contractor for access to all concealed valves, traps and other equipment where no other means of access is provided. All access panels shall be of sufficient size to service and remove the equipment for which they are provided, and in no case shall they have a clear opening less than 12" x 12". Access panels shall be of steel construction, having frames designed to suit the various locations and materials to which they are attached. The frames shall be rabbeted to receive cover and set flush with finished wall and ceiling surface. Covers shall be of rust-proofed furniture steel of not less than #14 gauge, and shall be secured with suitable clips and locking cams or counter-sunk screws. Covers shall be flush with the frames and finished wall or ceiling surface.

21.36 EXPANSION COMPENSATORS: Furnish and install on hot water circulating mains, at 50'-0" maximum spacings, wrought copper base slide couple expansion joints, as manufactured by American Tube and Controls, Incorporated, or equal as approved by the Architect.

21.37 WATER HAMMER ARRESTORS: This Contractor shall furnish and install water hammer arrestors as manufactured by Zurn, or approved equal. Arrestors shall be Model Z1700, Shoktrol, constructed of 18.8 stainless steel casing with pressure air charged bellows.

The arrestors shall be sized as recommended by the manufacturer. The locations are not shown on the drawings, but the Contractor shall install them in water lines feeding banks of fixtures where flush valves are installed or where quick closing of any valve will set up water hammer. They shall be located also in any location where it is normal good construction to provide an air chamber for the prevention of water hammer.

These units shall not be concealed in shafts without access panels so that the units may be replaced or repaired in the future.

21.38 HOSE HYDRANTS: Hose hydrants for exterior walls shall be as manufactured by Josam Manufacturing Co., or approved equal, Model 1410-N or 1410-NA depending on location. These units shall have cast bronze heavy duty box with polished brass face, hinged pop-out locking door.

Other interior hose bibbs shall unless otherwise shown, shall be chrome plated American Standard, or approved equal, Model R4421 single faucets with indexed four-arm handle marked hot or cold, according to the service.

21.39 HOT WATER CIRCULATOR: Furnish and install a hot water circulating pump, bronze fitted, Bell and Gossett Series 60, Model 1 AA, 1/4 HP, 1750 RPM, or approved equal, in the recirculating hot water lines.

This pump shall be controlled automatically by an immersion type aquastat. A thermometer shall be placed in the return piping at the circulator.

21.40 SUMP PUMP: Furnish and install a sump pump in the pit shown in the equipment room adjacent to the elevator. This pump shall be a Kenco, or approved equal, Model 59A rated at 2000 GPH at 10 ft. head.

21.41 FLOOR DRAINS: Floor drains for toilet room areas and finished spaces shall be as manufactured by J.A. Zurn Manufacturing Co., Model Z 415 with 6" Nickel Bronze Type A strainer, or approved equal by Josam, Smith or Wade.

Floor drains for equipment rooms and outside area ways shall be Model Z-520 with Dura-coated body and top, or approved equal.

All floor drains shall be installed with a trap.

21.42 FIXTURES: This Contractor shall furnish, deliver, and install all plumbing fixtures as hereinafter noted. Each fixture shall be new and shall be installed without any chips or cracks. All exposed pipe and connections, shut-offs, and traps in the toilet rooms, except risers, shall be chrome plated. All fixtures shall be white unless specified otherwise. Each fixture shall be cleaned of all stickers and left in a clean condition.

All water closets unless noted tank type, shall be Crane Placidus Elongated rim 3-459, American Standard Aftall F2477, or approved equal, vitreous china, siphon jet action, elongated bowl, 1 1/2" top spud, Speakman K-9000 BSP Si Flo flush valve with one inch capped angle stop, back syphon preventer and external flush adjustment, Olsonite #95 solid white open front seat, less cover, with concealed check hinge and vandal proof lock nuts, Wade, Inc., or approved equal W-311 carrier fitting.

All water closets noted as tank type shall be Crane Drexel 3-127, American Standard Compact F2052, or approved equal, elongated rim, vitreous china, free standing close coupled combination, two #9 china caps, Olsonite #44 solid white closed front seat with cover for elongated bowl with vandal proof locking nuts.

Urinals shall be Crane Correcto 7-187, American Standard Washbrook F-6500, or approved equal, vitreous china, washout urinal with extended shields integral flush spreader, 3/4" top spud, outlet connection, threaded 2" inside, Speakman K-9084 BSP Si Flo flush valve with 3/4" capped angle stop and external flush adjustment Wade, Inc., or approved equal, W-452-M2 chair carrier with bearing plate and block foot support.

Lavatories not mounted in counters or cabinets and not otherwise specified including Room 127 shall be Crane Norwich 1-1655, 20" x 18", American Standard Roxalyn F 194, 20" x 18", or approved equal, vitreous china, front overflow, anti-spash rim, cast in soap dish, Speakman S-4151-8 easy push Model #70 self-closing metering lavatory combination fitting with concealed vandl-rator, concealed volume adjustment, pop-up drain with 1 1/4" O.D. tailpiece, Wade Inc., or approved equal, concealed arm chair carrier with block foot support and threaded escutcheons to mount lavatory away from wall.

Lavatories for counter top use including Room 39 shall be Crane Westland 1-282-5, 20" x 19", American Standard Merrilyn F 140, 20" x 18", or approved equal, vitreous china, Speakman S-4151-8 easy push model #70 self-closing metering lavatory combination fitting with concealed vandl-rator, concealed volume adjustment, pop-up drain with 1 1/4" O.D. tailpiece, Stainless steel rim for counter top mounting using plastic type caulking compound for installation.

Mop receptors shall be furnished and installed by this Contractor as manufactured by Cutler Metal Products Co., or approved equal. They shall be similar to Biltmore genuine terrazzo with integrated terrazzo threshold and shall corner model. Trim shall be Speakman, or approved equal. Wall mounted Model S-4815 service sink fitting with vacuum breaker and hose thread.

Water coolers shall be as manufactured by Halsey Taylor, or approved equal, Series RWM 13A semi-recessed with a capacity of 14.4 gallon per hour capacity of 50° water at 80° room temperature. The top and backsplash shall be Stainless Steel and the fronts shall be vinyl clad steel with color and pattern vinyl selected by the Architects.

21.43 WATER HEATER: This Contractor shall furnish and install a water heater as manufactured by Ruud Manufacturing Co., or approved equal. This unit shall be Model CS 85-200-1 gas fired using natural gas, with a capacity of 168 gallons per hour at 100° rise. The input shall be 199,900 BTU per hour and the tank shall have a capacity of 85 gallons.

The installation shall be in accordance with the requirements of Labor and Industry. The local Gas Co., and A.G.A. with proper relief valves piped to drain. The flue shall be extended to the chimney by this Contractor. All water connections shall be by this Contractor. The gas connections will be by The Heating Contractor.

SECTION XXII - HEATING, VENTILATING & AIR CONDITIONING

22.01 SCOPE OF WORK: Work under this section of the Contract shall include all labor, materials and equipment, except as otherwise noted, for the installation of a complete heating, ventilating and air conditioning system as shown on the drawings and described in these specifications.

22.02 GENERAL: It is the intent of these drawings and specifications to describe a complete and integrated system. Unless otherwise noted, all equipment and accessories, which are reasonably inferable from the drawings and specifications as being necessary for the completion and proper performance of the work shall be included, even though not specifically mentioned on drawings or in specifications. What is called for on either the drawings or specifications shall be as binding as if called for on both.

It is the intent of the Architects and Engineers that all piping and ductwork be concealed, where piping is shown for clarity near walls it is intended that they be run within the walls or above ceilings, except where noted.

It is not intended that the drawings show every pipe, fitting and detail, and it is understood that while the drawings shall be followed as closely as circumstances will permit, this Contractor is held responsible for the proper installation of materials and equipment to the true intent and meaning of plans and specifications. Should it be found that any equipment or piping cannot be installed as shown on the drawings, this Contractor shall consult with the Architect or Engineer before making any changes.

The Contractor shall, at the completion of the job, furnish the Architect with a marked-up set of prints showing any changes for making "as-built" drawings. This applies particularly to underground and concealed work.

Before submitting proposals for the work, each bidder shall examine the premises and satisfy himself as to existing conditions under which he will be obligated to operate in performing his portion of the work. Contractor will be allowed no extras arising out of his failure to make the above examination or neglect to include all materials and labor required to complete the work. The Contractor shall verify the location condition and characteristics of all utilities existing or to be provided at the site.

The exact location for some items in this specification may not be shown on the Drawings. The location for such items will be established by The Architect and Engineers during the progress of the job.

22.03 INTERFERENCES: It shall be understood that the Contract drawings are diagrammatic and the Heating, Ventilating and Air Conditioning Contractor shall work in cooperation with the other Contractors in determining the running of pipe lines and the exact arrangement of equipment. The Contractor shall verify all measurements at the site. On request by the Architects or Engineers, the Contractor shall prepare shop drawings showing the arrangement of piping and ductwork at designated locations, and shall submit these drawings for approval. Where there are intersections involving various ducts and piping, particular consideration shall be given to clearances.

At the request of the Architect or Engineer, the Contractor shall, if tight conditions develop, prepare in cooperation with other conflicting Contractors, a compound drawing showing suggested solution and submit this drawing for approval. All Contractors in estimating their work, are deemed to have taken into consideration the fact that tight conditions will exist at various points and it shall be understood that extras for necessary variations required because of interferences will not be approved.

This Contractor shall coordinate his work in all cases to provide a minimum of 7 ft. head room, and to clear all doors, windows and openings provided in walls and floors.

22.04 CODES AND REGULATIONS: This Contractor shall comply with all state and local ordinances. Pennsylvania State Labor and Industry requirements shall be complied with as well as The Pennsylvania Department of Health and other controlling agencies. Requirements of the owners insurance carrier and the utility companies serving the project shall be observed. All N. F. P. A. codes shall be followed.

All permits and approvals required by such authorities and utility companies shall be secured and paid for by this Contractor.

22.05 OPTIONAL MATERIALS AND EQUIPMENT: Equipment and materials specified shall be considered as the quality standard for base bidding, except where noted. Materials and equipment standard with individual manufacturers, but different from that specified, may be furnished, provided that all essential requirements of these specifications are strictly met. All such materials or equipment must be submitted to the Architect or Engineer and approved before installation is started.

When provision is provided in the bid form for submitting a price for alternate equipment, the Contractor shall use equipment of the specified manufacturer in his base bid, and he may submit the requested alternates on the form provided. Where equipment must fit into limited areas substituted and alternate equipment shall not exceed the available space allocations.

22.06 UNREQUESTED ALTERNATES: For projects on which qualified bids are acceptable, the Contractor may submit an alternate for substituted equipment or construction which does not fully comply with the essential requirements of the specifications. The differences shall be clearly indicated in the bid.

22.07 SUBMITTALS: This Contractor shall submit to the Architects, sets of loose bound pamphlets, cuts, shop drawings, or other manufacturer's descriptive literature describing in detail all major items of equipment. There shall be as many sets of these submittals as will be desired by the Contractor allowing for one copy to be distributed to the General Contractor, one copy to be retained by the Architects, one copy to be retained by the Engineers, and one copy for the Owner. The owners set shall be collected and delivered with the operating instructions.

Submittals on equipment for which capacities are specified shall have the actual capacity at the specified conditions indicated. Capacities and details of construction, which differ from the equipment specified, shall be clearly noted in red on the submittal by the Contractor. In the absence of such notation it shall be the responsibility of the Contractor to furnish equipment exactly as specified. Other shop drawings or submittals required for proper coordination of the work shall be submitted at the request of the Architects or Engineers.

No materials or equipment shall be used in the work until they have been approved for such use by the Architects or Engineers.

22.08 OPERATING INSTRUCTIONS: This Contractor shall furnish three sets of complete operating instructions for all equipment furnished by him. The operating instructions shall be submitted to the Architects or Engineers for inspection and approval. After approval, two sets shall be submitted to the Owner by the Architects or Engineers. Manufacturer's advertising literature or advertising catalogs will not be acceptable for operating and maintenance instructions.

22.09 GUARANTEE: All work by this Contractor shall be guaranteed free from defects in materials or workmanship for a period of one year minimum from the date of final acceptance of the building as set forth in the Contract. Any such defective work developing during this period shall be replaced by the Contractor without cost to the Owner.

If any equipment normally has and is advertised to have a guarantee period longer than one year, the Contractor shall turn over to the Owner proof of such guarantee and the longer guarantee shall hold.

22.10 PAINTING: All exposed mechanical work shall be cleaned and prepared by this Contractor for painting. Painting shall be by General Contractor.

The Contractor shall make available to the Painting Contractor, a list of color identification codes as required by the Architects and The Owner.

22.11 CUTTING AND PATCHING: The General Contractor will provide necessary chases and openings in walls, floors, ceilings and partitions to accommodate pipe lines, ductwork and equipment, insofar as it is possible to determine their exact locations. This Contractor shall inform the General Contractor of these items, and shall check the sizes and locations of such items so provided.

This Contractor shall furnish and set in place all sleeves required for piping and ducts passing through floors, partitions, walls and ceilings before such general construction work is in place, and shall place all clamps and inserts required for hangers and supports, in order to eliminate unnecessary cutting of construction work.

Should it be necessary to perform any cutting and patching, it shall be done at the expense of this Contractor. No cutting of bearing walls, beams, etc., shall be done without the approval of the Architect. All patching and finishing shall be done by workmen skilled in those trades.

22.12 EXCAVATION AND BACKFILL: This Contractor shall do all excavation required for underground pipe work in connection with work of his Contract. The pipes shall be installed on solid undisturbed earth at bottom of trench and earth scooped out under valves, fittings and hubs so that pipes will be evenly supported throughout their length. After piping is installed and inspected trenches shall be backfilled to grade level with clean, compactable earth, placed in layers not over eight inches thick, and each layer shall be tamped solid. Walls of trenches shall not be caved into excavation for backfilling.

Where excavations are carried below the levels of adjacent wall or column footings, the soft earth, fill or other improper materials shall be removed until solid sides are found and the space filled with concrete to the level of the bottoms of the adjacent footings. Concrete for such fill shall be as specified under concrete section of The General Construction specifications.

Excavation shall be unclassified and the Contractor shall examine test boring information which is available at the Architects office to determine underground conditions at the site. Any rock or boulders must be removed before installation of piping.

Where earth is of such character as to be unstable, the Contractor shall provide shoring and sheet piling as may be necessary to support the banks and prevent movement of earth into trenches. All shoring shall be in accordance with the regulations of the Pennsylvania Department of Labor and Industry, and shall be removed after installation and test of piping. The Contractor shall provide and operate pumping equipment where necessary to keep trenches clear of water. No pump discharge shall be introduced into piping already installed.

This Contractor shall remove all excess material from the site.

22.13 SLEEVES: Pipes passing through walls partitions and floors concealed or exposed shall be provided with standard weight steel pipe sleeves as shown in detail on drawings. Sleeves when placed in floors shall extend 3/4 inch above the finished floor.

22.14 ROOF CURBS: All roof curbs for mechanical equipment except where noted will be constructed by the General Contractor. The Heating, Ventilating and Air Conditioning Contractor shall inform the General Contractor the exact location, size and height of each curb required after equipment is approved.

22.15 ROOF CONES AND PITCH BOXES: All pipes passing through roof shall go through a pitch box or be furnished with roof cones. Pitch boxes shall be six inches high, with lower 2 inches filled with a mixture of asbestos and portland cement. The upper four inches shall be poured full of high melting point pitch. Roof cones shall be copper 10 inches high, 1/4 inch larger than pipe at top. A second cone 4 inches high shall be brazed or soldered to pipe above lower cone and overlapping 2 inches to protect opening.

22.16 CONCRETE INSERTS: For reinforced concrete construction, this Contractor shall furnish and install malleable iron inserts of type approved by the Architect for suspending pipe and equipment. These inserts shall be installed under the supervision of The General Contractor.

22.17 CONCRETE WORK: Where this Contractor is called upon to provide pits, manholes, bases or other concrete for his work, the paragraphs and sections in The General Construction specifications shall be referred to and followed in regards to concrete work, reinforcing and form work.

22.18 CONCRETE BASES: Concrete bases for mechanical equipment shall be furnished and installed by this Contractor. Bases shall be minimum six inch high, and have a sufficient mass to prevent transmission of vibration to building structure. Bases shall be isolated from building structure to prevent vibration. All foundation bolts shall be furnished by this Contractor.

22.19 STEEL SUPPORTS: Unless otherwise noted on the drawings steel supports necessary to support his equipment from main building structural elements shall be furnished and installed by this Contractor.

22.20 ACCESS PANELS: Access panels shall be furnished and installed by this Contractor for access to all concealed valves, traps and other equipment where no other means of access is provided. All access panels shall be of sufficient size to service and remove the equipment for which they are provided, and in no case shall they have a clear opening less than 12 inches by 12 inches. Access panels shall be of steel construction, having frames designed to suit the various locations and materials to which they are attached. The frames shall be rabbeted to receive cover and set flush with finished wall and ceiling surface. Covers shall be of rust-proofed furniture steel of not less than #14 gauge, and shall be secured with suitable clips and locking cams or countersunk screws. Covers shall be flush with the frames and finished wall or ceiling surface.

22.21 ELECTRICAL WORK: This Contractor shall furnish all electrical devices required for each item furnished by him, including starters and overload protection. All disconnect switches, fused or unfused, required in addition to the safety disconnect switch furnished by the Electrical Contractor, shall be furnished by this Contractor. All electrical control devices or equipment, not an integral part of the mechanical equipment through which power wires pass, shall be turned over to the Electrical Contractor for installation. Necessary wiring diagrams shall be furnished by this Contractor. The Electrical Contractor will make all necessary connections for the proper operation of the above equipment.

All power wiring shall be by the Electrical Contractor. All control wiring by the Heating, Ventilating and Air Conditioning Contractor. All wiring shall be properly identified with numbered bands.

Any device, which is specified as a packaged unit, is assumed to have all control and power wiring installed and brought back to a panel to which the electrical or control wiring is connected. If this is not so with a particular piece of equipment and additional wiring is needed to provide a complete package, the Heating, Ventilating and Air Conditioning Contractor shall provide the additional wiring required.

All magnetic starters shall be furnished with one N. O. and one N. C. auxiliary contact. Electrical equipment shall meet the standards of the N. B. F. U. and shall bear the U. L. label where applicable. All electrical equipment and/or control devices shall meet N. E. M. A. Specifications and shall fully comply with electrical sections of these specifications. All motors 1/2 HP and larger shall be 208 volts, three phase, 60 cycle. All motors under 1/2 HP shall be 120 volts, single phase, 60 cycle, unless otherwise noted.

22.22 ELECTRICAL INTERLOCKS: The Mechanical Contractor shall prepare and submit as a shop drawing an electrical wiring diagram of all electrical interlocks. The diagram shall show all field connections plus enough of the internal wiring of the devices to indicate their function. The Mechanical Contractor shall do all necessary wiring to provide the electrical interlocks in accordance with the recommendations of the chiller and heating and cooling unit manufacturers.

For air cooled reciprocating chiller, the chiller shall not run unless the condenser fan is running, the condenser fan shall not run unless the chilled water pump is running. The chilled water pump shall not run unless the temperature control system is indexed to Summer. A flow switch shall prevent chiller operation if there is insufficient water flow through chiller.

22.23 PIPE HANGERS AND SUPPORTS: All hangers and supports shall follow the recommendations of Standard Practice Pamphlet SP-69 of the Manufacturers Standardization Society of the Valve and Fittings Industry. Pipe hangers shall generally be adjustable steel clevis type 1 with Type 40 protection shield for insulated pipe. Where copper pipe is used the hangers shall be copper plated.

22.24 FINISH PLATES: Finish plates shall be installed on any pipes extending through walls, floors, or ceilings of finished rooms. Finish plates shall be Fee and Mason, or approved equal. The figure numbers listed below have been taken from the Fee and Mason catalog; however, plates manufactured by other reputable manufacturers and conforming with the specifications will be approved. Floor plates shall be Figure 276, 284, or 286, and finish shall be nickel plated brass. Ceiling plates shall be Figure 275, 289, or 290, and finish shall be nickel plated brass.

22.25 PIPE STRAINERS: Strainers shall be screwed or flanged semi-steel bodies with bronze screens, 250 P.S.I., Sarco, Type AT. All strainers over 2 inches shall be provided with a nipple and full size blow-off valve.

22.26 PRESSURE GAUGES AND THERMOMETERS: Pressure gauges and thermometers shall be as manufactured by H. O. Trerice Co., or equal. The pressure gauges shall be Series #800.

The thermometers shall be either straight form or angle form BX series with separate sockets furnished with the thermometers.

All pressure gauges and thermometers shall be installed in locations so they are readable from the floor.

22.27 HEATING ACCESSORIES: The boiler shall be equipped with heating accessories as manufactured by Bell and Gossett. These shall consist of flo-control valves, airtrol tank and boiler fittings, pressure relief valves, self-filling valves, expansion tanks of A. S. M. E. construction.

22.28 WATER TREATMENT CONNECTIONS: Plugged connections one inch shall be provided by this Contractor for connection to water treatment devices, which will be provided by the water treatment contractor engaged directly by the Owner. Exact size and location of connections shall be obtained by this Contractor from Owner's water treatment contractor. For estimating purposes the following should be included.

Two at each main hot water pump inlet.

Two at each main hot water pump outlet.

One on each boiler with valve.

22.29 PIPING INSTALLATION: All piping shall follow generally the arrangement shown on the drawings, but with necessary modifications to coordinate with other contractors, and with existing work, and to make a neat appearance. All pipes shall be run with uniform grade and shall be exactly parallel. All vertical pipes shall be exactly plumb.

Piping in general shall run parallel or perpendicular to main building lines, and shall be cut accurately to measurements made on the site and installed without springing or forcing. All changes in direction shall be made with factory made fittings.

All pipes and connections shall be installed with due regard for clearance at other construction. Risers and exposed run outs shall be installed as close to building walls, columns or ceilings as possible and still provide adequate flexibility for expansion and contraction.

Piping shall be run concealed in finished areas and exposed in unfinished areas. Where piping is shown for clarity near walls it shall be run within the walls or above ceilings except where noted. Horizontal pipe shall not be run in walls or partitions.

No piping shall interfere with any door or window. In no case shall the head room in front of openings, or doors be less than the top of the opening. Joints or fittings shall not be erected over motors, switchboards, panels or other electrical equipment.

Piping shall be reamed after cutting. Open ends of pipe and equipment shall be properly capped or plugged during construction to keep out moisture and dirt. Threaded connections shall be tight without wrapping or caulking.

Piping in cinder fill shall be protected by a stone concrete envelope at least two inches thick. Copper tube shall not be used in cinder fill encased or not.

All gas piping required for the heating system in connection with the interruptable rate meter shall be furnished and installed by this Contractor. All gas piping involved with the firm gas rate will be furnished and installed by the Plumbing Contractor.

All hot water heating piping and chilled water piping shall be level or shall be pitched up in the direction of flow. Provide valved drains with hose connection at all low points and float type air vents at high points with overflow piped to drain. Air vents shall be isolated from the system by a cock to permit removal without draining the system.

Automatic vents shall be American Type 701, or approved equal, on unit, and American type 703, or approved equal on mains. Units located below mains may be fed from bottom of main. Down feed units shall have vents if there is a possibility of air pocket.

Refrigerant lines shall be run level or plumb. Oil traps shall be provided at the bottom of suction risers. Risers shall be sized for proper oil return. Lines shall be sized for a total pressure drop not to exceed 2° saturation temperature. Refrigerant piping shall be installed in strict accordance with the equipment manufacturers instructions.

All gas piping shall be pitched one inch in 60 ft. to prevent traps. Pipes shall pitch to meter or to appliance. Drips shall be installed at any point in line where condensate may collect.

Excentric reducers shall be used where necessary to prevent traps.

This Contractor shall follow rules and regulations of the Gas Company and shall furnish and install devices which are required but not furnished by the Gas Company. Any devices furnished by The Gas Company shall be installed and connected by this Contractor.

22.30 EXPANSION OF PIPING: Expansion joints are required in the piping in lengths where bends and turns do not reasonably take up the expansion without abnormal stress to the piping. The Contractor shall be responsible for expansion provisions of all piping and shall include joints where they may be required. This is best established after the exact runs of piping are established.

Expansion joints 6 inches and smaller shall be Robertshaw - Fulton No. 1291 with 2 inches travel or approved equal. Joints over 6 inches shall be AdSCO Corruflex internally guided, or approved equal, with 2 inches travel.

Pipe movement due to thermal expansion shall not exceed one and one-half inches. Provisions shall be made to allow steel hot water pipe to expand one and one-half inches per 100 feet, and hot water copper tubing to expand two and one-fourth inches per 100 ft. Provisions shall be made to allow steel chilled water pipe to expand $\frac{3}{8}$ inch per 100 ft. and chilled water copper tubing to expand one-half inch per 100 ft.

An expansion joint or offset shall be installed for each section of pipe with maximum spacing as follows:

Copper tubing carrying hot water at 75 ft.

Copper tubing carrying chilled water at 300 ft.

Steel pipe carrying hot water or steam at 100 ft.

Steel pipe carrying chilled water at 400 ft.

Offsets will be accepted in place of expansion joints in length according to the following table.

<u>SIZE PIPE</u>		<u>TRAVEL</u>						
		<u>1/8"</u>	<u>1/4"</u>	<u>1/2"</u>	<u>3/4"</u>	<u>1"</u>	<u>1 1/4"</u>	<u>1 1/2"</u>
Copper tube	1"			3 ft		4 ft		5 ft
Steel pipe	1 1/4 to 2"	3 ft	4 ft	6 ft	7 ft	8 ft	9 ft	10 ft
Steel pipe	3"	4 ft	6 ft	7 ft	9 ft	10 ft	11 ft	12 ft
Steel pipe	4"	4 ft	6 ft	8 ft	10 ft	11 ft	12 ft	13 ft
Steel pipe	6"	5 ft	7 ft	9 ft	11 ft	13 ft	15 ft	16 ft
Steel pipe	8"	6 ft	8 ft	11 ft	13 ft	15 ft	17 ft	18 ft
Steel pipe	10"	6 ft	9 ft	12 ft	14 ft	17 ft	19 ft	20 ft

Expansion loops may be installed instead of joints provided they do not interfere with other work. Engineers approval must be obtained before installing loops.

Expansion of refrigerant piping shall be installed with the necessary flexibility for vibration and expansion and contraction by the use of offsets and loops rather than expansion joints.

Furnish and install pipe alignment guides of the split spider and outer guiding cylinder type, Adsco Model FRS for hot water and FRS-ITB for chilled water, or approved equal. Guides shall allow insulation to be applied to pipe where it passes through guide.

Guides shall be located in accordance with expansion joint manufacturer instructions. As a minimum, there shall be one guide on each side of each expansion joint, except where the joint is located close to an anchor which would eliminate the need for one of the guides.

Anchors may be field fabricated or manufactured, and shall be located at both ends of the pipe length served by the expansion joint so the pipe will expand toward the expansion joint without damaging building construction.

22.31 PIPING MATERIALS: The following materials shall, in all cases, be new and in good, clean condition, manufactured by a well known and reputable firm. In no case shall copper pipe come in contact with cinders or acid-bearing soil.

All hot water heating piping, condenser water piping and chilled water piping one inch and under shall be Type 'L' hard drawn copper tubing with solder fittings.

All hot water piping, condenser water piping and chilled water piping 1 1/4 inch through 2 inch shall be Type 'L' copper tubing with solder joints or schedule 40 steel pipe using screwed or welded fittings.

All hot water piping, condenser water piping and chilled water piping 2 1/2 inches and over shall be schedule 40 black steel pipe. Fittings shall be welded.

Fuel oil piping underground shall be wrought iron standard weight; above ground shall be black steel pipe, both with malleable iron fittings.

Fuel oil vent pipe shall be galvanized steel with galvanized iron fittings.

Gas piping shall be schedule 40 black steel pipe with malleable iron fittings or welded fittings.

Refrigerant piping shall be Type "L" copper tubing using Mueller "Streamline" long radius wrought copper fittings. Solder shall be 95% tin, 5% antimony, except for hot gas lines, which shall use silfos or silver solder. When using high temperature solder the air in the pipes shall be replaced with dry nitrogen to prevent corrosion.

Drain lines from equipment shall be type DWV copper with drainage type solder fittings, or galvanized steel with galvanized drainage fittings.

Cold water makeup piping shall be Type 'L' copper tubing with solder joints.

Fittings for copper water tubing shall be cast bronze or wrought copper. Solder shall be 95% tin and 5% antimony.

Fittings for screwed water and steam piping shall be 125 psig cast iron.

Fittings for welded pipe shall be for socket-welding or butt welding, standard weight, conforming to ASTM Specification A 234. Branch connections shall be made with welding tees or forged branch outlet fittings designed to withstand full pipe bursting strength.

Solder for drainage lines and cold water lines shall be 50% tin, 50% lead or 95% tin and 5% antimony.

Unions, flanged for welded pipe and ground ball joint for screwed pipe shall be used so all equipment and valves may be easily removed for service.

22.32 VALVES: Furnish and install all valves shown on the drawings or as called for in this specification or that are necessary for the proper operation of the various systems installed under this Contractor's work.

All branches off main which serve more than one unit shall have shut off valves for maintenance. Each individual unit shall be valved so it can be removed without disturbing the remainder of the system.

All water and steam valves shall be Jenkins, Crane, Fairbanks, Chapman or equal, 125 lbs. working pressure, standard weight, unless otherwise noted.

The working pressure and manufacturer's name shall be cast on each valve body.

Shut off valves for sizes one inch and smaller shall be gate, globe or angle type.

Balancing valves for sizes one inch and smaller shall be globe, or angle type with full throttling type plug, or needle type plug.

For sizes one inch and smaller, combination balancing and shut off valves may be used instead of separate gate valves and balancing valves. Combination valves shall be Sarco Balance Master, or approved equal, with indicating and locking device. When locked in the balance position the valve may be closed as a shut off, and when opened will return flow to the proper balance.

Shut off valves for sizes 1 1/4" to four inch shall be gate valves.

Shut off valves for sizes above four inch shall be gate valves, or butterfly valves.

Balancing valves for sizes 1 1/4" to four inch shall be lubricated plug type or excentric plug type.

Balancing valves for sizes above four inch shall be lubricated plug, excentric plug, or butterfly.

Shut off valves for gas for sizes 3/4 inch and smaller shall be bronze square head.

Shut off valves for gas for sizes one inch and larger shall be lubricated plug cocks.

Shut off valves for refrigerant shall be globe valves with wing caps or diaphragm seals.

All globe and angle valves 2 inches and smaller shall be all bronze with renewable composition disc and screwed bonnet.

All globe and angle valves two and one-half inches and larger shall be iron body, flanged pattern, bronze mounted with renewable seat ring and composition disc, outside screw and yoke.

All gate valves two inches and smaller shall be all bronze, screwed pattern, inside screw, non-rising spindle, solid or split wedge with screwed bonnet.

All gate valves two and one-half inches and larger to iron body, flanged pattern, outside screw and yoke, rising stem (unless otherwise noted for space conditions then non-rising stem shall be used), bronze mounted, solid or split bronze wedge renewable seat rings and bolted bonnet.

All check valves two inches and smaller shall be all bronze screwed pattern, with renewable composition disc, screwed bonnet.

All check valves larger than two inches shall be iron body, renewable seat ring and composition disc, bolted top.

22.33 VALVE TAGS: All valves shall be provided with a numbered metal tag, chained to the valve. Valve tags shall be secured to the bonnet of the valve with a brass chain. This Contractor shall furnish in Oak Frame, under glass, a index chart for the building showing valve numbers or code, location and purpose; this shall be supplemented with two typewritten copies of the information contained in the framed chart.

22.34 DUCTWORK: Ducts shall be constructed according to the ASHRAE latest revised standards relative to gauges and bracing. Ducts shall be galvanized sheet metal unless otherwise noted, and in general, shall be fabricated so as to leave no obstructions, such as long, uncut bolts, which might hinder the application of insulation. Ducts shall be carefully suspended from joist, beams or other structural members and not from roof deck or floor above. All ducts except those to be insulated with board form covering or where noted shall be cross-broken.

Splitter dampers for adjustment of distribution to respective branches shall be installed where required for balancing. Splitters shall be double thickness with round edge to air flow made of 22-gauge or the thickness of the duct where used, which ever is greater, shall be properly hinged and provided with suitable operating rod and clamp or locking device. Splitter shall be installed at every branch take off.

Where space conditions prevent the installation of elbows with a center line radius equal to width of duct, vanes shall be installed so pressure drop equals full radius construction. Square throat elbows shall be equipped with Tuttle & Bailey duct turns.

Hand dampers shall be 18-gauge or heavier and provided with properly marked locking type quadrant. Dampers over 12 inches high shall be mounted in channel frames, installed where shown on drawings and/or as required for proper air balancing.

Control dampers for automatic operation shall be installed where required by the control system. Control dampers to be furnished by control manufacturer.

Access doors shall be provided for access to all heating coils and other equipment installed in duct. Doors in insulated ducts shall be double panel construction with one inch rigid insulation between metal panels, secured with cam locks operated from inside and outside.

Flexible connection of heavy woven asbestos, or fireproof glass fabric cloth shall be provided for all equipment connections.

Ducts shall be constructed, braced and supported so that they will not sag or vibrate, and so they will not oil can when fan starts or stops.

22.35 DUCT LINING: All ducts unless otherwise noted on drawing shall be lined with one inch fiberglass. Duct sizes shown on plans are actual sheetmetal sizes. Further information on duct lining is given in paragraph 22-72.

Where duct lining is specified or indicated on the drawings by note or dashed line, ducts and equipment casings shall be lined with Aeroflex fiberglass duct liner, or approved equal. Unless otherwise specified, the liner shall be one-half inch thick, 3 lbs. density. Liner shall be adhered to inside of duct with coated side toward air stream with a minimum 50% coverage of fire resistant bonding adhesive. Adhesive shall completely cover the sheet metal at each end of each section.

When duct width exceeds 12 inches or height exceeds 24 inches further secure the liner to these surfaces with approved mechanical fasteners at 16 inches O.C. Paint all joints in liner and butter the edges of the liner where sections of ductwork will be joined with approved fire resistant indoor breather mastic.

22.36 LOUVERS: All fixed exterior wall louvers shall be as manufactured by Air Balance, Inc., Model 102 aluminum. Adjustable louvers shall be Model 102WN, manufactured in aluminum. Operators shall be manual with wing nut adjustment.

All louvers shall have one-half inch mesh aluminum bird-screens.

22.37 FIRE DAMPERS: This Contractor shall furnish and install fire dampers in accordance with state and local codes. Fire dampers shall be built in strict accordance with NFPA Standard 90-A, 1967 revision. Damper blades shall not exceed 2 inches in depth and shall have rolled edges, interlocking to form full length steel curtain when released by breaking the fusible link. Entire fire damper mechanism shall be housed within a fully galvanized 18-gauge roll formed jacket not exceeding 4 inches of depth. Entire assembly shall be galvanized for corrosion resistance in conformance with ASTM Specification A-93-63T. Fire dampers shall be Air Balance Model 118-FS, Fire Seal, or approved equal.

Fire dampers shall be installed for all outside air intakes for air conditioning units and Air Handling Units, but not for Classroom Unit Ventilators.

22.38 HEATING PIPE INSULATION: All steam supply and return piping, and hot water supply and return piping shall be insulated with fiberglass covering of at least 3.5 lb. per cu. ft. density. Thickness shall be 3/4" up to and including 2" diameter. One inch thick from 2 1/2" to and including 8" diameter, and 1 1/2" over 8" diameter. Covering shall have Universal Fire Retardant jacket.

Apply insulation to clean dry pipe with side and end joints butted tightly. Seal lap of jacket and butt joint strips with fire resistant lagging adhesive.

Insulate all fittings unless otherwise specified with mitered pipe insulation or pre-molded fiberglass fittings, wired in place and made smooth with insulating cement. Jacket shall be 3.2 oz. canvas saturated with fire resistant lagging adhesive.

Insulate all exposed elbow fittings with fiberglass insulation and PVC covers as manufactured by Zeston Inc., 744 State Street, Perth Amboy, New Jersey., or approved equal, installed in accordance with manufacturers recommendations.

22.39 COOLING PIPE INSULATION: All chilled water supply and return piping shall be insulated with Owens-Corning, or approved equal, Fiberglas Dual Temperature pipe insulation 3.5# density, FRJ Jacket. All piping 2 1/2" and under shall be 3/4"; all piping above 2 1/2" shall be 1". Apply insulation to the pipes with side and end joints butted tightly. Adhere the white factory applied vapor barrier jacket smoothly and securely at longitudinal laps with a white or clear vapor barrier fire resistant adhesive. Adhere 4 inch wide strips of jacket material smoothly and securely over all end joints with the vapor barrier adhesive to insure a continuous vapor barrier. Seal off ends of pipe insulation with a vapor barrier coating at all flanges, valves and fittings and at intervals of not more than 21 feet on continuous runs of pipe. Insulate all fittings with Fiberglas molded fitting insulation or mitered segments of Fiberglas Pipe Insulation to a thickness flush with adjoining insulation. Vapor seal the fitting insulation with a wet coat of the vapor barrier coating. While still tacky, embed a layer of glass fabric or knitted glass lagging tape in the mastic. After the initial coat has dried, finish the surface with an additional wet coat to a smooth and neat contour.

Insulate all boiler breechings with 2 inch thick calcium silicate insulation blocks secured with wire or bands, wrapped tightly with hexagonal mesh wire. Insulation shall be finished with asbestos cement 1/2 inch thick applied in two coats. The second coat shall be part portland cement and troweled smooth.

Refrigerant Suction lines and fittings shall be covered with 1/2 inch Armaflex or approved equal. All transverse and longitudinal seams shall be cemented with Armstrong 520 adhesive.

22.40 REMOTE DAMPER CONTROLS: Where required on concealed ductwork, or other areas where required dampers are not accessible for adjustment. This Contractor shall furnish remote damper operators and linkage as manufacturer by Vent Fabrics, or approved equal. Each operator shall be placed so that it is accessible through an access door or ceiling space.

22.41 CEILING DIFFUSERS: All ceiling diffusers shall be as manufactured by Tuttle & Bailey, or approved equal. All diffusers shall be supplied with equalizing deflectors and volumn dampers. Volumn dampers are not required where ductwork dampers are shown which will allow balancing of each diffuser. All diffusers except the straight line units shall be furnished in aluminite steel. The straight line units shall be finished in anodized aluminum. The Heating Contractor shall check each location for diffusers with The General Contractor and supply the proper type of mounting for each type of ceiling and each diffuser so that the diffuser flanges are compatible with the ceiling suspension system. Diffuser sizes and types are shown on the schedule.

22.42 GRILLES AND REGISTERS: All registers shall be supplied with opposed blade dampers which shall be key operated from the face of the unit. All units shall be furnished in prime coated steel. The Heating Contractor shall check with the General Contractor to make sure that all styles and mounting details are compatible with the wall and ceiling finishes. All registers and grilles shall be manufactured by the same manufacturer. Numbers used in the specifications are those of Tuttle & Bailey but Anemostat Waterloo, Barber Colman, or approved equal will be considered.

Supply Grilles shall be T 55
Supply Registers shall be T 557
Exhaust Registers shall be T 78
Return Registers shall be T 78
Exhaust Grilles shall be T 70
Return Grilles shall be T 70

22.43 FLOOR REGISTERS: Floor Registers shall be Tuttle & Bailey Imperialine, series 4000 or approved equal, Type B without frame. Registers shall have apposed blade dampers.

22.44 BREECHING: This Contractor shall furnish and install a breeching as detailed on the drawings. This breeching shall connect to a masonry stack provided by the General Contractor. All angles and pieces required for connection shall be furnished by this Contractor and turned over to the General Contractor for installation during construction of the chimney. The breeching shall be 12 gauge alloy steel. Joints shall be welded.

Breeching shall be provided with a tight seal cleanout at the end and one tight seal cleanout near the chimney suitable for possible installation of a future barometric damper.

22.45 OIL TANK: Furnish and install 7500 gallon fuel oil storage tank. Tank shall be constructed and installed in accordance with the National Board of Fire Underwriters' Standards and applicable state and local codes. The tanks shall have one 24 inch L.D. manhole with extension, collar, bolted cover with bronze bolts and gasket; also suitable openings for the following: (Tank manufactures to confirm openings with boiler manufacturer).

4 inch fill	2" vent
One suction 3/4"	2" guage
One return 3/4"	

Tank shall be protected with a thick coat of asphaltum paint and buried to a depth of not less than 36 inches below grade. Provide poured concrete enclosure around the manholes, extending to grade level with cast iron frame and cover; provide drain openings in sides of enclosure. Tank shall be set on and anchored to a poured, reinforced concrete slab.

Fuel oil supply and return piping shall be wrought iron pipe; the vent line shall be galvanized iron pipe, arranged to drain back to the storage tank and terminating on the building wall approximately 30 inches above grade and a minimum of 2'-0" from any building opening, with weather-proof vent cap. Four inch fill line and two inch sounding line shall terminate at grade with waterproof fill boxes as shown on the drawing. All supply and return piping shall be installed according to the boiler manufacturer's recommendations.

Furnish and install oil tank guage, remote reading type, scale in inches and gallons, of proper type and size for this installation. Petrometer Corporation, or approved equivalent. Mount gauge in Boiler Room for easy reading. Transmission tubing shall be run in protective galvanized pipe.

The Contractor shall fill the tank with #2 fuel oil immediately after the installation of the tank and piping is complete. All fuel oil used thereafter for testing prior to the Owner's full acceptance of the heating system and building will be the responsibility of this Contractor. The tank shall be refilled for final acceptance.

22.46 PUMPS: Base mounted pumps shall be Bell & Gossett Universal, or approved equal, with flexible couplings, sleeve bearings, 1750 rpm motors and mechanical seals. Seals for heating pumps shall be suitable for continuous service at 225° water temperature. Ratings shall be in accordance with the schedule. Pumps shall be designed for quiet operation.

In line pumps shall be Bell & Gossett Booster or approved equal, with flexible coupling, sleeve bearings, 1750 rpm motors and mechanical seals suitable for continuous service at 225° water temperature. Ratings shall be in accordance with the schedule.

22.47 UNIT HEATERS: Unit heaters shall be as manufactured by Nesbitt, Trane, or approved equal. The units shall be sized as shown on the schedule. The type referred to in the schedule pertains to Trane numbers. Water temperature entering the units will be 210°F.

All units shall be supplied with discharge louvers. Each unit shall be suspended from building structure by This Contractor.

22.48 RADIATION: Radiation shall be as manufactured by Nesbitt, Trane, or approved equal. This radiation shall be as shown on the schedule. Model numbers refer to Trane.

All radiation covers shall be continuous from wall to wall or column to column with proper hanging device, end caps or extensions required. Radiation shall go around pilasters, etc. as shown on plans.

All radiation shall be furnished with baked enamel finish.

22.49 CABINET HEATERS: Cabinet heaters shall be as manufactured by Trane, or approved equal. The units shall be as sized on the schedule. Schedule numbers refer to Trane units.

Each unit shall be concealed above the ceiling. The Heating Contractor shall inform the General Contractor of the exact location and size of each unit. Units are designed for 210°F entering water.

22.50 CONVECTORS: Convectors shall be Trane, or approved equal, fully recessed type RG, complete with damper and manual tamper proof dial adjustment. Rating shall be in accordance with the schedule.

This Contractor shall inform the General Contractor of the exact size and location of each recess.

22.51 REHEAT COILS: Reheat coils shall be Trane Type T, or Type WS or approved equal with copper tubes and aluminum fins. Pressure drops shall not exceed .25 inches of water on the air side and .30 ft. of water on the water side. Rating shall be in accordance with the schedule.

22.52 EXHAUST FANS: Exhaust fans shall be Jenn Air as shown on the schedule. All exhaust fans shall be equipped with gravity damper and bird screen. This Contractor shall furnish exact curb dimensions and locations to the General Contractor in time for roof framing. All exhaust fans on the roof or remote from starting location shall be equipped with a separate switch to disconnect the fan from the fan location. All electrical information concerning approved fans shall be given to the Electrical Contractor by the Heating Contractor.

22.53 RETURN AIR FANS: Return air fans shall be Trane or approved equal centrifugal, air foil or backward curved, single width arrangement three, Class I belt driven. Fans shall be equipped with adjustable vibration isolating base for fan and motor. Fans shall be statically and dynamically balanced for minimum vibration. Maximum break horsepower shall not exceed 3.3 at rated RPM. Fans shall have wheel diameter of 40 1/4", capacity shall be as shown on schedule.

22.54 BOILER: Boiler shall be a cast iron sectional boiler, Mills "G3500" 14 section, or approved equal. Boiler shall be rated at 3500 MBH gross output. Unit shall function as a hot water generator and be designed for an allowable working pressure of 40 PSIG. Burner shall be equipped to burn natural gas and No. 2 fuel oil.

Boiler shall be complete with all necessary accessories, including but not limited to: insulated metal jacket, 1 1/2" drain valves, pre-wired electronic burner control panel, main gas pressure regulator, fluid power gas valve, dual gas train assembly as required by gas company, 18 inch Field draft control. High limit control, operating control, ASME relief valves set at 40 PSIG, low water cut off and piping pressure altitude gauge, Mercury column thermometer, Dip tube, air removal fitting, Manual air vent valve, approved non cycling flame failure control.

22.55 AC UNITS: The air conditioning units shall be draw through sprayed coil units, Trane, Carrier or approved equal. Unit shall be complete with copper tube, copper fin chilled water cooling coil, eliminators, space for future reheat coil, circulating spray piping with nozzles, base pan, pump, pump motor, fan, adjustable V belt drive 1750 rpm fan motor, access section with hinged door, low velocity filter section vibration isolators, and preheat coil. Cooling coil pressure drop shall not exceed 5 ft. Preheat coil pressure drop shall not exceed one ft. Provision for automatic bleed off shall be provided, which will operate whenever the spray pump is running. Saturation efficiency shall be not less than 85% when operating on evaporative cooling cycle. Ratings shall be in accordance with the schedule. Fan brake horsepower shall not exceed the motor specified.

22.56 FILTERS: Two complete sets of throw away type fiber glass filter shall be furnished for each air handling unit. One set shall be installed for operation during construction, and shall be maintained or replaced by this Contractor. The other set shall be installed at the completion of the job.

22.57 CHILLER: Chiller shall be a reciprocating hermetic, direct expansion unit with single or multiple compressors, Carrier Model 30HS-80, Trane CG 100B, or approved equal. Chiller shall have capacity of not less than 75 tons when cooling 180 gpm of water from 56° to 46° with a fouling factor of .005 and a pressure drop not to exceed 9 feet.

Pressure vessels shall conform to ASME and Pennsylvania Code for unfired pressure vessels and be so stamped.

Chiller shall be suitable for connection to an air cooled condenser, and shall operate at a condensing temperature not exceeding 120°. Chiller shall have water temperature controller with modulating control or step control with minimum of six steps.

Chiller shall be equipped with vibration isolators and sound absorbing enclosure.

22.58 CONDENSER: Condenser shall be an air cooled condenser suitable for outdoor mounting, Carrier 09DC084, Trane CA-10008, or approved equal. The condenser shall have the capacity necessary to produce 75 tons at the chiller without exceeding 120° condensing temperature when the ambient temperature is 95°. The unit shall be circuited to suit the chiller. Condenser shall be equipped with head pressure control to allow the chiller to operate at minimum capacity with 55° ambient air. Receivers shall be provided in the boiler room large enough to hold the entire refrigerant charge. Receivers shall be in accordance with ASME and Pennsylvania Regulations for unfired pressure vessels and be so stamped.

22.59 SAFETY VALVES: Receivers, chillers, condensers, and other pressure vessels shall have safety valves as required by code. Safety valves shall have discharge piped to outside.

22.60 AUTOMATIC FLOW CONTROL VALVES: Flow control devices shall be Griswold or approved equal, factory set to flows as shown on the drawings. All internal working parts shall be stainless steel. Absorption range shall be 1 to 16 PSI.

22.61 TESTING: Upon completion of this work and prior to the approval of the system, this Contractor shall be required to demonstrate satisfactory performance of all systems under normal operating conditions.

All pumps and motorized equipment shall be run and tested for proper performance, rotation, electrical voltage and current, lubrication and automatic control.

During appropriate stages of the construction the following tests shall be conducted in the presence of the Engineers representative.

All supply and return piping and equipment shall be tested hydrostatically at 50% in excess of the design pressure for not less than fifteen minutes.

Any defective pipes, joints or material shall be replaced and the Test repeated.

The boilers shall be tested, inspected and approved by an inspector representing the Owner's Insurance Carrier.

Direct expansion refrigeration system shall be tested with a mixture of refrigerant and dry nitrogen to a pressure of 300 PSIG on high side and 150 PSIG on low side. All joints shall be carefully checked with a Halide Torch or electronic leak detector.

This Contractor shall perform all tests and arrange for all inspections required by Authorities' having jurisdiction. Necessary tests inspection certificates shall be furnished at this Contractor's expense.

Refrigerant piping shall be dehydrated and tested in strict accordance with the compressor manufacturers published instructions. In the absence of such published instructions the following procedure shall be used:

The completed system shall be pressure tested to 300 p. s. i. g., with a mixture of Freon and dry nitrogen. All joints shall be tested with a Halide leak detector. After the system has been proven thoroughly-tight it shall be evacuated three (3) times with a high efficiency vacuum pump to 0.2 inch hg absolute. The system shall be allowed to stand under vacuum for 24 hours. Then, if a vacuum of 0.2 inch hg can be drawn within 30 minutes, the system shall be considered dry. If not, the procedure shall be repeated. The final vacuum shall be broken by charging with the correct refrigerant.

Gas piping shall be tested in accordance with utility company requirements, which as a minimum shall include a 24 hr. test at 30 PSIG using a recording gauge.

22.62 CLEANING AND FLUSHING: All new recirculating water systems, both open and closed, shall be filled and flushed with a 0.5% solution, by weight, of a non-foaming chemical detergent, to remove all foreign matter, after final filling, PH of the water shall not exceed 8.0.

New boilers shall be boiled out with an alkaline type boiling out compound to remove grease, oil, mill scale and other foreign matter. The compound should be used at the rate of 1/2 pound per boiler horsepower. After the boiling out period, each boiler shall be completely drained, flushed and refilled with fresh water.

22.63 BALANCING AND ADJUSTING: All labor, materials, instruments and equipment necessary to effect a complete and proper balance of the heating, ventilating and air conditioning systems shall be furnished by this Contractor.

The balancing work shall include, but not be limited to the following:

The setting and adjusting of all balancing cocks or valves as required to achieve proper water flows in all parts of all circulating water systems.

The setting and adjusting of all dampers, deflecting vanes, discharge vanes, and accessories to achieve proper air distribution and patterns in all parts of the air supply and exhaust systems.

The setting and adjusting of all belted fan speeds as may be required to attain proper total CFM deliveries.

Submitting a report on each phase of the work.

Instruments used shall have been calibrated within a period of six months prior to balancing. Types, serial numbers, and date of calibration of all instruments shall be listed in the final air and water balance reports.

All balancing valves, cocks, fittings, dampers and the like shall be permanently marked after balance is complete so that they can be restored to their correct position if disturbed at any time.

This Contractor shall review the work required with the Engineer before beginning balancing and adjusting work.

This Contractor shall adhere to the following test outline procedures and submit complete air and water balance reports to the Engineer. Sample of test report forms shall be submitted for approval prior to use. Report shall include at least the following data for each system, with modifications to add or delete specific items as may be required to suit the individual system needs. The drawings may be used to mark up locations and various information for air outlets as long as they are made a part of the report.

With the fan supply system set to handle normal minimum outdoor air, perform the following tests and compile the following information:

1. Air handling equipment

- (a) fan speed
- (b) fan motor operating amperes
- (c) total CFM
- (d) outside air CFM
- (e) return air CFM
- (f) calculated BHP

2. Individual outlets

- (a) Total CFM
- (b) Test result of blow and spread.

Testing and adjusting of individual outlets shall be performed under procedures recommended by the manufacturers of the outlets. All outlets shall be set for air pattern required and all main supply air and return air dampers shall be adjusted and set for design CFM indicated. Any required changes in air patterns or settings necessary for achieving correct air balance, shall be provided by this Contractor.

Water balance shall include heating water, chilled water and condenser water systems. Perform the following tests, compile data and submit reports.

(1) Pumps

- a. Discharge pressures
- b. Suction pressures
- c. Operating head and GPM
- d. Full flow amperes
- e. Calculated BHP

(2) Heating and/or cooling elements

- 1. Entering air and water conditions
- 2. Leaving air and water conditions
- 3. Water temperatures in and out of the refrigeration machines, boilers and cooling tower.

In addition to the above work, check the operation of all automatic temperature control equipment to verify set points and operations. This shall be accomplished after temperature control contractor is completed the work.

This Contractor shall return and check the system and readjust if necessary at least once during peak heating season, peak cooling season, and intermediate season.

NOISE AND VIBRATION CONTROL SPECIFICATIONS

22.64 GENERAL: All vibration control apparatus shall be supplied by a single, recognized manufacturer. Acceptable suppliers shall be Mason Industries, Amber-Booth, Consolidated Kinetics or Korfund.

Duct silencers shall be supplied by a single recognized manufacturer. Acceptable suppliers shall be Industrial Acoustics Company, or Koppers Company.

A representative of the vibration control equipment supplier shall inspect and approve the installation of their equipment. They shall submit a letter to the architect/engineer substantiating that their equipment has been properly installed.

Any requests for changes in the vibration isolation specifications must be submitted in writing in time for review and approval through a written addendum to the specifications prior to bid closing. This section shall also apply to the duct system layouts.

The suppliers of air moving devices shall submit to the Architect at the time of bidding the sound power level of the units in accordance with AMCA Bulletin 300. If, in the actual installations, the sound power level generated by the fan exceeds this level they shall be corrected or replaced at no additional expense to the Owner.

The suppliers of grills and diffusers shall submit at the time of bidding sound power levels generated by their equipment at airflow and pressure drop as specified on the contract drawing by A. S. H. R. A. E. procedure.

The supplier of the duct silencers shall be required to submit laboratory test data from an independent laboratory such as Riverbank Acoustic Laboratory using the Insertion Loss Duct-to-Room method with air flow. Silencer pressure drop ratings shall be obtained using the same silencer as tested by the acoustical testing laboratory. The pressure drop shall be measured by an independent testing laboratory such as Texas Engineering Experimental Station.

22.65 VIBRATION ISOLATION: The isolated fan or packaged air handling units inlets and outlets shall be connected to the ductwork with a flexible connector fabricated from synthetic rubber, glass fiber or asbestos in order to prevent short circuiting the vibration isolation. The minimum clear length of flexible connector not including the clamping section should be 2.5 times the TOTAL PRESSURE of the system or 8 inches, whichever is less:

All wiring and other connections to vibration isolated units shall be made flexible in order to avoid short circuiting the isolators. A 180 degree loop of green-field is acceptable for electrical connections.

Unless otherwise indicated, all equipment mounted on vibration isolated bases shall have a minimum operating clearance of 2 inches between the base and a 4-inch thick concrete housekeeping pad beneath the equipment. The clearance space shall be checked by the Contractor to ensure that no scraps have been left to short circuit the vibration isolation.

Vibration isolation sizes and locations shall be determined by the vibration isolation supplier.

The vibration isolator contractor shall submit drawings for approval stating the static deflection of the isolation element and showing the location of the isolators and base construction.

Fans and other rotating mechanical equipment shall operate at speeds at least 30% outside the critical speed range.

22.66 ISOLATOR TYPES: Type "A" - Spring isolators shall be free standing and laterally stable without any housing. All mounts shall have levelling bolts that must be rigidly bolted to the equipment. Spring diameter shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal spring constant to vertical spring constant is between one and two. If the mounting base plate is bolted to the floor, a vibration isolation washer shall be used under steel washers and boltheads. A Type "F" pad shall be bonded to the base plate of the isolators to act as a sound pad. The Type "A" isolators shall be Mason Type "SLF" Amber-Booth Type "SW", or equal.

Type "B" - Double deflection neoprene mountings. All metal surfaces shall be neoprene covered. The top and bottom surfaces shall be ribbed and bolt holes are to be supplied in the base. The mounts should have levelling bolts that must be rigidly mounted to the equipment. The type "B" isolators shall be Mason Type "ND", Karfund Type "F", Amber-Booth Type "RVD", or equal.

Type "C" - Vibration hangers shall contain a steel spring and a double deflecting neoprene element in series. The spring element shall be as described in Type "A" isolator and the double deflection neoprene element as described in Type "B" isolation. When installed, the spring element shall not be cocked. The hanger shall be able to hold the piping at a fixed elevation during installation. A neoprene spacer shall be inserted in the

steel box where the hanger rod passes through the hanger box to prevent short circuiting. The diameter of the hole in the mounting box including the neoprene spacer shall be at least 3/4" longer than the hanger rod. The Type "C" isolators shall be similar to Mason Type "PDNHS", or equal.

Type "D" - Double deflection neoprene hangers. A neoprene neck shall be provided where the hanger rod passes through the steel box supporting the isolating mount to prevent metal to metal contact. The double deflection, neoprene element shall be as described in Type "B" isolators. The type "D" isolator shall be similar to Mason Type "HD", Amber-Booth Type "BRD", or equal.

Type "E" - Flexible Butyl hose with integral rubber and duct flanges and malleable back-up rings shall be internally wire reinforced to limit elongation to 1.25% of overall length. Clamps are unacceptable. Hoses shall be suitable for 240 degree F service. Flexible length of hose shall be 6 times the diameter or a maximum of 36 inches. The flexible hose shall be equipped with a control cable assembly to protect hose from elongation. The control cable should be supplied with all the required installation hardware. The hose shall be selected by the vibration isolation supplier for pressure requirements. This flexible hose shall be similar to Mason Type "RFH", Amber-Booth Type "RS-SM", or equal.

Type "F" - Vibration isolation sandwich pad consisting of 5/16-inch thick ribbed or waffled neoprene pad 16-gauge steel - 5/16-inch thick ribbed or waffled neoprene pad. The pads shall be selected for optimum 40 psi loading. The neoprene pads for the Type "F" isolator shall be similar to Mason Type "W", Korfund Type "Korpad", Amber-Booth Type "NR", or equal.

Type "G" - Vibration isolation pad. Neoprene 5/16-inch thick pad ribbed or waffled on both sides. Ribbing should be orthogonal. Type "G" neoprene pads should be similar to Mason Type "WMW", Korfund Type "Korpad", Amber-Booth Type "NR", or equal.

22.67 AIR COOLED CONDENSER: The base of the unit shall be installed on a rigid, integral, structural steel frame. Each of the units shall be directly mounted on steel spring isolators, Type "A". The isolators should incorporate a housing that includes vertical resilient limit stops to prevent spring extension when weight is removed and for wind loading. The housing shall serve as a block during erection and a minimum clearance of 1/2-inches shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring operation. Steel springs and mountings shall be hot dipped galvanized. The unit must be firmly bolted to the roof or supporting structure. The isolators shall have a static deflection of 2 inches. The mountings should be Mason Type "SLR", or equal.

22.68 CHILLER: Each unit shall be directly mounted on free standing stable spring isolators Type "A". In the event of severe overhangs, with respect to base mounting points, or a high center of gravity, channel rails shall be supplied by the vibration isolation contractor to be used under the unit to properly distribute the load on the vibration isolators and prevent imbalance tilt.

The isolators shall incorporate a housing that includes vertical resilient limit stops to prevent spring extension when weight is removed. The housing shall serve as a block during erection. A minimum clearance of 1/2-inches shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring operation. Limit stops shall be out of contact during normal operation. The isolators shall have a static deflection of 1 inch. The mountings should be Mason Type "SLR", or equal.

22.69 PUMPS: AH pumps shall be bolted and grouted to spring supported reinforced concrete inertia bases which shall weigh not less than 1 1/2 times the combined weight of the pump and motor. The minimum thickness of the concrete base shall be 12 inches for pump motors over 3 HP, and 9 inches for pump motors 3 HP and less. Each concrete base shall include supports for base elbows at the suction and discharge connections. The concrete base shall be rectangular. The base shall be an integral structural steel perimeter frame, reinforced as required to withstand distortion. The isolators shall be installed on brackets welded to the side of the frame. The isolators shall be Type "A" and shall have a static deflection of 1 inch.

All pumps under 1 HP located on grade should be mounted directly on a reinforced concrete block supplied by the general contractor. The inertia block should be 12 inches thick supported by neoprene mountings having a minimum static deflection of 3/8-inch. The isolators shall be Type "B".

22.70 PIPE: All pipes connected to equipment that is installed on vibration isolated bases shall be suspended, supported or guided by means of appropriate vibration isolation.

All pipes connected to mechanical equipment should be mounted on steel spring and elastomer isolators. Horizontal pipes shall be mounted on sprung isolators from the isolated equipment for the following distances:

<u>Pipe Size</u> up to (inches)	<u>Distance</u> isolated (feet)	<u>Maximum Spacing</u> (feet)
1	10	Use single isolators
2	15	10
4	20	10
6	25	10
8	30	10
10	40	10
12	50	10

Floor supported piping shall be isolated on Type "A" isolators. Use floor stanchions if required. The steel spring element shall have a static deflection of 1-inch except for the first isolator following the vibrating equipment which shall have a static deflection of 1 1/2 times the static deflection of the isolated equipment of 1 inch, whichever is the greater.

Ceiling suspended piping shall be isolated on a Type "C" isolator. The elastomer element shall have a minimum static deflection of 1/4-inch and the steel spring shall have a static deflection of 1-inch, except for the first isolator after the vibrating equipment which shall have a static deflection of 1 1/2 times the static deflection of the isolated equipment or 1-inch, whichever is the greater.

At distances greater than those tabulated above, the piping shall be supported or guided on Type "D" hangers or Type "B" floor mounts with a static deflection of 3/8 inch.

When piping interconnects two pieces of equipment, where one is mounted on vibration isolators and the other is rigidly mounted within distances less than those tabulated above, then the piping shall be mounted on spring type isolators as described above, and the pipe shall be connected to the rigidly mounted equipment using a flexible hose, Type "E".

For vertical pipe runs, where the pipe has to be guided, a vibration mount shall be used. The mount will consist of a captured elastome isolators.

Pipe risers shall be supported on Type "C" isolators.

Where piping connects to the air handling units the connection should be made with Type "E" flexible hose.

When piping passes through a wall or floor, there shall be a minimum clear distance of 1/2 inches and a maximum of 3/4 inches between the pipe and wall or floor. After all of the piping has been installed, the mechanical engineer shall check the clearance, and then the void shall be filled by packing with glass fiber and caulking both ends one inch deep with a non-aging, non-hardening caulking compound.

Flexible hose should be installed in mechanical piping over 4 inches in diameter just prior to penetrating the walls, floors, or ceilings of the machinery room on the machinery room side. Flexible hose may be used at connections to pumps where required by the mechanical engineer for alignment purposed. The flexible hose should be Type "E".

22.71 FANS: Each fan and motor shall be mounted on a continuous integral structural steel base reinforced, as necessary, to withstand the belt pull without drive misalignment or base distortion. Clearance holes shall be provided in the structural base to correspond to the mounting bolt holes of the fan. Bases shall have built-in motor slide rails. The base shall be constructed with at least deep angle construction, have minimum vertical angle legs of 4 inches. The bases shall be supported by unrestrained free standing steel springs Type "A". The bases should be equal to Mason Type "SLF", or equal with a spring static deflection of 1-inch for fan EX-1, and Mason Type "WFSL", or equal, with a spring static deflection of 2 inches for fan EX-2. The fan base for fan EX-2 shall use structural beams whose depth equals 10% of the longest base dimension.

The entire air handling unit shall be mounted on a continuous integral structural steel base. The base shall be constructed with a structural beam whose depth equals 10% of the longest dimension. The base will be supported on brackets welded to the side of the base. The bases shall be supported on Type "A" isolators. The static deflection of the springs shall be 1-inch for unit AC-1 and 2.5 inches for unit AC-2.

22.72 ACOUSTICAL LINING: The sound absorbing material shall not impart any odor to the air, delaminate or be loosened by the air stream under normal operating conditions. All lining which is damaged in shipment shall not be installed.

Duct liner shall meet the NFPA 90A standards. It shall be Owens Corning Aeroflex, Guston Bacon Ultra-fine, or equal.

For air velocities up to 1500 fpm, the liner should be adhered to the duct using a minimum of a 50% coverage of fire-resistant adhesive. When the duct width exceeds 12 inches or the height of 24 inches, the liner shall be additionally secured with mechanical fastening on maximum 16 inch centers on all sides. Mechanical fasteners which pierce the duct are unacceptable. For velocities from 1500 to 4000 fpm in addition, before installing the lining coat, paint the edges with a fire resistant coating where the insulation butts together.

The leading edge of the lining shall have a 24-gauge galvanized steel nosing piece. All ends of the lined duct shall be coated before assembly with a cementing material that will prevent delamination, leakage or erosion.

The sound absorption coefficient for a 1-inch thick duct lining shall be:

Density, PCF

Noise Reduction Coefficient (#6 mount)

2

.80

3

.85

The entire supply and return system should be acoustically lined with a 1-inch thick 2 pcf duct liner including the fresh air intake, return air ducts, and the ducts connecting the return fan to the supply fan.

The toilet exhaust ducts should be lined with a 1-inch thick 2 pcf duct liner for a distance of 4 feet back from each grill.

The following ducts should be acoustically lined with a 2-inch thick 3 pcf duct liner.

The duct from unit AC-1 up to the duct division where the 55 x 28 duct change to a 36 x 12 and 32 x 28 duct.

For unit AC-2, line the supply duct from the fan unit up to and including the vertical shaft up to a point 12 feet in the horizontal direction from the shaft on each of the floors.

Line the return air ducts from each of the practice rooms and studios from the wall grill back to the corridor header. If the duct from the wall grill to the header is less than 4 feet, line the corridor header between these grills with a 2-inch thick duct liner.

22.73 DUCT SILENCERS: Furnish and install duct silencers as called for in the specifications.

Outer casing of rectangular duct silencers shall be fabricated from not less than 22-gauge galvanized steel in accordance with the recommended practices in the ASHRAE Guide. Seams shall be lock formed and mastic filled. The internal baffles shall be not less than 24-gauge galvanized perforated steel having an open area of at least 30%. Nosing pieces and tails shall be as per manufacturer's design. The sound absorbing media shall be not less than 4 1/2 pcf Aerocore glass fiber (mineral wool is unacceptable) packed under 5% compression. The material shall be inert, vermine and moisture proof. The sound absorbing material shall be protected from erosion by wrapping it in bonded glass fiber mat for internal velocities of 1500 fpm and less and a glass fiber cloth for velocities over 1500 fpm. The silencer shall be leakproof at a differential air pressure of 8 inches w.g.

The static pressure across the silencer should be less than 0.1 inches for the exhaust system and 0.2 for supply system.

Duct silencers shall have the following Insertion Loss with an air flow of 2,000 fpm through them:

		<u>Insertion Loss in dB</u>		
		<u>Octave Band Center Frequency (Hz)</u>		
<u>Silencer Type</u>	<u>Length</u>	<u>125</u>	<u>250</u>	<u>500</u>
Type 3S	3 feet	10	15	20
Type 3M	3 feet	8	10	12

Install a duct silencer in the following locations:

Fan EX-1, Install a Type 3M silencer in the 44 x 28 branch.
Install a Type 3S silencer in the 23 x 28 riser; or install a single Type 3S silencer at the inlet to the EX-1 fan.

Fan EX-2, Install a Type 3M silencer in the 60 x 24 inch return air duct.

Fan AC-2, Install a Type 3S silencer in the 60 x 24 inch supply duct.

22.74 AUTOMATIC TEMPERATURE CONTROLS: Alter and extend the present Johnson Service Company System of Automatic Temperature Control as shown on the drawings and as specified hereinafter. The system shall be installed, adjusted and guaranteed by the Johnson Service Company, except that automatic valves and dampers furnished shall be set in place by the Mechanical Contractor and power wiring to the air compressor, and basement ATC panel shall be installed by the Electrical Contractor.

The control manufacturer shall guarantee all equipment furnished by him against original defects for a period of one year and shall maintain the control system in adjustment for one year from the final date of acceptance, without expense to the Owner.

The control manufacturer shall furnish a complete set of control diagrams with detailed operating instructions for the Engineer's approval before starting his installation. On the completion of the project, the control manufacturer shall provide a complete instruction manual covering the function and operation of all control components on the job. This manual shall be furnished to the Owner's operating personnel, and a competent technician shall be provided for instruction purposes.

The outdoor relief and return air dampers for the air conditioning units shall be furnished by the control manufacturer. These dampers shall be fabricated of #16 galvanized blades rotating in 2-inch channel iron frames equipped with solid stops. All dampers shall be of the opposed blade type with blades not exceeding 9 inches in width.

Air lines to properly connect the control system shall be of copper tubing using air tight solder and compression fittings. All tubing shall be run concealed in finished rooms, and shall be run in straight lines parallel with the lines of the building. The entire air piping system shall be tested with a pressure of 30# on the line and there shall be no more than a 3# pressure drop within a 24-hour period. Air line connections behind the automatic temperature control panels may be run in plastic tubing. Plastic tubing may be used in lieu of copper, in concealed, accessible areas.

Pressure electric switches and/or relays furnished and installed by the control manufacturer shall be mounted near motor starting equipment which they control.

For the control of the radiation zone of hot water, furnish and install a capillary type outdoor master thermostat with its sensing element located, where shown on the drawings, which shall function to reset the operating temperature of a submaster capillary type thermostat, with its sensing element located in the hot water supply main. The outdoor sensing element shall be protected by a sun shield and lag tube, fabricated of aluminum or stainless steel. These controls shall function to reset the supply water temperature inversely to outdoor temperature. The range of temperatures over which the outdoor master thermostat functions and the range of readjustment of the submaster thermostat shall be entirely adjustable in the field. The submaster thermostat referred to shall operate to control a diaphragm type mixing valve, to be installed in the hot water piping, as shown on the drawings, to maintain the desired supply water temperature as dictated by the outdoor master thermostat. In addition, the outdoor master thermostat shall position a pressure electric switch to stop radiation hot water circulating pump whenever the outdoor temperature rises above 68° F., or as selected, and start the chilled water pump whenever the outdoor temperature rises above 55° F., or as selected. The existing outdoor master thermostat may be used for the above.

For the control of each propeller type unit heater furnish and install an electric single temperature room thermostat which shall cycle the unit fan motor to maintain the desired space temperature.

For the control of each cabinet type unit heater furnish and install a single temperature intermediate acting room thermostat which shall function on a rising room temperature to first, gradually close a heating coil two-way valve and then index a pressure electric switch to stop the fan motor. On a falling room temperature the reverse sequence shall occur.

Air conditioning units AC-1 and AC-2 shall be controlled in an identical manner. Furnish and install in the basement equipment room an ATC panel in which shall be mounted one seven-day program clock and two manual selector switches marked "occupied" - "clock" - "unoccupied." When either switch is indexed to the "unoccupied" cycle its respective AC unit and return air fan shall operate continuously and shall be controlled as specified hereinafter, except that the outdoor and relief dampers shall remain closed. When both switches are indexed to "unoccupied" all exhaust fans shall stop. When either or both switches are indexed to "occupied" the exhaust fans shall run continuously and the units shall be controlled as follows:

A. Furnish and install a solenoid air valve which shall open the outdoor and relief air damper to a minimum open position as determined by the setting of a minimum pressure relay whenever the fan is running. When the fan is stopped the outdoor and relief damper shall close and the spray water pump shall stop.

B. For each area served by these units furnish and install a single temperature room thermostat which shall function on a rising room temperature to gradually close a reheat coil two-way or three-way valve as shown on the drawings. On a falling room temperature the reverse shall occur. The room thermostats serving the choral and band rooms shall in addition to the above, function through a pressure selector to reset the operating temperature of a submaster dew point controller inversely to room conditions.

C. Furnish and install a return air humidistat which shall function on a rising return air relative humidity to first reset the operating point of the submaster dew point controller to a lower value and then index a pressure electric switch to stop the spray water pump. On a falling humidity the reverse sequence shall occur.

D. Furnish and install a submaster dew point thermostat which shall function on a rising fan discharge temperature to first, gradually position the heating coil three-way mixing valve closed to the coil, then gradually open the outdoor and relief dampers simultaneously closing the return air damper from the minimum position to introduce 100% outdoor air, and then gradually position a cooling coil three-way mixing valve to permit full flow through the cooling coil. On a falling fan discharge temperature the reverse sequence shall occur.

E. Furnish and install an outdoor in-take thermostat which shall gradually close the outdoor and relief dampers to their minimum open position simultaneously opening the return air damper whenever outdoor air can no longer assist in cooling. Furnish and install an outdoor in-take thermostat which shall operate the heating coil secondary pump continually below 70°F. outside air. Furnish and install a freeze protection thermostat with its element serpentine across the discharge of the heating coil and so connect it to stop the fan motors, should the temperature fall below 35°F. or as selected.

Furnish and install a flow switch which shall prevent the operation of the water chiller unless flow through the chiller is established.

Furnish and install in the new equipment room adjacent a new high pressure air compressor, mounted on a 60 gallon ASME storage tank. This compressor shall be sized to operate the entire building on less than one-third operation and shall be equipped with no less than one horsepower motor. A high pressure line shall be installed to inter-connect the present and new air compressor storage tanks. The existing compressor shall remain for standby emergency use. Furnish and install a refrigerated type air drier and an oil filter. Existing pressure reducing assembly shall be relocated to the new compressor.

Fire-stats shall be installed in return air fan discharge to stop both fans. Fire - stats shall be manually reset.

Whenever partitions are pierced with air tubing, the opening shall be tightly sealed with cauking.

DIFFUSER SCHEDULE

(NOTE 1)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>	<u>STYLE</u>
D-1	2	288	18 x 9	2L
D-2	4	123	9 x 9	4
D-3	5	54	6 x 6	2
D-4	6	61	6 x 6	2
D-5	7	61	6 x 6	2
D-6	8	54	6 x 6	2
D-7	9	65	6 x 6	2
D-8	10	62	6 x 6	2
D-9	11	62	6 x 6	2
D-10	12	62	6 x 6	2
D-11	21	134	9 x 9	4
D-12	22	131	9 x 9	2
D-13	23	54	6 x 6	2
D-14	24	58	6 x 6	2
D-15	25	58	6 x 6	2
D-16	26	54	6 x 6	2
D-17	27	54	6 x 6	2
D-18	29	58	6 x 6	2
D-19	30	54	6 x 6	2
D-20	31	58	6 x 6	2
D-21	32	58	6 x 6	2
D-22	33	54	6 x 6	2

DIFFUSER SCHEDULE (cont.)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>	<u>STYLE</u>
D-23	34	58	6 x 6	2
D-24	36	58	6 x 6	2
D-25	37	58	6 x 6	2
D-26	101	400	15 x 15	2
D-26A	101	150	9 x 9	4
D-27	104	57	6 x 6	4
D-28	107	132	9 x 9	2
D-29	108	78	9 x 6	2S
D-30	109	78	9 x 6	2S
D-31	110	133	9 x 9	1
D-32	111	205	12 x 12	2
D-33	112	227	12 x 12	2
D-34	113	205	12 x 12	2
D-35	114	205	12 x 12	2
D-36	120	157	12 x 9	4
D-37	122	163	12 x 12	4
D-38	125	135	9 x 9	4
D-39	126	180	12 x 12	2
D-40	127	90	9 x 6	4
D-41	129	222	12 x 12	2
D-42	41	545	18 x 18	4

DIFFUSER SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>	<u>STYLE</u>
D-43	201	338	15 x 15	2
D-44	202	344	15 x 15	2
D-45	203	250	12 x 12	2
D-46	204	376	15 x 15	2
D-47	208	278	15 x 15	2
D-48	209	248	12 x 12	2
D-49	210	308	15 x 15	2
D-50	211	248	12 x 12	2
D-51	212	121	9 x 9	2
D-52	218	230	12 x 12	2
D-53	219	317	15 x 15	2
D-54	220	228	12 x 12	2
D-55	221	214	12 x 12	4
D-56	301	375	18 x 12	2S
D-57	302	424	21 x 15	2S
D-58	303	360	18 x 12	2S
D-59	304	424	21 x 15	2S
D-60	305	424	21 x 15	2S
D-61	306	450	21 x 15	2S
D-62	309	267	18 x 9	2S
D-63	310	287	18 x 9	2S
D-64	311	385	18 x 12	2S

DIFFUSER SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>	<u>STYLE</u>
D-65	312	279	18 x 9	2S
D-66	313	105	9 x 9	2
D-67	318	298	12 x 12	4
D-68	319	326	15 x 15	4
D-69	320	151	12 x 6	3S
D-70	321	301	12 x 12	4
D-71	322	237	15 x 9	2
D-72	323	175	9 x 9	4
D-73	323	88	9 x 9	1
D-74	323	241	12 x 12	2S
D-75	324	102	9 x 6	2S
D-76	325	55	6 x 6	4

Notes

1. Style based on Tuttle & Bailey Type M

RETURN REGISTER SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>
RR-1	2	1155	20 x 10
RR-2	4	123	8 x 6
RR-3	5	54	8 x 6
RR-4	6	61	8 x 6
RR-5	7	61	8 x 6
RR-6	8	54	8 x 6
RR-7	9	130	8 x 6
RR-8	10	62	8 x 6
RR-9	11	62	8 x 6
RR-10	12	62	8 x 6
RR-11	21	535	18 x 6
RR-12	22	131	8 x 6
RR-13	23	54	8 x 6
RR-14	24	58	8 x 6
RR-15	25	58	8 x 6
RR-16	26	54	8 x 6
RR-17	27	54	8 x 6
RR-18	29	58	8 x 6
RR-19	30	54	8 x 6
RR-20	31	58	8 x 6
RR-21	32	58	8 x 6
RR-22	33	54	8 x 6

RETURN REGISTER SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>
RR-23	34	58	8 x 6
RR-24	36	58	8 x 6
RR-25	37	58	8 x 6
RR-26	39	176	8 x 6
RR-27	41	2,090	24 x 18
RR-28	101	1,485	24 x 12
RR-29	104	337	12 x 6
RR-30	107	132	8 x 6
RR-31	108	78	8 x 6
RR-32	109	78	8 x 6
RR-33	110	132	8 x 6
RR-34	111	205	8 x 6
RR-35	112	227	8 x 6
RR-36	113	205	8 x 6
RR-37	114	205	8 x 6
RR-38	120	627	12 x 12
RR-39	122	163	8 x 6
RR-40	125	270	10 x 6
RR-41	126	359	10 x 8
RR-42	127	90	8 x 6
RR-43	129	222	8 x 6
RR-44	201	1,350	24 x 12
RR-45	202	1,375	24 x 12

RETURN REGISTER SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>
RR-46	203	250	10 x 6
RR-47	204	376	10 x 8
RR-48	208	278	10 x 6
RR-49	209	248	10 x 6
RR-50	210	308	12 x 6
RR-51	211	248	10 x 6
RR-52	212	241	10 x 6
RR-53	218	920	18 x 12
RR-54	219	634	12 x 12
RR-55	220	912	18 x 12
RR-56	221	640	12 x 12
RR-57	301	375	10 x 8
RR-58	302	424	12 x 8
RR-59	303	360	10 x 8
RR-60	304	424	12 x 8
RR-61	305	424	12 x 8
RR-62	306	450	12 x 8
RR-63	309	367	10 x 8
RR-64	310	287	12 x 6
RR-65	311	385	10 x 8
RR-66	312	279	12 x 6
RR-67	313	105	8 x 6
RR-68	318	298	12 x 6

RETURN REGISTER SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>
RR-69	319	326	12 x 6
RR-70	320	151	8 x 6
RR-71	321	301	12 x 6
RR-72	322	237	10 x 6
RR-73	323	1044	18 x 12

EXHAUST REGISTER SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>CFM</u>	<u>SIZE</u>
ER-1	17	211	8 x 6
ER-2	19	211	8 x 6
ER-3	18	56	8 x 6
ER-4	117	211	8 x 6
ER-5	119	211	8 x 6
ER-6	118	56	8 x 6
ER-7	123	32	8 x 6
ER-8	124	32	8 x 6
ER-9	214	211	8 x 6
ER-10	216	211	8 x 6
ER-11	215	56	8 x 6
ER-12	307	56	8 x 6

REHEAT COIL SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>BTUH</u>	<u>GPM</u>	<u>P.D.</u>	<u>SIZE</u>
RH-1	16	39,390	1.97	.09	36 x 18
RH-2	19	5,384	.27	.10	24 x 6
RH-3	20	31,940	1.59	.08	24 x 18
RH-4	19	966	.05	.10	24 x 9
RH-5	111	3,500	.18	.08	18 x 6
RH-6	112	3,500	.18	.08	18 x 6
RH-7	113	3,320	.17	.08	18 x 6
RH-8	114	3,320	.17	.08	18 x 6
RH-9	110	2,160	.11	.06	12 x 6
RH-10	122	2,640	.13	.06	12 x 6
RH-11	107	2,140	.11	.06	12 x 6
RH-12	104	5,460	.27	.06	12 x 12
RH-13	117	10,150	.51	.10	24 x 6
RH-14	108	1,265	.06	.06	12 x 6
RH-15	109	1,265	.06	.06	12 x 6
RH-16	128	92,700	4.64	.09	36 x 24
RH-17	126	5,820	.29	.10	24 x 6
RH-18	125	4,380	.22	.06	12 x 9
RH-19	100	24,100	1.21	.09	36 x 12
RH-20	129	3,600	.18	.08	18 x 6

REHEAT COIL SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>BTUH</u>	<u>GPM</u>	<u>P. D.</u>	<u>SIZE</u>
RH-21	127	1,460	.07	.06	12 x 6
RH-22	211	4,200	.21	.08	18 x 6
RH-23	212	3,900	.20	.08	18 x 6
RH-24	208	4,500	.22	.08	18 x 6
RH-25	209	4,020	.20	.08	18 x 6
RH-26	210	4,990	.25	.08	18 x 6
RH-27	221	10,380	.52	.12	30 x 9
RH-28	205	6,100	.31	.10	24 x 6
RH-29	200	21,900	1.09	.09	36 x 12
RH-30	200	22,300	1.11	.20	42 x 9
RH-31	217	4,050	.20	.08	18 x 6
RH-32	200	14,750	.74	.15	36 x 9
RH-33	219	10,280	.52	.12	30 x 9
RH-34	218	14,900	.75	.15	36 x 9
RH-35	302	7,380	.37	.08	18 x 9
RH-36	304	7,380	.37	.08	18 x 9
RH-37	305	7,380	.37	.08	18 x 9
RH-38	303	7,360	.37	.08	18 x 9
RH-39	301	7,600	.38	.08	18 x 9
RH-40	306	8,830	.44	.08	18 x 9
RH-41	318	6,140	.30	.09	36 x 6

REHEAT COIL SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>BTUH</u>	<u>GPM</u>	<u>P. D.</u>	<u>SIZE</u>
RH-42	320	14,910	.75	.08	18 x 9
RH-43	321	6,290	.31	.08	18 x 9
RH-44	313	2,148	.11	.06	12 x 6
RH-45	322 & 323	16,660	.83	.08	18 x 12
RH-46	323	18,790	.94	.08	18 x 9
RH-47	310	5,500	.28	.06	12 x 9
RH-48	309	5,940	.29	.06	12 x 12
RH-49	312	6,010	.30	.06	12 x 12
RH-50	311	7,730	.39	.06	12 x 12
RH-51	323	2,840	.14	.08	12 x 9
RH-52	324	2,305	.11	.06	12 x 9
RH-53	325	3,315	.17	.06	12 x 9
RH-54	22	2,120	.11	.06	12 x 6
RH-55	23	1,000	.05	.06	12 x 6
RH-56	24	1,000	.05	.06	12 x 6
RH-57	25	1,000	.05	.06	12 x 6
RH-58	26	1,000	.05	.06	12 x 6
RH-59	27	1,000	.05	.06	12 x 6
RH-60	29	1,000	.05	.06	12 x 6
RH-61	30	1,000	.05	.06	12 x 6
RH-62	31	1,000	.05	.06	12 x 6

REHEAT COIL SCHEDULE (continued)

<u>TAG</u>	<u>ROOM</u>	<u>BTUH</u>	<u>GPM</u>	<u>P. D.</u>	<u>SIZE</u>
RH-63	32	1,000	.05	.06	12 x 6
RH-64	33	1,000	.05	.06	12 x 6
RH-65	34	1,000	.05	.06	12 x 6
RH-66	36	1,000	.05	.06	12 x 6
RH-67	37	1,000	.05	.06	12 x 6
RH-68	5	1,000	.05	.06	12 x 6
RH-69	6	1,000	.05	.06	12 x 6
RH-70	7	1,000	.05	.06	12 x 6
RH-71	8	1,000	.05	.06	12 x 6
RH-72	4	2,230	.11	.06	18 x 6
RH-73	10	1,500	.08	.06	12 x 6
RH-74	11	1,500	.08	.06	12 x 6
RH-75	12	1,500	.08	.06	12 x 6

NOTE: All reheat coil ratings based on 210° entering water, 40° drop, and 60° entering air.

RADIATION SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>BTU/HR REQ'D</u>	<u>TYPE</u>	<u>LENGTH</u>
R- 1	2	5,260	B7-3	9'
R- 2	9	1,100	B7-3	3'
R- 3	10	420	B7-3	3'
R- 4	11	420	B7-3	3'
R- 5	12	420	B7-3	3'
R- 5A	21	1,772	B7-3	3'
R- 5B	22	574	B7-3	3'
R- 5C	27	352	B7-3	3'
R- 8	106	5,700	B7-3	5'
R- 9	110	1,665	B7-3	3'
R-10	111	1,882	B7-3	3'
R-11	112	1,882	B7-3	3'
R-12	113	1,528	B7-3	3'
R-13	114	1,665	B7-3	3'
R-14	121	7,605	B10-3	7'
R-15	122	2,735	B7-3	4'
R-16	123	1,033	B7-3	3'
R-17	129	820	B7-3	3'
R-18	101	3,315	B7-3	6'
R-19	104	6,700	B7-3	10'
R-19A	102	3,845	B7-3	6'
R-20	107	2,165	B7-3	3'

RADIATION SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>BTU/HR REQ'D</u>	<u>TYPE</u>	<u>LENGTH</u>
R-21	201	6,360	B7-3	10'
R-22	202	4,922	B7-3	7'
R-23	204	1,530	B7-3	3'
R-24	208	1,455	B7-3	3'
R-25	209	1,320	B7-3	3'
R-26	210	1,818	B7-3	3'
R-27	211	1,320	B7-3	3'
R-28	212	1,320	B7-3	3'
R-29	218	4,552	B7-3	7'
R-30	219	3,800	B7-3	5'
R-31	220	4,350	B7-3	6'
R-32	221	6,545	B7-3	10'
R-33	301	3,380	B7-3	5'
R-34	302	2,436	B7-3	5'
R-35	303	1,933	B7-3	3'
R-36	304	2,436	B7-3	5'
R-37	305	2,436	B7-3	5'
R-38	306	2,436	B7-3	4'
R-39	307	4,089	B7-3	6'
R-40	309	1,945	B7-3	3'
R-41	310	1,455	B7-3	3'
R-42	311	1,945	B7-3	3'

RADIATION SCHEDULE (cont.)

<u>TAG</u>	<u>ROOM</u>	<u>BTU/HR REQ'D</u>	<u>TYPE</u>	<u>LENGTH</u>
R-43	312	2,550	B7-3	4'
R-44	313	1,117	B7-3	3'
R-45	319	3,730	B10-3	4'
R-46	322	4,560	B7-3	8'
R-47	323	5,055	B7-3	10'
R-48	325	3,670	B7-3	6'

UNIT HEATER SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>CAPACITY</u>	<u>HP</u>	<u>GPM</u>	<u>MODEL</u>
UH-1	401	29,810	1/8	1.49	100-S
UH-2	15	90,000	1/6	4.72	168-S

CABINET HEATER SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>CAPACITY</u>	<u>RPM</u>	<u>GPM</u>	<u>MODEL</u>
CH-1	120	35,000	1050	1.75	04
CH-2	100	35,000	1050	1.75	04
CH-3	105	35,000	1050	1.75	04

CONVECTOR SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>CAPACITY</u>	<u>GPM</u>	<u>TYPE</u>
CH-1	Stair "A"	10,037	.5	RG-26"x56"x6"
CH-2	Stair "B"	12,017	.6	RG-26"x56"x8"

FAN SCHEDULE

<u>TAG</u>	<u>CFM</u>	<u>S. P.</u>	<u>RPM</u>	<u>H. P.</u>	<u>SERVICE</u>
F-1	13,550	1 1/4"	485	5	Return Air
F-2	14,174	1 1/4"	502	5	Return Air
F-3	1,554	.3	815	1/4	Toilet Exhaust

Fan F-3 to be equipped with Birdscreen, automatic back draft dampers and high efficiency sound attenuating curb.

Fan F-1 and F-2 shall have adjustable V-belt drives.

PUMP SCHEDULE

<u>TAG</u>	<u>ROOM</u>	<u>GPM</u>	<u>HEAD</u>	<u>MODEL</u>	<u>HP</u>	<u>SERVICE</u>	<u>TYPE</u>	<u>NO. REQ'D</u>
P-1	15	75	23'	U2-A	1	Hot Water Primary	Base-mtd	2
P-2	15	16	30'	U 1 1/4 A	3/4	Hot Water Heating	Base-mtd	1
P-3	15	180	50'	U 2 1/2 B	5	Chilled Water	Base-mtd	1
P-4	15	124	15'	U 2 1/2 A	1	Hot Water Primary	Base-mtd	1
P-5	15	17	6'	"75"	1/12	Secondary Hot Water	In Line	1
P-6	401	14	6'	"75"	1/12	Secondary Hot Water	In Line	1

AIR CONDITIONING UNIT SCHEDULE

	<u>AC-1</u>	<u>AC-2</u>
<u>LOCATION</u>	<u>Basement</u>	<u>Penthouse</u>
Air Quantity, CFM	13,550	14,350
External Static Pressure, in water	.8	1.0
Motor Size, H. P.	7 1/2	7 1/2
Cooling Coil Water Quantity, GPM	90	90
Cooling Coil entering Water Temperature, Degree F	46	46
Cooling Coil Load, MBH	468	460
Cooling Coil Entering Air DB & WB	81.1 & 67.8	81.0 & 66.8
Cooling Coil Leaving Air DB & WB	57.6 & 56.5	57.6 & 56.5
Preheat Coil Water Quantity, GPM	16.8	13.2
Preheat Coil Entering Water Temp., Degree F.	210	210
Preheat Coil Load, MBH	336	263
Preheat Coil Entering Air Temp., Degree F.	52.6	58.0
Cooling Coil Minimum Face Area, sq. ft.	27.2	28.8

ALTERNATE NO. 1
to
SPECIFICATIONS
for
WILKES COLLEGE FINE ARTS CENTER ADDITION
Wilkes-Barre, Pennsylvania

In preparing estimates the contractors are requested to submit alternate proposals stating the amounts to be added or deducted from the base bid which would affect the contract. If any alternate proposals are accepted, alternate numbers as noted on this list of alternates shall be used in preparing the contract form and shall refer to the detailed description under the alternate number as listed. The specification of any alternate accepted shall take precedence over the portion of the general specification to which it refers.

ALTERNATE NO. 1

State the amount to be deducted from the base bid for the omission of the "Portable Closed Circuit Televising Equipment" as specified on pages 23-31 to 23-37 of the specifications. (PAGE 23-36 ONLY)

SECTION XXIII - ELECTRICAL

23.01 SCOPE OF WORK: Work under this section of the Contract shall include all labor and materials required for the following as specified herein and shown on the drawings.

- A. Complete electrical system for general lighting and power.
- B. All electrical work for the Plumbing, Heating, Ventilating and air conditioning systems as specified.
- C. Complete Fire Alarm System.
- D. Complete Emergency and Exit Lighting System.
- E. Certain work for Bell Telephone System.
- F. Complete Supervisory Time and Program Bell System.
- G. Complete Intercommunication System.
- H. Extend Closed Circuit Television System facilities as indicated on the drawings.
- I. Extend Radio and TV Broadcast Pickup facilities as indicated on the drawings.
- J. Special Electron Systems as specified herein and shown on the drawings that is Intercom, Master Recording, Remote Recording, Speakers and Jacks for built-in Stereo Units etc.

These specifications, in conjunction with the working drawings, are intended to provide finished work, and all items called for by either or both are to be considered as part of the job. Any items omitted from the specifications or drawings, which are clearly necessary for the completion of the work, shall be included in the Contract, unless specifically mentioned otherwise.

23.02 REFERENCE DATA: As soon as practical after the date of the Contract, a complete itemized schedule of materials and equipment which the Contractor proposes to use shall be submitted to the Architects for approval. This schedule shall include shop drawings, cuts, diagrams, descriptive data, ratings and dimensions as may be required to present a clear picture of the following materials and equipment plus data requested by the Architects on any other equipment:

None of the materials shall be installed until they have been approved by the Architects. This schedule shall be submitted with such promptness as to cause no delay in the work of any of the Contractors. Architects' approval of any submittals shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless he has called them to the Architects' attention in writing at the time of submission, nor shall it relieve him from the responsibility for errors in these submittals.

23.03 RULES AND REGULATIONS: The rules and regulations of all governmental agencies having jurisdiction and the latest publication of the National Electric Code shall be considered as included in these specifications, and all their requirements shall be fully met and strictly adhered to. All work shall meet the requirements and standards of the Utility Company serving the area. Upon completion of the electrical work, this Contractor shall pay for and deliver to the Architects, two copies of an Underwriters' certificate of final approval. All necessary permits and approvals shall be applied for and paid for by this Contractor. Nothing contained in these specifications shall be construed to conflict in any way with these aforementioned codes, rules and regulations.

23.04 SCHEDULING OF WORK: The Electrical Contractor shall plan his work so that the entire existing building remains in operation while the new work is proceeding.

The Electrical Contractor shall schedule all circuit transfers and service interruptions with the Owner's representative through the General Contractor and obtain approval of the time of day or night and length of interruption before proceeding with the work so that persons involved are informed and necessary temporary provisions can be arranged.

23.05 EXAMINATION OF PREMISES: Before submitting proposals of the work each bidder shall be held to have examined the premises and satisfied himself as to the existing conditions under which he will be obliged to operate in performing his part of the work. No extras will be allowed Contractor on account of his failure to make the above examination or neglect to include all materials and labor required to complete the work.

23.06 COORDINATION OF WORK: This Contractor shall work in conjunction with all other Contractors on this building in order to facilitate the proper and intelligent execution of the work, and where any apparatus, conduits, or other work conflicts with the work of other Contractors, shall consult with the Architects before installation and relocate as directed.

23.07 MEASUREMENTS: The drawings indicate the general arrangement of the system. This Contractor shall verify all measurements and dimensions on the job site, and shall check all connections with the shop drawings. Details of proposed changes found necessary by field conditions or other causes shall be submitted to the Architects for approval before proceeding with any such change.

23.08 EXCAVATION, BACKFILL AND REPAVE: This Contractor shall be responsible for all excavation, backfill and rough grading necessary to properly install all underground feeders and other electrical material requiring excavation. All backfilling shall be placed in six inch layers and tamped. Final grading and paving where required shall be done by the General Contractor.

23.09 CUTTING AND PATCHING: The Electrical Contractor shall be responsible for all cutting necessary to properly install all electrical equipment and shall make good all damage to buildings, piping, equipment, etc., caused either directly or indirectly by his workmen, using skilled mechanics for the trade involved. No cutting or patching is to be done until the matter has been first called to the attention of the General Contractor and his approval received. The Electrical Contractor shall arrange for necessary chases, sleeves, etc., in advance to avoid unnecessary cutting and patching. Failure to make arrangements with the General Contractor within reasonable time limit shall relieve the General Contractor of all responsibility and it shall become the duty of the Electrical Contractor to pay for any cutting and patching.

23.10 HANGERS AND SUPPORTS: This Contractor shall furnish and install all hangers and supports for materials he is to install. Approved clamping devices shall be used at all locations of longspan trusses and open bar joist. Drilling of longspan trusses and open bar joist for the support of materials and equipment will not be permitted. All electrical equipment shall be installed utilizing wood screws on wood, machine screws or bolts on iron or steel, and by expansion shields with machine screws or bolts on fireproof walls or ceilings. Where electrical materials and equipment is to be supported from beams, girders, purlins, etc., hanger supports shall be of the type that will not be loosened by vibration.

23. 11 STANDARDS OF MATERIAL AND WORKMANSHIP: All electrical materials and equipment shall be new and listed by the Underwriters' Laboratories, Incorporated, shall meet their requirements and shall bear their label wherever standards have been established and label service is regularly furnished by that agency. It shall be the responsibility of the Electrical Contractor to exercise necessary precaution to prevent accumulation of water, dirt, or concrete in conduits for all purposes during the execution of all electrical work. Conduits in which water or foreign material has been permitted to accumulate shall be thoroughly cleaned or replaced where such accumulations cannot be removed by methods approved by the Architects.

All electrical materials and equipment shall be kept six inches from all parallel runs of steam and hot water lines and flues and sprinkler lines and heads. No wiring for any purpose shall be installed until work which might cause damage to the conductors has been completed.

23. 12 TESTING AND INSPECTION: All electrical work shall be free from short circuits and improper grounds and shall be tested for proper operation under actual working conditions. Any circuits or equipment not operating satisfactorily and any failures shall be corrected in a manner satisfactory to the Architects. The superintendent or foreman shall give personal assistance if required, for all inspections of the work.

23. 13 EQUIPMENT BACKBOARDS: The Electrical Contractor shall furnish and install backboards as noted on the drawings of the size required to mount all equipment at the particular location. The Backboard shall be a sheet of 1" plywood (grade A-B) painted black with bevelled edges and shall be mounted on an angle or channel iron frame. All equipment shall be arranged in a neat, workmanlike manner, and connected with wireways and auxiliary gutters as required.

23. 14 WIRING: All electrical wiring for all purposes shall be installed in conduit as indicated on drawing, using at least the size and type materials specified hereinafter.

23. 15 CONDUIT: Electrical metallic tubing (thin wall conduit) galvanized or sherardized both inside and outside shall be used for runs two inches (2") and smaller, except where rigid, mild, steel conduit is definitely specified. Watertight connectors only shall be used. Installation shall comply with paragraph titled "Conduit Installation". All conduit installed in concrete floor slabs or concrete walls shall be mild, rigid, heavy wall steel, galvanized or sherardized both inside and outside, and in addition, shall have a coating both inside and outside of corrosion resisting enamel. These coatings shall have a smooth finish and shall be sufficiently elastic to prevent their flaking or cracking when conduit is used under normal conditions. The minimum size conduit shall be 1/2" trade size unless indicated otherwise. Flexible conduit connections shall be used at all motor locations in lengths not to exceed 18 inches.

23. 16 CONDUIT FITTINGS: All conduit fittings shall be cast metal having high tensile strength and high corrosion resistance, and shall be Crouse-Hinds condulets, or equal. Mogul type condulets shall be used for all runs of conduit one inch and larger. All conduit fittings shall be equipped with screw-on type covers and where in damp or wet locations, these covers shall be gasketed. All fittings for all purposes shall have tapered threads for maximum area of contact with conduits.

23. 17 CONDUIT INSTALLATION: All conduits shall be installed so that conductors may be removed and replaced at a later date. Exposed conduits shall be run parallel and perpendicular to building lines and as inconspicuously as possible. All ends of conduit shall be square cut and reamed to remove burrs. Running threads shall not be used. Approved threaded couplings only shall be used for rigid conduit. Couplings shall be pulled up tight and made water-proof in such manner as not to interrupt the electrical bond. Conduit supports shall be installed in all locations at not greater than ten foot spacing.

The double locknut and bushing method of connection shall be used for all conduit connections to outlet boxes, cabinets and other electrical materials of sheet steel construction. Insulating bushings of one-piece fiber shall be used for all main and sub-feeder conduit connections to cabinets and other materials of sheet steel construction. Bushings shall butt up tight against conduit ends.

23. 18 CONDUCTORS FOR GENERAL LIGHTING AND POWER: All conductors for general lighting and power shall be high-conductivity tinned copper of at least the size indicated on the circuit schedule and on the drawings. Insulation not otherwise specified shall be for 600 volts and shall, in no case, be less than Type THW, dual purpose heat and water resistant compound. All insulation shall be color coded, with the classification type, conductor size, and rating every foot. Branch circuit conductors shall, in no case, be smaller than No. 12. Control wiring for motor starters, thermostats, etc., shall be not smaller than No. 14. Fixture wiring shall be with not less than No. 16, Type AF fixture wire.

23. 19 CONDUCTOR INSTALLATION AND CIRCUITING: All conductors shall be installed so that they can be removed and replaced at a later date. At least six inches of conductor shall be left extended from the conduit at each outlet box. All conductors of the same circuit shall be in one raceway. Conductors of different systems shall be in enclosures separate from each other. Circuiting shall be as indicated on the drawings, and in panelboard circuit schedules. A common neutral shall be used for not more than 3 circuits for a 208 volt system properly combining 3 separate phase conductors and a neutral for a 4 wire system.

23.20 SPLICES AND CONNECTIONS: All splices in No. 10 or smaller conductors shall be mechanically and electrically secured, then soldered, brazed or welded with approved materials. Mechanical high pressure type splicing methods may be substituted for soldering subject to approval by the Architects. Burnday solderless type connectors shall be used for conductors larger than No. 10. All splices and joints shall be covered with an insulation equal to that of the conductors, using approved high quality rubber and friction tape, or Scotch #22 electrical tape. Splices in wet locations shall be covered with approved insulating paint.

23.21 PULL AND SPLICE BOXES: All pull and splice boxes shall be threaded hub conduit type fittings and shall be individual boxes for each run of conduit. All covers shall be blank screw on type. No hinged covers shall be used. Boxes shall be installed wherever pull points would otherwise be more than 100 feet apart or where there would otherwise be more than four 90 degree bends between pull points. Covers in wet or damp locations shall be gasketed. Common pull boxes of sheet steel for two or more feeders will not be acceptable.

23.22 OUTLET BOXES: All outlet boxes shall have dimensions which conform to the National Electric Code, Article 3709, and which meet the requirements of the electrical equipment and the wall or ceiling construction being used. Sheet steel boxes, in general, shall be not less than four inches square, cadmium or zinc coated, and all conduits shall be securely fastened to outlet boxes with approved locknuts and bushings. All sheet steel boxes shall be independently supported. No sectional boxes will be permitted.

Cast metal outlet boxes shall be used for local switches, convenience receptacles, pilot lights, and similar devices where exposed conduit is run.

For wiring devices on plaster walls, four inch sheet steel boxes with raised plaster ring type cover adapters of the proper depth shall be used. Outlet boxes on tile walls shall be four inch size, equipped with a rectangular (not oval) raised cover of the required depth for the wall construction, so that tile will fit squarely against the sides of the cover.

Boxes for recessed lighting fixtures shall be located above the ceiling adjacent to the fixture and wired to the fixture with Type AF fixture wire in flexible steel conduit.

Concrete boxes shall be used for all outlet boxes in concrete ceiling construction slabs.

Boxes for outside lights and receptacles shall be cast metal with gaskets as required.

23.23 LOCAL SWITCHES (SILENT TYPE): These shall be Underwriters' "L" rated flush toggle switches with brown bakelite handles, washer type plaster ears and totally enclosing moulded bakelite bases. Binding posts shall be on side of switch. These shall be Arrow Hart, Catalog No. 1991 for single pole, 1993 for three-way, and 1994 for four-way, or equal, all rated 20 amperes, 120/277 volts. Mounting height shall be 4'-6" above finished floor.

23.24 WEATHERPROOF LOCAL SWITCHES: The same switches previously specified shall be used for outside and other vaportight or weatherproof switch location, except they shall be mounted in single or ganged Crouse-Hinds condulets and vaportight and weatherproof covers shall be used. Covers shall be Crouse-Hinds, Catalog No. DS 185, and shall be furnished with necessary gaskets, arranged for flush mounting wherever practical.

23.25 LOCAL SWITCHES - LOCKING TYPE: These shall be Underwriters' "T" rated at 20 amperes, 125 volts, with totally enclosing bakelite moulded bases with keyway finished brown to match bakelite, and having washer type plaster ears. These shall be #1991-L-SL for single pole, #1993-L-SL for three-way, and #1994-L-SL for four-way. Switches shall be mounted at 4'-6" from finished floors.

23.26 CONVENIENCE RECEPTACLES: These shall be duplex convenience outlets, with parallel slots and "U" shaped slot for grounding, totally enclosing moulded bakelite bases, and washer type plaster ears, and rated at 15 amperes, 125 volts. These shall, in general, be Hubbell Catalog No. 5262, or equal. Receptacles not circuited shall be circuited by the Contractor with not more than six on each circuit. Mounting height shall, in general, be 1'-6" above finished floor, unless indicated otherwise. At locations of counters, etc., these shall be mounted above the work surface.

23.27 WEATHERPROOF RECEPTACLES: These shall be single outlet, two wire, three pole, double "T" slot units rated at 15 amperes, 125 volts, and shall be mounted in a cast metal outlet box set flush with the wall wherever practical. Cover plate shall be weatherproof gasketed type with spring loaded gasketed door housing over receptacle. These shall be Crouse-Hinds, Catalog No. DS-332.

23.28 PILOT LAMP RECEPTACLES: These shall be candelabra porcelain base pilot lamp receptacles complete with 125 volt lamps, for use in standard gang outlets, Hubbell, Catalog No. 427, or equal, furnished complete with cover plate matching other wiring devices and rectangular ruby jewel, with snap-in-ring finished to match cover plate.

23.29 CLOCK RECEPTACLES: These shall be clock hanger outlets with a double "T" slot receptacle rated at 15 amperes, 125 volts, and a 0.040" brass plate having a supporting hook for clocks, Hubbell, Catalog No. 7707, or equal. Mounting height shall be as indicated on the drawings.

23.30 RECEPTACLES SPECIAL PURPOSE: These shall be specification grade, Hubbell Cat. No. 9350-G or approved equal.

23.31 COVER PLATES: All wiring devices, convenience receptacles, local switches, pilot lights, telephones, etc., which are flush mounted, shall be furnished with satin finish stainless steel matching cover plates.

All surface type outlet boxes, shall, in general, be equipped with cast metal cadmium plated covers.

Where two or more devices are at the same location, they shall be mounted under a common face plate.

23.32 DISCONNECTING SAFETY SWITCHES: The Electrical Contractor shall furnish and install all disconnecting safety switches at indicated location on the drawings. These shall, in general, be 240 volt, Type "A" unfused front operated switches in general purpose NEMA Class I sheet steel enclosures for dry or indoor locations and in cast iron rust-proofed gasketed weather proof enclosures for outdoor or wet indoor locations. These shall be of the proper number of poles and horsepower rating for all motors to be served. All switches shall be Trumbull, Type H. C. I., or approved equal.

23.33 MANUAL MOTOR STARTER SWITCHES: These shall be overload type snap switches with toggle type operating mechanisms with indication of "OFF", "TRIPPED" and "ON" status, which is also used for "RESETTING". Overload unit shall be thermal type calibrated in accordance with the code for the running current of the motor being served, arranged for removal without disturbing wiring. Units shall be single overload type, single pole for 120 volt operation and double pole for 230 volt operation. At all locations, switch shall be mounted in the same manner as local switches for lighting control. These shall be Westinghouse Type "MS" or equal.

23.34 MAIN DISTRIBUTION PANELBOARDS: These shall be of heavy duty deadfront "CONVERTIBLE" type construction designed for complete interchangeability of circuit breakers up to and including 225 ampere frame sizes. Panelboards shall have individual automatic circuit breakers of the number, size, and setting indicated in the circuit schedules. Circuit breakers 50 amperes and smaller shall have thermal trips only. Circuit breakers above 50 amperes shall have thermal-magnetic trips. Breakers above 100 amperes shall have interchangeable trip units. All breakers shall have multiple pole quick-make, quick-break, trip-free toggle mechanisms for manual operation as well as automatic, which clearly indicate by distinct positions the "ON", "OFF", and "TRIPPED" status.

23.35 POWER PANELBOARDS: These shall be of deadfront convertible construction designed for interchangeability of single pole, two pole, and three pole, 100 ampere frame size breakers with a provision, where specified, for at least one (1) 225 ampere sub-feed breaker. Each breaker shall have the number of poles, and trip setting indicated in the schedules. All 50 ampere breakers shall have thermal type multiple pole trips and shall be trip free on overload. Toggle mechanism for both manual and automatic operation shall indicate "OFF", "ON", and "TRIPPED" status by assuming a distinct position. Bus bars shall be of high conductivity satin finish, flat copper bar sized at not more than 1000 amperes per square inch, with lugs only for the feeds. All breakers and busses shall be equipped with individual solderless type lugs properly sized for the conductors indicated in the schedules. Bus bar bridges shall be extended to all blanked off spaces for future breakers. The complete construction shall be as manufactured by Westinghouse, or Trumbull. See schedules for panel and breaker types.

23.36 LIGHTING PANELBOARD: Lighting panelboard shall be of standardized deadfront construction with thermal-magnetic trip, 50 ampere maximum, single pole, or two pole branch circuit breakers of the number and trip setting indicated in the schedules on the drawings. Breakers shall have toggle mechanism for manual operation as well as being automatic, which shall indicate breaker condition by assuming distinct positions of "ON", "OFF", and "TRIPPED" status. Breakers shall be quick-make, quick-break trip-free type, and shall have solderless connectors for the branches. Buswork shall be arranged for sequence phasing. The neutral shall have an individual terminal for each circuit. Sufficient neutral capacity shall be available to connect all spare and future circuits.

Lugs only shall be used for the mains. Where lighting is switched from the panel, handle lock-on devices shall be clipped over all breakers not used for switching of lighting so that operating personnel do not inadvertently turn off receptacle circuits. The complete construction shall be as manufactured by Westinghouse, or approved equal. See Schedules for panel and breaker types.

23.37 LIGHTING PANELBOARDS (FUSE TYPE): These shall be of the switch and fuse type, with 30 ampere, 125 volt, single pole, toggle switches and plug fuses. The panels shall be made up of high heat moulded phenolic compound sections mounted on No. 12 or No. 14 gauge, one-piece, galvanized sheet steel backs with flange turned on each side to increase rigidity. Mounting back shall be securely anchored to panel cabinet with provisions for adjustments in all directions. Each circuit shall be provided with an etched number tag.

23.38 PANELBOARD CABINETS AND TRIM: All panelboards shall be mounted in enclosing cabinets consisting of a code gauge, sheet steel box with trim and door. The box shall be manufactured from commercial galvanized sheet steel. The trim shall be manufactured from one-piece of full finish sheet steel (not galvanized), painted first with a rust-resisting prime coat and second with a finish coat of neutral gray lacquer. Cabinets shall be of sufficient size to allow a gutter space of at least four inches for all lighting panels, six inches for power panels, and eight inches for main distribution panels. Trim shall be fastened to cabinet by means of approved indicating adjustable clamps which will allow both vertical and horizontal adjustment. All trims shall have door equipped with chrome plated combination lock and catch, two keys being supplied with each lock, and all locks shall be keyed alike.

Each door shall be equipped with a directory and with a glass front and typed circuit designation card. Each panelboard cabinet shall be independently supported by suitable brackets or by an angle iron from floor to ceiling on each side. Cabinet shall be flush or surface type as indicated on the drawings. Cabinets shall be mounted at the same height so that the distance from the finished floor to the top circuit breaker handle is not more than six feet.

23.39 SPARE CONDUITS: Furnish and install two empty 1 1/4" conduits from each recessed panel. Conduits shall be stubbed out and capped above ceiling.

23.40 EXPANSION JOINTS: At all points where conduits run across building expansion joints, either in floor slabs, exposed or concealed in building structure, this Contractor shall furnish and install expansion joint fittings.

Expansion fittings shall be "O-Z" type DXT for installation in concrete and EX with bonding jumper in all other locations.

23.41 LIGHTING FIXTURE SPECIFICATIONS: Locations, mounting height, lamp size, etc., of each type fixture, shall be as indicated in the lighting fixture specification, or on the drawings. A fixture shall be furnished and installed at each location of a fixture symbol.

All fluorescent fixtures shall be supplied with high power factor (not less than 90%) ballasts.

Fixtures shall comply with the label of the Underwriters' Laboratories, Incorporated.

It shall be the Electrical Contractors responsibility to check the type of ceiling to be furnished with the General Contractor prior to ordering fixtures.

TYPE "A": Suspended two (2) lamp semi-indirect fluorescent unit complete with: white aluminum louver bottom shield 800 MA H. O/RS/CW lamps, HO/HPF certified 120 volt, self protected low noise level ballasts (i. e. in audible in ambients of 25 decibels), and stem hangers with canopies-lengths noted on drawings. ✓

Luminaire shall satisfy all I. E. S. "Scissor's Curve" and "Brightness Ratio requirements" and comply with "American Standard Guide" for School Lighting.

These shall be Miller "System 800", Curtis-Electro "SCF" series or Guth "Excelux 800".

TYPE "B": Surface mounted, four (4) foot, four (4) lamp fluorescent fixture, semi-direct lens enclosed unit not exceeding 2 3/4" in oval depth. Lens not to exceed 1 1/2" in depth. Lens shall be acrylic hinged along entire length of housing. Reflectance not less than 85%.

Ballasts shall be 120 volt, fused, C. B. M. certified, HFP.

Unit shall be Smithcraft "Dominaire" Cat. No. DMA 4-40 or approved equal.

TYPE "C": Recessed incandescent unit with steel roughing-in box, outlet box, aluminum reflector and drop opal glass bottom mounted in hinged frame, complete with 150 watt lamp.

Where unit is indicated as combination normal and emergency light, it shall be supplied with extra socket, 50 watt lamps and outlet box.

Unit shall be Prescolite series 1015-6615 and 1015-6615 EM.

Unit shall be for 120 volt operation.

TYPE "D": Surface side wall mounted incandescent lighting fixture of die cast aluminum construction, complete with screw-in white opal globe, weatherproof gaskets and 100 watt lamp. Finish shall be satin chrome. These shall be Prescolite Cat. No. WB-2-2. Unit shall be mounted cross wise. Emergency section shall be provide with a 60 watt lamp for operation on 120 volts.

TYPE "E": Surface mounted two lamp, four foot (4') long commercial fluorescent unit having acrylic plastic wrap-around closure. These shall be Lightolier "Sightron" series, or approved equal.

TYPE "F": Fluorescent R. L. M. two lamp unit, furnished in all white porcelain enamel with R. S. /HPF ballasts, CBM certified. Unit shall be Day-Brite Cat. No. 40211-4 complete with lamps and stem hangers. ✓

TYPE "G": Surface mounted incandescent unit, twenty (20) inches square with "Albalite" diffuser framed in genuine walnut, satin finished, brick grid, satin finish; and four (4) 75 watt lamps. Unit shall be Lightolier "Corona" Cat. No. 6599.

TYPE "H": Outdoor weatherproof bracket complete with moulded white glass diffuser, gaskets, and 100 watt lamp. Units shall contain an emergency lighting socket. These shall be McPhilben #9-36, or equal.

TYPE "J": Keyless porcelain outlet box fixture, Alabox No. 3141 with 75 Watt lamp.

TYPE "K": Surface mounted two (2) foot by two (2) foot, six (6) lamp fluorescent unit with acrylic diffuser supported by concealed hinges. Unit shall be complete with HPF 120 volt ballasts E. T. L. certified.

This shall be Lightolier modular "Optiplex" Cat. No. 13526.

TYPE "L": Surface mounted, two lamp fluorescent unit with "light stable" grade Polystyrene plastic closure, and opaque white, molded, impact-strength plastic end plates permanently banded in place. Unit shall be Miller "Sabre 12" Cat. No. 2100-04 complete with H. P. F. ballasts and R. S. lamps. ✓

TYPE "M": Ceiling mounted, single lamp fluorescent unit, with hidden hinges, white plexi glass diffuser, and 120.volt ballasts. Unit shall be Lightolier Modular "Sightron" or approved equal. Lengths as shown on drawings.

TYPE "N": Surface side wall mounted unit complete with prismatic glass lens, two (2) 75-watt lamps and convenience outlet. These shall be Perfeclite #980 or equal.

TYPE "O": Sidewall mounted two lamp fluorescent units of lengths as shown on the drawings having light stabilized styrene plastic closure. These shall be Lightolier "Prismalux" series or equal. Mount above mirrors.

TYPE "P": Surface mounted 25 watt incandescent unit equipped with blue Roundel type lens. This shall be McPhilben Cat. 87-25BL.

TYPE "Q": Same as Type "B" except two lamps, Smithcraft
DMA 19-2-40.

TYPE "R": These shall be cluster mounted incandescent units to be field fabricated as follows: The posts shall be square aluminum posts 6" x 6" with the same finish as the aluminum members of the building. On each face of the post shall be mounted a Prescolite WB28-2 weatherproof unit (vertically) complete with two 150 watt lamps and gaskets. Total of four fixtures or eight lamps per Type "R" assembly). The center line of the lighting fixtures to be about 10'-0" above grade. The top of the post to be closed off and made weathertight. Furnish and install a weatherproof receptacle in the base of each light standard.

TYPE "S": Recessed two foot by four foot (2' x 4') four lamp fluorescent unit with M-1, invisible frame, acrylic lens and four R. S. lamps and C. B. M. -HPF ballasts. ✓

These shall be Miller RH or RD 4122-04 in accordance with the ceiling type being installed.

TYPE "T": Four (4') foot square suspended, eight (8) lamp fluorescent unit with drop white opal plastic (Plexiglass) diffuser bottom and eight 40-watt rapid start lamps. Metal parts shall be rust-inhibited, with exposed metal finished in baked white enamel.

Unit shall be chain suspended from four corners. Chain shall as recommended by the fixture supplyier for this purpose and shall include canopys. Verify finish with Architects prior to placing order.

Fixture shall be Lightolier "Modular Optiplex" Cat. No. 83815 or approved equal complete with 120 volt H. P. F. ballasts.

NOTE: Lamps shall alternately connected to central switches.

TYPE "U": This shall be same as Type "T" except 2' x 4' - four lamp, Lightolier Cat. No. 83615, surface mounted.

TYPE "V": Incandescent vapor tight unit complete with 100-watt lamp, globe and guard. These shall be Crouse-Hinds VXHA, or equal.

TYPE "W": Incandescent R. L. M. standard dome reflector type unit arranged for 1/2" pendant mounting. ✓

Unit shall be Wheeler No. 1214 or approved equal, complete with 100 Watt lamp.

TYPE "X": Same as Type "H" except Cat. No. 9-31 complete with 100 watt lamp.

EXIT LIGHTS: These shall be Miller, or equal, "Pathfinder" units and shall be furnished with red letters and metal stencil background. Directional arrows shall be included as noted on the drawings. Units shall be recessed where practical. Units which are not recessed shall be furnished with the down light feature.

Lamp life shall be 50,000 hours guaranteed.

23.42 PLASTER FRAMES: Plaster frames for all lighting fixtures, where specified, or required, shall be furnished by the Electrical Contractor and turned over to the General Contractor for installation. These shall be of galvanized steel to prevent rust marking of plaster.

23.43 LAMPS: The Electrical Contractor shall furnish and install all lamps for all fixtures of the size indicated in the fixture specifications. All lamps shall be the type which fixtures are designed to use. Exposed incandescent lamps shall be inside frosted. Fluorescent lamps shall be Deluxe warm white. Lamp sizes for emergency use shall be as indicated on the drawings, and socket adapters of the proper length to place the light center at the correct position shall be used.

23.44 DEMOLITION AND SALVAGE: The Electrical Contractor shall remove all existing wiring and conduit which is not to be reused and is in the new work area, together with any related switches, lighting fixtures, wiring devices etc.

All wire and conduit shall become the property of the Contractor and he shall be responsible for removing them from the job.

All other materials and equipment shall remain the property of the Owner, except for material shown on the drawings to be reinstalled by this Contractor.

The Electrical Contractor shall be responsible for stock piling and notifying the Owner when these may be removed from the job site.

Electrical Contractor shall furnish all labor and material required to feed electrical outlets in undisturbed areas, in the event that the remodeling work disturbs the present feeds.

It shall be the Contractor's responsibility to inspect the existing building and make allowances in his bid for the above.

FIRE ALARM SYSTEM:

General: Furnish and install a Fire Alarm System as covered by these specifications, to be wired, connected, and left in first class operating condition.

The catalogue numbers specified in the following are those of the Simplex Time Recorder Company and constitute the type and quality of the equipment to be furnished. Bids on similar equipment, when written approval of the Architect has been obtained, will be considered, providing the Contractor states in his bid the manufacturer's name, and the amount to be added or deducted from his bid for this substitution. Final determination of compliance with specifications shall rest with the awarding authorities who at their discretion may require proof of performance.

System Operation: The actuation of any non-coded station, automatic heat detector, or other approved device shall cause the march time operation of all alarm signals of the system including the trouble signal until the actuating device is restored to normal and the control panels manually reset. Trouble signal will continue to sound until actuating device is restored to normal and the control panel is manually reset. In the event of operating power failure, an open circuit or ground in the system, a trouble signal and trouble lamp shall be actuated until system is restored to normal. The trouble signal may be silenced by means of a switch mounted on the control panel door. Upon restoration of the system to normal the trouble signal shall again sound until the switch is returned to normal position. System shall operate from one phase of a three wire supply while supervisory power shall be taken from the other phase.

Equipment: Furnish and install where shown on plans a Simplex Fire Alarm Control mounted in a code gage steel cabinet equipped with lock and keys. All lamps, silencing, test, and reset switches, and meters if required, shall be mounted on the door of the cabinet so that all normal operations of the system may be controlled without opening the cabinet door.

Control Panel: The control shall contain all necessary components to completely supervise and operate the system and shall be Simplex type 4247-4CRS. Each signal circuit shall be capable of sounding up to 27 vibrating bells or 20 synchronous non-contact horns.

Remote Station: Simplex type 4293-51 remote station shall be located at the local fire headquarters.

Code Transmitter: Simplex Type 4268-43 code transmitter shall be located next to and connected to the fire alarm control panel for the purpose of march time operation.

Manual Fire Alarm Stations: Simplex Type 4251-13 semi-flush non-code break rod station shall be furnished where shown on plans. A downward pull of the lever shall actuate a positive, snap action switch. Station shall remain actuated until station is reset by means of a key furnished with each station. The same key shall be used for drill and test purposes.

Automatic Heat Detectors: Automatic heat detectors Type 4265-135 shall be installed where shown on Architect's plans.

Signals: Bells shall be of the underdome, non-contact, single stroke type 4027-00 (6") as noted.

Trouble bells shall be Simplex Type 4017-42 style as above.

Annunciators: Furnish and install annunciator Simplex Type 4331-16E Flush with zone lamps located where shown on plans. Annunciator lamps shall be red, neon, extended life type, mounted on black polished ebony modules. Each lamp shall have a zone identification plate fastened underneath.

Wiring: The Contractor shall furnish and install in accordance with manufacturer's instructions all wiring, conduit, and outlet boxes required for the erection of a complete system as described herein and as shown on the Architect's drawings.

All wiring shall be in conduit and of the same approved type as used for electric light power wiring and shall meet the requirements of all national, state and local electrical codes. The sizes of the different wires shall be those specified by the manufacturer. Color code shall be used where specified. All wired shall be tagged at all junction points and shall test free from grounds or crosses between conductors.

Final connections between equipment and the wiring system shall be made under direct supervision of a representative of the manufacturer.

Guarantee: The Contractor shall guarantee all equipment and wiring free from inherent mechanical and electrical defects for a period of one year from the date of installation.

The manufacturer shall furnish gratis to the owner a one year contract effective from date of installation for the maintenance and inspection service of the manufacturer's equipment with a minimum of two inspections during the contract year.

23.46 ELECTRICAL WORK FOR PLUMBING, HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS: All electrical apparatus required in these systems not otherwise specified shall be furnished by the respective contractors and shall conform to the electrical specifications. The electrical contractor shall furnish and install all necessary conductors, disconnects and conduit to provide power to this equipment.

The Plumbing, Heating, Ventilating and Air Conditioning Contractors will furnish and install all conduit, wire, etc., required to control the equipment furnished and installed under their respective contracts, except as follows:

Control devices, such as line voltage thermostats, fan control switches, etc., which are to be inserted directly into the power wiring, will be furnished by the respective contractors and shall be installed by the Electrical Contractor.

Magnetic starters whether remote or integrally mounted will be furnished by the contractor furnishing that particular system. Remote starters shall be installed by the Electrical Contractor.

The Electrical Contractor shall furnish and install all power wiring required originating at the branch circuit protective breaker, to the line side of the disconnect, from the load side of the disconnect to the line side of the starter (if applicable) from the load side of the starter to the motor terminal box as applicable.

23.47 CIRCUIT BREAKER "LOCK-ON" DEVICES: Furnish and install handle "lock-on" devices on the circuit breakers indicated in the schedules or as directed by the Owner. These "lock" devices shall prevent accidental turning "Off" of critical circuits (such as receptacle circuits, refrigerators, etc.). These devices shall be "trip-free" and permit the circuit breaker to trip automatically on overload.

One lock-on device shall be furnished for every four circuit breakers in the lighting and power panels, i.e., 25% of the breakers shall be so equipped. Lock-on devices which are not installed in the panels shall be turned over then to the Owner for his future use.

23.48 KEY OPERATED SWITCHES: All corridor, stair and toilet lighting shall be controlled with key operated switches, whether indicated on the drawings or not. This shall include all other switches at other locations indicated to be key operated.

23.49 HAZARDOUS CONDITION: The Contractors attention is hereby directed to the notation on drawing E-1 which indicates the approximate location of the existing, underground, 12,470 volt service to the existing building together with other services such as telephone, fire alarm etc. Exact location and depth unknown.

The Contractor is hereby warned to exercise proper precaution in the event he excavates in this area.

23.50 ELECTRICAL WORK FOR ELEVATOR: The Electrical Contractor shall furnish and install all materials required to serve the elevator as indicated on the drawings and specified hereafter.

Install conductors and conduit from point of supply to main disconnect and from main disconnect to elevator contractor. This shall include terminations at point of supply, main fused disconnect and controller.

Install a junction box and a light at mid-point in shaft. Junction on box shall serve cab lights. Light shall provide light in shaft and shall be controlled with a switch located as directed by the elevator supplier.

Install light and receptacle in pit, with switch control for light as designated by the elevator contractor.

Complete installation shall meet all code requirements.

Lights shall be vapor-proof with guards.

23.51 ELECTRICAL WORK FOR CHILLER: The Electrical Contractor shall furnish and install the disconnect indicated on the drawings for the chiller and shall do the power wiring between the main switchboard and the disconnect and between the disconnect and terminal block on chiller.

(Note: This is a pre-wired package unit).

Disconnect shall be a three pole, 600 volt, 500 ampere circuit breaker in NEMA-1 enclosure. This shall be Westinghouse Type MA or approved equal.

23.52 CONDUITS PASSING THROUGH ACOUSTIC WALLS AND/OR FLOORS:

All conduits passing through Acoustic walls and through floors shall be installed in accordance with detail shown on Drawing E-5.

Ends of these conduits shall also be packed with duct seal at their points of termination.

23.53 ELECTRIC SERVICE: Electric service to this addition shall be 120/208 Volt, 3 phase, 4 wire, supplied from a new twenty-five inch wide section installed adjacent to the existing main switchgear as indicated on drawing E-1. See schedule for distribution breakers: ratings and types. This section shall be supplied from the main bus in the existing gear with 2 - 1/4" x 6" copper bus bars per phase and neutral.

The secondary service conduits from the switchgear to handhole No. 1 shall be 4 - 3" galvanized rigid conduits encased in concrete envelope (1-2-4 mix) as indicated on the drawings.

Note: These conduits are presently stubbed-up at the switchgear location, and out at Point "A" as indicated on drawings.

Three conduits shall be extended from this hand-hole to the MDP panel and the other to the main disconnect for the chiller.

Conduits from hand-hole No. 1 to M.D. P. shall leave hand-hole through the bottom as indicated. This method must be adhered to, in order to provide necessary space for sewer lines to pass between hand hole and elevator pit. Ends of these conduits shall be provided with "O-Z" Cat. No. CRC-300, terminators. Note: Fill with compound.

See drawings and schedules for further details.

23.54 HAND HOLES: All labor and materials required for the construction of the hand holes will be furnished and installed by the General Contractor. It shall be the Electrical Contractor's responsibility to properly position the conduits entering and leaving these hand holes and coordinate these so as to avoid conflicts with other trades.

23.55 GROUNDING: Furnish and install all electrical grounds as required by article 250 of The National Electric Code.

In order to establish continuity of the grounding system, all conduits entering and leaving hand holes shall extend into hand holes sufficiently to permit bonding bushings to be installed on their ends. Bare stranded copper wire bonding jumpers shall be installed between terminals of related bonding bushings.

Two ought (2/0) bonding jumpers shall be used for 2", 2 1/2" and 3" conduits and No. 1 for 1 1/4 and 1 1/2" conduits.

Bushings shall be "O-Z" type "IGB" or approved equal.

NOTE: "O-Z" Cat. No. CG 3125 ground connectors shall be provided for the three (3) conduits leaving hand hole No. 1 to supply M.D. P. These shall be installed below terminators. Three (3) inch conduits shall be bonded to main ground at switch gear.

23.56 EMERGENCY LIGHTING SYSTEM: The Electrical Contractor shall furnish and install a complete emergency lighting system as approved by The State of Pennsylvania and in strict accordance with all applicable regulations. All equipment shall be on the "approved" list of the Department of Labor and Industry.

The Electrical Contractor shall obtain a Pennsylvania State certificate of approval and turn it over to the Architects upon completion of the installation.

The emergency source of power shall be from spare circuits in the existing emergency power panel EMP located in the existing electrical equipment room, see drawing E-1.

Two 1 1/2" conduits from this panel have been stubbed outside building at point "A". These shall be extended in the duct bank indicated on the drawing into hand hole No. 1, then from hand hole No. 1 to new emergency panel EMP located in room No. 13 of the new addition.

Normal section EMPN shall be served with 4 No. 6 THW from existing panel circuit EMP IN-8.

Emergency section EMPE shall be served with 4 - No. 6 THW conductors through a contactor from circuit EMPID-8 as indicated on riser diagram.

Contactor shall be enclosed normally open A-C Type - 30 ampere 3 pole. Magnetically held with 120 volt coil. Coil shall be supplied direct connected to circuit EMPIN -5 i.e. contactor shall be in closed position when normal section of EMPI is energized.

23.57 MASTER TELEVISION SYSTEM: The Contractor shall furnish all labor and material to complete all work under the above heading, as indicated on the drawings, or herein specified, or both. The General Conditions, the Supplementary General Conditions, the Drawings and the Specifications apply to each and every contract and contractor, and other person or persons supplying any material or labor entering into this project directly or indirectly.

The system defined herein shall receive and distribute all available requested VHF and UHF broadcast signals to the specified outlets. The system shall be designed for installation of closed circuit origination or reception equipment. The system must be capable of expansion to permit the addition of one or more locally originated channels without the addition of any equipment to the distribution system itself, other than amplifiers, converters and dividing networks.

General Equipment Requirements: All basic electronic equipment described herein shall be the product of a single manufacturer. Basic electronic equipment shall be defined as all TV distribution equipment necessary for a complete operative system. Cables, TV sets, etc., may be of other manufacture, providing this equipment meets minimum specifications contained herein.

All equipment, including the wiring, cabling and junction boxes, furnished and installed, shall be guaranteed for a period of one year from the date of final acceptance thereof against electrical or mechanical defects or failures.

All basic electronic equipment shall carry the label of the Underwriters Laboratories, where applicable.

The distribution system shall be installed so that additional closed circuit television channels may be transmitted.

The Contractor shall show satisfactory evidence that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system including replacement parts. The Contractor shall be prepared to offer a service contract for the maintenance of the system after the guarantee period.

All equipment installed outdoors shall be provided with suitable protection against weather.

All equipment shall be installed so as to be accessible for maintenance and shall be located so as not to interfere with the servicing of other nearby equipment.

All equipment shall be rated for 24 hours per day continuous operation.

All electronic equipment shall be mounted in adequately ventilated housings. The housing cabinet shall be designed with locking type device for a pad lock, or cylinder lock.

All equipment operating from a power source shall be adequately fused.

System Function And Capabilities: The head end equipment shall receive and distribute all channels supplied by the antenna system. The received signals that are distributed to outlets shall be equal or superior to those obtainable with an individual antenna and TV sets.

The school shall have an antenna system and shall receive and distribute the following broadcast VHF and UHF channels 16-28-22-44.

The UHF Antenna shall be high gain directional antenna with front to back ratio of 20 db minimum. The antenna shall be heavily plated to prevent rust.

The total number of outlets per building are shown on the accompanying floor plans and riser diagrams. The system shall deliver a minimum signal strength to each receiver on every channel of 1000 microvolts across 75 ohms.

The system shall be capable of passing standard color TV signals without noticeable effects on color fidelity and intelligence.

The system signal to noise ratio shall exceed 40 db when the signal input at the antenna site is 1000 microvolts or more.

No system component shall have a voltage standing wave ratio exceeding 1.5:1. The system shall meet basic radiation limits as required by the F.C.C.

Electronic Equipment: UX-3 crystal-controlled solid state converters shall be utilized. It shall be completely self contained and designed for continuous duty.

Gain: 4 - 13 db, depending upon conversion.

Bandpass: CH. 2-6: 6 mc plus or minus 1/2 db.

CH. 7-13: plus or minus 3/4 db.

Noise Figure: 9-15 db, depending upon conversion.

Impedance: 75 ohm input and output; bridging outputs.

Connectors: BTF; mate with Blonder-Tongue BTF male connectors.

Stability: with plus or minus 10% voltage change from 117V, 0.0025%; over plus or minus 20 degrees C temp. change from 25 degrees c, 0.005%.

Temperature Range: 40 degrees F to 110 degrees F recommended (minus 20 degrees to plus 150 degrees F, maximum)

Power Requirements: 105-129 VAC, 50-60 cps; .065A.
3 wire line cord.

Dimensions: 9" L x 4 5/8" W x 3 1/4" H.

Provide MCS Single Channel Amplifier with specifications
as follows:

Gain: 2-6, 45 db minimum; 7-13, 35 db minimum.

Bandpass: 2-13, 6 mc plus or minus 1/2 db.

Maximum Output: 1.4V HB, 1.0V LB.

AGC: Factory set for 0.7 volts output with input of at least 3500 microvolts on channels 2 thru 6 and 12,500 microvolts on channels 7 thru 13. AGC level control may be set for any desired output between 0.45 volts and maximum output.

Gain Control Range: 18 db minimum manual. 20 db minimum automatic.

Impedance: 75 ohm input and bridged output, UHF type SO-239 connectors.

Noise Figure: CH. 2-6, 5 db; CH. 7-13, 6.5 db.

Monitor Jacks: Input/output; -20 db.

Power Requirements: 117V AC, 60 cps; 0.28A 3-wire line cord.

Converter:

A CO-2 Crystal Controlled VHF Converter shall be supplied.

Tubes: 1 type 6BZ7, 2 type 6AK5 or EF95, 1 overtone quartz crystal.

Frequency Accuracy: 006%

Stability: 0-100 degrees Fahrenheit .0025%

Bandwidth: 6 megacycles plus or minus 1 db.

Gain: 0 to 20 db depending on conversions.

Minimum Input: 2,000 microvolts.

Maximum Input: 5,000 microvolts.

Input and Output Impedance: 75 ohms.

Supply Voltage: 115 volts, 60 cycles, 20 watts.

Fuse Protection: Primary: 3/8 amp. 3AG Slo Blo.

Dimensions: 20 1/2" x 3 1/4" x 5 1/4".

Net Weight: 6 1/2 lbs.

Sub-Filter: An AN2-75 Sub-filter network shall be supplied to provide an efficient method for separating or combining low and high band signals.

V2U12/17/23 VSLB back matched tapoffs shall be supplied providing two output connectors for either cameras, receivers or both. Isolation from through lines shall be 17 db with through lines loss not exceeding 0.8 db per tapoff. Frequency response shall be 22 to 220 MC to accommodate sub channels. Connectors shall be heavy duty SO239 type.

The above tapoff devices shall be complete in themselves and shall not require changing, insertion of plug-in devices or alteration in any way when changes are made in the distribution or program origination point.

DCR190 Indoor Housings shall be supplied as head end cabinets. They shall be large enough to hold all electronic equipment needed for each master TV system.

Back Matched Line Splitters shall be supplied. Splitters shall pass frequencies 4.5 to 220 mc/s. Splitters shall be radiation proof with low insertion loss and high isolation between outputs.

Cable and Hardware Specifications: All distribution cabling shall be foam type RG11/U, RG59/U or other standard sized 75 ohm coaxial cable, as required to supply specified signals to each location. The cable shall be of new manufacture and it shall be sweep tested, with non-contaminating outer jacket, meeting all JAN specifications.

The frequency response of the cable shall be flat within plus or minus 1/2 db, and the VSWR shall not exceed 1.25 to 1.0 over the 6 megacycle channel width.

All cable attached to electronic equipment shall be tagged to show function and destination. All cable shall be contained in conduit.

System Tests: At such time as directed, the installer shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements of this specification.

A TV receiver shall be connected to any outlet in the system and picture quality on all channels must be equal or superior to reception normally available in the area.

23.58 TIME AND PROGRAM SYSTEM: Furnish and install a Synchronous Time and program system with Hourly and 12 Hour Individual Correction according to the following specifications to be wired, connected and left in first class operating condition. All equipment shall be approved by the Underwriter's Laboratories. Equipment shall match existing equipment for compatibility and shall be connected to existing master clock. Equipment shall be that of the Simplex Time Recorder Company.

Indicating clocks shall be Simplex Type 57-45 surface. They shall be single synchronous motor operated, individually corrective, with drawn metal cases, convex protection lens, off white dials and black modern hour and minute hands and red sweep second hands.

Executive clock shall be provided, style to be determined by architect at a later date. All clocks shall be located where shown on Architect's plans.

Simplex Type 4045-12 single stroke chimes shall be installed where shown on the plans.

The Contractor shall furnish and installed in accordance with manufacturer's instructions, all wiring conduit and outlet boxes required for the erection and operation of a complete electric time and program system as described herein and as shown on Architect's drawings.

All wiring shall be the same approved type as used for electric light and power wiring, and shall meet all the requirements of national, state and local electric codes. The size of the different wires shall be those specified by the manufacturer. All wired shall be tagged at all junction points, and shall test free from grounds or crosses between conductors.

Final connections between clock and program equipment and the wiring system shall be made under direct supervision of a representative of the manufacturer.

The Contractor shall guarantee all equipment and wiring free from inherent mechanical or electrical defects for one year from date of installation.

The manufacturer shall furnish gratis to the owner a one year contract effective from date of installation for maintenance and inspection service of the manufacturer's equipment with a minimum of two inspections during the contract year.

23.59 ELECTRONIC BACKGROUND MASKING NOISE SYSTEM: The Electrical Contractor shall furnish and install as shown on the drawings and as hereinafter specified a complete and operable noise masking system including all conduit, wire outlet boxes, loudspeaker equipment, level controls and noise generator.

A. Loudspeaker Equipment

1. Loudspeakers shall be installed on ceiling mounted baffles, located as shown on drawings. The enclosures shall be lined with 1.5 to 3.0 lbs/cu ft. glass fiber. The loudspeaker-transformers shall be connected in parallel as shown. Wire equivalent to Belden 8205 shall be used; this wire need not run in conduit, but shall pass through tight fitting grommets entering the enclosure.

Acceptable Loudspeakers: Altec Lansing 409B or
Jensen K950

Quantity: One hundred and forty-two (142) Required.

2. Matching transformers shall be provided for the loudspeakers, and mounted thereon.

Acceptable: Altec Lansing 15074 or
Jensen 70 CV-4

Quantity: One hundred and forty-two (142) Required

3. Level controls shall be provided for each speaker. Level controls for each loudspeaker, except those in the Orchestra and Band Room, shall be mounted on the loud speaker enclosure as shown on drawing E-4.

Level controls for the loudspeakers in the Orchestra and Band Room shall be mounted in two four gang wall boxes located in the storage closet in the area.

Acceptable: Type 1: Jensen LT 810

Quantity: One hundred and thirty-eight (138) required.

Acceptable: Type 2: Jensen LV-10

Quantity: Four (4) Required.

4. Loudspeaker enclosures shall resemble air conditioning diffusers, with finish to be determined by the Architect.

Acceptable: Soundolier 67-8 baffle,
with 95-8 protective enclosure, and
75-8 or 76-8 plaster ring (as necessary)

Quantity: One hundred and forty-two (142) Required.

B. Noise Generator:

The noise generator shall be Grason Stadler Model "Special" No. 14870 as manufactured by Grason Stadler Company, 15 Winthrop Street, West Concord, Massachusetts. Provide shelf in equipment Room 13 5'-4" above finished floor to set unit on.

Furnish two complete sets of tubes with generator. One set for operating purposes and the other for replacements.

Unit shall be connected as recommended by supplier and acoustical consultants.

C. Preliminary Adjustments, Final Adjustments, and Acceptance Testing:

1. Initial adjustments shall be performed by the Contractor and shall consist of the following work:
 - a) Following the preliminary adjustment of noise level, at the generator, adjust the setting of the tone control (3) for most satisfactory noise spectrum. The noise shall be subjectively similar to the sound of a distant waterfall or, more properly, the sound of a ceiling diffuser in an air conditioned room.
 - b) Set the level control for each loudspeaker to obtain the following levels:
 - 30 dBA - Choral Practice Room, Orchestra and Band Room, and Lecture Room.
 - 35 dBA - Class Rooms, Lounges, Percussion Studio, and Studios.
 - 40 dBA - Practice Rooms and all other spaces served by the system.

These levels are to be measured on the dBA scale of a calibrated precision sound level meter at 3'8" above the floor under each loudspeaker.

2. When the Contractor has completed the initial adjustments, he shall notify the Architect in writing that the system is complete and ready for inspection by representatives of the Architect, building owner, and acoustical consultant.

The acoustical consultant will then make measurements to determine the optimum sound pressure level which the system should provide.

3. The Contractor shall then make final adjustments to obtain the levels called for by the owner or his acoustical consultant, using the measuring method in subparagraph (b) above.
4. Acceptance tests will be performed by the acoustical consultant acting as the representative of the Owner, with the support and cooperation of the contractor.

The acoustical consultant may measure the noise levels produced by this system.

These tests may include subjective tests by observers in the rooms listening under various operating conditions of the systems. Speech intelligibility surveys may be part of this testing procedure.

If the system does not appear to be functioning properly, further tests may be performed on any item of equipment to determine whether it is operating properly.

D. Guarantee and Service:

All equipment shall be guaranteed to be free of defective components (including tubes) and faulty workmanship for a period of one year from the date of final acceptance. If any materials prove to be defective within the above period, they shall be replaced within two days at no expense to the owner.

The Contractor shall provide at his expense maintenance service for a period of one year after final acceptance of the installation. This service shall consist of at least six bi-monthly visits to the site for checking and adjusting of equipment.

The Contractor shall carefully instruct the Owner's operating personnel in the operation, care, and maintenance of the equipment before the installation can be considered complete.

The sound system contractor shall be required to answer all service calls within twenty-four hours.

The Contractor shall furnish two copies each of a block diagram of the system showing the essential parts of the installation and their functional relations. One copy shall be mounted behind glass near the noise generator.

All tests and adjustments shall be performed by a experienced and qualified sound technician acceptable to the Architects.

23.60 TELEPHONE CONDUIT SYSTEM: Furnish and install a complete empty conduit system including cabinets, junction boxes and conduit runs to all indicated locations, sizes of cabinets and conduits and number of phone outlets for each individual run of conduit shall be as indicated in the Riser diagram.

Telephone cabinets, if required, shall be of the same construction as panelboard cabinets and shall be fitted with 3/4 inch wooden backboard of white pine (smoothly finished and painted black) for mounting terminal strips.

At each indicated location of a wall outlet, a standard 4 11/16" x 4 11/16" outlet box complete with plaster ring and cover plate shall be installed.

Outlet box and cover plate shall be provided with a one-hole bushing.

Outlet shall be installed at same height as convenience receptacles unless noted otherwise on the drawings.

A pull-in fish wire, No. 14 galvanized iron, shall be left in each conduit run.

Service shall be from the existing T. C. M. box indicated on the drawings.

A 3" conduit from this box has been stubbed outside building at Point 'A'. This shall be extended in the duct bank indicated on the drawing into hand hole No. 2 then from hand hole No. 2 to new telephone box TMCA located in storage room No. 14.

The Electrical Contractor shall check the arrangements indicated on the drawings and specified herein with the Telephone Company's Engineering Department prior to submitting his bid. If indicated arrangements do not meet with their approval and must be revised, the Contractor shall notify the Architect of these changes if added costs are incurred, for their approval before submitting his bid.

23.61 EXTERIOR LIGHTING POSTS: Furnish and install conduit and wire underground as indicated on plot plan to serve the new exterior light posts.

A one inch conduit from existing panel LPA has been stubbed out side of building as indicated.

Furnish and install a magnetically held contactor as indicated in schematic diagram.

This Contactor shall be Square 'D' Cat. No. MG-2 or approved equal.

Posts shall be mounted on a concrete base similar in design to that detailed on drawing.

23.62 ELECTRICAL CONNECTIONS TO EQUIPMENT INSTALLED ON ISOLATION PADS: All electrical raceway connections to this equipment shall be made with flexible conduit bent in 180° Radius.

23.63 CONDUIT SEAL: The ends of all conduits shall be sealed with not less than 1 1/2" of duct seal packed into conduit.

23.64 EXTENSION OF EXISTING SERVICES: Extend all services from existing building stubbed-out at point 'A', into new addition as indicated on drawings E-1 and E-5. All conduits shall be galvanized rigid steel.

23.65 SPECIAL SYSTEMS: Furnish and install all materials indicated in riser diagrams and on floor plans, for special services not previously specified, i. e.

1. Speaker Riser Diagram for Stereo play-back.
2. Directors headset and annunciator riser diagram.
3. Riser diagram for stereo tape recording.
4. Riser diagram for remote television camera.
5. Intercom Telephone Riser diagram.

PORTABLE CLOSED CIRCUIT TELEVISING EQUIPMENT

23.66 CLOSED CIRCUIT TELEVISION CAMERA:

Vidicon Tube: Only a first quality type 7735A (or approved equivalent) vidicon tube shall be used. A grade B, spotted, sticky, or otherwise sub-standard tube shall not be used. The camera shall have capabilities to use a separate mesh vidicon.

Transistorization: With the exception of the vidicon tube and input stage, the television camera shall be silicon transistorized and shall contain no germanium components, or other vacuum tubes. No transistor shall be "hand picked" and shall be of registered type.

Synchronizing Circuits: The camera shall contain an integral silicon solid state synchronizing generator. For maximum stability and reliability, the generator shall use binary counters only. There shall be provision for AFC locking to the 60 cycle power line or for crystal control. The generator shall provide a 262-1/2:1 relationship between the horizontal and vertical drive pulses. The counter circuits shall use molecular integrated circuitry with micrologic elements. It shall be possible to use the interlaced sync generator module or an external EIA sync generator. When the internal sync generator module is used, its pulse outputs shall be available to drive other equipment via connectors on the rear of the camera.

Video Amplifier: The vidicon tube and video amplifier shall provide a video output up to two (2) volts peak-to-peak and 800 lines of horizontal and 400 lines of vertical resolution as observed on a standard EIA test pattern. Band width shall be down less than 3 db at 12 mc. The video amplifier shall have adjustable high peaker and aperture correction circuits. A keyed clamp circuit shall assure stable black level. Signal to noise ratio shall be 60 to 1 or greater with uniform 2870 degrees K faceplate illumination of 0.5 footcandle on a 7735A.

Automatic Electronic Focus Regulation: The camera shall contain an electronic focus regulation circuit which shall assure at least 750 lines of horizontal resolution over primary A. C. line voltage fluctuations of + 15 volts (115 volts reference) and temperature range of 0 degrees C to 70 degrees C.

Automatic Light Compensation: An automatic light compensation circuit shall be included to compensate for variations in scene lighting intensity. This circuit shall automatically compensate for light changes as great as 4000:1 down from bright sunlight (10,000 footcandles maximum) with less than 50% decrease in video output.

Internal Controls: The following controls shall be easily accessible on the camera plug-in circuit boards (inside the camera case) to optimize camera and system performance.

Vertical Gain	Aperature Correction
Vertical Size	Vidicon Beam Align #1
Vertical Linearity	Vidicon Beam Align #2
Vertical Centering	Voltage Adjust
Horizontal Size	Master OSC Frequency Adjust
Horizontal Centering	High Peaker
Set-up (Adjust reference black to picture black)	Crystal/AFV Switch
Horizontal Linearity	AFC Phase Switch
	AFC Phase Control

Vidicon Protection Circuit: A silicon transistorized vidicon protection circuit with no relays or electromechanical device shall prevent damage to the vidicon by instantly removing the scanning beam in case of horizontal or vertical sweep circuit failure.

Gray Scale: All ten shades of gray scale on a standard EIA test chart shall be discernible with ten foot-lamberts of scene brightness and an F:1.4 lens.

Sensitivity: The camera shall provide a low-noise picture with 800 lines of horizontal resolution with only ten foot-lamberts of scene brightness; and a useable picture with more than 600 lines of horizontal resolution with scene brightness as low as one foot-lambert at a lens opening of F:1.4.

Audio System: The Viewfinder shall have provisions for dual audio system (with separate volume controls for program and intercom). The audio system shall include low impedance microphones (dynamic), high impedance headphones (40 k ohms), and provision for stereo headphones (program and intercom).

Geometric Distortion: The camera shall have 2% or less geometric distortion as measured on a standard EIA test chart.

Chassis Construction: The camera shall be of modular construction with a minimum of at least three easily replaceable modules not including the vidicon tube deflection circuitry. These modules shall be removable and replaceable without making or breaking any soldered connections with the exception of the video module which shall have the video coaxial cable directly connected to the output connector. At least 95% of the components on the modules shall be completely accessible for servicing without removing the modules from the camera chassis.

The basic chassis shall be of metal construction to provide maximum strength, rigidity and precise optical and mechanical alignment.

For uniformity, strength and reliability, each modular circuit board shall be constructed as follows:

1. Glass-Epoxy Base
2. Etched Wiring of 2 oz. Copper
3. All Transistors shall be Mounted in Sockets.

Regulated Camera Power Supply: The output of the camera power supply circuitry shall be regulated so that picture degradation shall not exceed 5% in size, contrast or resolution for variations of ± 15 volts (115 volts reference).

Temperature Range: The camera shall, without any kind of adjustment, provide a picture over the ambient temperature range of -20 degrees C to +70 degrees C. From 0 degrees C to 70 degrees C picture degradation shall not exceed 5% in size, contrast or resolution.

Tally Lights: A minimum of one tally light for optimum camera "on-air" warning will be provided. Light shall be visible from the front of the camera.

Lens Turret: The Viewfinder shall contain a four-position lens turret capable of accepting four lenses with Type "C" mount. Control of the turret position shall be from the rear of the camera. A lens indicator will be located in the turret handle to show which lens is in operating position. Camera to be supplied with 4:1 rear controlled zoom lens.

Local Control: The camera may be completely operated locally without remote control unit. Camera shall be compatible with future EIA sync operation.

Viewfinder Case: The Viewfinder case shall be attractively finished with a color baked-on enamel leatherette finish. The rear panel shall be painted non-reflective black to minimize any ambient light reflections in the cathode ray tube.

Mechanical: Viewfinder dimensions shall not exceed 22 inches long (less detachable hood), by 11 3/4 inches high (including top carrying handle) by 9 1/2 inches wide.

The Viewfinder complete with camera shall not exceed 60 pounds; and will be capable of mounting to standard pan head mounting of 3/8 inch-16 thread or 1/4 inch-20 thread.

Quick Set Model 5302 tripod, Model 5602 dolly and Model 6245 cradle-head shall be supplied.

TXIB Audio -Video Modulators shall be supplied

Transmission: Single Sideband

Output: Picture carrier adjustable from 10,000 microvolts to at least 4,000,000 microvolts.

Sound Carrier: Adjustable from 7,000 microvolts, to at least 280,000 microvolts.

Video Input: 1 volt peak-to-peak (hi-Z bridged).

Audio Input: 600 ohms balanced or unbalanced

Output Impedance: 75 ohm "UHF" type SO-239 connectors.

Dimensions: 5 1/4" by 19" front panel by 12" deep.

Preamplifier: 1A451

Input Transformers: 3A55

Power Supply: 17A70

All equipment to be enclosed in DCR70 Housing for easy portability.

1A840 Preamplifier panel shall be supplied. The rack mounted mixing and preamplifier panel shall be DuKane Model 1A840. The unit shall provide mixing for 3 microphone input. The third microinput shall have provision to be used as an auxiliary phono input. Bass and treble tone controls shall be provided. The bass control shall boost and cut 10 db at 100 Hz and the treble control shall boost and cut 10 db at 10,000 Hz.

A master gain control and meter level switch shall be provided. The VU type meter shall be capable of reading the output of this panel directly, as well as the 70V or 25V line level of the entire system.

The unit must have a voltage gain of at least 80 db and a frequency response flat within + db from 20 to 20,000 Hz. It shall have a rated output of +18 dbm. The distortion at rated output shall not exceed 2% at any frequency between 30 and 20,000 Hz. The noise level shall be at least -122 dbm (EIN) to be acceptable under these specifications.

The load impedance of this panel shall be 600 ohms (single ended) or (balanced) line and terminated with screw terminals. The power supply for this panel must operate over a range of 105 to 125 volts, 50/60 Hz. The panel shall be 19" wide, 2-7/8" high and 9-1/4" deep and finished in light gray baked enamel.

Housing. The Audio-Video modulator shall be housed in a Premier DCR100

Microphones:

Supply as listed below:

1 DuKane 7A160

1 EV 647 LO Z

1 EV 647 HI Z

1 651-32 Stand

Video Tape Recorder:

Specifications:

Record and Playback

Bandwidth: 3 mcs -4 db.

Horizontal Resolution: 300 lines

Video Signal-to-Noise: 42 db, peak-to-peak video to rms noise.

Playing Time: Continuously -60 minutes.

Head, or Heads: 500 hour guarantee, spare to be provided.

Outputs: Video, audio, and RF (picture only)

Audio Inputs: Microphone, balanced and unbalanced bridging

Audio Output: Balanced or unbalanced line

Audio Recording Channels: Two, each providing for separate record function, and permitting audio recording without disturbing previously recorded video.

Audio Frequency Response: 100-12,000 cps plus or minus 4 db.

Audio Flutter and Wow: Less than 0.2% rms

Audio Signal-To-Noise: 45 db.

Integral Loudspeaker, permanent magnet

VU Meters with needle indicators. Separate meters shall indicate audio input or output, and video input or output.

Functional Operating Controls: Play, Record, Fast Forward, Fast Rewind, Stop Action, Slow Motion, Audio Input and Output, Video Input and Output. Brake Control shall be positive and provide for prevention of damage to tape.

All solid State Circuitry

100% tape playback interchangeability on like make and model, meeting the above specifications.

Recorder outputs may be played back on any conventional receiver or monitor with no requirement for modification whatever.

Provide one (1) Regulated Utility Video Monitor Model CVA17C.

Specifications:

Input Power: 117/234 volts, 50/60 cycles, 190 watts. All performance specifications will be met while line voltage varies from 105 to 130 volts AC at any rate.

Video Signal: 0.25 volt, pp (minimum for 50 volts at kine-scope) 4.0 volts maximum. Sync negative at monitor input.

Video Input: High impedance bridging (equivalent to 470K in parallel with 15 mmfd.) can be terminated by an internal 75 ohm load through a switch located on rear apron.

Video Response: 10 mc plus or minus 1 db (800 line resolution) Differential gain below 5% with 50 volt kine-scope drive.

Linearity: Within 2% of picture height.

Front Panel: On-off switch, brightness, contrast, vertical hold, horizontal hold, vertical size, vertical linearity, AC line fuse, focus.

Rear Apron: Paralleled video input connectors, video terminating switch, paralleled sync input connectors, sync level, horizontal linearity, horizontal drive, width, horizontal output fuse.

Chassis Deck: DC restorer switch, external-internal switch, Ultor voltage adjust, B plus adjust.

Connectors: All video and sync connectors are SO239 type.

Provide one (1) Multiple Monitor Control Receiver Model ERL12A.

Specifications:

Input Power: 110/120 volts, 60 cycles, 85 watts, 3-wire AC cord 6' long.

RF Signal: VHF 2-13, 75 ohms-unbalanced.

IF Signal: Picture Carrier 45.75 mc., Sound Carrier, 41.25 mc., Intercarrier Sound 4.5 mc.

Video Signal: Input minimum 0.25 volts pp for 0.25 volts pp at each of two isolated outputs. Recommended input 1.0-2.0 volts pp for 0-1.0/2.0 volts pp controlled at each of two outputs. Sync negative in and out.

Video Input: High impedance bridging (equivalent to 470K in parallel with 15 mmfd.) must be terminated by an external 75 ohm load.

Video Response: Closed circuit 10 mc plus or minus 1 db, off-air 3.75 mc through 10 mc output DA.

Audio Signal: Input 1 volt minimum high impedance single ended. Output cathode follower 1 volt minimum. Additional local monitoring output 2.5 watts undistorted at 3.2 or 16 ohms.

Audio Response: 100-20,000 cycles in normal position. Snap switch response selector provides "speech", "bass", and "treble" responses as well as "normal".

20 - 1 inch Helical Scan Video Tape on 9 3/4" reel. Playing time to be 62 minutes on 3000 feet of tape. Scotch #357 Video Tape #357-1-3000-R97B, or guaranteed equivalent performance shall be supplied.

23.67 TYPE "S" SPEAKERS: The loudspeakers shall be DuKane Model (5A400) (5B400) or approved equal. The loudspeaker shall be coaxial type with a 110° angle of distribution. The low frequency speaker shall be 8" diameter; high frequency, 3" diameter. A built-in crossover network shall divide the output between the two speakers. Crossover frequency shall be approximately 2000 Hz.

The loudspeaker shall have a minimum sensitivity of 85.5 db measured on axis. The continuous power rating shall be 16 watts. Frequency response shall be uniform over the range of 30 to 14,000 Hz with a demonstrative dispersion angle of at least 110°.

The 10 ounce magnet of the low frequency unit shall produce at least 11,000 gauss; the 1.47 ounce magnet of the high frequency unit, at least 7,000 gauss. The loudspeaker shall be furnished with a 25 volt (5A400) 70 volt (5B400) line matching transformer having taps for 1/8, 1/4, 1/2, 1, 2 and 4 watts output terminating at KWI-KON clips. All external metal parts shall be finished in brown, baked enamel.

Speakers shall be mounted in a Model 25A30 square speaker housing for flush mounting. The assembly shall consist of one No. 110-799 Speaker Baffle 14 - 3/16" square end 3/4" deep and a No. 145-192 Back Box. The baffle shall be expanded platinum white steel grille surrounded by a bushed and anodized aluminum frame supplied with an acoustical batten. Back shall be coated on the inside with an acoustical coating.

NOTE: Main bus ties to existing switch board shall be 2-1/4" by 6" copper bars per phase and neutral.

SHEET NO 2

PANEL BOARD NO. ____MDP

TYPE CDP BUS CAPACITY 1000 SYSTEM VOLTAGE 120/208V-3ph-4w

NOTE: Proper size gutter space shall be provided to accommodate the 12 - 300 M. C. M. feeder conductors.

CIRCUIT SCHEDULE

SHEET NO. 3

Lighting		PANEL BOARD NO.			LP				
TYPE		NQB	BUS CAPACITY		225A	SYSTEM VOLTAGE 120/208V, 3ph, 4w			
CIRCUIT NO.	RELAY FRAME			TRIP SETTING (AMPS)	USE	F E E D E R			
	SIZE (KCMIL)	TYPE	POLES			NO.	SIZE	TYPE	CONDUIT
1-17	50	B	1	20	Lighting	2	12	THW	3/4"
18-20	50	B	1	20	Corridors	2	12	THW	3/4"
21-32	50	B	1	20	Receptacles	2	12	THW	3/4"
33	50	B	1	20	Stair 'A'	2	12	THW	3/4"
34	50	B	1	20	Stair 'B'	2	12	THW	3/4"
35	50	B	1	20	Stair 'C'	2	12	THW	3/4"
36	50	B	1	20	Elevator Pit Lights	2	12	THW	3/4"
37	50	B	1	30	Cleaning Receptacles	2	10	THW	3/4"
38	50	B	1	20	Lighting	2	12	THW	3/4"
39	50	B	1	20	Lighting	2	12	THW	3/4"
40	50	B	1	20	Noise Generator	2	12	THW	1/2"
41-42	50	B	1	20	Spare				

SHEET NO. 4

PANEL BOARD NO. LP 1

TYPE NQB BUS CAPACITY 225A SYSTEM VOLTAGE 120/208V, 3ph, 4w

CIRCUIT NO.	BREAKER FRAME			TRIP SETTING (AMPS)	USE	FEEDER			
	SIZE (KMP)	TYPE	POLES			CONDUCTORS			CONDUIT
						NO	SIZE	TYPE	
1	50	B	1	20	Corridor	2	12	THW	3/4"
2	50	B	1	20	Corridor	2	12	THW	3/4"
3-22	50	B	1	20	Lighting	2	12	THW	3/4"
23-29	50	B	1	20	Receptacles	2	12	THW	3/4"
30	50	B	1	30	Cleaning Receptacles	2	10	THW	3/4"
31	50	B	1	20	Receptacles	2	12	THW	3/4"
32	50	B	1	20	Phone Booth	2	12	THW	3/4"
33	50	B	1	20	Lighting	2	12	THW	3/4"
34	50	B	1	20	Lighting	2	12	THW	3/4"
35	50	B	1	20	Spare				
36-40	50	B	1		Provisions Only				
41-42	50	B	1	20	Spares				

CIRCUIT SCHEDULE

SHEET NO. 5

Lighting		PANEL BOARD NO. LP 2							
TYPE	NQB	BUS CAPACITY 225A			SYSTEM VOLTAGE 120/208V, 3ph, 4w				
CIRCUIT NO.	PANEL FRAME			T.E.P. SETTING (AMPS)	USE	F E E D E R			
	SIZE (AMPS)	TYPE	POLES			CONDUCTORS			
						NO	SIZE	TYPE	COND. T
1-17	50	B	1	20	Lighting	2	12	THW	3/4"
18	50	B	1	20	Corridor	2	12	THW	3/4"
19	50	B	1	20	Corridor	2	12	THW	3/4"
20-23	50	B	1	20	Receptacles	2	12	THW	3/4"
24	50	B	1	20	Spare				
25-31	50	B	1	20	Receptacles	2	12	THW	3/4"
32	50	B	1	30	Cleaning Receptacles	2	10	THW	3/4"
33	50	B	1	20	Elevator Lights	2	12	THW	3/4"
34	50	B	1	20	Pent House	2	12	THW	3/4"
35	50	B	1	20	Spare				
36	50	B	1	20	Spare				
37	50	B	1	20	Spare				
38-42	50	B	1		Provision Only				

CIRCUIT SCHEDULE

SHEET NO.

6

Lighting		PANEL BOARD NO. LP 3							
TYPE NQB		BUS CAPACITY 225A				SYSTEM VOLTAGE 120/208V, 3ph, 4w			
CIRCUIT NO.	CIRCUIT BREAKER FRAME			TRIP SETTING (AMPS)	USE	F E E D E R			
	SIZE (AMPS)	TYPE	POLES			CONDUCTORS NO.	SIZE	TYPE	CONDUIT
1-22	50	B	1	20	Lighting	2	12	THW	3/4"
23-29	50	B	1	20	Receptacles	2	12	THW	3/4"
30	50	B	1	30	Cleaning Receptacles	2	10	THW	3/4"
31-33	50	B	1	20	Receptacles	2	12	THW	3/4"
34	50	B	1	20	Pent House	2	12	THW	3/4"
35	50	B	1	20	Spare				
36	50	B	1	20	Spare				
37	50	B	1	20	Spare				
38-42	50	B	1		Provisions Only				

CIRCUIT SCHEDULE

SHEET NO 7

Emergency		PANEL BOARD NO.		EMP	
TYPE NT1P		BUS CAPACITY 100A		SYSTEM VOLTAGE 120/208V-3ph-4w	
FUSE		FEEDER			
CIRCUIT NO.	Plug Fuses	USE		CONDUCTORS	
	SIZE TYPE/POLES (AMPS)			NO.	SIZE TYPE CONDUIT
EMERGENCY SECTION - EMPE					
1-7	30	1	20	Emergency Lights	2 10 THW 3/4"
8	30	1	20	Emergency Lights	2 10 THW 3/4"
9	30				
10	30				
SPLIT BUS					
NORMAL SECTION - EMPN					
1	30	1	20	Exits Extinguisher Lights	2 10 THW 3/4"
2	30	1	20	Emergency	2 10 THW 3/4"
3	30			Fire Alarm System	2 12 THW 3/4"
4	30			Spare	
5	30			Spare	
6	30			Spare	

CIRCUIT SCHEDULE

SHEET NO. 8

Power		PANEL BOARD NO.		PP-1							
TYPE		NEB		BUS CAPACITY		225		SYSTEM VOLTAGE		120/208V, 3ph-4w	
CIRCUIT NO.	BREAKER FRAME			TRIP SETTING (AMPS)	USE	F E E D E R					
	SIZE (AMPS)	TYPE	POLES			NO.	SIZE	TYPE	CONDUIT		
1	100	EA	3	70	AC-1 Unit	3	10	THW	3/4"		
2	50	EA	3	40	F -1 Fan	3	10	THW	3/4"		
3	50	EA	3	20	Boiler	3	12	THW	1/2"		
4	50	EA	3	20	AC-1 Pump	3	12	THW	1/2"		
5	50	EA	1	20	Circulator	2	12	THW	1/2"		
6	50	EA	3	40	P-3	3	12	THW	1/2"		
7	50	EA	3	30	Air Compressor	3	12	THW	1/2"		
8	50	EA	3	20	P 1	3	12	THW	1/2"		
9	50	EA	3	20	P1-A	3	12	THW	1/2"		
10	50	EA	3	20	P 4	3	12	THW	1/2"		
11	50	EA	3	20	P 4A	3	12	THW	1/2"		
12	50	EA	3	20	P 2	3	12	THW	1/2"		
13	50	EA	3	20	Spare						
14	50	EA	3	30	Spare						
15		EA	1	20	Circulator	2	12	THW	1/2"		
16	50	EA	1	20	Circulator	2	12	THW	1/2"		
17	50	EA	1	20	P 5	2	12	THW	1/2"		
18	50	EA	1	20	Control Circuit	2	12	THW	1/2"		
19 -20	50	EA	1	20	Spare	2	12	THW			
21-26	50	EA	1		Provisions						

CIRCUIT SCHEDULE

SHEET NO 9

Power		PANEL BOARD NO.		PP-2					
TYPE NEB		BUS CAPACITY		225					
				SYSTEM VOLTAGE					
				120/208V-3ph-4w					
CIRCUIT NO.	BREAKER FRAME			TRIP SETTING AMPS	USE	FEEDER CONDUCTORS			CONDUIT
	SIZE (AMPS)	TYPE	POLES			NO.	SIZE	TYPE	
1	100	EA	3	70	AC-2 - Unit	3	10	THW	3/4"
2	50	EA	3	40	F-2 - Fan	3	10	THW	3/4"
3	50	EA	3	40	Condenser	3	10	THW	3/4"
4	50	EA	3	20	AC-2 - Pump	3	12	THW	1/2"
5	50	EA	3	20	F-3	3	12	THW	1/2"
6	50	EA	3	20	Spare				
7	50	EA	3	30	Spare				
8	50	EA	1	20	UH-1	2	12	THW	1/2"
9	50	EA	1	20	Circulator	2	12	THW	1/2"
10-12	50	EA	1	20	Spares				
13-17	50	EA	1		Provisions				
18	50	EA	1	20	Control Circuit	2	12		