

April 15, 1971
Appropriation 36-9356

SPECIFICATIONS FOR
OPERATING SERVICES CONTROL CENTER
BUILDING 828
HUMBLE OIL & REFINING COMPANY
BAYTOWN, TEXAS

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EXHIBIT "A"

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SECTION 1SUMMARY OF THE WORK1. SCOPE

A. These specifications cover the erection of the Operating Services Control Center, Building 828, located at the Baytown Refinery of the Humble Oil and Refining Company.

B. All work shall be done in accordance with these specifications, and with the standards and engineering drawings listed below in Tables I and II:

TABLE I - LIST OF BAYTOWN ENGINEERING STANDARDS

BTES 50-3-5.1A Standard Clauses Instructions
 BTES 50-5-1.1C Construction Requirements Instructions
 BTES 50-6-5.1B Invoicing for Lump Sum Contracts Instructions

TABLE II - LIST OF ENGINEERING DRAWINGS

<u>HOR NO.</u>	<u>ARCH. NO.</u>	<u>TITLE</u>	<u>DATE</u>
472-140-1	A-1	SITE PLAN AND INDEX	4-15-71
472- 35-1	A-2	FLOOR PLAN AND SCHEDULES	4-15-71
472- 35-2	A-3	ELEVATIONS AND SECTIONS	4-15-71
472- 35-3	A-4	WALL SECTIONS	4-15-71
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472- 35-5	A-6	ACCESS FLOOR PLAN AND DETAILS	4-15-71
472- 35-6	A-7	CEILING PLANS AND DETAILS	4-15-71
472- 35-7	S-1	FOUNDATION PLAN	4-15-71
472- 35-8	S-2	STRUCTURE STEEL PLAN	4-15-71
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472- 35-11	S-5	VESTIBULE DETAILS	4-15-71
472- 35-12	S-6	WALL SECTIONS	4-15-71
472- 35-13	S-7	WALL PLAN	4-15-71
472- 35-14	S-8	FOUNDATION AND SLAB SECTIONS	4-15-71
472- 35-15	S-9	FOUNDATION SECTIONS AND DETAILS	4-15-71
472- 35-16	S-10	WALL DETAIL	4-15-71
472- 35-17	S-11	STRUCTURAL DETAILS	4-15-71
472- 35-18	M-1	MECHANICAL PLAN	4-15-71
472- 35-19	M-2	SCHEDULES - DETAILS	4-15-71
472- 33- 1	P-1	PLUMBING PLAN	4-15-71
472- 34- 1	E-1	ELECTRICAL PLAN LIGHTING	4-15-71
472- 34- 2	E-2	POWER & SYSTEMS PLAN	4-15-71
472- 34- 3	E-3	SCHEDULES - DETAILS & DIAGRAMS	4-15-71
472- 34- 4	E-4	CONTROL DIAGRAMS	4-15-71
472- 34- 5	E-5	COMPUTER PANEL SCHEDULES	4-15-71
472- 34- 6	E-6	SCHEDULES	4-15-71

SECTION 2A

EARTH WORK

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the completion of the clearing, excavating, filling, and rough grading. Refer to drawings, details, schedules, and these specifications for type, location, and extent of such work required.

B. Excavating and backfilling for sewers, water, gas, plumbing, heating, and electrical work are included under their respective divisions.

2. EXCAVATION

A. Subsurface soil in general is suitable for bearing at the levels indicated on the drawings. A record of footing depths shall be kept. If the average of all footings varies more than six inches from approximate depth shown on the drawings, an adjustment shall be made on a predetermined unit price based on the difference between the approximate depth shown and the average depth of actual excavation.

B. Excavate to elevations and dimensions indicated plus sufficient space to permit erection of forms, shoring, and inspection of foundations. Excavation for footings and trenches may be cut to accurate sizes and side forms omitted if concrete is poured in clean-cut trenches without cave-ins.

C. Grade under slabs must be smooth and at elevation to provide proper slab thickness.

D. Protect bottom of excavation from frost. Do not place foundations, footings, or slabs on frozen ground. Shore and brace excavations; protect all slopes and earth banks, if necessary, to prevent cave-in. Remove shoring before backfilling is completed but not until permanent supports are in place.

E. Contractor shall control the grading around building so that ground is pitched to prevent water from running into the excavated areas of the building or damaging other structures. He shall furnish all pumping required to keep excavated spaces clear of water during construction.

F. Placing of footings and foundations on earth fill will not be permitted. Fill excess cuts under footings and foundations with concrete and fill any excess cut under slabs with tamped bank sand.

G. Execute drilled and reamed-type footing excavations with approved equipment which will provide required size, shape, and depth for footings.

2A-01

EARTH WORK

3. FILL

- A. Provide and place any additional earth and topsoil material needed to bring existing grades to new grades indicated or specified.
- B. Fill under concrete slabs shall be of compactible material and shall be approved by Humble before use. Place in layers not exceeding eight inches thick and moisten during compaction. Compaction shall be by means of approved equipment. Fill shall be compacted to at least 95% dry density at +3% of optimum moisture as determined by ASTM Specification D 698 (Standard Proctor).
- C. Sand may be used for leveling.

4. SANDFILL

- A. Band sand may be used for fill in place of earth. If water saturation is used, fill layer may be any depth. Same compaction is required as for earth.

5. TESTING LABORATORY

- A. At the option of Humble, a testing laboratory, selected and paid for by Humble, may be employed to verify conformance with density requirements for fill and backfill.
- B. In case of nonconformance, Contractor shall remove material from rejected areas and recompact until specified density is obtained. Costs of tests to verify density of reworked areas shall be paid by Contractor.

6. SITE WORK

- A. Site work in general will be handled by Humble under separate contract or contracts.
- B. Site work to be included in this contract will be limited to back-filling at grade beams on exterior of structure, compacted as above in paragraph 3, and such additional earth fill as necessary to drain water away from structure during the construction period.

SECTION 3A

STRUCTURAL CONCRETE

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the completion of the concrete work.

B. See drawings, schedules, and details for type and location of concrete work required.

C. Refer to Section 3B for architectural concrete.

2. MATERIALS

A. Portland Cement -- Shall conform to standard specification for Portland Cement (ASTM Specification C 150) or specification for Air Entraining Portland Cement (ASTM C 175) and be Type I or IA. Type III or Type III-A (high early strength) may be used, subject to the approval of Humble in each instance of its proposed use.

B. Water -- Shall be clean and free from oil, acid, and injurious amounts of vegetable matter, alkalies, or other salts.

C. Aggregates -- Shall conform to ASTM Specification C 33 for standard aggregates or to ASTM Specification C 330 for lightweight aggregates. The maximum size of the aggregate shall not exceed 1/5 of the narrowest dimension between forms of the member where concrete is to be placed nor exceed 3/4 of the minimum space between reinforcing bars.

D. Reinforcing -- All reinforcing steel shall be Grade 60, shall conform to ASTM Specification A615, and shall be weldable.

E. Steel Fabric Reinforcing -- Shall be cold-drawn wire or welded wire fabric for slab or decks and shall conform to ASTM Specification A 85.

F. Metal Accessories -- Shall include all spacers, chairs, ties, and other devices necessary for properly placing, spacing, supporting, and fastening reinforcement in place.

3. STORAGE OF MATERIALS

A. Store cement on platforms off ground; protect stored cement against the elements. Handle and store aggregates separately in manner to prevent intrusion of foreign material. Protect all reinforcement until used.

STRUCTURAL CONCRETE

4. FORMS

A. Standard Finish -- Obtain by using clean, straight-dressed lumber. Concrete having a standard finish shall have honeycombing and minor defects patched. Standard concrete finish shall be used for concrete for which no other finish is indicated or specified. It is the intent of these specifications to provide concrete work with sharp, clean lines with a minimum amount of patching. All work with standard finish shall be smooth and paintable.

5. CONSTRUCTION OF FORMS

A. Construct forms to slopes, lines, and dimensions shown plumb and straight and sufficiently tight to prevent leakage; securely brace and shore forms to prevent displacement and to support construction loads safely. Provide access openings to clean and inspect forms and reinforcing prior to depositing concrete. Do not coat forms with material that will stain or cause injury to exposed concrete surfaces. Keep wood forms wet as necessary to prevent shrinkage. Forms for exposed concrete beams, girders, columns, and pilasters shall provide for a one-inch chamfer on external corners. Construct forms for beams, girders, and lintels so that sides may be removed without disturbing bottom of form or its support.

B. Where soil conditions will permit excavation to accurate sizes without bracing, side forms for footings may be omitted and the sides of excavation lined with waterproof paper.

C. Form ties for exposed concrete shall be removable type. Locate ties level and plumb in horizontal rows and vertical tiers. Remove tie wires completely or to a depth of 1-1/2 inches from exposed faces of concrete; fill holes as hereinafter specified.

6. PLACING REINFORCEMENT

A. Place reinforcement accurately in position shown; securely fasten and support to prevent displacement before or during depositing of concrete; cleaning, bending, and placing of reinforcement shall be done in accordance with requirements of the drawings and the City of Houston Building Code.

B. Use steel chairs to hold reinforcement to proper clearance from slab bottoms, beams, or wall faces.

C. Minimum concrete protection for steel reinforcement shall be as follows except where noted otherwise on the drawings: footings, three inches; columns, 1-1/2 inches; walls, two inches; grade beams, three inches on bottom and 1-1/2 inches side and top; beams above grade, 1-1/2 inches; slabs on grade, one inch; and slabs above grade, 3/4 inch.

3A-02

EXX 001743

STRUCTURAL CONCRETE

7. PROVISION FOR OTHER WORK

A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking grounds, and other fastening devices required for attachment of other work. Properly locate in cooperation with other trades and secure in position before concrete is poured. Do not install sleeves in any concrete beams or columns except upon approval of Humble.

B. All inserts and fastening devices shall be subject to Humble's approval for each condition of use.

8. DESIGN OF CONCRETE MIX

A. See structural drawing for design strength of concrete. Aggregate shall be stone except in precast wall panels, which shall be Haydite.

B. Transit mix concrete shall conform to requirements of ASTM Specification C 94.

C. Slump shall be determined by the conditions prevailing on the job and shall be specified by the purchaser at the time the order is placed. Where it is impracticable to place concrete with the slump specified, a change may be made on approval of Humble. Concrete shall not be placed when outside the following maximum limits for slump:

Footings - 4-1/2 Inches

Walls - Six Inches

Columns, Slabs, and Beams - Five Inches

9. PLACING CONCRETE

A. Place no concrete until foundations, forms, reinforcing steel, pipes, conduits, sleeves, hangers, anchors, inserts, waterproofing, and other work required to be built into concrete has been inspected and approved by Humble. Before depositing concrete in footings or foundations, see that bottoms of excavations are on undisturbed earth, properly leveled off and tamped. Thoroughly wet or oil wood forms prior to placing concrete.

B. Place concrete in forms immediately after mixing and in such manner as to maintain the top surface reasonably level and to avoid flowing along the forms as much as possible. It shall be compacted by suitable means so that the concrete adjacent to the forms will be agitated sufficiently to cause mortar to exude from the mass and form a smooth wall and bottom surface. Give special attention thus in the case of concrete wall forms.

3A-03

EXX 001744

STRUCTURAL CONCRETE

C. Contractor may place concrete at night provided he supplies sufficient artificial light to enable the work to be thoroughly inspected and takes all precautions to guard against displacement of the steel during the pour. Notice must be given to Humble so that arrangement can be made for proper inspection of the work.

D. Fill footings to required height without stopping pour. Fill over excavation with concrete only.

10. REMOVAL OF FORMS

A. Forms shall be removed without damage to concrete and in a manner to insure complete safety of the structure. Forms shall not be removed, in any case, from beams, girders, slabs, joists, and similar structures, until concrete has reached two thirds of its design strength and even then shall be shored to the satisfaction of Humble until full strength has been reached. In the interest of expediting the work, Contractor may, at his option, take additional test cylinders for breaking ahead of scheduled seven- and 28-day aging periods. All expenses in connection with taking such cylinders and their breaking shall be paid by Contractor.

B. Forms shall be completely removed in order that no form material will be left in the completed work.

11. CONSTRUCTION JOINTS

A. The rate and method of placing concrete and arrangement of construction joint bulkheads shall be such that the concrete between construction joints may be placed in one continuous operation.

B. Before placing slabs, locate and form for construction joints and depressed areas. Depress slabs without decreasing thickness of slab.

C. When it becomes necessary to discontinue concreting before completion of the unit involved, temporary bulkheads may be introduced at approved points. On removal of these temporary bulkheads, the concrete face exposed must be roughened up with picks or otherwise as elected to give a satisfactory bond with the new concrete. Wet and paint with neat cement before placing new concrete.

12. FINISH OF ROUGH SLABS

A. Strike off structural slabs at required levels with a straight edge; strike roof slabs at underside of roof insulation, fill, or roofing as required; strike slabs having ceramic tile or cement topping the required depth below finish floor elevations unless other dimensions are shown.

3A-04

STRUCTURAL CONCRETE

B. Slab surfaces to receive roofing or rigid roof insulation shall have a float finish. All other surfaces of structural slabs, except where integral cement finish is required, shall be thoroughly raked or wire broomed to provide bond for other finishes.

13. PATCHING AND CLEANING

A. Concrete not formed as shown on the plans or out of level or alignment or having a defective surface shall be considered as not conforming to these specifications and shall be removed at the Contractor's expense unless permission is given to patch the defective area. Permission to patch shall not be considered a waiver of the right to require removal of the defective work should the patching prove unsatisfactory to Humble. Do not patch any surface until examination has been made by Humble and permission given.

B. Directly after forms have been removed, all exposed ties shall be removed from concrete surfaces to be exposed; cut ties flush with finished surfaces of all other concrete. Rub smooth or cut off fins and rough places and remove all loose concrete.

C. When permitted, patching shall be done with approximately the same materials as used for the concrete except that the coarse aggregate shall be omitted and the mortar shall not be richer than one part cement to one part sand. All patching shall conform to the requirements set out in Architectural Concrete Specifications AC-1, Paragraph 36, 4th Edition, as published by the Portland Cement Association.

14. CURING AND PROTECTION

A. Protect concrete against frost and rapid drying and keep moist for at least seven days after placing (three days for high early concrete or cement). When outside temperature is 40°F or less, maintain concrete temperature of at least 70°F for three days or 50°F for five days.

B. Cover troweled interior concrete floor surfaces as soon as the concrete has hardened sufficiently to prevent damage thereby and start curing. Covering shall be of a type that will not stain or discolor finished surfaces and shall be maintained in good condition until the installation of finished floor covering or until otherwise directed. Do not use curing compound unless approved by Humble.

C. Concrete roof slab surface shall be sprayed with water during the curing period as frequently as drying conditions may require. Curing on grade beams and other accessible exterior surfaces may be with an approved liquid chemical compound which does not affect texture or color.

3A-05

STRUCTURAL CONCRETE

15. CEMENT FINISH

A. Dusted-On Concrete Floor Finish -- Use dusted-on concrete floor finish for all interior floor slabs. To produce, strike off floor at proper level; remove excess water, laitance, and trash; and apply a dry mixture of one part Portland cement and two parts sand to the hardened slab in a uniform layer 1/16 to 1/8 inch thick. When the dry materials have absorbed the moisture and the slab is hardened enough to allow finishing, float and trowel to unite the dust coat with the base. Do not overwork, but trowel to a smooth, level, even surface, free from air holes or blemishes.

B. Brushed Area -- Ramps and entry platforms shall be given a medium-brushed surface immediately after troweling.

C. Rubbed Surfaces -- The exposed vertical surfaces of poured-in-place concrete shall be rubbed. All fins shall be removed and ground even with surrounding surfaces; all voids shall be filled with neat grout; and all surfaces shall then be coated with grout to an even and homogeneous surface free from swirls and discolorations.

16. METAL FORMS FOR ROOF DECK

A. Forms over steel joists for concrete roof deck shall be 24-gauge, galvanized iron "Cofar", 1-15/16 inch deep, with Type A T-wire spacing as manufactured by Granco Steel Products Company, Granite City, Illinois. End laps shall occur over joists with a minimum lap of two inches. Weld each sheet at each joist with two welds using "Corruform" curved washers. After sheets have been welded in place, Granco vent clips shall be inserted at the side lap of each sheet locating one clip at midpoint between joists. Under no circumstances are the vent clips to be eliminated or reduced in quantity.

17. FOUNDATIONS FOR EQUIPMENT:

A. This Contractor shall coordinate his structural work with the mechanical and electrical subcontractors. He shall include bases for equipment and shall build in anchors furnished to him by the subcontractors.

18. CLEANUP AND DEFECTS

A. Leave floor construction broom clean and all other surfaces ready for painting and facing or ready for use.

B. Cement floors found to be other than absolutely level or with foreign material "stuck on" shall be ground down or otherwise corrected to provide a satisfactory surface for installation of floor coverings.

SECTION 3B

ARCHITECTURAL CONCRETE

1. SCOPE

A. Work under this section includes all labor, materials, accessories, and equipment necessary for architectural concrete work.

B. Refer to drawings and these specifications for type, location, and extent of work involved.

C. The work covered in this section is, in particular, the exposed vertical surfaces, interior and exterior, of concrete walls.

D. Except where stipulated otherwise in this section of the specifications, all provisions and requirements of Section 3A, STRUCTURAL CONCRETE, shall apply for Architectural Concrete Work.

2. MATERIALS

A. CEMENT: White Portland cement shall be used in wall panels. Grey cement may be used in columns.

B. EXPOSED AGGREGATE: "Rainbow Mix" pea gravel.

3. OPTION

A. At the option of the Contractor, exposed aggregate panels may be pre-cast or cast on the job site.

4. WALL PANELS

A. Wall panels shall have exposed aggregate on exterior surface. Size of aggregate and general appearance shall match that of the panels on Hydrofining Control Center and Light Ends Control Center. Interior exposed surfaces shall be smooth, without form marks and suitable for painting.

B. The exposed surfaces of columns and those portions of wall panels which do not receive exposed aggregate finish shall be rubbed and blended together to form a uniform and continuous surface.

5. SUBMITTALS

A. The Contractor shall submit, for approval of Humble, a written outline of procedure, with drawings for the following:

- 1) Casting Method
- 2) Type and placement of brace inserts
- 3) Type and placement of lifting bolts
- 4) Type of lifting harness
- 5) Bracing
- 6) Method of grouting holes left by lifting bolts and inserts

3B-01

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ARCHITECTURAL CONCRETE

6. SAMPLE

A. Prepare, for approval of Humble, samples of wall panel work to show finish and texture of both faces.

7. DEFECTIVE PANELS

A. ANY PANELS THAT ARE CRACKED FROM THE PROCESS OF RAISING OR ANY OTHER CAUSE SHALL BE REPLACED BY THE CONTRACTOR WITHOUT CHARGE.

3B-02

EXX 001749

SECTION 3C

LIGHTWEIGHT CONCRETE FILL

1. SCOPE

- A. Work under this section includes furnishing all labor, materials, equipment and accessories necessary for the execution of the lightweight concrete work.
- B. See drawings and details for location, type and thickness of fill. Protect from moisture until roofing is applied. Provide temporary walkways for handling materials.

2. LIGHTWEIGHT CONCRETE ROOF DECK FILL

- A. Concrete used as drainage fill over roof slabs shall be poured-in-place Perlite or Vermiculite aggregate concrete of thickness as shown on the drawings. Aggregate shall comply with A.S.T.M. C-332 specifications for lightweight aggregates for insulating concrete.
- B. Mixture shall be such as to obtain a minimum compressive strength of 100 pounds per square inch at 28 days and weighing approximately 37 pounds per cubic foot (wet density) and 21 pounds per cubic foot (dry density). Mix in accordance with directions of the Perlite or Vermiculite manufacturer.
- C. Steel reinforcement shall be galvanized electrically welded steel fabric of cold drawn steel wire. Longitudinal wires shall be not less than No. 12 gauge and spaced 4 inches on center, transverse wires not less than No. 14 gauge spaced 8 inches on centers; effective cross sectional steel area shall be not less than .026 square inches per foot of width. Fabric shall be drawn tight and securely anchored at ends. Make side laps not less than 3 inches and securely tied together. Extend reinforcement up in curbs and cants.
- D. The applicator of the roof deck fill shall be responsible for the proper curing of the lightweight concrete.

4. SLAB FINISH

- A. Shall be smooth enough for complete adherence of roofing insulation when mopped on. Patch all holes, cracks and other damage before roofing is applied.

SECTION 5A

STRUCTURAL STEEL

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the fabrication, erection, and execution of the structural steel work.

B. See drawings and schedule for type, location, quantity, and details of steel framing and structural steel required to complete work. Anchor bolts and other incidental items of structural steel required to be built into concrete or masonry shall be furnished to respective trades at proper time and shall include instructions or templates for their installation.

C. Substitutions of shapes or modifications of details may be permitted only by approval of Humble.

2. MATERIALS

A. Structural Steel -- Shall conform to ASTM Specification A 36, suitable for welding.

B. Steel Joists -- Shall be open-web type conforming to standard specifications of the Steel Joists Institute. Joists shall be high strength of H or LH series with bearing depth of 5". Minimum yield point shall be 50,000 psi. Bottom chords of joints shall be made of angles same as top chords. Steel shall be suitable for welding.

C. Welding electrodes shall conform to those specified in AISC Specification Manual 1.17.2. Welding on A 36 steel shall be made with ASTM A 233, Class E-60 or E-70 series electrodes; Grade SAW-1 or SAW-2 shall be used for welding this steel with the submerged-arc process. Manual welding on the high-strength steel joists shall be done only with Class E-70, low-hydrogen electrodes.

D. Anchor Bolts -- Shall be in accordance with ASTM A 193, Grade B.

E. Anchor Bolt Nuts -- Shall be heavy in accordance with ASTM A 194 Grade 2.

3. SHOP DRAWINGS

A. Submit shop and erection drawings for all structural steel work to Humble for approval. Manufacturing or fabricating of any material or the performing of any work prior to approval of shop drawings will be entirely at risk of Contractor.

B. The approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimension shown on shop drawings shall be the responsibility of the Contractor.

5A-01

EXX 001751

STRUCTURAL STEEL

4. PROTECTIVE COATING

A. Clean steel of all rust, scale, millscale, sand, or other foreign matter and apply one shop coat of Humble Rust-Ban 281 red lead paint. Asphalt paint will not be allowed as shop coat on bar joists.

B. After erection, touch up field connections and abraded places with paint, and all surfaces which are not to be encased in masonry or concrete shall be given a field coat of Rust-Ban 281 red lead paint except that four ounces of lamp black shall be added to each gallon of paint.

5. FABRICATION

A. Unless otherwise shown, fabricate structural steel in accordance with current edition of specifications adopted by American Institute of Steel Construction. Punch and drill steel as indicated on drawings or specified for attachment of other materials thereto; punching and drilling required but not definitely indicated on drawings or specified, shall be done in the field.

6. ERECTION

A. Except as otherwise shown on drawings, all details of erection shall be in accordance with the specification for the design, fabrication, and erection of structural steel for buildings (riveted, bolted, and arc-welded construction) and the Code of Standard Practice for Steel Buildings and Bridges as issued by the American Institute of Steel Construction.

7. STEEL JOISTS

A. Set joists level to spacing shown with bearing of four inches on concrete and 2-1/2 inches on steel. Provide headers, trimmers, and bearing plates as indicated.

B. Each joist resting on steel shall be welded to the steel support with two welds, each two inches long, at each support or shall be secured to steel as detailed on structural drawings.

C. Bridge joists in accordance with structural drawings. Splicing of joists will not be permitted.

D. Where suspended ceilings occur on bottom of joists, furnish and install ceiling extensions for joist ends. Provide bridging, headers, anchors, and clips as required.

5A-C2

EXX 001752

SECTION 5B

MISCELLANEOUS METAL

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the execution of the miscellaneous metal work.

B. See drawings, schedules, and details for items of miscellaneous metal required. The following metal items are specified under other provisions of specifications: anchors, bolts, sleeves, and supports required for installation of plumbing, heating, ventilating, and electrical equipment; metal clamps, anchors, ties, and dowels for masonry and concrete work; metal windows, metal doors and frames, aluminum trim, and aluminum doors.

2. MATERIALS

A. Steel -- Conform to ASTM Specifications A 36 for structural steel, suitable for welding, and A 27 for cast steel. Architectural and miscellaneous steel not otherwise indicated or specified shall be mild steel.

B. Aluminum shall be Alloy No. 43 for castings, No. 35 for sheet, and No. 63-ST for extruded. All aluminum shall be from virgin ingot, as made by the Aluminum Company of America, or equal.

C. Screws and bolts shall be made of the same material as the exposed piece they hold, except screws for aluminum are to be of stainless steel.

3. SHOP DRAWINGS

A. Before any fabrication is begun, shop drawings of all miscellaneous metal items shall be submitted to Humble for approval. The drawings shall show sizes of metal, method of assembly, hardware, and anchorage or connection with other work.

4. WORKMANSHIP

A. Sheet and wrought iron shall be well-formed to shape and size with sharp lines or angles. Shearing and punching shall leave clean, true lines and surfaces. Weld or rivet permanent connections. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screws uptight, and threads nicked to prevent loosening.

B. Castings shall be sound and free from warp, holes, and other defects that impair their strength or appearance. Exposed surfaces shall have a smooth finish and sharp, well-defined lines and arris. Machined joints, where required, shall be milled to a close fit.

5B-01

EXX 001753

MISCELLANEOUS METAL

C. Provide necessary rabbets, lugs, and brackets so that work can be assembled in neat and substantial manner.

D. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

E. At proper time, deliver and set in place items of metal work to be built into adjoining construction.

F. Extruded members shall be clean cut, sharp and straight, and not less than 1/8 inch thick. Sheet aluminum shall be of such weights and so applied that it will be free of waves, buckles, or other irregularities of surface.

G. Where aluminum attaches to steel, the materials shall be properly insulated to prevent direct contact by means of bituminous paint.

H. Provide all necessary joints so constructed as to be watertight.

5. FINISH AND PROTECTIVE COATING

A. All aluminum shall have a satin finish. All surfaces shall be given an Alumilite coating equal to the finishes of the Aluminum Company of America, Alumilite No. 204-A2.

6. PAINTING

A. All ferrous metal shall be properly cleaned and given one shop coat of Rust-Ban 191, unless specified to be galvanized. Anchors that are built into masonry or concrete shall be coated with asphalt paint unless specified to be galvanized. Where hot-dip galvanized or zinc-coated metal is required, it shall not be shop primed unless specifically called for, but all abraded places and weldings shall be touched up with aluminum paint. Where hot-dip galvanizing or hot-zinc coating is specified, it shall be done in accordance with the standard specifications of ASTM A 123.

7. MISCELLANEOUS BOLTS AND ANCHORS

A. Provide all bolts, anchors, and attachments detailed on the drawings or specified herein.

8. MISCELLANEOUS METAL

A. Items of miscellaneous metal work shall include, but shall not be limited to, the following:

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MISCELLANEOUS METAL

- (1) Bearing plates for steel joists at concrete walls.
- (2) Steel support for open counter at Kitchen.
- (3) Steel support for wall counter at Kitchen.
- (4) Steel angles at concrete in access floor areas.
- (5) Steel channel at Door No. 3
- (6) Stair rail
- (7) Louvre

a. Model 4110 as manufactured by Construction Specialties, Inc.,
using 63T5 alloy and with two vertical mullions..

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EXX 001755

SECTION 6ACARPENTRY1. SCOPE

A. Work under this section includes all labor, material, equipment, and accessories necessary for execution of carpentry work.

B. Refer to drawings, schedules, and these specifications for type, location, and extent of work required.

2. GRADING REQUIREMENTS

A. Material for all woodwork shall be thoroughly air on kiln dried and protected from moisture. Maximum moisture content shall be 12%.

B. Grade and trademark shall be required on each piece of lumber (or bundle in bundled stock). Use only the recognized official marks of the association under whose rules it is graded. Grade and trademarks will not be required if each shipment is accompanied by certificates of inspection issued by the association.

C. Quality -- Lumber must be sound, thoroughly seasoned, well manufactured, and free of warp. All wood shall be dressed. Finished lumber shall be free of pitch pockets, knots, and off-colored wood.

3. GRADES OF WOOD

A. Grades and species of lumber and millwork shall be as follows, except that grades and species hereinafter specified under specific items shall govern:

Bucks and Nailers -- Grade 2 southern yellow pine or Douglas fir.

Treated Wood -- Use six-pound, Woodlife for roofing grounds and nailers.

4. STORAGE AND PROTECTION

A. Protect lumber from exposure to rain.

5. TEMPORARY ENCLOSURES

A. Provide temporary wood doors for exterior wall openings until specified doors are ready for installation.

6. ROUGH HARDWARE

A. Provide and install all rough hardware and metal fastenings as shown on drawings, specified herein, or required for proper installation of carpentry and millwork. Nails, spikes, screws, bolts, and similar items shall be of sizes and types to rigidly secure members in place. See the

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various headings hereinafter specified for specific sizes and type of rough hardware required.

7. HARDWARE APPLICATION

A. Receive, store, and be responsible for all finished hardware. Properly tag, index, and file all keys as directed. Apply hardware in accordance with manufacturer's instructions. Fit accurately, apply securely, and adjust carefully. Use care not to injure work when applying hardware. When necessary, remove and replace doors so they may have their bottoms painted. Hinge screws shall be of sufficient length to extend through doorframes and into wood bucks on all doors with door closers.

B. The location of hardware, in connection with doors, shall be as follows, unless otherwise shown on drawings: center doorknobs 38 inches above finished floor, center door pulls 40 inches above finished floor, center push plates 45 inches above finished floor, center cylinder deadlocks 52 inches above finished floor, center single push bars 48 inches above finished floor, locate upper edge of top hinge five inches below head of frame, locate lower edge of bottom hinge ten inches above finished floor, and space center hinges an equal distance between top and bottom hinges.

C. Cover doorknobs and pulls with heavy cloth until painting is completed. Prior to completion of building, examine all doors, sash, and other movable parts; adjust, as required, to leave the hardware in good working order.

8. NAILERS

A. Provide wood nailers behind all wall hung cabinets, counters, lockers and accessories.

SECTION 6BMILLWORK1. SCOPE

A. Furnish and deliver all millwork shown and specified. Millwork is defined to include all exterior and interior woodwork and plastic laminate exposed to view in the finished building.

B. Typically exempted wood items are: (1) lumberyard and specialty items of flooring, shingles, exposed roof decking, ceilings, siding, structural members, overhead doors, and wood bumpers; (2) painting, finishing, and erection; (3) furnishing and installing of hardware; and (4) factory-finished furniture and furnishings.

2. GENERAL

A. Quality Standards -- The Quality Standards of the Architectural Woodwork Industry, dated 1963, shall apply and, by reference, are made a part of these specifications. Where these specifications are in conflict with the Architectural Woodwork Industry Standards, these specifications take precedence.

B. Shop Drawings -- Required brochures or catalogs may be substituted for drawings of stock items. Show elevations of items requiring assembly. Details shall be drawn full size or three-inch scale. Give grade of millwork, wood species, and whether natural or paint finish. Show dimensions requiring field measurements.

C. Field Dimensions -- Contractor is responsible for details and dimensions not controlled by the job conditions. Contractor and Humble shall cooperate to establish and maintain field dimensions.

D. Delivery and Storage -- Not permitted until storage area is enclosed and wet application materials have essentially dried.

3. CASEWORKA. Definitions

(1) Exposed -- Surfaces visible when doors and drawers are closed and bottoms of cases more than four feet zero inch above floor. Surfaces visible through clear-glass doors. Tops of cases less than six feet zero inch above floor.

(2) Semiexposed -- Surfaces visible when drawers and opaque doors are opened. Tops of cases six feet six inches or more above floor.

(3) Concealed -- Surfaces not usually visible after installation.

B. Assembly -- Completely shop assembled except:

- (1) When casework is too large for entrance to the use area. In such cases, it will be assembled into sections prepared for field connections.
- (2) Fitting of hinged doors when door hardware is specified under another section.
- (3) Fitting and attachment of finished hardware specified under other sections.
- (4) Installation assembly.

Contractor may construct at the jobsite.

C. Material Thicknesses -- The following thicknesses shall apply, except when shown thicker on the drawings.

- (1) Tops, Bottoms, End, and Divisions -- Three-fourths inch thick. Thinner plywood may be used if reinforced with members and at locations not requiring dadoes.
- (2) Face Plates -- Equal to door thickness with 3/4-inch minimum.
- (3) Web Frames -- Three-fourths-inch minimum.
- (4) Backs and Drawer Bottoms -- One-fourth-inch plywood, 1/4-inch hardboard, or 1/8-inch tempered hardboard. Drawers over 24 inches wide require center bottom support. Backs reinforced with strips or braces to limit areas to 12 square feet.
- (5) Drawer Fronts -- Three-fourths inch.
- (6) Drawer Backs and Sides -- One-half inch.
- (7) Shelves -- Exposed shelves 3/4 inch thick to 42 inches and one-inch minimum over 42 inches. Concealed shelves 3/4 inch thick to 48 inches.
- (8) Dust Panels -- Not required unless shown on the drawings.
- (9) Bases -- Specified under Carpentry Section. Design toe space three inches deep and four inches high, except when shown otherwise on the drawings. Design 1/2-inch-deep recessed base across exposed ends.
- (10) Doors -- Three-fourths-inch-minimum thickness, except when shown greater on the drawings. When thicknesses 1-3/8 inches and over are shown, specifications for full-size, walk-through doors apply. Flush type, except where shown otherwise on the drawings. Hardware final

fitting and installation are not in this section. Omit edge binding on the tops and bottoms of sliding doors. Omit edge binding on the tops of doors over six feet above floor and on the bottoms less than three feet above floor.

D. Drawers

(1) Flush type, except where shown otherwise on the drawings. Include slides installed:

K & V No. 1300

Washington No. B-2000

Garcy No. 380 or Humble's Approved Equal

E. Shelves

(1) All adjustable unless marked fixed or removable on the drawings. Removable shelves shall be on cleats or standards. Include standards and shelf supports, installed. Standards are to be K & V No. 255 zinc plate with recessed mounting. Shelf supports are to be K & V No. 256 zinc plate.

F. Plastic Laminate

(1) Standards -- Meet NEMA Test LP 2-1957.

(2) Brands -- Nevamar, Wilson-Art, Textolite, Micarta, Formica, and Panelyte.

(3) Selection of Color and Pattern -- By Humble from full range of stock materials. Satin finish unless specified otherwise.

(4) Thicknesses -- Use 1/16 inch (0.062 inch) for counters and similar horizontal surfaces and walk-through-size doors. Use 1/32 inch (0.032 inch) for cabinet facings and edge banding. Use 0.30-inch phenolic plastic backer sheets.

(5) Backer Sheets -- Required where plastic laminated sheet is not supported along all four edges and where unsupported areas exceed six square feet for custom-grade cabinets or four square feet for premium-grade cabinets. All doors require backer sheets or plastic on two sides. Hinged doors require finished plastic on both sides.

(6) Edges -- Self edge unless shown or specified otherwise.

(7) Cores -- Three-fourths-inch-thick, five- or seven-ply core, softwood or hardwood veneer plywood with "B" surfaces on sides exposed to view. Hardwood veneers required for premium-grade cabinets. Plywood is to

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conform to APA standards and carry grade mark. Particle boards are to conform to the standards of NAPF, Grade B, optional for custom or economy grades. Raised-grain core boards that telegraph imperfections cannot be used.

G. Adhesives - Urea formaldehyde type for shop use. Set in press. Job application permitted only where shop fabrication is impractical. Use either contact or pressure types for job application.

H. Grades -- Custom.

I. Exposed Surfaces -- Hardwood, stain finish.

J. Semiexposed Surfaces -- Softwood, natural finish drawers. Softwood, paint finish cabinets.

4. STANDING AND RUNNING TRIM

A. Wood -- Pine, fir, or hardwood.

B. Finish -- Paint.

C. Grade -- Custom.

5. MISCELLANEOUS ITEMS

A. Cabinet Work -- Kitchen, natural finish.

B. Cabinet Work -- Electrical Instrument Repair - Natural finish.

SECTION 7B

WATERPROOFING

1. SCOPE

- A. Work under this section includes furnishing of all labor, materials, accessories, and equipment necessary for completion of waterproofing work.
- B. Refer to the drawings and these specifications for type, location, and extent of work required.
- C. Caulking is specified under a separate section.

2. GUARANTEE

- A. Provide guarantee, in writing, warranting workmanship against leakage and material against hardening, cracking, or crumbling away for a period of two years from date of completion, as evidenced by date of final payment.

3. MATERIALS

- A. Membrane -- Six-mil-thick polyethylene plastic sheet.
- B. Plastic Cement -- Cold-applied asphalt emulsion as approved by Humble.

4. INSTALLATION

- A. Apply one ply of membrane over sandfill at all building concrete slabs.
- B. All joints shall be lapped a minimum of six inches and sealed with cement for watertight joint.
- C. Any penetrations of membrane for conduit, pipe, or other reasons shall be carefully repaired with extra ply of membrane and cement to restore to a reasonably watertight condition. Screed stakes may penetrate the membrane without patching.

SECTION 7AROOFING1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the execution of the roofing and deck insulation work.

B. See drawings for location, extent, and details of roofing and deck insulation work required.

C. Ventilators and flashing, plumbing vent flashing, and roof drains are included in the Mechanical Specifications. This Contractor shall build items as furnished into the roofing.

2. GUARANTEE

A. The roofing contractor shall be approved by Humble. The roofing subcontractor shall provide a two-year maintenance guarantee for all roofing and flashing against leakage.

3. MATERIALS

A. Primer shall be specially prepared priming material for asphalts and shall conform to ASTM Spec. D41.

B. Insulation shall be rigid or semi-rigid glass-fibered insulation equal to "Fiberglas" as manufactured by Owens-Corning Fiberglas Corporation.

C. Asphalt shall conform to the applicable section of ASTM Spec. No. D312-44.

D. Base sheet shall be Owens-Corning's "Fiberglas Base Sheet" or 30 lb. asphalt saturated asbestos felt conforming to ASTM Spec. No. D250-60.

E. Roofing felt shall be 36 in. wide asphalt-saturated asbestos felt conforming to ASTM Spec. No. D250-60, or Owens-Corning's "Fiberglas Perma-Ply".

F. Asphalt-base emulsions shall be specially prepared asphalt roofing material for smooth built-up roofs, conforming to ASTM Spec. D1227-59.

G. Mechanical Fastener -- Neoprene compound extruded to shape shown on drawings in lengths to extend between premolded corners. Premolded corners shall be at right angles and shall conform to profile of mechanical fastener.

H. Neoprene compound for mechanical fastener shall be as recommended by manufacturer of mechanical fastener.

J. Elastic Flashings -- "Saraloy No. 400" as manufactured by Dow Chemical Company or "Nervastral No. 600" as manufactured by Rubber and Plastic Compound Company.

K. Adhesive for fastening of elastic flashing shall be as recommended by manufacturer of flashing material.

4. GENERAL

- A. Roof insulation shall be of thickness shown on drawings. Unless otherwise specified or noted on drawings, all built-up roofs shall be applied over a 1/2 in. minimum thickness of insulation to minimize the effect of expansion and contraction in the roof structure.
- B. Open-fired kettles will not be permitted on the roof.
- C. All asphalt shall be applied at temperatures between 250°F and 300°F unless otherwise specified herein.
- D. A minimum of 40 lbs. of asphalt per layer of felt per 100 sq. ft. of roof shall be applied in a smooth, even coat so that all felt is embedded in hot asphalt. In no case shall felt touch felt.
- E. Primer shall be uniformly applied at a minimum rate of 1 gallon per sq. ft.
- F. Mineral aggregates shall not be used as a finish coat.
- G. Emulsion shall be uniformly applied at a minimum rate of 2 1/2 lbs. per 100 sq. ft.
- H. Coal tar and coal tar products shall not be used under any conditions.
- J. Roofing shall not be applied unless roof is completely dry.

5. PROCEDURE FOR APPLICATION

- A. Coat roof deck uniformly with primer.
- B. Apply insulation in an unbroken coating of hot, mopped-on asphalt.
- C. Apply four plies of 15 lb. felt in an unbroken coating of mopped-on molten asphalt. Lap each ply a minimum of 28 in. over the preceding ply.
- D. Seal roofing at edges with elastic flashing and neoprene mechanical fastener as shown on drawings.
- E. Apply a final, even coat of asphalt-base emulsion.

SECTION 7CCAULKING1. SCOPE

A. Work under this section includes furnishing of all labor, materials, accessories, and equipment necessary for completion of the caulking work.

B. Refer to the drawings and these specifications for type, location, and extent of work required.

C. Waterproofing is specified under a separate section.

2. GUARANTEE

A. Provide guarantee, in writing, warranting workmanship against leakage and material against hardening, cracking, or crumbling away for a period of two years from date of completion, as evidence by date of final payment.

3. MATERIALS

A. Caulking Compound -- An elastic, waterproof adhesive as manufactured by Pecora, H. B. Fred Kuhls, A. C. Horn, Minwax, or an equal, as approved by Humble. Compound shall be of proper consistency to be readily worked and not be affected by vibration or long exposure to outside climatic and temperature changes. Compound shall form a thin, tough, elastic film on the surface but remain permanently plastic underneath. It shall contain no acid or ingredients that will stain stone, corrode metal, or have an injurious effect on painting. Compound shall be white or colored, as required, to match adjacent work.

B. Rope Yarn -- Raveled strands of nonstaining rope fiber, oakum, or jute.

C. Caulking Primer -- A quick-drying, clear varnish thinned to proper consistency or other methods as recommended by the manufacturer of the compound.

4. APPLICATION

A. All joints and spaces to be caulked shall be clean, free from dust, and dry. When gun consistency compound is used, prime absorbent or rough surfaces that are in contact with caulking before caulking is applied. Joints more than 3/4 inch deep and joints where a suitable backstop has not been provided shall be packed with rope yarn to within 1/2 inch of surface before applying caulking. Caulk joints before final coat of paint is applied to adjacent work.

B. Apply compound with gun having proper size nozzle or with knife as required. (See requirements of other section.) Use sufficient pressure to fill all voids and joints solid; superficial pointing of joints with a

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CAULKING

skin bead will not be accepted. Remove excess caulking and leave surfaces neat, smooth, and clean. Upon completion, caulking shall have a smooth, even finish. All caulked joints shall be watertight.

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EXX 001766

SECTION 7D

WEATHERSTRIPPING

1. SCOPE

A. Work under this section includes all labor, materials, equipment and accessories necessary for the provision and installation of weatherstripping at exterior doors.

2. MATERIALS

A. Materials listed below are as manufactured by Argil J. May Manufacturing and Dist. Corp.

- 1) Door Bottom Weather Seal: 33AA.
- 2) Door Seals: 21AA Neoprene

3. INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations.

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EXX 001767

SECTION 8AHOLLOW METAL FRAMES1. SCOPE

- A. Work under this section includes all labor, materials, accessories, and equipment necessary for erection of hollow metal frames.
- B. Refer to the drawings, schedules, and these specifications for type, location, and extent of work required.
- C. Exterior steel doorframes are specified elsewhere.

2. MATERIALS

- A. Metal doorframes, where indicated on the plans, shall be combination buck and jamb type as detailed on the drawings.
- B. Frames to be formed to shape, as detailed, from 16-gauge, best-grade furniture steel. Head and jamb sections are to be accurately mitered, continuously welded, filled, and ground smooth to produce a completely rigid assembly.
- C. Bucks shall be mortised, reinforced, drilled, and tapped at the factory to receive mortised template hinges, lock strikes, flush bolts, and door closers where required; reinforce bucks to receive surface-applied hardware. Provide cover boxes in the back of all hardware cutouts.

3. SHOP DRAWINGS AND SAMPLES

- A. Submit to Humble, for approval, shop drawings showing typical construction of all items. The drawings shall also show the conditions at doors, with various wall thickness and materials, and a schedule listing the location in the building for each item.
- B. Submit sample corner sections of metal bucks to Humble for approval. Sample section shall clearly show details of construction.

4. SHOP FINISH

- A. All frames shall be electrogalvanized or be primed with paint that will pass a 200-hour, 5% salt spray test in accordance with ASTM method.

5. LOCATION OF HARDWARE

- A. The location of hardware, in connection with metal bucks and trim and hollow metal doors, shall be as follows unless otherwise shown on the drawings: center doorknobs 38 inches above finished floor, center door pulls 40 inches above finished floor, center push plates 45 inches above finished floor, center cylinder deadlocks 52 inches above finished floor, locate upper edge of top hinge five inches below head of frame, locate

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EXX 001768

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HOLLOW METAL FRAMES

lower edge of bottom hinge ten inches above finished floor, and space center hinges an equal distance between the top and bottom hinges.

6. INSTALLATION

A. Install frames plumb, rigid, and in true alignment. Frames are to be securely anchored to wall members.

8A-02

EXX 001769

SECTION 8BWOOD DOORS1. SCOPE

- A. Work under this section includes provision of wood doors.
- B. Installation of doors is covered under the Carpentry Section of these specifications.

2. MATERIALS

- A. General -- Comply with AWI Brochure 5, 1963, Revision and Commercial Standards CS171-58, except when more stringent requirements are set forth herein. In such cases, the most stringent requirements shall apply.
- B. Warp Limits -- Maximum warp or twist in all grades is 1/4 inch, as defined by the National Woodwork Manufacturers Association standard door guarantee. If door cannot operate properly, it shall be corrected regardless of the amount of warp or twist.
- C. Glue -- All doors shall be glued with Type I, fully waterproof glue.
- D. Solid Core Doors -- Type A.
- E. Door Cores and Veneers
 - 1) Cores -- Solid cores.
 - 2) Veneers -- Hardwood or overlay type.

3. SAMPLES, BROCHURES

- A. Submit cutaway sample or manufacturer's literature that describes construction completely.

SECTION 8C

EXTERIOR STEEL DOORS AND FRAMES

1. SCOPE

A. Work under this section includes all labor, materials, accessories and equipment necessary for the provision and installation of exterior steel doors and frames.

2. MATERIALS:

A. Doors shall be heavy duty galvanized steel doors, as manufactured by Dean Steel Products Co., or Tex-Steel Corporation, with 16 gauge face sheets and 18 gauge inner stiffeners on 6: centers spot welded to both faces of doors.

B. Metal panel above door No. 3 shall be same construction as doors and shall be removable.

C. Frames shall be formed tubular sections of 14 gauge galvanized metal. Horizontal mullion at door No. 3 shall be reinforced as detailed and shall be removable.

3. FABRICATION, GENERAL:

A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, accurately formed to the required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work, that cannot be permanently factory-assembled before shipment, to assure proper assembly at the project site. Dress all welded joints on exposed surfaces flush and smooth, to be invisible when prime painted. Use of metallic filler to conceal manufacturing defects is not acceptable.

4. FINISH HARDWARE PREPARATION

A. Prepare hollow metal units at the manufacturer's plant to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping. Comply with applicable requirements of ANS A115 "Specifications for Door and Frame Preparation". Prepare for other mortised and concealed finish hardware to the templates of the manufacturer of each finish hardware item required in the work.

B. Reinforce all doors for closers, whether or not closers are indicated.

C. Reinforce hollow metal units at the manufacturer's plant to receive surface-applied hardware. Drill and tap for surface-applied finish hardware at the project site during installation.

D. Provide removable moldings at all other locations, unless otherwise shown.

EXTERIOR STEEL DOORS AND FRAMES

5. SHOP PAINTING

- A. Clean, treat and paint all surfaces of fabricated hollow metal units, including galvanized surfaces, whether concealed or exposed in the finished work.
- B. Remove mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.
- C. Apply shop coat of baked-on prime paint of even consistency to provide a uniform finished surface ready to receive field-applied paint.
- D. Molding Locations: Provide moldings around solid, glazed or louvered panels in hollow metal units for a rigid and secure installation.
- E. Provide non-removable moldings on the outside of exterior hollow metal units.

6. INSTALLATION

A. General

- 1) Install hollow metal units and accessories in accordance with the final shop drawings and manufacturer's data, and as herein specified.

B. Placing Frames

- 1) Set frames and secure to adjacent construction with machine screws and masonry anchorage devices.

C. Door Installation

- 1) Fit hollow metal doors accurately in their respective frames, within clearances specified in S.D.I. 100.
- 2) Finish hardware is specified in Section 8D "Finish Hardware".
- 3) Final Adjustments
 - a. Check and readjust all operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

7. SUBMITTALS

EXX 001772

A. Manufacturer's Data, Hollow Metal Doors and Frames

- 1) For information only, submit 2 copies of manufacturer's specifications for fabrication and shop painting, and installation

EXTERIOR STEEL DOORS AND FRAMES

instructions. Indicate by transmittal form that one copy of instructions has been distributed to the Installer.

B. Shop Drawings, Hollow Doors and Frames

- 1) Submit shop drawings for the fabrication and erection of hollow metal doors and frames, as required to supplement manufacturer's data and to show location in building. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Provide details at 3" to 1'-0" scale and dimensioned elevations at not less than 1" to 1'-0" scale. Show anchorages and accessory items.

EXX 001773

8C-03

SECTION 8DFINISH HARDWARE1. SCOPE

A. See drawings, schedules, and details for items requiring hardware and installation details. Include all finish hardware and related items necessary to complete work shown and specified.

B. Where hardware is required in connection with the following items it is specified to be furnished with those items unless specifically noted otherwise:

- 1) Metal lockers
- 2) Toilet partitions

C. Should items of hardware not definitely specified be required for completion of the work, furnish such items of type and quality suitable for the service required and comparable to adjacent hardware.

D. As soon as practicable, and no later than 30 days after award of the general contract, Contractor shall submit to Humble for approval six copies of the finish hardware schedule, complete with all details and a sample of each individual item.

2. SAMPLES

A. Submit such samples as are required by Humble for approval; do not deliver hardware until approval is obtained.

3. MATERIALSA. BUTTS

- 1) Doors shall have 1-1/2 pairs of butts per leaf. All butts shall have flat button tips. All butts shall be sized per manufacturer's recommendations for size and weight of door involved.
- 2) Exterior doors shall have solid bronze or anodized aluminum butts (except where prime coats are specified) with rust-proof, oil-lite bronze bearings. Butts shall be standard mortise type for wood and hollow metal doors and frames. Half surface butts shall be used for doors with channel frames.
- 3) Interior doors shall have standard weight, oil-lite bearings and anodized aluminum leaves.

B. DOOR CLOSERS

- 1) Door closers shall have aluminum finish, 140-degree swing, regular arm (unless specifically noted to have fusible link, hold-open arm for exit or fire doors) and shall be surface mounted. Closers

FINISH HARDWARE

shall be Norton Door Closer Company's 1600 series, or approved equal, selected per manufacturer's recommendations for size and weight of door involved.

C. DOOR STOPS

- 1) Door stops shall be dome floor type equal to Glenn-Johnson's GJ-F18X-US26D.

D. KICK PLATES

- 1) All kick plates shall be brushed aluminum, 10 inches wide by door width less 2 inches with minimum of 14 countersunk, flush-headed, chrome plated, wood screws.

E. LOCK SETS

- 1) Lock sets shall be mortise case sets in accordance with Federal Specification FFH106, Series 86; 2-3/4-inch back set; equipped with an interchangeable core with paracentric keyway, 1-1/8 inch diameter of six-pin tumbler as manufactured by the Best Universal Lock Company, Inc. The interchangeable core shall be removable only with a special control key. Lock sets shall be supplied keyed with construction cores. All other keying or keying systems are to be by Owner. Lock sets shall have anodized aluminum and/or US26D finish trim.

F. KEYING FOR CYLINDER, CABINET, TUBULAR, RIM, AND DEAD LOCKS

- 1) All lock sets requiring keying shall be of the type specified in Paragraph 2.7.

G. KEY-IN-KNOB LOCK SETS

- 1) Key-in-knob lock sets shall be of matching design and finish of surrounding hardware, equipped to accommodate the "Best interchange" aboe core" as specified in Paragraph 2.7.

H. METAL HAT AND COAT RACKS

- 1) Racks shall be "BEVCO" Style No. 124, with row of coat hooks made of 1-inch steel tubing, chrome finish as manufactured by Precision Manufacturing Company, or equal. Metal tube for clothes hooks shall have smooth edges and ends.

J. DUMMY KNOBS

- 1) All dummy knobs are to be of matching finish and design of that of surrounding hardware.

FINISH HARDWARE

K. PUSH-PULL TRIM

- 1) All push-pull trim shall be anodized aluminum finish to match surrounding hardware.

L. FLUSH BOLTS

- 1) For inactive leaf of interior double doors: cast bronze with dull nickel finish, 12" rod.
- 2) For inactive leaf door No. 3: Special heavy duty steel with 3/4" diameter steel rod.

M. ROOM DESIGNATION PLATES

- 1) Plates shall be phenolic resin plastic with beveled edges, incised letters, and four holes for mounting with chrome-plates wood screws. Letters and numerals shall be 7/8 inch high. Letters shall be white on a black background.
 - a. Type 1 -- Plates for office-type doors shall be 5 inches high by 4-1/2 inches wide with 3-inch high by 3-1/2-inch wide card opening with room numbers above consisting of letters or numbers, as required.
 - b. Type 2 -- Plates for conference, coffee, equipment rooms, etc., shall be 2 inches wide by length required.
- 2) Location and exact wording of each designation plate required shall be as directed by Humble.

4. SHIPMENT

A. All items of hardware shall be properly packages to prevent damage during shipment. Each package shall be legibly and accurately marked to show the items it contains. When hardware schedules are required, item numbers used for marking shall correspond to the item numbers shown on the hardware schedule.

5. SCHEDULE OF HARDWARE

Type 1

1 1/2 Pr.	Butts
2	2 Dummy Knobs
1	Closer
1	Stop

Type 2

1 1/2 Pr.	Butts
1	Lockset
1	Closer
1	Stop
1	Kick Plate

FINISH HARDWARE

Type 3 (Interior Double Doors)

3 Pr.	Butts
1	Push
1	Pull
2	Closers

Type 4

Similar to Type 2 except extra heavy butts

Type 5

3 Pr.	Extra heavy butts
1	Lockset
2	Extra heavy flush bolts
1	Closer

Type 6

Cabinet Hardware as shown on drawings.

SECTION 8E

GLASS AND GLAZING

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the execution of the glass and glazing work, including aluminum frames at borrow lights.

B. Refer to drawings and these specifications for type, location, and extent of work required.

2. MATERIALS

A. Exterior glass shall be 3/4 inch thick, tempered plate glass as manufactured by Pittsburgh Plate Glass Company or Libby-Owens-Ford.

B. Interior glass shall be 1/4 inch thick, tempered plate glass, same manufacturers as above.

C. Aluminum frames for borrow light shall be as manufactured by Pittsburgh Plate Glass Company. Finish shall be as shown on drawings.

3. MANUFACTURER'S LABELS

A. Labels showing strength, grade, thickness, type, and quality will be required on each piece of glass. Labels must remain on glass until it has been set and inspected. When glass is not cut to size by the manufacturer and is furnished unlabeled from local stock, Contractor shall submit an affidavit stating the quality, thickness, type, and manufacturer of the glass furnished.

4. INSTALLATION

A. Installation of glass shall be as indicated on drawings and in accordance with recommendations of the manufacturer.

SECTION 9A

PAINTING

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the completion of the painting work.

B. Refer to drawings, details, schedules, and these specifications for type, location, and extent of such work required.

C. Touch up prime coats of steel. No finish coats required, except where exposed on exterior or in finished rooms.

D. Field painting will not be required on items specified to be completely finished at factory or on aluminum, copper, brass, bronze, and other non-ferrous metal unless specifically designated. Do not paint putty on aluminum windows. Do not paint acoustical tile. Paint aluminum gravel stop.

E. All walls, exposed pipe, conduits, ducts, and equipment not provided with factory finish in mechanical room shall be painted.

F. Omit exterior painting of concrete except for trim designated on the drawings.

2. MATERIALS

A. Paints, varnishes, lacquers, stains, and fillers shall be of type and brands hereinafter specified under Schedule of Painting. Painting materials such as shellac, turpentine, etc., shall be of the highest quality and have identifying labels on containers.

B. All paint shall be delivered to site in manufacturer's unbroken, sealed containers. Each container shall be labeled by the manufacturer; labels shall give manufacturer's name, type of paint, label analysis showing all of the important constituents of the paint such as alkyd (glycerol-phthalate) titanium, zinc, acrylate esters, etc., color of paint, and instructions for reducing. Thinning shall be done only in accordance with directions of manufacturer. Job mixing or job tinting may be done when approved by Humble.

C. Paints shall be Humble, as specified in Schedule of Painting. Substitution may be made for good reason but only with prior approval of Humble.

3. COLORS AND SAMPLES

A. Paint colors shall be as selected by Humble. Bids shall be based on colors as scheduled. Before any work is done, furnish Contractor with a set of color cards and a schedule showing where the various colors shall

PAINTING

go. Contractor shall then prepare samples at the job, as required, until the colors and textures are satisfactory.

4. STORING MATERIALS

A. Store and mix materials only in such rooms as may be assigned for this purpose and take necessary precautions to prevent fire. All solvents shall be in self-closing safety containers. No paint container larger than five-gallon size will be permitted in the building.

5. PROTECTION

A. Protect work of other trades against damage or injury by materials, tools, or utensils used. Work damaged as a result of prosecution of this contract shall be repaired at Contractor's expense or, if in the opinion of Humble, it cannot be properly repaired, it shall be replaced with new work by Contractor without additional compensation beyond contract amount.

6. PREPARATION OF SURFACES

A. Wood -- Sandpaper to smooth and even surface and then dust off. After priming or stain coat has been applied, thoroughly fill nail and other holes and cracks with plastic wood or putty; for natural-finished work, putty shall be colored to match the wood. Sand off sharp corners of millwork.

B. Before painting, fill holes; paint carefully around openings; remove foreign material from surfaces to be painted; and patch all blemishes that will affect the final appearance of the work. Exercise caution to keep adjacent work free from paint.

C. Before painting any surfaces, notify Humble's inspector of suitability of surface for painting. The absence of such notification shall be construed as acceptance of surfaces by painter, and it shall become his responsibility to correct any defects appearing in the painting work thereafter.

D. General -- Before painting, remove or tape hardware, accessories, plates, lighting fixtures, and similar items, or provide ample protection of such items. Upon completion of each space, replace above items.

7. APPLICATION

A. Do not apply exterior paint in damp, rainy weather or until the surface has thoroughly dried from the effects of such weather. Do not apply varnish or paint when temperature is below 50°F.

B. Surface to be stained or painted shall be clean, dry, smooth, and adequately protected from dampness. Each coat of paint shall be brushed

PAINTING

on well, worked out evenly, and allowed to dry (at least 48 hours) before subsequent coat is applied. Spray painting is acceptable where appropriate.

C. Finished work shall be uniform; of approved color; and smooth and free from runs, sags, defective brushing, clogging, or excessive flooding. Make edges of paint adjoining other materials or colors sharp and clean without overlapping.

D. At completion, touch up and restore finish where damaged and leave in good condition. Paint top and bottom edges of hollow metal and wood doors with one coat and varnish tops and bottoms of plastic-covered doors with one coat after fitting.

8. SCHEDULE OF PAINTING

<u>Equipment To Be Painted</u>	<u>Preparation of Surface</u>	<u>Prime Coat</u>	<u>Finish Coat</u>	<u>Special Notes</u>
Gypsum, Concrete	To Humble's Satisfaction			
Four-Foot Wainscot	Mechanical or Handcleaned, SSPC-SP-3-63	Aqua Tone 6772	Rust-Ban AK-6438**	
Remainder of Walls	SSPC-SP-3-63	Aqua Tone 6790	Semigloss 6646**	
Ceilings	SSPC-SP-3-63	Aqua Tone 6780	Semigloss 6630**	
Doors and Door Frames and Galvanized Steel	SSPC-SP-3-63	Rust-Ban VY-6528	* Two Coats Rust-Ban AK-6438**	* Rust-Ban EE-6565
Steel Doors	SSPC-SP-3-63	Rust-Ban EE-6565	Inside: Match Room Color Outside: Match Exterior Concrete Trim Color	
Outside Concrete	SSPC-SP-3-63	Block Prime 6604	Two Coats Vinyl Emulsion in Napko- Bobolink**	

Other materials not mentioned to be painted in accordance with Humble's recommendations for that material. Gypsum board and concrete sand-finish texture.

* Intermediate coat.

** Color selections are tentative only and final selection will be made by Humble prior to painting schedule.

SECTION 9B

ACOUSTICAL CEILINGS

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the execution of the acoustical ceiling work.

B. Refer to the drawings, schedules, and these specifications for type, location, and extent of work required.

C. Luminous ceiling in the control room is included under this section.

D. All other suspension systems and hanging for acoustical ceilings are included in this section of work.

2. GUARANTEE

A. Provide a joint manufacturer's and Contractor's guarantee warranting all materials against defects in materials and installations for a period of one year from date of completion, as evidenced by date of final payment.

3. LAYOUT

A. See ceiling plans and electrical and mechanical drawings for layout to coordinate pattern with light and air-conditioning grilles that lay into grid system.

4. SUSPENSION SYSTEM

A. Direct hanging system by wires directly to main tees; space wires at two-foot maximum centers along each tee; No. 14 galvanized wires; every wire must have load capacity of 200 pounds. Luminous ceiling grid to hang from upper acoustical ceiling grid. Use sufficient wires to support load of ceilings with light fixtures attached to them at 1,000 pounds per fixture. Each end of each wire shall be clinched with at least three turns.

5. MATERIALS

A. Grid System -- Donn Products, Eastern Products System, or approved equal. Finish -- Zinc-coated steel, bonderized, semigloss white, baked enamel.

(1) Main Tees -- Gauge of 0.030-inch minimum, 15/16-inch minimum flange, 1/2-inch minimum bulb stem, and ends to interlock or clip together to provide accurately aligned hairline joints.

(2) Cross Tees -- To surround each light fixture and air-conditioning grille and air-conditioning registers. Gauge of 0.25-inch minimum and 15/16-inch minimum stem and flange.

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ACOUSTICAL CEILINGS

(3) Wall Angle or Channel -- Gauge of 0.25-inch minimum and 15/16-inch minimum flanges.

B. Eggcrate -- For luminous ceiling by Contractor.

(1) Size -- Three-eighths-inch or 1/2-inch cube.

(2) Material -- White polystyrene.

C. Acoustical Board, Type "A" -- 24" x 48" x 1/2" minimum.

(1) Armstrong -- "Classic" minaboard.

(2) Celotex -- Acoustiform "Embassy."

(3) Elot Hansson -- Perforated "Hansoboard."

(4) Johns-Manville -- Pierced "Spintone."

(5) Gold Bond -- Needlepoint "Acoustiroc" or "Solitude."

(6) Simpson -- "Petite" Classe'.

(7) Lo-Tone -- "Constellation" lay-in board.

D. Acoustical Board, Type "B" -- 24" x 48" x 3/4" minimum. Any Type "A" may be used as Type "B."

(1) Johns-Manville -- "Spanglas."

(2) Owens-Corning -- "Fiberglas" textured ceiling board.

(3) Celotex -- "Acoustiform" mat faced.

6. INSTALLATION

A. Installation of acoustical materials shall be made by a contractor approved by the manufacturer of suspension system and ceiling board. All materials shall be installed in accordance with recommendations of the manufacturers and shall not begin until the humidity within the area is 65% or less and can be maintained at this limit during and for at least 24 hours after installation. The temperature range shall be maintained between 60-85 degrees during the same period.

B. Metal "T" shall be erected in patterns, as shown on the approved layout drawings, with all edges in alignment and all faces in a plane. Splicing

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ACOUSTICAL CEILINGS

of members shall be avoided but, where necessary, shall be made with special care in order not to interrupt continuity of appearance.

C. Where lay-in-type light fixtures are used, two paralld ends or sides of light fixture shall be supported by metal "T's" on hanger wires. All "T" members that are cut around air-conditioning grilles, speakers, and light fixtures shall have loose ends supported by hanger wires.

D. Where "T" members of grid lay on wall angle, cement "T" in place to prevent discoloration.

7. CLEANING AND REPLACEMENT

A. At completion, replace all units that are damaged and clean soiled tile or replace where tile cannot be properly cleaned.

SECTION 9C

RESILIENT FLOORING

1. SCOPE

A. Work under this section includes furnishing labor, materials, equipment, and accessories necessary for a complete job of resilient flooring as specified herein and indicated on the drawings.

2. SAMPLES

A. Provide samples for Humble's field superintendent to select colors and patterns from the full range included under the specifications. Also, provide any additional samples requested by Humble for use verifying compliance with specifications.

3. EXAMINATION OF SUBFLOOR

A. Examination of subfloor prior to laying any flooring is the responsibility of Contractor. Examination to include the following items:

(1) Smoothness -- Any irregularities that would cause a visible fault in the finished flooring job shall be corrected before proceeding. Maximum irregularity is 1/16 inch within any running foot and 1/4 inch in eight feet zero inch.

(2) Moisture and Alkalinity -- Conduct necessary tests to confirm that these are below levels that would be detrimental. If alkalinity is excessive, reduce noninjurious level by treatment with acid.

(3) Unsound Concrete -- Do not lay flooring on patches or other areas showing signs of softness or crumbling.

(4) Cleanliness -- Accept subfloor surface only in perfectly clean condition with all foreign materials removed. Anything that could telegraph through flooring and cause a fault is to be removed.

(5) Curing Compounds -- Verify, with adhesive manufacturer, the compatibility of curing compound and adhesive. Conduct adhesive tests in areas indicating excessive buildup of compound.

4. PREPARATION OF SUBFLOORS

A. Do minor spot patching of chips and minor leveling, particularly at points resilient flooring abuts other materials.

5. LOCATION OF RESILIENT FLOORING

A. Extent of work is indicated on the drawings. Particular attention is called to the Room Finish Schedule. Flooring is not required under built-in cabinets. Provide base on cabinets wherever room base is scheduled as resilient and where noted.

Appropriatic

RJ

6. ACCEPTANCE

A. Flooring and base will be accepted only in immaculate, condition, free of dirt, dust, or markings. Resilient floor shall be cleaned, waxed, and buffed as required to achieve this condition.

7. GUARANTEE

A. Period to commence from date of substantial completion and acceptance as determined by Humble. Guarantee to include defective workmanship and materials including warping, buckling, shrinking, cracking, discoloring, indenting excessively, and coming loose from the subfloor.

8. VINYL ASBESTOS TILE

A. Material -- Size of 12" x 12" x 1/8" with Contractor's choice. Humble to select from listed range of the following brands. Brand is to be selected by Humble.

(1) Armstrong -- "Custom Imperial," "Travertex."

(2) Congoleum -- Nairn "Feathervein."

(3) Kentile -- "Architectural Marbles."

(4) Azrock -- "Microromatic Veining," "Opaque Marbles," "Premiere," "Wood Tones."

B. Adhesive and Primer -- Cut back asphalt adhesive and primer to be of the same brand as flooring. Primer use required for all conditions.

C. Installation

(1) Storage -- Store materials at the jobsite at least 24 hours prior to laying at temperature of 70°F or above. Maintain this temperature at least 48 hours after laying.

(2) Layout -- Arrange pattern in rooms so that the edge rows against wall are not smaller than 1/2 of the tile size.

(3) Grain Direction -- Lay tile with grain running as directed by Humble.

(4) Edges -- Provide adhesive-applied, tapered, resilient strips where flooring terminates at an unfloored area. When flooring abuts other types of flooring, finish level with other flooring.

(5) Workmanship -- Joints in accurate alignment with hairline fit.

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EXX 001786

RESILIENT FLOORING

9. VINYL BASE

- A. Size -- Four inches high, 1/8 inch thick, topset-type, roll length.
- B. Corners -- Outside corners, one piece, premoulded type, with minimum 2-1/2-inch-long legs. Inside corners cut square.
- C. Brand -- Same as listed for tile. Color, black or brown as selected.
- D. Adhesive -- Use only base adhesive. Brand is to match base material.
- E. Installation -- Toe of base must touch floor at all points. End joints made to hairline fit. Base and preformed corners must be accurately leveled.

10. DOORWAY STRIPS

- A. Provide strip across doors and cased openings the width of door frames and the thickness of the flooring. Strip to be vinyl and of the same color as base.

SECTION 9DCERAMIC TILE1. SCOPE

A. Work under this section includes all labor, materials, accessories, and equipment necessary for execution of ceramic tile work. Include galvanized metal lath and cement brown coat for tile base.

B. Refer to the drawings, schedules, and these specifications for type, location, and extent of work involved.

2. MATERIALS

A. Certification -- Meet the quality standards of the Department of Commerce's R61-61 and the Federal Specification RS SS-T-308B.

B. Color Selection -- Range available for selection to be comparable to what is offered by the Mosaic Tile Company. Provide samples for selection purposes. Color selection by Humble.

C. Floor Tile -- Natural clay type; cushion edge; sizes mixed with 1" x 1", 1" x 2", and 2" x 2"; color range selection to include Mosaic "Velvetone," "Velvetex," and "Granitex."

D. Wall and Ceiling Tile -- Size 4-1/4" x 4-1/4" x 3/8", bright glaze, cushion edge, A-4402 external wall corners; butt joint internal corners; other combination units, as necessary, for first-class work; cove base; outside corners rounded; and inside corners square.

E. Soap Holder -- Size 4-1/4" x 4-1/4" recessed, without lip, one for each shower head, and anchored.

F. Cement -- Portland ASTM Specification C 150, Type 1.

G. Lime -- Hydrated ASTM Specification C 206 or C 207, Type S.

H. Aggregate -- Sand, clean and graded, ASTM Specification C 144.

J. Water -- Potable.

K. Grout -- For floors, gray "Crest Ceramic Acidite" as manufactured by Kaiser Manufacturing Company. For walls and ceilings, "Crese Superwhite" as manufactured by Kaiser Manufacturing Company.

3. MORTAR

A. Floors -- Half gray and half white Portland cement.

B. Walls and Ceilings -- Dry-set Portland cement, Kaiser Manufacturing Company's "Crest," sanded, or others produced under the Tile Council hallmark.

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EXX 001788

CERAMIC TILE

4. DELIVERY, STORAGE, AND APPROVAL

- A. Samples submitted for all tile selections.
- B. Deliver and store materials to prevent damage or staining.
- C. Seals unbroken and labels intact until time of use and after Humble's inspection.

5. WORKMANSHIP

A. General Requirements

(1) Inspections

- a. Examine surfaces to receive tile -- must be dry, clean, free from oil or wax film, firm, level or plumb, and within tolerances set by USAS A108.
- b. Make certain areas to be covered are complete and protection is provided for adjoining work.
- c. Report all defects because start of work implies acceptance of surfaces.

(2) Protection

- a. Control temperature and humidity as required by USAS A108.
- b. Cure installation for three days without traffic.

(3) Layout and Fittings

- a. Lay out floors and walls so fields or patterns center on areas with no tile cut less than half size.
- b. Wainscots to height shown or nearest full tile square.
- c. Provide trim pieces as indicated or as necessary for a complete installation. Use "combination" trim pieces unless specifically excepted.
- d. Grind and fit carefully around all equipment trim and accessories.

(4) Expansion Joints

- a. Lay out as detailed or directed.

B. Installation Methods

(1) Mortar

- a. Portland cement mortar.

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EXX 001789

CERAMIC TILE

b. Dry-set Portland cement mortar.

(2) Organic Adhesive

a. Water-resistant organic adhesive set to USAS A108 applicable to type of tile and surface covered.

C. Vertical Surfaces

(1) Apply leveling or plumb coat and mortar setting bed to provide true plane for setting finish wall tile.

(2) Backing for dry-set or adhesive application must be true plane.

(3) Apply primer sealer coat over surfaces unless otherwise recommended by adhesive manufacturer.

D. Horizontal Surfaces

(1) Over wood construction, apply waterproof cleavage membrane and metal shrinkage mesh before setting bed.

(2) Reinforcing mesh is required in any setting bed over a cleavage membrane (shower receptors).

(3) Over concrete slab or fill (properly graded), apply setting bed.

(4) For dry-set or adhesive application, correct subgrade with mortar or adhesive underlayment.

E. Special Treatments

(1) Ceiling applied with special attention to mortar mix and avoidance of vibration during setting period.

(2) Provide shower receptor with waterproofed mortar setting bed.

F. Grouting

(1) When tile has set firmly, wash and force in maximum of grout. Tool cushion edge tile to depth of cushion square edge tile flush. Do not grout tile set with organic adhesive for at least 24 hours.

G. Accessories

(1) Cut and fit tile to accessories.

(2) Locate as shown or directed and anchor securely.

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EXX 001790

Appropriation 36-9356

CERAMIC TILE

H. Cleaning

(1) Clean tile thoroughly after grouting is finished. Use acid only as recommended by USAS A108.

9D-04

EXX 001791

SECTION 9E

DRYWALL

1. SCOPE

A. Work under this section includes furnishing labor, materials, and accessories necessary for a complete job of drywall as specified herein and as indicated on the drawings.

B. Texture coat on gypsum board is not part of the work included in the section.

2. SAMPLES

A. Provide samples for approval of any variations in materials or manufacturers from those specified.

3. BRANDS

A. Materials to be as distributed by the Gold Bond Division of the National Gypsum Company or other national brands approved as equal by Humble. Materials all to be of the same brand where variations might be incompatible within a system.

4. MATERIAL HANDLING

A. All materials specified shall be delivered to the jobsite in the original packages bearing the name of the manufacturer. Gypsum wallboard shall be kept flat under cover and out of contact with damp surfaces until ready for use. Maintain a uniform room temperature above 50°F during application and until completely dry or occupied. Provide adequate ventilation.

5. MATERIALS

A. See paragraph on "Systems and Locations" for proper selections for material uses.

(1) Studs -- Screw type, drywall type, 25 gauge, hot-dipped galvanized (1-5/8 inches, 2-1/2 inches, 3-5/8 inches).

(2) Floor and Ceiling Tracks -- Same as studs.

(3) Furring Channels -- Screw type, same as studs.

(4) Gypsum Board -- Regular board (3/8 inch, 1/2 inch, 5/8 inch), Underwriters' Laboratories labeled "Fireshield" type (1/4 inch, 5/8 inch), backer board regular or "Fireshield" (3/8 inch, 1/2 inch, 5/8 inch), vinyl-surfaced backer board (1/2 inch), and finish boards to have tapered edges.

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EXX 001792

DRYWALL

- (5) Screws -- Self-drilling, cadmium-plated, one inch for single ply and 1-5/8 inches for double ply.
- (6) Corner Beads -- Standard galvanized steel, one-inch flanges for 3/8-inch or 1/2-inch single ply, 1-1/8-inch flanges for 5/8-inch single ply, and 1-1/4-inch flanges for two ply.
- (7) Casing Bead -- Gold Bond No. 100 or 200 designed for floating in.
- (8) Joint Treatment -- Regular joint tape, ready-mixed or dry joint and topping compounds, and same brand as gypsum board.
- (9) Laminating Adhesive -- Same brand as gypsum board.

6. STUD INSTALLATION

- A. Floor Track -- Attach to floor at 24-inch-maximum centers with shot-in pins or concrete nails.
- B. Ceiling Track -- Attach to structure above or carry above required wall height where partitions do not close to structure above. Brade ceiling track at intervals not exceeding four feet zero inch.
- C. Studs -- Space as required under paragraph of "Systems and Locations" and as required by sound- and fire-resistance ratings. In no case is spacing to exceed 24 inches center-to-center.
- D. Corners -- Place one stud directly in corner with second stud abutting. Screw stud to adjoining gypsum board at intersections.

7. GYPSUM BOARD INSTALLATION ON STUDS

- A. System -- Horizontal or vertical application at Contractor's option.
- B. Position studs in track on centers by rotating into place for a friction fit. Secure studs located adjacent to door and window frames and partition intersections and corners by self-drilling sheet metal screws through both flanges of studs and tracks. Apply gypsum wallboard with the length (parallel and at right angles) to the studs. Center abutting ends or edges over the stud flanges. Where wallboard abutments are made between studs, free ends are to be backlocked. No two such joints should occur between the same two studs.
- C. For nonfire-rated construction, locate all attaching screws 12 inches on-center. For fire-rated construction, vertical application, space screws 12 inches on-center in the field and eight inches on-center staggered along the vertical abutting edges.

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EXX 001793

DRYWALL

D. Attach the gypsum wallboard to Gold Bond steel studs with self-drilling, drywall screws using an electric screwdriving gun (wallboard Scrugun Kit No. 740, Black and Decker Company) and a No. 2 Phillips bit.

E. For vertical wallboard application with studs at two feet zero inch on-center, erect the wallboard on one side of the partitions, screwing it to every other stud. Complete the wallboard application to the entire side of the partition in this manner. For the opposite side, cut the first wallboard panel two feet wide so that joints will be staggered. Fasten this and succeeding wallboard panels to all studs on this side. When this partition face is complete, return to the first side and complete the installation by attaching screws to the previously unattached studs.

F. Make door and window frame opening of such size that, when the wallboard is secured to the studs, it will fit snugly into the steel frames.

G. Joints -- Apply tape, joint compound, and topping compound in accordance with manufacturer's directions. Sand smooth. Finish over screws and nails.

H. Inside Corners -- Tape and finish same as joints.

J. Outside Corners -- Metal beads of size given under Materials Section.

K. Joints to Different Materials -- Do not tape and join to any materials other gypsum boards unless specifically required. Use casing beads against other materials.

8. HEIGHT OF PARTITIONS ABOVE CEILING

A. Seal to Construction -- Where indicated on the drawings.

B. Acoustic Ceiling Locations -- As detailed.

9. WORKMANSHIP

A. Any nicks, bumps, out-of-level, out-of-plumb areas detectable by the naked eye must be corrected.

SECTION 9F

PLASTIC FABRIC

1. SCOPE

A. Work under this section includes labor, materials, equipment and accessories for the installation of plastic fabric in accordance with the contract documents.

2. MATERIALS

A. Plastic Fabric -- To be purchased under an allowance of \$3.00 per square yard based on net contract prices. Installation costs shall be included separately as part of bid price. The final price shall be adjusted if the selected material is higher or lower prices. Selection of material by Humble.

B. Wall Paste -- Ready-mixed type sold by manufacturer of plastic fabric for materials used. To be Gilfor WP 515 or others approved by Humble.

3. INSTALLATION

A. Surfaces -- Do not install over surfaces unless they are perfectly smooth. Any irregularities showing through the fabric will require removal and replacement.

B. Seams -- Double cut to form hairline seams.

C. Adhesion -- No bubbles or loose areas permitted.

SECTION 10A

TOILET PARTITIONS

1. SCOPE

A. Work under this section includes all labor, materials, accessories, and equipment necessary for partitions and installation of toilet partitions.

B. Work shall include a complete job of materials and labor to provide toilet partitions indicated on the drawings and specified herein.

2. MATERIALS

A. Toilet partitions shall be laminated plastic partitions, floor anchored, series 1040 as manufactured by Bobrick Dispensers, Inc., complete with door hardware, steel plinths, B212 clothes hook and door bumper, and anchoring devices.

- 1) Toilet paper dispensers are specified under "Toilet Accessories".
- 2) Plastic laminate shall be NEVAMAR.

3. SUBMITTALS

A. Submit shop drawings and manufacturer's literature for Humble's approval. Fabrication or delivery shall not be started until they have been returned from Humble with indication of "Approved for Design" or "Approved for Design with Corrections Noted". Work shall be done in accordance with the approved shop drawings.

B. Submit samples and standard color range of plastic laminate for selection by Humble.

4. INSTALLATION

A. Installation shall be by manufacturer's approved mechanics and in strict accordance with manufacturer's recommendations.

SECTION 10B

LETTERS

1. SCOPE

A. Work under this section includes furnishing labor, materials, equipment, and accessories necessary for the sign letters.

2. SHOP DRAWINGS

A. Submit full-size layout drawing that shows spacing, anchor location, anchor details, letter cross section, materials, and finishes.

3. LETTERS

A. Eight-inch, high-cast aluminum with 1-11/16-inch stroke, 1-1/4-inch depth, Futura S-903 style, baked enamel finish, and color selected by Humble.

4. MOUNTING

A. With minimum 1/8-inch diameter, threaded, stainless steel studs 1-1/2 inches into concrete wall, minimum of three per letter. Projected mounting with 1/2-inch spacers.

5. WORDING

A. Sign shall read: OPERATING SERVICES CONTROL CENTER.

SECTION 10C

TOILET ACCESSORIES

1. SCOPE:

A. Work under this section includes all labor, material, equipment and accessories necessary for provision and installation of toilet accessories.

2. MATERIALS:

A. MIRRORS

- 1) Mirrors shall be 20 inches x 20 inches x 1/8 inch thick, polished plate glass with polished aluminum frame. One each lavatory.

B. PAPER DISPENSERS

- 1) Paper towel dispenser shall be surface mounted, Scott Paper Company's No. 989 (white). Quantities as shown on drawings.
- 2) Toilet tissue dispensers shall be Scott Paper Company's' No. 965, or equal.

C. SOAP DISPENSERS

- 1) Liquid type shall be West Chemical Products, Inc., No. 851, or equal, with nickel-plated brass globe. One each lavatory.
- 2) Powder type shall be U. S. Sanitary Specialties No. 031, or equal each lavatory.

D. TOILET ROOM SHELVES

- 1) Shelves shall be stainless steel, 4 feet 0 inch long (unless otherwise specified on drawings) and 5 inches wide with 3/4-inch turned down front lip, 2-inch turned-down back lip, and turned down end lips tapered 3/4 inch to 2 inches. All corners shall be welded. All corners shall be rounded and edges shall be ground smooth and polished. The 2-inch turned-down back lip shall be punched for anchoring shelf to wall. Quantities as shown on drawings.

E. COAT HOOKS

- 1) Double prong, chrome plated. To be provided at shower anteroom. Quantities as indicated on drawings.

3. ATTACHMENT

A. Attachment to the various materials shall be as recommended by manufacturer.

SECTION 10D

OPERABLE WALL

1. SCOPE

A. Work under this section includes all labor, materials, accessories and equipment necessary for provision and installation of operable wall.

B. Refer to drawings, schedules, and these specifications for type, location, and extent of work required.

2. MATERIALS:

OPERABLE WALL: ACOUSTI-SEAL 51 Model 510 as manufactured by New Castle Products, complete with hardware. Finish of panels shall be Moderncote 11 vinyl weighing 15 ounces per linear yard.

3. SUBMITTALS:

A. Submit shop drawings and samples of covering for approval and selection by Humble.

4. INSTALLATION:

A. Installation shall be in accordance with recommendations of manufacturer.

SECTION 11A

LOCKERS AND LOCKER BENCHES

1. SCOPE

- A. Work under this section includes furnishing all lockers, labor, and materials for installation of lockers.
- B. Refer to drawings and these specifications for extent of work required.

2. MATERIALS

- A. Lockers shall be steel, 15-inch wide x 18-inch deep x 6-foot high, single-tier, through-vision door, sloping top, baked-on enamel finish, no legs, four coat hooks, name and number plates, automatic locking handle with slots for padlocks, less padlocks, with stainless steel soap dish and towel rod attached to inside of door, with one shelf, equal to Republic Steel Corporation's "Visualocker".
- B. Locker benches shall be as manufactured by Republic Steel Corp. Tops shall be laminated maple.

3. INSTALLATION:

- A. Installation shall be as indicated on drawings. Note that lockers against south wall are not to be attached to the wall.

SECTION 11B

KITCHEN EQUIPMENT

1. SCOPE

- A. Work under this section includes all labor, materials, equipment, and accessories necessary for provision and installation of kitchen equipment.
- B. Refer to drawings and these specifications for type, location, and extent of work involved.
- C. Connection of equipment to electrical and plumbing services is specified under those respective sections of these specifications.
- D. The two refrigerators will be purchased and installed under a separate contract.

2. SCHEDULE OF EQUIPMENT

- A. DISHWASHER: KITCHEN-AID "Superba" KP16 stainless steel or brushed or brushed chrome. This item shall be purchased through Ainsworth and Company of Baytown, Texas.
- B. EXHAUST HOOD: TRADEWIND Masterpiece Series H62 stainless steel, 30" long, with fan and filter.
- C. RANGE: FRIGIDAIRE Model RBG-533N with brushed chrome finish on top and door.
- D. ICE MAKER: FRIGIDAIRE Model SCN-11A.
- E. RADIANT OVEN: AMANA RADARANGE Model RR3 with grey vinyl cover and chrome front.

3. SAMPLES AND LITERATURE

- A. Provide manufacturer's literature and samples of standard colors for selection and approval of Humble.

4. INSTALLATION

- A. Installation of kitchen equipment shall be in accordance with manufacturer's recommendations.

SECTION 13A

ACCESS FLOOR

1. SCOPE

A. Work under this section includes all labor, materials, accessories, and equipment necessary for provision and installation of access flooring.

B. Refer to drawings, schedules, and these specifications for type, location, and extent of work required.

2. MATERIALS

A. FLOOR: Free access with 24" x 24" wood panels, on adjustable pedestals. Floor system shall be MULT-A-FLOOR as manufactured by Mult-a-frame Corporation. Panels shall be surfaces with NEVAMAR.

B. REGISTERS: A-440-B LINEAR as manufactured by U. S. Register Co. Quantities and sizes required:

8	20" x 10"
20	20" x 20"

3. SAMPLES

A. Submit samples of panels, surfacing materials, together with colors and patterns, pedestal and registers for approval and selection by Humble.

4. INSTALLATION

A. Installation shall be manufacturer-approved mechanics.

SECTION 15A

PLUMBING

1. SCOPE

A. Work to be performed under this section of the specifications consists of furnishing labor and materials required and necessary for complete installation of plumbing systems hereinafter noted and further described herein and/or called for on the drawings, together with attendant accessories, etc., necessary to deliver a complete and satisfactory operating installation acceptable to Humble.

2. WATER SERVICE

A. Underground water lines two inches and larger shall be Class 150, cast iron, mechanical joint pipe, and fittings shall be American Water Works mechanical joint fittings for 150 psi. Lines not underground shall be as specified under Water Supply Piping.

3. SANITARY SEWER

A. Cast iron lines shall be standard weight, cast iron pipe and fittings made with tarred oakum or Sealtite White Oakum No. 110 and caulked pig lead joints or Tyler "Ty-Seal" joint gaskets.

B. Lines shall be installed with uniform and continuous fall toward sewer main.

C. Provide cleanouts at all changes of direction and at intervals of not more than 90 feet zero inch brought up flush with finished floor. Cleanouts shall come off line with either a "Y" and 1/8 bend or with a long sweep 1/4 bend and cleanouts shall be Josam YL-310-FBK, Smith 4020, Wade W-8030/K, or Zurn Z-1326.

D. Lines shall be installed a minimum of three feet zero inch finished grade unless otherwise shown on drawings or directed by Humble. No lines shall be installed until points of connection to existing lines have been uncovered. Inspections and tests must be made before backfilling.

4. STORM DRAINAGE

A. Lines under slab shall be extra-heavy, cast iron pipe and fittings made with tarred oakum or Sealtite White Oakum No. 110 and caulked pig lead joints or Tyler "Ty-Seal" joint gaskets.

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B. All downspout lines inside the building shall be Schedule 40, black wrought iron (not steel) pipe assembled by means of screwed cast iron drainage fittings.

5. INSTRUMENT AIR

A. Pipe shall be ASTM A 53 Schedule 40, galvanized with 150-pound, MI, screwed, galvanized fittings, USAS B16.3.

6. PIPE AND FITTINGS - GENERAL

A. Screwed pipe shall have clean-cut tapering threads with inside reamed to maintain original bore of pipe. An approved pipe dope shall be used on threaded joints. Pipe assembled with solder connections shall be cut square, inside reamed to maintain original bore of pipe, and outside polished bright. Pipe assembled by welding shall be beveled end with inside reamed smooth.

B. Companion flanges and/or unions shall be provided at proper points so that piping may be dismantled to permit repair or replacement of strainers, valves, etc., and at connections to items of equipment.

C. Dielectric insulating fittings with nylon washers shall be installed at juncture of copper lines with ferrous lines.

D. No mitered fittings will be accepted and weld-type fittings shall be of wall thickness matching that of pipe.

E. Piping systems shall be complete and properly graded to maintain proper flow and to permit proper draining and venting.

7. VALVES

A. Furnish and install valves where indicated on drawings and on inlet, outlet, and bypass connections to items of apparatus and equipment whether so shown or not. Valves not specified by catalog number shall be as approved by Humble.

B. In general, valves shall have threaded or flanged connections in lines assembled with threaded fittings and shall have solder connections in lines assembled with solder fittings. In lines larger than three inches, gate valves shall be Crane No. 461; globe valves shall be No. 351, and check valves shall be No. 373. In threaded lines three inches and smaller, gate valves shall be Crane No. 430; globe valves shall be No. 14-1/2P, and check valves shall be No. 34. In soldered lines, gate valves shall be Crane No. 1334; globe valves shall be No. 1310, and check valves shall be No. 1303. Where

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applicable, NIBCO "Husky" gate valves may be used, No. 22 for threaded connections and No. 722 for solder connections.

C. Valves in instrument air system shall be 150 pounds. Screwed bronze Globe valves union bonnet, inside screw, rising stem composition disc, Lunk 123, Jenkins 106A, Crane 7, or Powell 150.

8. FLASHING

A. Furnish to roofing subcontractor lead flashing for vent pipes passing through roof; same flashing is to be of sheet lead weighing not less than 2-1/2 pounds per square foot, running up pipe and turned down one inch into pipe cavity.

9. WATER SUPPLY PIPING

A. Install system complete. Lines shall be Schedule 40 galvanized steel pipe assembled with 150-pound, galvanized, malleable iron fittings.

10. STERILIZATION OF WATER LINES

A. Water piping shall be thoroughly treated and sterilized with chlorine solution in amount to give a minimum dosage of 50 ppm and allowed to remain for a minimum of 24 hours. Tests shall be made at various points throughout system with orthatolidine solution and concentration shall be such that solution turns red at each point. At end of this period, system shall be thoroughly flushed out. Comply with all requirements of authorities having jurisdiction. All cost in connection with this work shall be included in bid price.

11. AIR CHAMBERS AND/OR SHOCK STOPS

A. At Contractor's option, he may install air chambers of same diameter as supply pipe to each fixture and 18 inches high on water branches at each fixture, or he may install shock stops as manufactured by Josam, Smith, Wade, or Zurn on batteries of fixtures where they occur in groups and on each fixture where they occur individually. Shock stops shall be sized and located in accordance with requirements of the Plumbing Drainage Institute Manual as approved by Humble.

12. HOUSE SEWAGE AND DRAINAGE

A. Basic system shall be cast iron pipe and fittings with these exceptions:

- (1) Tapped tees with cast iron or red brass nipples may be used in vertical

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position above floor for fixture connections.

(2) Brass soldering nipples and lead pipe with wiped joints may be used for fixture connections and where space will not permit use of cast iron. Lead pipe shall not be used where it could be damaged by rodding from a cleanout.

(3) Vent piping not underground may be Schedule 40, galvanized Byers wrought iron or Youngstown "Yolloy" pipe or Type "M" copper tubing. Galvanized steel pipe will not be accepted.

B. Cast iron pipe and fittings shall be standard weight, heavily coated at factory with tar, inside and outside, and with weight designation cast thereon. Joints shall be made up with tarred oakum or Sealtite White Oakum No. 110 and caulked pig lead or Tyler "Ty-Seal" joint gaskets.

C. Lead pipe shall not be less than the following weights:

1-1/4 Inches	2.50 Pounds/Linear Foot
1-1/2 Inches	3.50 Pounds/Linear Foot
2 Inches	4.75 Pounds/Linear Foot
3 Inches	6.00 Pounds/Linear Foot
4 Inches	8.00 Pounds/Linear Foot

D. Fixture vents shall be same size as waste connections except on water closets which may be two inches. Minimum size of vents through roof shall be two inches.

E. Cleanouts shall be same size as pipe and shall be installed at each change in direction, not more than 90 feet apart in horizontal runs, and where otherwise indicated on drawings.

Cleanouts in finished floors: Josam YL-310-FBK
Smith 4020

Wade W-8030-K
Zurn Z-1326

F. Wall-hung water closets shall be mounted and connected with carriers and fittings as hereinafter specified under Schedule of Plumbing Fixtures.

G. A deep seal "P" trap shall be installed below all floor drains, shower drains, and hub drains.

H. Provide reducers, increasers, special fittings, etc., as required between piping work and fixtures and equipment to provide a complete and proper installation.

I. Drainage lines shall have a uniform slope downward towards sewer, not

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less than 1/4 inch per foot for lines three inches and smaller and not less than 1/8 inch per foot for lines four inches and larger.

13. FLOOR DRAINS

A. Locations of drains shall be verified with Humble at jobsite, and elevations of tops shall be accurately set to match finished job conditions. Unless otherwise noted, drains shall be as follows:

(1) Floor Drains - "FD" -- Josam Series 303X-36AK, Smith 2010A, Wade W-1100, or Zurn Z-415, cast iron body, lacquer finish with six-inch, round, nickel-bronze, adjustable strainer, three-inch caulk outlet, with clamping collar where membrane exists.

14. ROOF DRAINS

A. Exact locations of roof drains shall be such as to avoid interference with other items on roof and permit proper flashing. Unless otherwise indicated, drains shall be cast iron, lacquer finished, caulked outlet, with removable dome strainer, flashing clamp device and gravel stop, bottom outlet, and adjustable installation collar.

Josam	Series 4550	Wade W-3500-DF/X
Smith	1015	Zurn Z-100E

15. PLUMBING FIXTURES - GENERAL

A. Furnish and install plumbing fixtures complete with all brass in connection with such as traps, stop and basin cocks, escutcheons, etc. Fixtures must be delivered to building properly crated and in perfect condition. Brass must be of best quality. Brass pipe shall be seamless brass tubing, and fittings shall be heavy-cast brass. Nipples shall be extra heavy. Light-weight goods will not be accepted. For the purpose of establishing type and class of fixtures required, the fixtures in the following paragraph are scheduled. Fixtures as manufactured by Eljer, Crane, Kohler, or American Standard which fully meet specifications will be acceptable. Portfolios and specifications of fixtures which this Contractor proposes to furnish shall be submitted to Humble for approval.

B. Where copper supply piping is used, it shall be installed continuous to brass solder-screwed adapter immediately behind partition, and chrome-plated brass supplies shall screw into these adapters.

16. SCHEDULE OF PLUMBING FIXTURES

A. Water Closet "WC" -- American Standard "Instanto" No. 2510.048 Royal 112YV flush valve and Church 9500 seat.

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B. Urinal "U" -- American Standard "Allbrock" No. 6540.017 with Sloan Royal No. 180TYV flush valves.

C. Lavatory "L" -- American Standard "New Lucerne" No. 0350.470, 20 inches by 18 inches with N-2200.020 fitting, 2303.162 supplies, and 1-1/4" 4401.014 P-trap with cleanout.

D. Service Sink "SS" -- American Standard "Akron No. 7690.019, 24 inches by 20 inches with No. 8340.234 faucet and 7798.176 trap standard.

E. Shower "SH"

- (1) Shower Head -- Speakman Company S-2260.
- (2) Mixing Valve -- Speakman Company 2230.
- (3) Shower Floor Drain -- Two-inch-NPS, cast iron spigot outlet and nickel bronze strainer, Zurn Z-250.

F. Electric Drinking Fountain "EDF" -- Oasis ODP13S, semi-recessed stainless steel or approved equal.

G. Sink "SK" -- American Standard 5222.245, 33 inches by 22 inches, stainless steel with disposer well on left and 4331.013 stainless steel sink strainer and basket on right, single-lever, 4172.045 faucet. Disposer to be General Electric Model FC800, continuous feed, with Carbloy cutter.

H. Hot Water Heater -- National Model 40RGF, 40-gallon, glass-lined, electric water heater. Upper heating element 2,500 watts, lower heating element 2,000 watts.

Section 15B SCOPE OF HEATING, VENTILATING, AND AIR-CONDITIONING

1. SCOPE

A. Work under this section includes furnishing all labor, materials, equipment, and accessories necessary for the execution of the air-conditioning, heating, ventilating, and building pressurization work.

B. Refer to drawings for location and size of equipment, duct work, piping, flashing, and pertinent notations regarding the installation.

C. Particular attention is called to the fact that the air-conditioning system shall also be used to maintain a positive internal building pressure for the purpose of preventing the infiltration of hydrogen sulfide gases. No unauthorized penetrations of the building envelope, tending to adversely affect building pressurization, will be permitted.

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SECTION 15C

AIR-CONDITIONING EQUIPMENT

1. AIR-COOLED CONDENSING UNITS

A. Furnish and install on concrete foundations (furnished under general work) on southeast side of building, where shown on the plans, air-cooled, condensing units as scheduled on plans.

B. Air-cooled condensing units shall be completed and shall consist of Refrigerant 22 semihermetic compressor, condenser coil, fans, fan motors, receivers, fan dampers, controls, refrigerant piping completely factory assembled in a galvanized steel casing and tested before shipment to jobsite.

C. Coils shall be copper tube aluminum fins epoxy coated.

2. AIR-HANDLING UNITS

A. Furnish and install air-handling units where located and scheduled on plans.

B. Each air-handling unit shall consist of galvanized casing, fan, motor, driver, six-row split DE cooling coil, and drain pan. Coil shall be copper tubes and fins epoxy coated.

C. Unit casing shall be insulated with one-inch-thick, blanket-type fiber glass, drain pan with one-inch thick polystyrene or polyurethane.

3. HEATING (ELECTRIC)

A. Furnish and install where shown and as scheduled on the Plans, Electric Duct Heaters "Indeeco" Series QU, complete with thermal cutouts, contactors with 120 VAC holding coils.

4. BOILER (ELECTRIC)

A. Furnish and install a Weil-McLain Model CS-28 electric-steam boiler, 95,560 BTU, wall hung, see Plans. Boiler shall be suitable for operation on 480 volt, 3 phase, 60 Hz service, 28 KW, and shall operate at 5 PSIG.

B. Boiler shall be cast iron constructed in accordance with ASME Code, with heavy duty insulated jacket, low density heating element, and prewired controls plus other listed standard equipment.

C. Furnish and install a McDonnell No. 47-2 water-feeder and low water cut-off. Low water cut-off to operate alarm bell furnished in electrical work.

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AIR-CONDITIONING EQUIPMENT

5. HUMIDIFIER

A. Furnish and install in duct work where shown on plans, an "Armstrong" AM-32D-M3, capacity 84 lbs. steam per hour, 5 psig., pressure, pneumatic controller.

6. FILTERS

A. See Plans for type, quantities, and construction details.

SECTION 15DAIR HANDLING1. FLEXIBLE CONNECTIONS IN DUCT WORK

A. Furnish and install flexible connections on suction and discharge sides of air-moving equipment to eliminate transmission of vibration to duct work. Connections shall be made of "Ventglas" fire-resistant glass fabric as manufactured by Ventfabrics, Inc., 5520 N. Lynch Avenue, Chicago 30, Illinois, with suitable galvanized steel collar frame at each end. Material shall weigh approximately 30 ounces per square yard and be securely and firmly attached to collar frames so that a minimum of two inches clearance is provided between collar frames. Connections shall be stitched, not stapled, and shall be airtight. Installation shall be such that collar frames are in alignment and there is slack in the "Ventglas" -- it must not be taut.

B. Canvas or asbestoc cloth connections are not acceptable.

2. DUCT WORK

A. Furnish and install duct work complying with Sheet Metal and Air-Conditioning Contractors' National Association (SMACCNA) Manual, complete with necessary appurtenances. Sheet metal shall be galvanized steel as manufactured by Armco, Wheeling, or Youngstown "Tufkote." Duct systems shall be leak tested and made airtight in accordance with SMACCNA Balancing Manual.

B. Dimensions shown are clear-inside dimensions.

C. Make necessary offsets and bends in duct work to avoid interference and to conform to available space. Where changes in dimensions are necessary, they may be made provided effective cross-sectional area is maintained, subject to approval of Humble.

D. Horizontal ducts shall be supported in an approved manner from construction above on a maximum of five-foot zero-inch centers on ducts 24 inches and less, 36 inches on larger ducts, and minimum 16-gauge by one-inch galvanized, nonperforated hangers.

3. ACOUSTICAL DUCT LINING

A. Install acoustical lining in all duct work.

B. Lining shall be one-inch thick fiber glass "Aeroflex" or approved equal by Johns-Manville or Gustin-Bacon, 1.5-pound density, bearing UL label.

C. Lining shall be fastened securely to duct to be continuous with butt-joint connections where duct sections are joined. Liner shall be attached to duct with adhesive on all surfaces and shall be further secured with sheet

AIR HANDLING

metal screws and 1-1/2-inch-diameter metal caps on 12-inch maximum centers on all surfaces. Adhesive shall be Insul-Cooustic I-C 200 Sure Stick of Minnesota Mining 33.

D. A metal frame with dimensions two inches less than duct shall be installed to house dampers, turning vanes, splitters, and air-control devices occurring in acoustically lined ducts.

4. TURNING VANES

A. Turning vanes shall be installed in nonradius turns 45 degrees and greater. They shall be Barber-Colman "Airturms" or Tuttle and Bailey "Ducturns". Where they occur in acoustically lined ducts, they shall be set in metal frame sized to permit lining to be continuous.

5. SPLITTERS AND BRANCH TAKEOFFS

A. Furnish and install splitter or branch takeoff in order to proportion air at all places where duct divides or where takeoff is made. Splitters shall be constructed of 16-gauge minimum galvanized steel secured to a square operating rod of adequate cross section to prevent distortion and of length as required. Edges of splitter shall be lined with felt to properly contact duct. Splitter length shall be minimum of 1-1/2 times width of narrow split. In some cases, special splitter control may be necessary and such shall have approval of Humble.

B. Where branch duct takeoffs (not splitters) are shown, furnish and install Tuttle and Bailey "Vectrol" or Titus AG-45, No. 2 air volume extractor and controller.

C. Where duct work is concealed, splitters and branch duct takeoffs shall be equipped with Young Regulator Company No. 315 (not 301) chrome-plated, adjustable, cover-concealed, damper regulator installed flush and located so as to avoid conflict with lighting fixtures and other items. Where duct work is exposed, duct takeoffs shall be equipped with locking-type quadrants.

D. Where splitters and branch duct takeoffs occur in acoustically lined ducts, they shall be set in metal frame sized to permit lining to be continuous.

E. Young regulator shall be so located on the job as to avoid conflict with lighting fixtures and other items.

6. AIR-CONTROL DEVICES

A. Furnish and install an air-control device where boot taps into supply duct ahead of each supply grille and register; to be Tuttle and Bailey

AIR HANDLING

"Vectrol" or Titus AG-45 with No. 1 operator. Operator shall extend to within 12 inches of grille or register.

7. VOLUME DAMPERS

A. Furnish and install manual volume dampers (MVD) where shown on drawings. Damper blades shall be constructed of 16-gauge, minimum galvanized steel securely fastened to square operating rod of adequate cross section to prevent distortion of length as required, and of 12-inch maximum width. Where duct work is concealed and not above lay-in ceilings, dampers shall be equipped with a Young Regulator Company No. 315 (not 301) chrome-plated, adjustable, cover-concealed, damper regulator installed flush. Where duct work is exposed or above lay-in ceilings, they shall be equipped with locking-type quadrants.

B. Where dampers occur in acoustically lined ducts, they shall be set in metal frame sized to permit lining to be continuous.

8. BACK DRAFT DAMPERS (BDD)

A. Furnish and install in supply ducts from each A.H. unit fan. Blades shall be of 16 gauge galvanized steel, felt edged, off-center hinged, in dust shielded permanently lubricated ball bearings and balanced so that a low air velocity will open them.

9. GRILLES, REGISTERS, DIFFUSERS, AND DOOR GRILLES

A. Furnish and install as specified on the drawing.

10. DUCT ACCESSORIES

A. Roof vents shall be provided with epoxy-coated, galvanized Breidert caps with epoxy-coated, galvanized Breidert standard bases. Provide bird screen.

11. BALANCING DUCT SYSTEMS

A. Fans shall be started and all necessary settings and adjustment shall be made to provide satisfactory operation, including the following:

(1) Dampers, splitters, branch takeoffs, air-control devices, etc., shall be properly positioned and secured in place.

(2) Fan rotation and belt and sheave adjustments shall be proper.

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- (3) Supply outlets shall be adjusted to provide proper air distribution and quantity, without objectionable drafts, and with registers in full open position.
- (4) Running current on motors shall be checked to determine that name-plate ratings are not exceeded.
- (5) Necessary readjustments shall be made.

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SECTION 15E

INSULATION

1. GENERAL

- A. Furnish and install insulation as specified herein. Work shall be installed by a qualified insulation subcontractor approved by Humble.
- B. No substitutions in materials and/or methods of application shall be made without written approval of Humble.

2. REFRIGERANT SUCTION LINES AND AIR-HANDLING UNIT DRAIN LINES

- A. Insulate refrigerant suction lines and drain with 3/4-inch-thick, Armstrong Armaflex 22. Use adhesive at joints, not tape.
- B. Coat insulation with two coats of white Armstrong Armaflex finish.

3. STEAM AND CONDENSATE LINES

- A. One-inch-thick, Johns-Manville, calcium silicate. Finish with eight-ounce, canvas jacket and with two coats of 30-70 Benjamin-Foster fire-resistant white coating.

SECTION 15F

PIPING

1. REFRIGERANT PIPE

A. Refrigerant lines shall be Type "L", hard copper, with sil-fos soldered joints. Fittings shall be wrought copper, elbows long radius. Coat all sil-fos welds with epoxy.

2. DRAIN PIPING

A. Shall be Schedule 40, galvanized steel pipe, 125 psig, with threaded, galvanized, malleable iron fittings.

3. STEAM - 5 PSIG

A. Shall be Schedule 40, black steel with Schedule 40 welding fittings. See BTES 39.01-120S.

B. Gate valves "Crane" 459 OS&Y to three inches, strainers McAlear Style S.

4. PIPE SUPPORT

A. All drain and refrigerant piping shall be properly secured and suspended from roof joist using threaded rod, steel angle, and pipe hangers.

B. Hangers for insulated lines shall be Clevis type sized for outside diameter of insulation with galvanized sheet metal saddles six inches wide at each hanger.

C. Provide 1/2" thick Armaflex 12" long insulation with galvanized shield around bare copper pipes at support points to protect pipe.

SECTION 15G

AUTOMATIC TEMPERATURE CONTROL

1. GENERAL

A. Furnish and install a complete pneumatic system of automatic temperature control as specified herein and as shown on the contract drawings as manufactured by Honeywell Inc., Johnson Service, or approved equal.

B. After completion of the installation, the automatic temperature control contractor shall adjust all thermostats, control valves, motors and other equipment provided under his contract. He shall place them in complete operating condition subject to the approval of the engineer, and instruct the operating personnel in the operation of the control system.

C. The control system as shown on the drawings and specified herein shall be guaranteed free from defects in workmanship and material under normal use and service for a period of one (1) year after acceptance of the Architect and/or Engineer.

D. Any equipment herein described proven to be defective in workmanship or material during the guarantee period shall be adjusted, repaired, or replaced by the automatic control manufacturer at no charge to the Owner.

2. AIR PIPING SYSTEM

A. Complete air piping shall be provided for the pneumatic control system adhering to the highest standard of quality and appearance and subject at all times to the approval of the Architect and Engineer.

B. Pipe shall be of seamless copper tubing or non-metallic tubings as specified below. All piping shall be concealed except in mechanical rooms or areas where other piping is exposed. Hard drawn tubing will be used in all exposed areas and either hard drawn or annealed if concealed. Where copper tubing is run exposed, each tube is to be securely fastened at regular intervals and run parallel to the lines of the building. Only tool made bends will be acceptable. Fittings for copper tubing shall be brass or copper solder joint-type except at connection to apparatus, where brass compression type fittings shall be used.

C. Non-metallic tubing shall be virgin polyethylene, ASTM Type 1, Grade 5, Class B or C; meeting the stress crack test performed per ASTM D1693-60T. All individual tube polyethylene or multi-tube instrument tubing harness must be classified as flame retardent and must be rated as self-extinguishing when tested under ASTM-D635 flammability test.

D. All non-metallic tubing run in mechanical or finished spaces where other tubing is exposed shall be run within adequately supported rigid metallic raceway, E.M.T. pipe or duct. Terminal single lines shall be hard drawn

AUTOMATIC TEMPERATURE CONTROL

copper to armored non-metallic tubing, except if the run is less than 12 inches, flexible polyethylene may be used.

E. Non-metallic tubing installed in concealed locations such as pipe chases, suspended ceilings or within walls shall be adequately supported and installed inconspicuously in a neat and workmanlike manner. Multi-tube instrument harness (bundle) may be used in place of single tube where a number of tubes run to the same points.

F. Tubing installed inside or behind control panels, may be color coded or number coded polyethylene. The tubing must be neatly tied and supported.

G. Flexible connections bridging the cabinet and its door shall be neatly fastened along the hinge side and protected against abrasion.

H. All tubing except local individual room control shall be number coded or color coded for future identification and servicing the control system.

3. WORK BY OTHERS

A. Electrical Contractor - All electrical work required to wire all devices furnished by the Temperature Control Contractor including the following:

- (1) EP relay.
- (2) PE switches.
- (3) Firestats
- (4) Contactors, Starters and Relays.
- (5) Air compressor.
- (6) Miscellaneous switches and devices.

4. EQUIPMENT

A. The control manufacturer shall furnish all two-position relays, capacity relays, pneumatic sequencing relays, plus all other controls necessary to meet the specifications and provide for properly operating automatic control system.

AUTOMATIC TEMPERATURE CONTROL

B. All electric-pneumatic or pneumatic-electric switches and relays must be UL listed and of a type to meet current and voltage requirements of the particular application.

C. Room Thermostats;

(1) Shall be of the two-pipe principle. They shall contain low-mass, bi-metallic sensing elements insulated from the thermostat base for maximum responsiveness. They shall have an adjustable throttling range and set point stop, gage adaptor, and blank locking metal covers.

D. Electric-Pneumatic Relays;

(1) EP relays shall be 3-pipe body of metal alloy with all internal operating parts of corrosion resistant stainless steel. Device shall be provided with wall mounting brackets, manifold for tubing connection, and junction box for wiring connection.

E. Air Compressors (2);

(1) Air compressors shall be of suitable size. Each shall provide air to all pneumatic temperature controls. Air compressors shall have 480 volt, 3 phase motor with starter and shall be complete with a 30 gallon storage tank which conforms to the ASME code for unfired pressure vessels and be so stamped. Each compressor shall be sized to operate not more than 33% of the time. Each air compressor shall be equipped with pressure switch, high and low pressure gages, relief valve, intake air filter, belt guard and motor overload protection. A direct expansion, air cooled, moisture condenser with auto trap and drain and combination pressure reducing, low pressure relief valve and filter assembly shall serve each air compressor (120 volt, 1 phase, 60 Hz.)

F. Pneu.-Electric Switches;

(1) Shall be diaphragm operated snap acting switch. Set point shall be adjustable from 3 to 15 psi and differential adjustable from 1.5 to 5 psi. Switches must be rated for resistance loads with a minimum rating of 7.2 amps at 277 volts AC and 8.3 amps at 120-240 volts AC. Pneu-electric switches must be UL tested and approved for the 100,000 cycle test.

G. Differential Pressure Switch;

(1) Shall be diaphragm operated with 4-inch diaphragm to actuate a single-pole double-throw snap switch. Motion of diaphragm shall be restrained by a calibrated spring that can be adjusted to set the exact pressure differential at which the electrical switch will be actuated. Switches will have repetitive

AUTOMATIC TEMPERATURE CONTROL

accuracy within 2% of adjustable range.

H. Time Clock;

- (1) Furnished under electrical section.

I. Firestats;

- (1) Shall be manual reset safety devices which shall break line-voltage contacts as the air temperature reaches a pre-determined cut-out level. Sensing elements shall be bi-metal and switch shall be housed in a sturdy metal case with reset button protruding through the front. Switch shall be rated for 10 amps at 120 volts. Firestats to have adjustable set point. One each A.H. unit.

J. Magnetic Starters;

- (1) Except for air compressors, will be provided under Electrical Section of specifications.

5. SEQUENCE OF OPERATION

A. Air Handling Units 1 and 2;

- (1) Air handling units 1 and 2 are redundant systems designed to serve the computer room. Both air handling units 1 and 2 have a split DX coil with two stages of cooling. In the supply duct off the two air handling units, there will be one electric duct heater with 4 stages of electric heat. Air handling units 1 and 2 will be controlled as follows. A time clock located where shown on the drawings shall energize air handling units 1 or 2 so that run time on air handling units may be divided equally. When either of the air handling units is energized, gravity type back-draft dampers in the supply ducts off of each air handling unit shall go to the open position and supply air to the space served by air handling units 1 and 2. Should the air handling unit selected by the time clock fail during the normal operating conditions a static-pressure switch sensing air movement in the supply duct shall automatically energize the back-up air handling unit and condensing circuits so that conditioned air may be supplied at all times to the space.

- (2) A space thermostat located where shown on the drawings shall energize the 4 stages of electric heat and the 2 stages of DX cooling on the air handling unit in service in sequence as necessary to maintain the desired space temperature.

- (3) A humidistat located where shown on the drawings shall override the space

AUTOMATIC TEMPERATURE CONTROL

thermostat and energize the DX cooling in 2 stages for dehumidification. When humidistat is in control of cooling, the thermostat shall energize the stages of electric heat as necessary to maintain the desired space dry bulb temperature. The PE switches controlling the electric heat shall be interlocked thru a static pressure switch to insure that an air handling unit is energized before the stages of electric heat can be energized. On a fall in space humidity, the space humidistat shall energize a steam humidifier to provide the necessary humidification for the space served.

B. Air Handling Units 3 and 4

(1) Air handling units 3 and 4 shall operate in the same manner as air handling units 1 and 2. They shall be back-up systems to one another and their operation shall be selected by a time clock selecting the appropriate air handling unit. A static pressure switch shall be provided to being on the back-up unit should the air handling unit selected for normal operation fail. Gravity type back-draft dampers shall go to the open position when the air handling unit is energized.

(2) Space thermostats located where shown on the plans shall energize their two stages of electric heat thru pressure electric switches, as necessary to maintain the desired space temperature. The pressure electric switches shall be interlocked thru a static pressure switch so that no electric heat can be energized unless an air handling unit is running. Any space thermostat sensing a rise in space temperature shall thru a system of selector relays energize the 2 stages of DX cooling as necessary to maintain the desired dry bulb temperature.

SECTION 16A

ELECTRICAL GENERAL REQUIREMENTS

1. SCOPE OF WORK

A. Work under this section includes all labor, materials, accessories, and equipment necessary for completion of the electrical work.

2. GUARANTEE

A. Contractor shall guarantee work as installed by him for a period of one (1) year from date of final acceptance of work, said guarantee to cover defective materials and workmanship, and Contractor shall furnish materials and labor necessary to comply with this guarantee without additional cost to Owner.

3. INSPECTIONS

A. Before requesting final inspection, the electrical installation shall be complete, tested, balanced, adjusted, and in final operating condition.

B. Furnish qualified representative to demonstrate and prove performance of the installation.

4. CODES AND REGULATIONS

A. Unless otherwise specified, all work, materials, and equipment shall be in strict accordance with the National Electrical Code and Regulations of the National Board of Fire Underwriters for Electrical Wiring and Apparatus, latest editions, as recommended by the National Fire Protection Association.

5. SHOP DRAWINGS

A. Contractor shall submit seven sets of shop drawings for approval. Shop drawings shall be submitted on the following:

- (1) Transformers.
- (2) Panelboards.
- (3) Lighting fixtures.
- (4) Transfer switches.
- (5) Motor control centers.

SECTION 16B

SERVICE AND DISTRIBUTION

1. GROUNDING

A. Provide grounding system as indicated on the drawings.

2. TRANSFORMERS -- DRY TYPE

A. Dry-type transformer shall be air-cooled, with taps, as manufactured by Sorgel, Heavi-Duty, Westinghouse, General Electric, Jefferson, or Uptegraff to AIEE, USAS, and NEMA standards.

B. Connections to transformers shall be made using flexible steel conduit with the ground wire pulled through.

C. Taps on transformers shall be set so that secondary voltages will be as near as possible to 120/208 or 120/240 volts with normal primary voltage.

D. Noise level for any transformer shall not exceed NEMA rating.

3. PANELBOARDS

A. Panelboards shall be as manufactured by General Electric, I-T-E, Square D, or Westinghouse and be of dead-front standard construction. Cabinets shall be galvanized. Fronts shall be minimum 12 gauge, bonderized, and painted, minimum four-inch gutters, with flush-type cylinder lock. Panelboards shall comply with requirements of the National Electrical Code and Underwriters' Laboratory. Busing shall be copper.

B. Provide substantial adjustable supports to permit centering, plumbing, and spacing in and out of interior.

C. Provide, on the back of the door, a directory frame and directory with typewritten identification of each circuit, indicating type of load (receptacles, lighting, etc.), and room numbers that circuit serves.

D. Circuit breakers shall be "bolted-in" type, Westinghouse "Quicklag" or "AB", or equal. Multiple pole breakers shall be common trip; tie-bars will not be accepted. Breakers shall be ambient temperature compensated or calibrated at 40°C.

4. MOTOR CONTROL CENTER

A. Motor control centers shall be indoor Westinghouse Type "W", or equal, NEMA Type I with Class B wiring.

B. Motor control center and all components are to conform with all the latest

SERVICE AND DISTRIBUTION

IEEE and NEMA standards.

C. Enclosure and structural parts shall be a minimum of 3/32-inch steel. Surfaces shall have a rust-inhibiting primer coat and two finishing coats of a light gray lacquer.

D. All parts shall be designed for normal operating voltage at 440 volts, three-phase, 60 cycles.

E. Motor control center is to consist of units 90 inches high and 20 inches deep. Three-phase main horizontal busses are to be copper with a continuous rating of 800 amperes and vertical copper buses of 400 amperes.

F. All bus work shall be braced for 25,000 amperes.

G. Continuous 300-ampere ground bus with solderless connectors for No. 2/0 Awg cable at each end shall extend the full length of lineup and shall be solidly connected to each section.

H. Spare-spaces shall be provided with blank covers.

J. Cables shall enter at the top and bottom of the control center in the conduit.

K. Standard nameplates are to be one inch by three inches. For three lines, 3/16-inch letters; for two lines, 1/4-inch letters; and for one line, 3/8-inch letters. Nameplates are to be engraved black micarta with white letters.

L. Circuit breakers, other than motor control, are to be molded case, three poles, 600 volts, 15,000-ampere asymmetrical, minimum interrupting capacity at 600 volts with thermal magnetic trip.

M. All circuit breakers shall be manually operated by a trip-free handle on the front panel. Each handle shall give visual indication of the "on", "off", of tripped position and shall be capable of being padlocked in the "off" position. Each handle shall interlock the compartment door so that the door cannot be opened unless the handle is in the "off" position.

N. Each starter modular unit shall be completely isolated from the other in the structure by removable, horizontal, and vertical fireproofed barriers. Plug-in stabs shall be provided on the rear of each drawout starter unit for power connections to the vertical bus. All starter units shall be removable.

O. Motor starters are to be combination magnetic across-the-line type with adjustable magnetic trip only circuit breakers with a minimum interrupting rating of 15,000 amperes. Starter control circuit transformer secondary

SERVICE AND DISTRIBUTION

is to have one leg fused and the other grounded. Three automatic reset overload relays are to be ambient compensated. Starter operating coil is to be 120-volts, one-phase, and 60 cycles.

P. Motor starters shall be provided with two normally open and one normally closed auxiliary contacts including the normal seal-in contact.

Q. Provide removable, fireproofed barriers for each vertical section, top and bottom, to avoid damage to adjacent sections and wiring.

R. Provide top mounted pull box full length of center for termination of conduits.

5. CONNECTING OF MOTORS

A. Others will furnish and deliver motors.

B. Mount motor starters, auxiliary relays, control switches, etc., and install wiring required to completely connect motors, starters, controls, and accessories.

C. Conduit connections shall not be run rigid to motors. Flexible conduit not less than 12 inches long shall be installed at each motor and ground wire pulled through or on the outside to point of rigid conduit connection.

D. Control wiring may be as small as No. 14TW if that size will provide proper function of said controls.

E. Any motor near the floor with its exposed service raceway overhead (such as pumps) shall be connected by installing rigid conduit down through "T" conduit to the floor flange with flexible connection from "T" to motor.

SECTION 16C

RACEWAY SYSTEMS

1. RACEWAY SYSTEMS

A. Furnish and install raceways systems and accessories including outlet boxes, pull boxes, wire gutters, etc. Minimum raceway size shall be 3/4 inch unless otherwise indicated. Raceways shall be installed concealed where possible and, where exposed, shall be parallel to axes of the building.

B. Raceways concealed in furred ceilings and partitions, exposed above nine feet, or against wall or ceiling surfaces may be electric metallic tubing. All other raceways shall be rigid conduit.

C. Support exposed raceways by ring hangers or on trapeze hangers of vertical steel rods and horizontal "Unistrut" members but not by perforated strap hangers. Malleable iron clamps are acceptable for raceways against surfaces. Concealed raceways shall be supported from building construction.

D. Raceway runs shall avoid proximity to hot water and steam lines. Conduit in concrete shall not affect the strength of concrete construction. Run parallel raceways straight and true with offsets uniform and symmetrical. Conduit at sheet metal boxes shall have locknuts inside and outside and insulated bushing on end.

E. Rigid conduit connections shall be threaded with threads cleaned and coated with one coat of zinc-chromate base primer, Humble's Rust-Ban 270, or approved equal before connecting.

SECTION 16DWIRING1. WIRING

A. Unless otherwise specified or noted, No. 2 conductors and larger shall be 90-degree, dry-rated Type "THW"; wires No. 4 and smaller shall be Type "TW". Wires shall be copper as manufactured by General Electric, Rome, Hatfield, Okonite, Phelps Dodge, Triangle, Simplex, or Anaconda.

B. Wire No. 8 and larger shall be stranded and connected with compression-type copper connecting lugs correctly sized to the diameter of the bare conductors. Run mains and feeders their entire length in continuous pieces without splices or joints. Minimum size wire shall be No. 12 unless noted. The size of wire shall be the same from panelboard to last outlet on circuit.

C. Conductors shall be installed in a neat and workmanlike manner including color scheme identification, joint and splices, forming and lacing in the panels, and pull and junction boxes.

D. Branch circuit splices or joints shall be made with Ideal or Buchanan steel compression connectors and covered with vinyl- or nylon-insulated jackets.

2. WIRING DEVICES AND PLATES

A. Lighting branch circuit switches shall be as scheduled on the drawings. Switches shall be installed so that the down position is "off" and the up position is "on". Switches shall be located on the strike side of the door as finally hung, whether so indicated or not, and shall be as close as practical to the door opening.

B. Switches shall conform to NEMA Standard ED-1-2.05 and shall be as follows:

- (1) 15 Amperes, 120/277 vac, Single Pole
Arrow Hart No. 1891
P & S No. 15AC1
Hubbell No. 1201
- (2) 20 Amperes, 120/277 vac, Single Pole
Arrow Hart No. 1991
P & S No. 20AC1
Hubbell No. 1221
- (3) 15 Amperes, 120/277 vac, Two Poles
Arrow Hart No. 1892
P & S No. 15AC2
Hubbell No. 1201

WIRING

- (4) 20 Amperes, 120/277 vac, Two Poles
Arrow Hart No. 1992
P & S No. 20AC2
Hubbell No. 1222
- (5) 15 Amperes, 120/277 vac, Three Way
Arrow Hart No. 1893
P & S No. 15AC3
Hubbell No. 1203
- (6) 20 Amperes, 120/277 vac, Three Way
Arrow Hart No. 1993
P & S No. 20AC3
Hubbell No. 1223
- (7) 30 Amperes, 120/277 vac, Motor
Rated, Single Pole
Arrow Hart No. 3991
P & S No. 30AC1
Hubbell No. 3031
- (8) 30 Amperes, 120/277 vac, Motor
Rated, Double Pole
Arrow Hart No. 3992
P & S No. 30AC2
Hubbell No. 3032
- (9) 30 Amperes, 120/277 vac, Motor
Rated, Three Way
Arrow Hart No. 3993
P & S No. 30AC3
Hubbell No. 3033
- (10) 30 Amperes, 120/277 vac, Motor
Rated, Center Off, Double Pole,
Double Throw (Two-Pole, Two-
Speed Switch)
P & S No. 1228

C. Receptacles shall be as scheduled on the drawings, shall conform to NEMA Standard WD2-4.02, and shall be as follows:

- (1) Duplex 125 Volts, 15 Amperes (NEMA 5-15R)
Arrow Hart No. 6262
P & S No. 6200
Hubbell No. 5262

WIRING

- (2) Duplex 125 Volts, 20 Amperes, T-Slot (NEMA 5-20R)
Arrow Hart No. 6739
P & S No. 6300
Hubbell No. 5362
- (3) Duplex 125 volts, 20 Amperes, Non-interchangeable
P & S No. 6371
Hubbell No. 5392
- (4) Duplex 250 Volts, 15 Amperes (NEMA 6-15R)
Arrow Hart No. 6662
P & S No. 6662
Hubbell No. 5662
- (5) Simplex 250 Volts, 20 Amperes (NEMA 6-20R)
Arrow Hart No. 5861
P & S No. 5851
Hubbell No. 5461
- (6) Simplex 125 Volts, 30 Amperes (NEMA 5-30R)
Arrow Hart No. 5716
P & S 5920
Hubbell No. 9308

D. Plates shall be of standard beveled design of 0.040-inch, non-magnetic, AISI Type 302 stainless steel, satin finish, and of proper number of gangs as required.

SECTION 16E

LIGHTING

1. LIGHTING FIXTURES -- GENERAL

A. Furnish and install lighting fixtures throughout the project and erect in place and in operation, including lamps.

B. Ballasts shall conform to the following:

(1) Labels of UL, ETL, and CBM.

(2) Two-year guarantee.

(3) Rapid-start, two-lamp, Type "A" sound-rated ballasts unless otherwise required.

(4) Internal thermal element, Type "P" Super Premium as manufactured by Jefferson or Advance (for rapid-start fixtures).

2. LAMPS

A. Fixtures shall be installed complete with lamps and broken or burned-out lamps shall be replaced as required to leave all fixtures ready for operation and use at time of final acceptance.

SECTION 16F

MISCELLANEOUS ELECTRICAL

1. AUTOMATIC CONTROLS

A. Carefully read and become familiar with the paragraph on automatic controls of the Mechanical Section of these specifications, make electrical connections, and interlock wiring noted therein for proper function of controls.

B. The system of control is pneumatic. Connect electric-pneumatic switches, pneumatic-electric switches, firestats, electric-motorized dampers, etc. Furnish and install electric wire, raceways, and control devices (push buttons, auxiliary contacts, etc.) noted or required. Wiring shall be in raceways.

C. The Automatic Controls Contractor will furnish the Electrical Contractor with complete, approved wiring diagram and supervise connections.

SECTION 16G

SPECIAL SYSTEMS

1. TELEPHONE SYSTEM

A. Telephone system shall be complete including raceways, fishwire, terminal cabinet, and outlets. Outlets shall be standard receptacle box with plates (3/8-inch round hole) of the same material as hereinbefore specified under "Wiring Devices and Plates".

16G-01

EXX 001833

EXHIBIT "A"

April 15, 1971
Appropriation 36-9356

OPERATING SERVICES CONTROL CENTER
BUILDING

HUMBLE WILL FURNISH ONLY THE FOLLOWING:

1. Copies of applicable drawings, specifications, and standards reasonably necessary for work execution.
2. The following utilities, if required and requested by Contractor, at existing outlets, which will not be extended by Humble, and in quantities available at those outlets each to be used at Contractor's risk:
 - a. Drinking water, not cooled.
 - b. Electrical power at 110/220 volts, 60 cycles, single-phase; and 440 volts, 60 cycles, three-phase.

HUMBLE WILL PERFORM ONLY THE FOLLOWING:

1. Designate a site or sites in Baytown Refinery to which Contractor shall haul all dismantled or surplus materials and debris.
2. Designate material storage areas and areas on which Contractor may locate temporary sanitary facilities, shops, or offices.
3. Set one reference point and advise Contractor of the elevation and coordinates thereof.
4. Install telephone wiring and instruments.

EXX 001834

~~NOT POSSIBLE~~
TODIAN IF CONTRACT LEAVES
UR POSSESSION.

27-5319 ENJAY CHEMICAL COMPANY
CONTRACT FILES

01-461-2-20

EXX 001835

REQUEST FOR ASSIGNMENT OF JOB NUMBER
BROWN & ROOT, INC. AND ASSOCIATED COMPANIES

427-5319

September 21, 1971

TO ACCOUNTING DEPARTMENT
FROM Industrial-Civil Division Brown & Root, Inc. DATE
SUBJECT JOB NUMBER ASSIGNMENT - Industrial-Civil DEPARTMENT
SUB-DIVISION Industrial (Littlepage at Baytown Office)

PLEASE ASSIGN A JOB NUMBER TO BE USED FOR RECORDING OF INCOME AND COSTS RELATING TO THE CONTRACT DETAILED BELOW:

OWNER Enjay Chemical Company

PRIME CONTRACTOR

CONTRACT DATE September 20, 1971

DESCRIPTION OF WORK Site Preparation River Water Clarification Plant at Owner's Baytown, Texas Plant.

TYPE OF CONTRACT UNIT PRICE (), LUMP SUM (XX), FORCE ACCOUNT (), COST PLUS FEE ()
OTHER (), EXPLAIN:

ESTIMATED COMPLETION DATE April 1972 OR CONTINUOUS ().

CONTRACT AMOUNT: \$ 590,538.00 ACTUAL (XX), ESTIMATED ().

TERMS OF PAYMENT PROGRESS BILLINGS - MONTHLY (XX), WEEKLY (), BIWEEKLY (),
SEMIMONTHLY (), REVOLVING FUND (), OTHER (), EXPLAIN:

PERCENT RETAINED 10 % OF Completed Amount
OTHER (), EXPLAIN:

TO BE COMPLETED ONLY FOR JOINT VENTURES:

PARTNERS AND PARTICIPATION:

SPONSOR: %
%
%

ATTACH FINANCING CURVE OR CASH FORECAST:

JOB NUMBER ASSIGNED 27-5319
Copy of contract attached

ORIGINAL - ACCOUNTING
DUPLICATE - RETAINED
TRIPPLICATE - TREASURY/CREDIT
QUADRUPLICATE - PURCHASING

O. M. Bakken
SIGNATURE OF EMPLOYEE REQUESTING JOB NUMBER

ACCOUNTING

FORM A 58

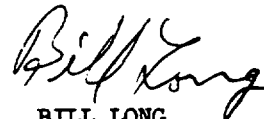
EXX 001836

OFFICE MEMO
BROWN & ROOT, INC.

OCTOBER 6, 1971

TO THOSE CONCERNED:

JOB NO. 27-5319 IS ASSIGNED TO COVER THE SITE PREPARATION FOR A
RIVER WATER CLARIFICATION PLANT FOR ENJAY CHEMICAL COMPANY AT
BAYTOWN, TEXAS.


BILL LONG

BL/nb

JOB TITLE: ENJAY CHEMICAL COMPANY - SITE PREPARATION FOR A RIVER
WATER CLARIFICATION PLANT AT BAYTOWN, TEXAS.

(WORK TO BE PERFORMED BY THE L. J. DERRICK DEPARTMENT)

EXX 001837

THIS CONTRACT, entered into this 20th day of September,
1971, by and between ENJAY CHEMICAL COMPANY, hereinafter referred to as
"Enjay," and BROWN & ROOT, INC.
hereinafter referred to as "Contractor," WITNESSETH:

27-5319

That in consideration of the covenants and agreements set out herein
and the payments provided for herein Enjay and Contractor agree as follows:

1. If any provision of this Contract incorporates by reference into this Contract or provides for the attachment hereto of any safety regulations, engineering standards, or other documents issued in the name of Humble Oil & Refining Company, then for the purpose of this Contract, Enjay hereby adopts those documents and any references to "Humble" therein shall be construed as references to Enjay.

2. Contractor agrees to begin immediately and press with due diligence until completion in a careful and workmanlike manner, with the necessary labor, supervision, tools, equipment, and materials, furnished and maintained by Contractor at its own cost and expense except as hereinafter provided, certain work briefly described as follows:

Perform all work in accordance with the specifications and exhibits listed below, a copy of said specifications and exhibits and of each drawing and Baytown Engineering Standard referred to therein being attached hereto and made a part hereof.

Designation	Title	Date
Specifications	Specifications for Site Preparation River Water Clarification Plant, Enjay Chemical Plant, Enjay Chemical Company, Baytown, Texas, Revision 1 -----	August 23, 1971
Exhibit "A"	Site Preparation, River Water Clarifi- cation Plant, Revision 1 -----	June 25, 1971
Exhibit "B"	Brown & Root Owned Equipment Rates	September 17, 1971
Exhibit "C"	Labor Rates	September 17, 1971
Exhibit "E"	Additional Safety Rules and Regulations	May 15, 1971

Contractor agrees to begin work on or about September 20, 1971, and to make every effort to complete the work included in this Contract by April 5, 1972, including, if necessary, payment of premium time and/or furnishing additional equipment all at Contractor's cost. Inclement weather exceeding thirty (30) workdays will be cause to extend the completion date.

3. As consideration for the satisfactory performance and completion of this Contract by Contractor, Enjay agrees to pay Contractor the lump sum of FIVE HUNDRED NINETY THOUSAND FIVE HUNDRED THIRTY-EIGHT AND NO/100 (\$590,538.00) DOLLARS. This Contract is subject to cancellation by Enjay at any time during

the period of the Contract, subject to the following cancellation terms:

Cancellation charges at any point in time after award of the Contract are to be based upon actual charges for materials to Brown & Root, Inc., documented by vendors' support plus five percent (5%), labor actually expended at the rates attached as Exhibit "C," equipment rental expended at the rates attached as Exhibit "B," rental of third party equipment at invoice cost plus a fee of thirty-five percent (35%) to cover the cost of all maintenance, fuels, lubricants, overhead, profit, taxes, etc., but less operators, and subcontract items at invoice cost plus five percent (5%).

Enjay's duly authorized representatives shall have access, at all reasonable times, to all Contractor's personnel, books, records, correspondence, instructions, plans, drawings, receipts, vouchers and memoranda of every description pertaining to work under Contract for the purpose of auditing and verifying costs of work upon prior notice to Contractor's project manager. Enjay's representatives shall have the right to reproduce any of the aforesaid documents. Contractor shall preserve all of the aforesaid documents for a period of two years after the completion and acceptance or termination of work.

4. Contractor shall comply with all of the terms and conditions contained in Enjay's publication entitled "Contractors' Responsibilities," dated March, 1970, revised June, 1970, said publication being made a part of this contract by reference. Enjay will furnish copies of this publication to the Contractor. The rules and regulations contained in the "Contractors' Responsibilities" shall apply to all subcontractors and their employees as well as to the prime Contractor and its employees. Before starting work under this Contract, Contractor shall obtain from Enjay copies of these regulations. Contractor shall notify its employees, its subcontractors, and the employees of its subcontractors of the provisions of said regulations and shall secure compliance therewith by all such parties; and Contractor shall not allow any of such persons to begin work inside Enjay's Baytown Chemical Plant until such notification has been given them.

Said "Contractors' Responsibilities" are designed as minimum requirements for Contractor, and Contractor shall take any additional precaution necessary or proper under the circumstances to prevent injury or death to persons or damage to property. Neither compliance with such regulations by Contractor nor Enjay's approval of any actions or procedures of Contractor as provided therein shall relieve Contractor of its obligation always to use due care in performing work hereunder.

5. Although Contractor shall provide its own representative or representatives to supervise and inspect all materials and workmanship entering into this job, Enjay reserves the right to have an inspector on the job. Any material which Enjay considers unsatisfactory shall be removed and replaced at Contractor's expense. Neither inspection, waiving of inspection, nor acceptance by Enjay shall relieve Contractor of its obligation to furnish all materials and workmanship in accordance with specifications.

6. It is understood and agreed that all work performed by Contractor hereunder shall meet with the approval of Enjay's engineers or inspectors but that the detailed manner and method of doing same shall be under the control of Contractor, Enjay being interested only in the result obtained, and that Contractor is an independent contractor as to all work performed hereunder. In this connection, Contractor and Enjay agree as follows:

A. Contractor agrees to indemnify and hold Enjay harmless from all claims, actions, demands, loss and causes of action arising:

(1) From injury, including death, to its employees and those of its subcontractors, except such as may result solely from the negligence or willful acts of Enjay or its employees.

(2) From (a) injuries to or deaths of persons, including employees and representatives of Enjay, which result in whole or in part from the willful acts or negligence of Contractor, its employees, agents, or subcontractors, or (b) damage to property of Enjay and all other persons, which results in whole or in part from the negligence or willful acts of Contractor, its employees, agents, or subcontractors, except that Contractor shall not be responsible for damage to Enjay's property resulting from fire or explosion.

(3) From damage to property or injury to or death of persons which results in whole or in part from willful acts or the negligence of Contractor, its employees, agents or subcontractors, in connection with the handling and use of utilities furnished by Enjay, except that Contractor shall not be responsible or liable for such damage to Enjay's property resulting from fire or explosion.

B. In addition Contractor agrees to carry insurance as follows: *

(1) Workmen's Compensation Insurance in compliance with the Texas Employers' Liability Act and all amendments thereto.

(2) Comprehensive General Liability Insurance (including Contractors' Protective Liability when subcontractors are used), covering

(a) Bodily injury liability with a limit of not less than \$ 100,000 for one person injured or killed and, subject to such limit, \$ 100,000 for more than one person injured or killed in any one accident, and

(b) Property damage liability with limits of not less than \$100,000 for each accident, and \$100,000 aggregate.

(3) Automobile Liability Insurance on owned, non-owned and hired automotive equipment covering

(a) Bodily injury liability with a limit of not less than \$100,000 for one person injured or killed and, subject to such limit, \$300,000 for more than one person injured or killed in any one accident, and

(b) Property damage liability with limits of not less than \$50,000 for each accident.

C. Prior to commencing work hereunder, Contractor shall produce evidence in a form satisfactory to Enjay that all insurance required under this Contract is in force and carried with companies acceptable to Enjay and that such insurance will not be materially altered or cancelled while the work covered hereby is in progress without a reasonable prior written notice to Enjay. Upon request of Enjay, Contractor shall furnish certified copies of all such insurance policies. Should Contractor at any time neglect, or refuse to provide, or should it cancel the insurance required herein, Enjay shall have the right to procure same and deduct the cost thereof from the consideration to be paid Contractor hereunder.

7. Contractor agrees to pay off and satisfy all claims for labor and material employed or used in anywise by it in connection with the work performed hereunder, and to permit no liens of any kind to be fixed upon or against the property of Enjay by Contractor's laborers, mechanics or materialmen, and agrees to indemnify, protect and save Enjay harmless from and against all such claims and liens.

8. Contractor agrees that if, in the opinion of Enjay, Contractor should fail at any time during the performance hereof, to provide the necessary labor, supervision, tools, equipment or materials for the prompt performance of the work herein contracted for, or should breach this Contract in whole or in part or fail to use due diligence in the performance thereof, or should not be performing this Contract in the manner herein provided, Enjay may, at its election, take over and perform or obtain another contractor to take over and perform all or any part of the work then remaining unperformed. In the event Enjay should exercise such right, it shall have the right to use all or any part of Contractor's tools or equipment then in use on the job but shall pay Contractor a

* Insured under a separate policy as excess of limits shown for employers liability, general and automobile bodily injury and property damage - \$1,000,000 each occurrence.

reasonable rental for the use of such tools and equipment during the period of use by Enjay and shall return same to Contractor upon the completion of the job in as good condition as when taken over by Enjay, ordinary wear and tear excepted. Should Enjay take over the completion of said job, or obtain another contractor to do so Enjay shall pay Contractor for the work then completed, subject to the later provisions hereof, unless the compensation for the completed work cannot be readily determined, in which latter event Enjay shall pay Contractor the full contract price less all costs and expenses incurred by it in the completion of the work.

9. Contractor agrees that upon the completion by it and acceptance by Enjay of the work herein contracted for it will furnish Enjay with proof satisfactory to the latter that all claims for labor and material have been satisfied and paid and that there are no unsatisfied claims for injuries to persons or property, and thereupon the amount due as herein provided shall be paid by Enjay to Contractor, subject, however, to the right in Enjay to withhold payments in accordance with the provisions of Article 5469, Texas Revised Civil Statutes of 1925, and all amendments thereto or other provisions of law applicable. It is agreed that upon request of Contractor and upon showing to the satisfaction of Enjay that all claims for labor and material and for damages to persons and property, as above provided, have been satisfied, Enjay in the event it considers it safe to do so, will advance at approximately fifteen (15) day intervals up to ninety per cent (90%) of the value of the work then completed, based upon estimates by Enjay's engineers or inspectors, in which event the balance will be paid upon completion and acceptance of the work and compliance with the terms and provisions hereof.

Contractor agrees that in the event any lien or liens are fixed or attempted to be fixed, secured or claimed against Enjay or Enjay's property by any person or firm, lumber dealer or corporation, artisan, laborer, mechanic or subcontractor who furnished services or materials in connection with the performance of this Contract, Contractor will, within ten (10) days following notification by Enjay that such lien or liens have been fixed or attempted to be fixed, secured or claimed, furnish Enjay a bond in an amount equal to twice the value of the lien or liens. Such bond shall be executed by a corporate surety authorized to do business under the laws of the State of Texas and shall comply in all respects with the requirements of Article 5472c, Vernon's Annotated Texas Statutes. Contractor further agrees to file such bond with the County Clerk of Harris County, Texas, and to take all steps necessary to assure that prompt notice of such filing is given to the obligees named therein. Contractor further agrees that the giving of such bond shall be in addition to any other rights of Enjay or obligations of Contractor under this Contract and shall in no way be construed as abrogating or qualifying such rights and obligations.

10. In the event there is a conflict between any of the provisions hereof and any of the proposals, general conditions, specifications, or any documents, agreements, or papers of any kind which have been incorporated herein by other provisions hereof, it is understood and agreed that the provisions hereof shall be controlling.

The making, execution and delivery of this Contract by the parties hereto have been induced by no representations, statements, warranties or agreements other than those herein expressed. This Contract embodies the entire understanding of the parties hereto and there are no further or other agreements or understandings, written or oral, except as mentioned herein.

11. In performing its obligations hereunder, Contractor shall comply with all applicable federal, state, and municipal laws, and all applicable orders, rules and regulations of constituted authority.

12. If Contractor fails or refuses to pay any taxes or governmental charges, state or federal, relating to the employees of Contractor, and Enjay may be required or deems it necessary to pay such taxes or charges, Contractor agrees to furnish Enjay with information required to enable it to make the necessary reports and to pay such taxes or charges. Contractor agrees to reimburse Enjay on demand at Houston, Texas, for all such taxes or governmental charges, state or federal, which Contractor fails or refuses to pay and which Enjay may be required or deems it necessary to pay. In addition, Enjay, at its election, is authorized to deduct all sums so paid for taxes and governmental charges from any payment due Contractor hereunder.

13. In connection with the work provided for hereunder, Contractor (1) guarantees and warrants all material and equipment fabricated by it against defects and agrees to replace, without cost to Enjay, any such material or equipment which may become defective within one (1) year from Enjay's acceptance of the work except when such defects are the result of corrosion, erosion, normal wear and tear; (2) guarantees its field workmanship and agrees without cost or charge to Enjay to replace or repair any defects in the work covered by this contract resulting from its field workmanship if such defects are reported to Contractor within one year from date of Enjay's acceptance of the work; (3) will to the extent reasonably possible secure from the vendors of materials and equipment guarantees substantially the same as the guarantees of Contractor set out in (1) and (2) above.

14. In the event Enjay loans or furnishes tools or equipment, to Contractor in connection with its work covered hereunder, Contractor agrees:

A. To make its own determination before commencing work that such tools and equipment are adequate for the safe performance of the work by Contractor;

B. That such tools or equipment will be loaned or furnished and accepted by Contractor without warranty or representation by Enjay as to their condition;

C. To return such tools or equipment to Enjay at the conclusion of such use in as good condition as when received, ordinary wear and tear excepted; and

D. To indemnify and hold Enjay harmless from all claims, demands, causes of action, damages and injuries resulting from Contractor's use of said tools or equipment.

For the purpose of this paragraph 14, tools and equipment shall be defined to include scaffolds, lights, and all other types of apparatus, facilities or services which Enjay may loan or furnish. In addition, all of the provisions of this paragraph shall be applicable to any lighting or illumination loaned or furnished to Contractor by Enjay.

15. Enjay may from time to time, by written instructions or drawings issued to Contractor require additional work and services directly in connection with

or incidental to the work covered by this Contract; and Enjay may, by such instructions or drawings, require Contractor to alter, change, accelerate, or omit any work covered by this Contract. In the event Enjay desires any such additions, changes, alterations, accelerations or omissions which will materially increase or decrease the total contract price referred to in paragraph 3 above, Contractor shall submit to Enjay an estimate of such increase or decrease. Should Enjay desire to proceed in accordance with such estimate, Enjay shall issue to Contractor a Contract Change Order describing the work to be added or deleted and the corresponding price addition or deduction therefor. If Contractor has not obtained a Contract Change Order, signed by Enjay's appointed representative, no claim for additional compensation will be allowed. The provisions of this Contract except as may be otherwise provided shall apply to all such additions, changes or alterations as if they were embodied in the original drawings and specifications.

16. Contractor shall procure Enjay's prior written approval as to any subcontract covering any portion of the work provided for hereunder. No such approval shall relieve Contractor from any of the obligations of this Contract, and, as between the parties hereto, Contractor shall be and remain liable as if no such subcontract had been made. No subcontract shall bind or purport to bind Enjay but shall contain a provision permitting assignment thereof by Contractor to Enjay.

17. Contractor agrees to hold in confidence any and all technical information disclosed to Contractor by Enjay, including technical information included in or on tracings, drawings, field notes, calculations, specifications, and engineering data, except:

- A. Technical information which at the time of disclosure by Enjay to Contractor is in the public domain;
- B. Technical information which, after disclosure by Enjay to Contractor, becomes part of the public domain by publication or otherwise; and
- C. Technical information which Contractor can show was in Contractor's possession at the time of Enjay's disclosure to Contractor and was not acquired, directly or indirectly, from Enjay.

Contractor agrees that Contractor will not, without the written permission of Enjay, use the technical information which Contractor is required to keep confidential under this agreement for any purpose other than the accomplishment of work under this agreement.

18. If Contractor or Contractor's personnel make any inventions based upon technical information which Contractor is required to keep confidential under this agreement, Contractor shall promptly disclose said inventions to Enjay. Contractor agrees to grant and hereby grants to Enjay an irrevocable, nonexclusive, royalty-free license and the irrevocable right to grant nonexclusive licenses, without accounting therefor to Contractor, to use said inventions under Contractor's Patent Rights. The licensing right herein granted by Contractor to Enjay is assignable by Enjay to any of its Affiliates. For the purpose of this Contract only, the term "Contractor's Patent Rights" shall mean patents and patent applications based on inventions made by Contractor or Contractor's personnel which inventions are based upon information which Contractor is required to keep confidential under this Contract and which are conceived during the life of this Contract and two (2) years thereafter. The term "Affiliate," as used in this

paragraph 18, shall mean any company of which Humble Oil & Refining Company (a corporation of the State of Delaware) or Standard Oil Company (a corporation of New Jersey) now or hereafter owns or controls, directly or indirectly, fifty per cent (50%) or more of the stock having the right to vote for directors thereof. For the purpose of this definition, the stock owned or controlled by a particular company, shall be deemed to include all stock owned or controlled, directly or indirectly, by any other company of which the particular company owns or controls, directly or indirectly, fifty per cent (50%) or more of the stock having the right to vote for directors thereof.

19. It is expressly understood by Contractor that Enjay accepts no obligation of confidence with respect to any information disclosed to Enjay by Contractor under this Contract unless specifically covered by a separate, written confidentiality agreement. In the absence of such separate confidentiality agreement, Contractor agrees that it will not place any restrictive notices on the tracings, drawings, field notes, specifications, and any other documents embodying engineering or professional data developed by Contractor for Enjay pursuant to this Contract, and that Enjay shall be free to use or disclose any or all of the information contained therein to third parties without accounting to Contractor therefor.

20. It is understood and agreed that Enjay may, upon written notice to Contractor, terminate the work provided for hereunder. In the event of such termination, Contractor shall be reimbursed for actual costs incurred to the date of such notice of termination in connection with the execution of the described work, and for actual costs thereafter incurred by Contractor in connection with such termination, plus applicable overhead and a reasonable profit based on such costs. However, in no event shall such reimbursement include prospective profits for work unperformed.

21. Contractor's obligations under paragraphs 17 and 18 of this Contract shall survive any termination of this Contract.

22. It is agreed as a condition of the Contract as follows:

A. That in the performance of this Contract, Contractor shall not engage in any conduct or practice which violates any applicable law, order or regulation prohibiting discrimination against any person by reason of race, color, religion, national origin, sex or age.

B. This Contract is ☒ is not ☐ subject to the Equal Opportunity Supplement entered into between the parties pursuant to Executive Order 11246. This Supplement is:

☒ on file in this office

☐ attached hereto. Please sign and return to this office.

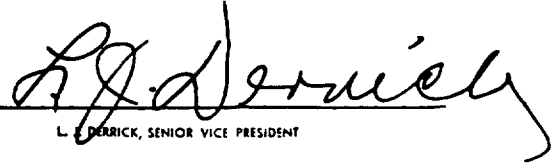
IN WITNESS WHEREOF, the parties hereto have executed this Contract in duplicate originals as of the day and year first above written.

ATTEST:

Secretary

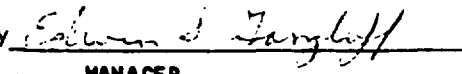
BROWN & ROOT, INC.

By


L. E. DERRICK, SENIOR VICE PRESIDENT

ENJAY CHEMICAL COMPANY

By


MANAGER
BAYTOWN PLANT

1002
WLB:aj
(WJGates)

CONTRACTOR'S ACKNOWLEDGMENT

STATE OF TEXAS I

COUNTY OF HARRIS I

Before me, the undersigned authority, on this day personally appeared L. J. DERRICK known to me to be the person whose name is subscribed to the foregoing instrument as SENIOR VICE PRESIDENT of Brown & Root, Inc. and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity stated, and as the act and deed of said Brown & Root, Inc.

Given under my hand and seal of office, this the 20TH day of September, A. D., 19 71.

A. V. Armstrong
Notary Public in and for
Harris County, Texas

(SEAL)

ENJAY'S ACKNOWLEDGMENT

STATE OF TEXAS I

COUNTY OF HARRIS I

Before me, the undersigned authority, on this day personally appeared Steven L. Langhuff known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity stated and as the act and deed of said Enjay Chemical Company.

Given under my hand and seal of office, this the 20th day of September, A.D., 19 71.

Annelisa M. Jones
Notary Public in and for
Harris County, Texas

ANNELISA M. JONES
Notary Public in and for Harris County, Texas
My Commission Expires June 1, 1973

EXX 001848

EXHIBIT "E"

ADDITIONAL SAFETY RULES AND REGULATIONS

The following safety rules and/or regulations will be a part of this contract/purchase order:

1. Other than in control rooms and office buildings, every person in the Baytown Refinery and Chemical Plant is required to wear safety glasses to assure continuing protection against eye injury. Plant Security personnel will issue to visitors of one day or less clear plastic spectacles, which shall be worn in conformance to this policy. These spectacles are to be returned to Plant Security as the visitor leaves the premises.
2. All contractors moving trailer-type equipment within the Baytown Refinery and Chemical Plant must use a hitch equal to Premier's automatic latching hitch No. 105 for one-ton loads, or No. 580 for 1-1/2-ton loads, except that properly rated ball hitches may be used when provided with safety chains.

May 15, 1971

EXX 001849

September 17, 1971

EXHIBIT "B"

HUMBLE OIL & REFINING CO.
REF. BID REQUEST BK-CO-7950
BROWN & ROOT OWNED EQUIPMENT RATES

<u>DESCRIPTION</u>	<u>HOURLY</u>	<u>DAILY</u>	<u>WEEKLY</u>	<u>MONTHLY</u>
½ Ton Pickup or Car	\$ 1.00	\$ 8.00	\$ 40.00	\$ 176.00
105 - 125 Air Compressor	1.75	14.00	70.00	308.00
2 Ton Flatbed Dump Truck	2.30	18.40	92.00	404.80
2 Ton Winch Truck	2.30	18.40	92.00	404.80
10 - 12 Ton Galion Model 110 Hydraulic Crane (or equal)	13.00	104.00	520.00	2,288.00
200 Amp Gasoline Welding Machine	.75	6.00	30.00	132.00
200 - 300 Amp Electric Welding Machine	.50	4.00	20.00	88.00
50 Passenger Personnel Bus	2.30	18.40	92.00	404.80
Combination Backhoe and Front-end Loader W/Bucket	8.50	68.00	340.00	1,496.00
250 Air Compressor	2.75	22.00	110.00	484.00
1 Ton Air Tugger	1.50	12.00	60.00	264.00
2 Ton Air Tugger	1.75	14.00	70.00	308.00
Pipe Threading Machine ½" to 2"	.75	6.00	30.00	132.00
MDL 95 Crane	14.25	114.00	570.00	2,508.00
MDL 6 Crane	11.25	90.00	450.00	1,980.00
520 Pile Hammer	13.75	110.00	550.00	2,420.00
Pile Extractor	2.00	16.00	80.00	352.00
6" Diesel Water Pump	4.13	33.00	165.00	726.00
4" Diesel Water Pump	1.25	10.00	50.00	220.00

EXX 001850

-2-

600 Air Compressor	\$ 4.75	\$ 38.00	\$190.00	\$ 836.00
D-7 Dozer	14.25	114.00	570.00	2,508.00
No. 12 Motor Grader	6.25	50.00	250.00	1,100.00
Sheepsfoot Roller	1.50	12.00	60.00	264.00
621 Scraper	25.63	205.00	1,025.00	4,510.00
Water Truck	1.63	13.00	65.00	286.00
2 cy Drag Bucket	1.25	10.00	50.00	220.00
1½ cy Clam Bucket	1.00	8.00	40.00	176.00
15 cy Towed Scraper	6.50	52.00	260.00	1,144.00
5 KW - 20 KW Generator	2.00	16.00	80.00	352.00

EXX 001851

September 17, 1971

EXHIBIT "C"

HUMBLE OIL & REFINING CO.
REF. BID REQUEST BK-00-7950
LABOR RATES

<u>CLASSIFICATION</u>	<u>STRAIGHT TIME</u>	<u>OVERTIME</u>
Superintendent	\$10.21	\$10.21
General Foreman	8.13	11.56
Craft Foreman	7.80	11.10
Field Engineer	7.80	11.10
Job Clerk	5.33	7.59
Welder	7.15	10.18
Electrician	7.15	10.18
Electrical Lineman	7.28	10.36
Pipefitter	7.15	10.18
Carpenter	6.89	9.81
Operator	7.02	9.99
Truck Driver	5.53	7.86
Concrete Finisher	6.89	9.81
Structural Iron Worker & Rigger	7.02	9.99
Iron Worker - Reinforcing	6.89	9.81
Helper (All Crafts)	5.53	7.86
Laborer	4.75	6.75
Labor Foreman	6.89	9.81
Safety Supervisor & First Aid Man	6.89	9.81

EXX 001852

SCOPE

- 1.1 This Basic Practice covers all mandatory requirements governing the design, application, and testing of lead linings installed in exchanger components.
- 1.2 An asterisk (*) indicates that a decision by the purchaser is required, or that additional information is furnished by the purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- 2.1 Table 1 lists the specification and standards which shall be used with this Basic Practice.

TABLE 1 SPECIFICATION AND STANDARDS	
<u>ASTM Standards</u>	
B29	Pig Lead
B127	Nickel-Copper Alloy Plate, Sheet and Strip
B164	Nickel-Copper Alloy Rod and Bar
B295	Nickel and Nickel Alloy Covered Welding Electrodes
<u>AWS American Welding Society Specification</u>	
A5.11	Nickel and Nickel-Alloy Covered Welding Electrodes

MATERIALS

- 3.1 Nickel-copper alloy shall be as follows:
 - a. Rod or bar: ASTM B 164, Class A.
 - b. Plate, sheet or strip: ASTM B 127.
 - c. Electrodes for weld deposit: ASTM B 295 (or AWS A5.11) AWS-ASTM Class E Ni Cu-2.
- 3.2 Lead shall be of Chemical Lead grade per ASTM B 29.

DESIGN

- 4.1 — Vessel components shall be tested before any shell or nozzle joints are covered with lining.
- 4.2 * Where lead lining "with anode" is specified, the anode shall be per Figure 1 including detail A. The anode shall be electrically connected by attaching one end of a piece of No. 12 AWG copper wire to the 1/4 in. brass machine bolt on the anode, and the other end to the tube sheet with the 1/4 in. brass cap screw.
- 4.3 * Where lead lining "without anode" is specified, it shall be per Figure 1 except omit detail A and 1/4 in. brass cap screw in tube sheet.
- 4.4 Solid nickel copper plate may be used without lead lining as an alternate to the partition shown in Figure 1. The minimum thickness of plate shall be 1/2 in.
- 4.5 ID of compressed asbestos gasket for the channel cover shall be equal to the channel ID less 1 in.
- 4.6 Web of compressed asbestos gasket for the channel cover shall be 1 in. wider than thickness of the channel baffle tip.
- 4.7 Ring type facing of nickel copper may be used as an alternate to the 1/8 in. weld deposited flange or cover facing. The nickel copper ring shall be welded to the flange.
- 4.8 Finished machine thickness of weld deposits on flange and cover faces shall be 1/8 in.
- 4.9 Facing finish raised face flanges shall have a serrated facing finish consisting of 20 to 40 grooves per inch, 0.002 to 0.004 in. deep, cut spirally or concentrically with a roundnose tool.

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Page 2 of 4		

LINING DETAILS

- 5.1 Lining details shall be per Figure 1.
- 5.2 Lining for bonnet type (integral) channel shall be similar to floating head detail, Figure 1.
- 5.3 Bonded lead lining shall be applied as follows:
 - a. All edges shall be rounded to a radius 1/8 in. before lining.
 - b. Lining shall be bonded homogeneously to the shell of the vessel by pouring or lead burning. If a tin precoat has been applied, all surplus tin shall be removed to minimize contamination of the lead lining.
 - c. If the vessel is to be lined in sections that are to be welded together later, the lead coating shall be stopped about 3 in. from all edges which are to be welded. The 6 in. wide exposed bands shall be lined after pressure testing.
 - d. Linings in nozzles shall be homogeneously bonded as indicated in Figure 1. If this is not possible in small nozzles, unlined Ni Cu alloy pipe connections shall be used, with carbon steel slip-on flanges which have been overlayed with Ni Cu weld deposit. Details are shown in Figure 2.
 - e. The lead lining shall be smooth and free of entrapped gas or dross. This can be facilitated by remelting the surface, using a soft flame.

INSPECTION

- 6.1 The term Inspector, used in this Basic Practice, refers to the Owner's representative.
- 6.2 Visual inspection of the lining shall be made for continuity, and for blistering or other defects.
- 6.3 Lining thickness may be measured by callipers, magnetic thickness gage, or other non-destructive methods.
- 6.4 Dye penetrant method of inspection shall be used to expose any pinhole porosity and defective bonding of the lead to alloy facing.
- 6.5 Test for tin contamination. If pretinning is used, samples of the lead shall be taken from one of each five components which are lined and analyzed for tin content. The sample shall be chipped from the surface of the lining to a depth of 1/16 in. The tin content shall not exceed 0.01%.
- 6.6 The test for tin contamination may be waived, at the discretion of the Inspector, when quality is known to be consistent.

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EXX 017696

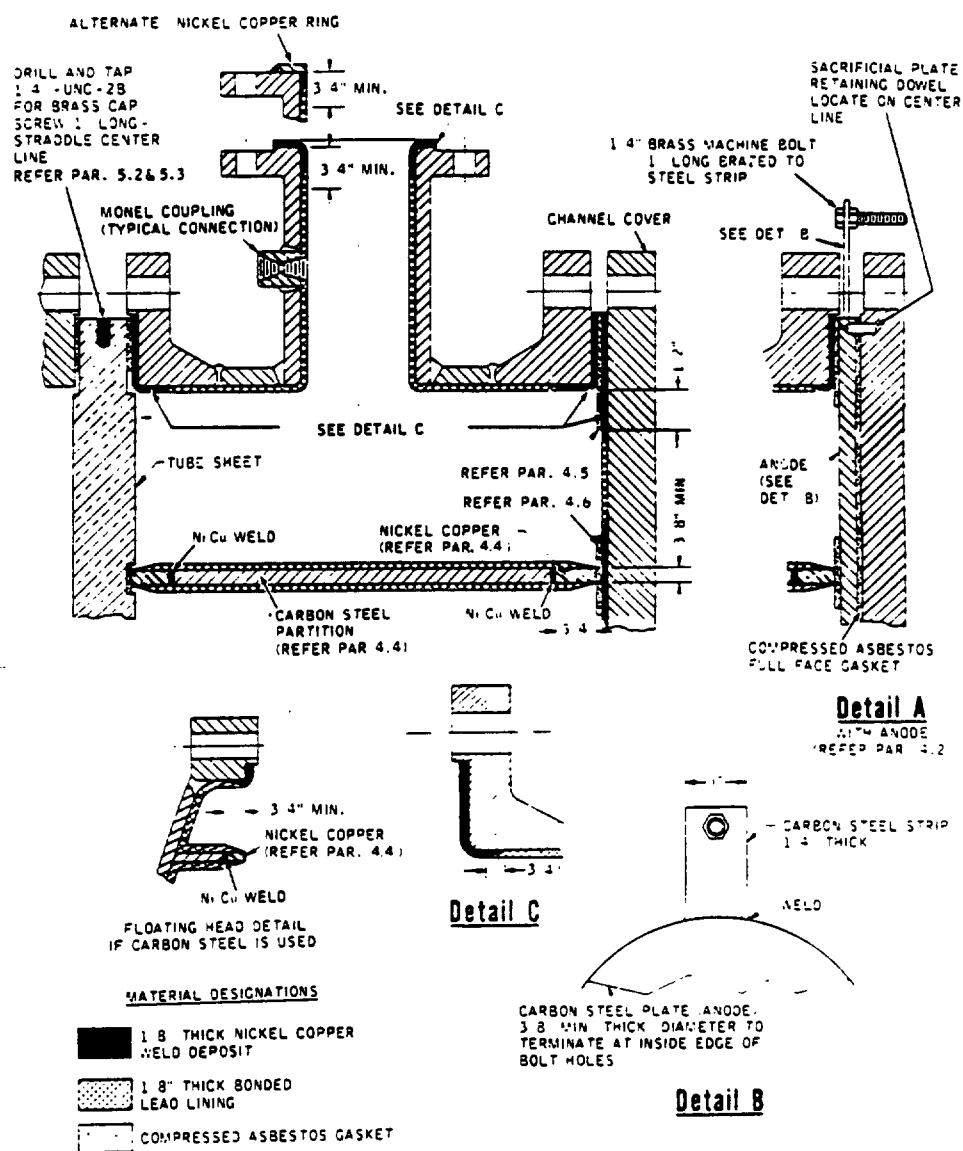


Figure 1

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EXX 017697

BP19-2-2	LEAD LINING FOR EXCHANGER COMPONENTS	ER&E BASIC PRACTICE
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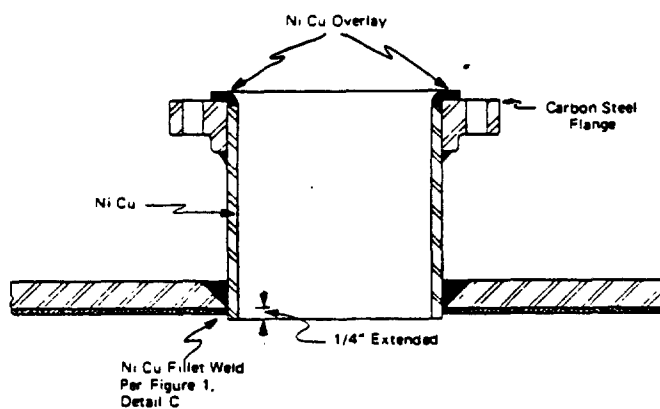


Figure 2
Ni-Cu Alloy Nozzles
(Small sizes only)

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EXX 017698