UCP

TECHNICAL SPECIFICATIONS

****

ELEMENTARY AND HIGH SCHOOLS

CODY, WYOMING AND GRANADA, COLORADO

JAPANESE RELOCATION CENTERS

****

AUGUST 8, 1942

Plans By -

U. S. DEPARTMENT OF AGRICULTURE
FARM SECURITY ADMINISTRATION
950 BROADWAY
DENVER, COLORADO

For -

War Relocation Authority
704 Kittredge Building
16th & Glenarm Streets
Denver, Colorado

IMPORTANT NOTICE

The attention of all bidders is invited to the fact that all capital equipment is subject to allocation by the War Production Board. It is expected that each bidder will own, or will have arranged to rent or otherwise acquire, and have available the plant and construction equipment necessary to construct the work herein specified. Delays in procurement of plant and equipment necessary for completion of the work under this contract will not constitute justification for any extension of time to the contract period as specified in the Contract.

INFORMATION

The information contained in these Drawings and Specifications is not to be publicized in any way. It must be clearly explained to all persons to whom this information is made available that it is to be held in strict confidence, and not, under any circumstances, to be transmitted to others for publication or release to the press, periodicals or other agencies of public contact having either general or limited distribution. Any person failing to observe these restrictions may be prosecuted under the provisions of the Espionage Act, Title 50, U.S.C., Sections 31 and 32.

INDEX

TECHNICAL SPECIFICATIONS

SECTION ONE

CLEARING, GRADING, EXCAVATION, BACKFILL

SECTION ONE

CLEARING, GRADING, EXCAVATION, BACKFILL

1:00 INTENTION

This specification shall include everything necessary and incidental to do the clearing, grading, excavating and backfilling, and any additional work of this nature not specifically called for or shown on the plans but necessary to finish the work as specified, shown or intended on the plans.

GENERAL REQUIREMENTS

1:01 MOVEMENT OF MATERIALS

If during grading operations, it is necessary or convenient to move material across the area excluded from finished grading, this will be permitted provided that, at completion, the surface is left with no accumulation of loose rocks, clods, or large lumps, trash, or other material from adjacent areas.

Except as shown on the plans or called for in the specifications, the existing top soil shall not be removed or borrowed.

1:02 PROTECTION OF EXISTING CONSTRUCTION

If material or equipment is to be moved across existing paved roads or ditches, crossings shall be made only at points designated by the Contracting Officer's Representative; and upon completion these crossings must be repaired to the satisfaction of the Contracting Officer's Representative.

1:03 DISPOSITION OF EXCAVATED MATERIAL

Spoil from excavation shall be disposed of as directed by the Contracting Officer's Representative on the site.

All surplus excavated material, after all backfilling and required grading is completed, shall be placed as directed by the Contracting Officer's Representative.

1:04 PLACING OF FILLS AND BACKFILLS

All fills and backfills shall be placed as follows:

Fills in excess of twelve inches (12") shall be spread in eight inch (8") layers, and each layer puddled and compacted sufficiently to produce a firm and stable fill.

The first six inches (6") below the finished ground surface of all fills and backfills shall be of good grade top soil suitable for plant growth taken from the site and approved by the Contracting Officer's Representative.

1:05 FINAL CLEANING UP

After construction has been completed, the entire site shall be left clear of all obstructions, temporary buildings or structures, debris, stumps, weeds, and holes, so that the entire area shall present a neat, workmanlike and finished appearance.

GENERAL CLEARING AND GRADING

1:06 GENERAL

This work includes clearing the site of all existing fences, flumes, and other structures, and brush, stumps or other growth, and disposing of materials removed in a manner that will leave the site clear and free of obstructions to the progress of the building project contemplated. It also includes shaping the ground so that all portions are in suitable condition for the landscaping contemplated, for convenient irrigation, and for proper drainage; this work to extend five feet (5') out from the building.

1:07 PRIORITY OF CLEARING AND GRADING

Clearing the site and grading, except finished grading adjacent to buildings, are to be completed prior to the start of any other construction work on the Project.

1:08 AREAS ADJACENT TO BUILDINGS

Following completion of all exterior construction on buildings including work on the roofs thereof, and when in the judgment of the Contracting Officer's Representative the work can be undertaken without interference with other construction, cleaning up of trash and litter shall be done. When the area in the vicinity of buildings has been cleared of refuse to the satisfaction of the Contracting Officer's Representative, finished grading shall be done in accordance with the plans and this specification.

After finished grading work has started and until it is completed, no trash or refuse shall be put out from any building unless it is placed directly into a vehicle for disposal to the satisfaction of the Contracting Officer's Representative.

Except where otherwise called for on the plans, the finished ground surface at the wall of the building shall be brought to an elevation closely approximating eight inches (8") below the lowest wood construction on the exterior wall of

the building, and for at least five feet (5') from the building the finished surface of the ground shall slope downward away from the building at not less than one inch (1"), nor more than two inches (2") per foot. This slope shall be maintained for the specified distance, regardless of the general slope of the ground beyond. The finished grading shall provide proper drainage of storm water away from the buildings. The top six inches (6") of this finish grade will be of top soil removed from building excavations.

EXCAVATION, TRENCHING, AND BACKFILLING

1:09 BRACING AND SHEETING

Adequate bracing and sheeting shall be used whenever the excavation conditions become hazardous to life or property. All requirements of the State in which this work is located covering construction of trenches or excavations shall be fully complied with. The Contracting Officer's Representative may call for bracing whenever he deems such advisable, but in no case will these instructions or the absence of such instructions relieve the Contractor of any responsibility.

1:10 DRYNESS OF EXCAVATION

All excavation for trenches or structures shall be kept as dry as reasonably possible, until construction and installation work has been accomplished. In no case shall water be allowed to enter any excavation, or to come in contact with any concrete construction until the concrete has taken its initial set.

The Contractor shall dispose of all water from the work in a suitable manner, without damage to property, subject to the approval of the Contracting Officer's Representative. No water shall be drained or pumped into pipe lines or structures, or work under construction. All removal and handling of water required to maintain dry trenches or structure excavations shall be at the expense of the Contractor.

1:11 EXCAVATION FOR STRUCTURES AND BUILDINGS

All excavation for basements shall be at least two feet (2') on the outside of the foundation lines in all directions, to allow sufficient space for the proper placement and removal of forms. The last two inches (2") vertically of excavation shall be removed by pick and shovel, and the excavation shall be neatly finished to the required depth at all points. All foundations or footings shall be extended down to undisturbed material.

Any excavation made by the Contractor in excess of that called for in the plans or authorized by the Contracting Officer's Representative shall be backfilled to the proper grade. The type of material required to make the fill, and the tamping or other method of consolidation required to provide a firm footing, shall rest entirely with the Contracting Officer's Representative, except that for structural footings the backfill shall be made with concrete of the same class as that used for the footings. The Contractor shall not be reimbursed for any excess excavation or backfill.

All excavation for footings or floors of buildings or structures shall be inspected and approved by the Contracting Officer's Representative before any concrete is poured. Such approval shall in no way relieve the Contractor of any responsibility.

1:12 FOOTING EXCAVATION

All trenches shall be entirely of open cut unless otherwise approved by the Contracting Officer's Representative.

Not less than the last two inches (2") vertically shall be excavated by hand, and the trench shall be finished to the exact depth required. Provided, however, that, if upon excavation to the required depth improper foundation material is encountered, the Contracting Officer shall be so informed, and he will then direct the Contractor to take such steps as are necessary to provide a proper foundation.

If suitable soil is encountered, footing trenches for all walls where basement does not occur may be made neat width of concrete footings, using earth sides for footing forms. All finishing of floors and side walls of trenches to be by hand and all corners sharp. No earth fill will be permitted to bring low places to grade; all fill must be of same material as footings.

Excavations for all pipe trenches will be level with top of concrete footings and of widths as shown by detail on Heating Piping Plan and/or Section in general drawings.

1:13 BACKFILLING AND COMPACTING

Backfilling of excavations shall be done at such time as permitted or directed by the Contracting Officer's Representative and to his satisfaction. The backfill shall be of material free from large rocks, stones or other non-compressible materials.

Compaction of backfill in trench or structure excavations shall be by either puddling or mechanical tamping, as directed by the Contracting Officer's Representative.

Puddling will not be allowed in soil that swells. All backfills shall be brought to sufficient elevations above ordinary ground to allow for settlement.

SECTION TWO

CONCRETE CONSTRUCTION

SECTION TWO

CONCRETE CONSTRUCTION

2:01 INTENTION

This specification shall include everything necessary and reasonably incidental to the execution of all Concrete Construction as shown on the drawings, whether specifically mentioned or not. Poured concrete will consist of footings only except where excavated. Where excavated the concrete walls will be flush on top with top of unexcavated footings.

Any work not detailed on the drawings shall be equal in quality to specifically detailed work.

2:02 AFFIDAVITS, CERTIFICATES, SUBSTITUTIONS

Affidavits and/or test and inspection certificates will be required on concrete materials, as noted in this section.

2:03 SAMPLES

Samples will be required on concrete materials, as noted in this Section. Cost of shipping samples shall be borne by the Contractor.

MATERIALS

2:04 MIXING WATER

All water used shall be clean, free from oil, acid, alkalies or vegetable matter. No salt, sea water, or water containing in excess of five tenths of one percent (0.5%) of SO_4 shall be used.

2:05 PORTLAND CEMENT

All cement shall be Portland, of American manufacture conforming to Federal Specifications SS-C-191A.

All cement shall be delivered to the site in sacks bearing the brand and name of the manufacturer. All cement delivered shall be of the same brand. The Contractor shall furnish the Contracting Officer three (3) copies of the manufacturer's regular laboratory test of the lot from which each delivery was made.

2:07 SAND FOR MASONRY

Sieve Opening Inches	U.S. Standard Sieve No.	Per Cent Passing
.187	4	95-100
.0661	12	60-80
.0331	20	35-58
.0197	35	23-40
.0117	50	14-25
.0059	100	5-10
.0029	200	0-2

A ten pound (10 lb.) sample of fine aggregate shall be furnished the Contracting Officer for his inspection and approval five (5) days prior to any use.

2:08 COARSE AGGREGATE

All coarse aggregate shall consist of crushed stone, gravel or other inert material with similar characteristics, having clean, hard, durable, uncoated particles, free from deleterious matter, and shall contain not more than two percent (2%) silt. The aggregate shall range in size from fine to coarse within the limits of percentage by weight as indicated below, subject to the decision of the Contracting Officer's Representative as to the final grading within these limits.

One inch (1") maximum size grading shall be as follows:

Passing 1" square opening screen	90-100%
Passing ½" square opening screen	25-60 %
Passing No. 4 screen	0-10 %

One and one-half inch (1½") maximum size grading shall be as follows:

Passing 1½" square opening screen	90-100%
Passing 3/4" square opening screen	55-75 %
Passing No. 4 screen	0-10 %

2:09 PIT RUN AGGREGATE may be used, provided it meets the specifications for fine and coarse aggregate. A fifteen pound (15 lb.) sample of Pit Run Aggregate shall be furnished the Contracting Officer for analysis and approval five (5) days prior to use.

The Contractor shall have on hand, during the use of Pit Run Aggregate, adequate equipment for the Contracting Officer's

Representative to make sieve analyses determining the grading of the run. The Contracting Officer's Representative shall be the final authority as to the acceptability of such material.

2:10 GRAVEL FILL UNDER FLOOR SLABS - ADOBE OR ABNORMAL GROUND CONDITION shall be sand and/or gravel material one-hundred percent (100%) passing a one and one-half inch (1½") square mesh screen and not more than ten percent (10%) passing one-hundred eighty-seven thousandths of one inch (.187") opening screen, number four (No. 4) mesh.

GENERAL REQUIREMENTS

2:11 QUANTITY OF CONCRETE

On all drawings, dimensions of concrete work referred to either natural or finish ground line adjacent, are minimum dimensions only, and shall not be construed to mean that only the quantity of concrete indicated by the drawings will be required, if otherwise necessitated by site conditions.

2:12 SUPERVISION BY ENGINEER

The details of all concrete construction shall be under the direction of the Contracting Officer's Representative who shall have the authority to stop any operation if, in his opinion, these specifications are not being complied with.

2:13 STOCKPILING AGGREGATES

All aggregate for concrete construction shall, immediately upon its delivery to the site, be stockpiled separately as to course, fine, or pit run, in separate stockpile areas, and on floorings of tightly laid wood planking, sheet metal, or other solid and clean surfacing. Stockpiling shall be so conducted as to prevent segregation of sizes, or inclusion of dirt or other foreign substances in the aggregate. Rejected aggregate shall not be stockpiled, but shall be immediately removed from the site.

PROPORTIONING AND STRENGTHS

2:14 MEASURING INGREDIENTS

a. PROPORTIONING of aggregates shall be by either weight or volume measurement. All measurements of cement, fine and course aggregates, shall be based on dry, loose condition. Any moisture content of the aggregates shall be included in the mixing water allowance, and any bulking of sand due to moisture shall be properly compensated for. Water shall be measured by a device accurate to within one pint, plus or minus, of the total amount of water

required per batch. The fine and coarse aggregate and water shall be measured separately and accurately for each batch of concrete.

b. FINE TO TOTAL AGGREGATE shall be so proportioned that the percentage shall amount to between thirty-one percent (31%) and forty-seven percent (47%) by weight where one inch (1") maximum size aggregate is used, and between thirty to forty percent (30% to 40%) by weight where one and one-half inch (1½") maximum size and aggregate is used.

c. PROPORTIONS MAY BE CHANGED, within the limits above prescribed, as appears necessary or desirable in the judgment of the Contracting Officer's Representative, provided that the proportion of total aggregate to cement shall not be altered.

2:15 AMOUNT OF WATER BY SLUMP TEST

a. AMOUNT OF WATER required for the proper consistency of concrete subject to the maximum as hereinafter provided, shall be determined by means of the slump test. A mold, being a frustrum of a cone with base diameter of eight inches (8"), upper diameter four inches (4"), and height twelve inches (12"), shall be filled to about one-fourth (1/4) of its height with concrete immediately out of the mixer, and then puddled. The filling shall be completed in three (3) successive layers similar to the first, and the top struck off level. Approximately one-half (½) minute after being filled, the mold shall be carefully removed, by raising it vertically. The molded concrete shall be allowed to subside until quiescent, and the height of the specimen immediately measured. The slump is defined as twelve inches (12") minus the height after subsidence. During the test, the mold shall rest upon a smooth non-absorbent surface.

b. MAXIMUM ALLOWED for various types of construction shall be as follows:

Footings and heavy sections - - - - - - -3"
Floor slabs - - - - - - -4"

2:16 CLASSES OF CONCRETE; REQUIRED STRENGTHS

a. PROPORTIONS as stated in this section are volumetric. Separate proportions of fine and coarse aggregate are subject to adjustment. Amount of water is subject to adjustment. The required strengths of the several classes of concrete are the minimum twenty-eight (28)

day strengths, in pounds per square inch, as shown by test cylinders of such concrete, taken and tested as hereinafter provided.

b. CLASS B CONCRETE shall be two thousand pound (2000 lb.) concrete, and shall be mixed in the proportion of one (1) part cement, two and one-half (2½) parts fine aggregate, four and one-half (4½) parts coarse aggregate, and not to exceed seven and one-half (7½) gallons of water per sack of cement.

SAMPLING AND TESTING

2:17 NUMBER OF CYLINDERS

Two (2) test cylinders shall be taken and tested from each one-hundred cubic yards (100 cu. yds.) of concrete poured for buildings and miscellaneous construction.

2:18 IDENTIFICATION OF CYLINDERS

Cylinders shall be numbered in order, and identified as to the date the sample was taken, the mix used, the water cement ratio, the slump, the location of the structure, and the part in the structure wherefrom the sample was taken. This information shall be furnished the testing laboratory as part of the identification of the cylinder and shall be incorporated in the laboratory report on the specimen.

2:19 TAKING, CURING, AND TESTING OF CYLINDERS

The cylinders shall be taken from a representative batch of concrete, while being placed in the structure. The cylinder moulds shall be of non-absorbent material, preferably metal, six inches by twelve inches (6" x 12") in size. Whatever equipment and/or help is needed for taking, preparing, and handling cylinders shall be furnished the Contracting Officer's Representative by the Contractor. All cylinders shall be so handled as to receive their initial set undisturbed. After a period of at least twenty-four (24) hours, test cylinders shall be immersed in a water bin for seven (7) days, then removed and allowed to dry for the remainder of the period before testing. The water for the above immersions shall at all times be kept to a temperature of approximately seventy degrees F. (70° F.)

2:20 PERIODS FOR BREAKING

Of the two (2) cylinders taken for each test, one (1) shall be tested fourteen (14) days after taking, and the other twenty-eight (28) days after taking. All breaking tests shall be conducted by a testing laboratory approved by the

Contracting Officer's Representative. All test cylinders shall be forwarded by the Contractor to the laboratory in sufficient time to allow the tests to be made within the time specified, and shall be so shipped as to prevent any damage to the specimen.

2:21 REPORTS OF TESTS

The Contractor shall deliver to the Contracting Officer's Representative, after laboratory tests have been made, three (3) copies of the laboratory test reports providing all identification date of the specimen and the ultimate unit compressive strength thereof.

2:22 COST OF TESTS

All concrete cylinder tests shall be at the expense of the Contractor.

FORMING

2:23 DESIGN AND CONSTRUCTION OF FORMS

a. STRENGTH - Forms shall be designed in accordance with standard design factors, and be capable of any needed adjustments. Working stresses twenty-five percent (25%) greater than standard structural practice will be permitted for all timber and steel used in forms.

b. WIRE TIES to hold forms in place during placing of concrete will be permitted on concrete foundations.

c. ALL FORMS shall be sufficiently tight to prevent leakage of mortar.

2:24 SMOOTHNESS OF FORMS

a. SHEETING for all visible exposed surfaces shall be surfaced lumber. Lumber shall be free from warps and checks. Forms shall be so constructed that the form marks will conform to the general lines of the structure, and be continuous.

2:25 OILING OF FORMS

All forms to be re-used shall be thoroughly coated with paraffine oil, form oil, or an acceptable material approved by the Contracting Officer's Representative, before initial use and before each subsequent use.

2:26 NATURAL GROUND FOR FORMS

Natural ground shall not be used for forms except where excavations can be made true to line and grade, and provide an even and solid side and bottom which will not sluff or break away. The Contracting Officer's Representative shall be the final authority on the acceptability of any forms using natural ground walls.

2:27 INSPECTION OF FORMS

All forms shall be inspected and approved by the Contracting Officer's Representative before the placing of the concrete. Such approval, however, shall not relieve the Contractor of any responsibility for all forms being adequate for their intended use. All forms shall be thoroughly cleaned, free from shavings, tags, dirt or other rubbish, and shall be well drenched prior to placing concrete, except in freezing weather. Forms for vertical construction shall have openings at the bottom until pouring starts, to permit removal of rubbish and dirt.

MIXING AND PLACING

2:28 MIXING OF CONCRETE

Except as provided in Paragraph 2:32, all concrete shall be mixed on the job, in a batch mixer of either the revolving drum or pug mill type. The mixer shall be equipped with a locked automatic timing device, and a satisfactory water tank for the control and accurate measurement of the water content of each batch. The mixer drum shall rotate at a peripheral speed of approximately two hundred feet (200') per minute. All mixing equipment shall be subject to the approval of the Contracting Officer's Representative, and shall not be used prior to such approval. Each batch shall be mixed not less than one and one-quarter (1¼) minutes after all the ingredients are in the mixer, and shall be completely discharged before the mixer is recharged. The mixer shall not be loaded beyond its rated capacity as given by the manufacturer, nor to such amount that there will be any loss of ingredients during mixing. The batch shall be proportioned to contain one or more full sacks of cement; split-sack batches will not be permitted.

2:29 ACCELERATORS

Where the atmospheric temperature is fifty degrees F. (50° F.) or less, and where approved by the Contracting Officer's Representative, Calcium Chloride may be used as an accelerator. Amount shall not exceed two pounds (2 lbs.) per sack of cement, and shall be applied in the mixer drum in solution form.

Solution stock shall consist of four pounds (4 lbs.) of Calcium Chloride in one gallon (1 gal.) of water. Solution shall be counted as an equal volume of mixing water.

2:30 ADMIXTURES

Admixtures to prevent segregation, improve the workability, or water proof concrete will be permitted, provided the admixture material, and the proportions to be used, be approved by the Contracting Officer prior to such use. Dry admixtures shall not be used to replace cement, and liquids shall be counted as an equal volume of mixing water.

2:31 CLEAN EQUIPMENT

Before mixing and placing concrete, all equipment used therefore shall be cleaned of all foreign materials. Hardened concrete shall be removed from the inner surface of the mixing and conveying equipment. All transporting equipment shall be clean, adequate, and of such design as to prevent segregation of ingredients.

2:32 TRANSIT OR PRE-MOULDED CONCRETE

Concrete from an off the site mixing plant may be used providing the concrete meets all requirements of this specification. All such concrete shall have an initial mixing at the plant of at least one (1) minute after all the materials, including the water, are in the mixer. Transporting devices shall be clean and water tight, and equipped with an agitator device which shall be operated until the concrete is discharged. If transported in an accepted revolving drum mixer, the initial plant mixing may be omitted, provided the drum is rotated until the concrete is discharged, and for not less than five (5) minutes after all materials, including the water, are in the mixer. Transit concrete shall be deposited within one (1) hour after all the ingredients have been placed in the drum; otherwise it shall not be used.

2:33 PLACING, GENERAL REQUIREMENTS

a. PRIOR TO DEPOSITING of concrete the Contracting Officer's Representative shall be notified, and his approval obtained.

b. WHERE WATER IS ENCOUNTERED in footings, no concrete shall be placed until an effective method of unwatering is applied, subject to the approval of the Contracting Officer's Representative.

c. CONCRETE SHALL BE DEPOSITED immediately after mixing in approximately horizontal layers of uniform thickness,

not exceeding three feet (3') in depth, and shall not have a free fall greater than six feet (6'). Each batch shall be consolidated as hereinafter specified, and no batch shall be deposited until the preceding batch has been so treated. When, in pouring vertical members, water collects in the upper zone, it shall be concentrated and removed and the amount of mixing water adjusted accordingly.

2:34 COLD OR FROST CONDITIONS

Whenever the atmospheric temperature is below forty degrees F. (40° F.), the concrete being deposited shall have a temperature of from seventy degrees F. (70° F.) to one hundred degrees F. (100° F.), and adequate means shall be taken to maintain a concrete temperature of not less than seventy degrees (70°) for three (3) days, or not less than fifty degrees (50°) for five (5) days.

2:35 SPADING, VIBRATING

a. ALL CONCRETE shall be thoroughly spaded and vibrated while being deposited, to insure a dense product, and the working of the concrete into the corners of the forms and around all pipes.

b. SPADING shall be done in conjunction with vibrating, and shall consist of working a suitable tool between the fresh concrete and the form.

2:36 CONSTRUCTION JOINTS

a. JOINTS in concrete due to stopping of work are to be avoided if possible. When such stoppage is unavoidable, joints in walls shall ordinarily be horizontal. All joints shall be keyed to a depth of two inches (2") over not less than one-quarter (1/4) nor more than one-third (1/3) of the area of the joint, and continuous tongues shall be provided in all vertical joints. Before again placing concrete at a joint, all latent and unsound concrete shall be removed. The old surface shall be roughened, cleaned, and coated with a layer of neat cement grout.

REMOVAL OF FORMS

2:37 ABOVE FREEZING TEMPERATURES

The Contracting Officer's Representative shall be notified prior to removal of forms, which shall be subject to his approval. Forms shall not be loosened or removed in less than the following periods:

Side forms for members that do not resist dead load, bending, or column stress - - - 2 days

The above periods are minimums, and the Contracting Officer's Representative may increase them in order to offset unavoidable adverse curing conditions. The Contractor shall be responsible for any premature removal of any forms.

2:38 FREEZING TEMPERATURES

Where the weather has maintained freezing or slightly above freezing temperatures, or where concrete has frozen after being placed, the forms shall be left in place until such weather is over, and the concrete has fully hardened.

CURING, FINISHING AND PROTECTING

2:39 CURING PERIOD

All concrete shall have a curing period of not less than seven (7) days, during which it shall be protected from injury and kept constantly moist, and at the minimum temperatures as noted in Paragraph 2:34.

2:40 MEMBRANE CURING

An impervious, colorless, paraffine base solution, if approved by the Contracting Officer, may be used on the concrete after removal of forms, in lieu of the water curing specified above. Such solution shall be applied in two (2) coats, and care taken that the surface is not broken during the curing period. The amount for each project shall be determined at the time of application. Normal conditions shall require one gallon (1 gal.) for each one hundred and fifty square feet (150 sq.ft.) for two (2) coats.

2:41 ORDINARY SURFACE FINISH

a. ALL FORMED SURFACES shall have this finish at least: Immediately after all forms have been removed, all form bolts shall be removed to a depth of at least one inch (1"). All holes, pockets, and sand streaks shall be cleaned, moistened, and filled with patching mortar. All fins shall be cleanly removed. All form wires shall be cut flush with walls and ends smoothed off.

b. MORTAR for patching after formstripping, shall be composed of one (1) volume of Portland cement to two (2) volumes of fine sand. The sand shall meet the specifications for fine aggregate as to hardness and cleanness, and shall pass a twenty (20) mesh sieve.

c. ALL EXPOSED SURFACES shall be cleaned of stains and mortar streaks by washing down while scrubbing with a stiff brush or broom.

2:42 FINISHING FLOOR SLABS

a. ALL CONCRETE FLOOR SLABS shall be of monolithic construction. After the concrete has been deposited, rodded, tamped and struck off to approximately finished grade, it shall be treated with a grated end tamper of such type, and in such a manner that the coarse aggregate will be forced downward, and a layer of mortar at least one-quarter inch (¼") thick left on top. When this has dried to the proper consistency, the surface shall be struck off with a strike board to a uniformly smooth surface, after which it shall be floated with an approved wooden or cork float, and then steel troweled to a smooth, hard finish. Adding of cement or water to the surface shall not be permitted.

b. WHEN TESTED with a ten foot (10') straight edge, the finished surface shall not vary more than one-eighth inch (1/8") therefrom.

2:43 FLOOR PROTECTION AND CLEANING

a. ALL FLOORS IN BUILDINGS shall be protected by placing waterproof building paper, reinforced with sisal fibers, on the entire surface, immediately after the floor has been cured. The paper shall be adequately fastened in place and shall remain on the floor until the building or structure is completed. The Contractor shall use whatever further means are necessary to protect, and present for final acceptance, floor slabs free from damage due to scratching, paints, or stains of any nature.

b. UPON COMPLETION OF CONSTRUCTION any paint spots or stains shall be removed; the slab surface shall be broom cleaned with water and soapsuds, and the entire surface flushed with clean water.

SECTION THREE

MASONRY

SECTION THREE

MASONRY

3:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the Masonry as shown on the drawings, whether specifically mentioned or not.

Any work not detailed on the drawings shall be equal in quality to specifically detailed work.

3:01 AFFIDAVITS, CERTIFICATES

Affidavits and/or test inspection certificates will be required from manufacturers of all materials or items specified to conform to Federal Specifications before delivery to site. This requirement may be waived only by the written authorization of the Contracting Officer. Materials shall conform to the specifications below. Any additional materials required to finish the work as specified or shown on the drawings shall be furnished and shall be equal in quality to these.

3:02 STORAGE OF MATERIALS

All materials shall be stored in such a manner as to permit easy access for proper inspection and identification of each shipment. Cement and lime shall be so stored as to protect them from dampness.

MATERIALS

3:03 MIXING WATER

All water used shall be clean, free from oil, acid, alkalies or vegetable matter. No salt, sea water, or water containing in excess of five tenths of one percent (0.5%) of SO_4 shall be used.

3:04 PORTLAND CEMENT

All cement shall be Portland, of American manufacture conforming to Federal Specifications SS-C-191A.

All cement shall be delivered to the site in sacks bearing the brand and name of the manufacturer. All cement delivered shall be of the same brand. The Contractor shall furnish the Contracting Officer three (3) copies of the manufacturer's regular laboratory test of the lot from which each delivery was made.

3:05 MASONRY CEMENT shall conform to Federal Specifications No. SS-C-181a. Only one brand of Masonry Cement shall be used.

3:06 LIME (hydrated) shall conform to Federal Specification No. SS-L-351, Type M.

3:07 SAND FOR MASONRY

Sieve Opening Inches	U. S. Standard Sieve No.	Per Cent Passing
.187	4	95-100
.0661	12	60- 80
.0331	20	35- 58
.0197	35	23- 40
.0117	50	14- 25
.0059	100	5- 10
.0029	200	0- 2

A ten pound (10 lb.) sample of fine aggregate shall be furnished the Contracting Officer for his inspection and approval five (5) days prior to any use.

3:08 CINDER CONCRETE BLOCKS

The units shall be made from Portland cement and such aggregates as sand, gravel, crushed stone, cinders, burned clay or shale, and blast furnace slag in such proportions and with such a process of manufacture that units meeting the requirements of this specification will be produced.

All units shall be sound and free from cracks or other defects that would interfere with the proper setting of the units or impair the strength or permanence of the construction. When specified, units that are intended to serve as a base for plaster or stucco shall have a sufficiently rough surface to give good adhesion.

The units shall show a compressive strength of not less than six hundred pounds (600 lbs.) per square inch. All materials entering into the construction of blocks are to meet the materials specifications listed herein.

3:09 BRICKS, COMMON - Federal Specification No. SS-B-656, Grade H.

3:10 BRICKS, FIRE-CLAY - Federal Specification No. HH-B-671a, Class H-57.

3:11 FIRE-CLAY - Federal Specification No. HH-C-451, Grade C.

3:12 FLUE LININGS AND THIMBLES shall be hard-burned terra cotta.

3:13 PREPARATION OF LIME PUTTY

HYDRATED LIME shall be mixed with water to form a putty and stored, with reasonable care to prevent evaporation, for (at least) twenty-four (24) hours before use.

COMPOSITION OF MORTAR

3:14 MORTAR shall be mixed in suitable devices which will protect it from impurities and from contact with the ground. No artificial coloring shall be used in mortar. No mortar shall be used or re-tempered after it has received its initial set. It shall be composed in the proportions indicated below. All sand shall be passed through an eight (8) mesh screen before being measured for use.

3:15 MANHOLE AND UNDERGROUND MASONRY

Mortar for laying shall be by volume one (1) part Portland Cement to two (2) parts sand. Not more than thirty percent (30%) of the cement may be replaced by an equal volume of hydrated lime.

3:16 SMOKE STACK LINING

Mortar for laying fire-brick shall be composed of Fire-Clay and water mixed to a creamy consistency.

3:17 COMMON BRICK MASONRY

Mortar for laying shall be by volume one (1) part Portland Cement to one (1) part Lime Putty to six (6) parts Sand, or by volume one (1) part Masonry Cement to three (3) parts Sand.

3:18 WETTING MASONRY, TEMPERATURE

All brick, clay tile or concrete blocks shall be wet thoroughly before using. No masonry shall be laid in freezing weather unless provisions satisfactory to the Contracting Officer or his Representative shall be made to prevent mortar from freezing before it has set.

LAYING MASONRY

3:19 LAYING COMMON BRICK CHIMNEYS

All brick work shall be built plumb and true to lines with courses level and laid with whole headers every sixth (6th) course unless otherwise noted or specified.

Joints shall be about three-eighths inch (3/8") and shall be completely filled with mortar, including all vertical joints. Brick shall be shoved into place (not laid); buttering will not be permitted. Excess mortar shall not be struck off in such manner as to pull mortar from contiguous brick faces. Joints shall be flush unless otherwise shown or specified.

3:20 LAYING FIRE-CLAY BRICK

In general, unless otherwise specified, the specifications for laying common brick shall apply to fire-clay brick except that joints shall be made as thin as possible.

3:21 PROTECTION

Masonry surfaces shall be properly protected when they are not being worked on. Masonry shall be protected from frost when and where necessary. At the end of each day, when rain is imminent, the tops of masonry walls shall be covered with a strong waterproof membrane that will keep water from entering the top of the wall. This protecting membrane shall be well secured in place.

SECTION FOUR

LATHING AND PLASTERING

SECTION FOUR

LATHING AND PLASTERING

4:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the "Lathing and Plastering", as shown on the drawings, whether specifically mentioned or not.

Any work not detailed on the drawings shall be equal in quality to specifically detailed work.

4:01 SCOPE

This specification will apply to the ceiling of the entire excavated portion of the building, and to the side walls of the two halls and two toilet and shower rooms in basement.

4:02 STORAGE OF MATERIALS

All materials shall be stored in such a manner as to permit easy access for proper inspection and identification of each shipment. Cement, plasters, and lime shall be so stored as to protect them from dampness.

MATERIALS

4:03 MIXING WATER

All water used shall be clean, free from oil, acid, alkalies or vegetable matter. No salt, sea water, or water containing in excess of five tenths of one percent (0.5%) of SO_4 shall be used.

4:04 PORTLAND CEMENT

All cement shall be Portland, of American manufacture conforming to Federal Specifications SS-C-191A.

All cement shall be delivered to the site in sacks bearing the brand and name of the manufacturer. All cement delivered shall be of the same brand. The Contractor shall furnish the Contracting Officer three (3) copies of the manufacturer's regular laboratory test of the lot from which each delivery was made.

4:05 LIME (hydrated) shall conform to Federal Specifications No. SS-L-351, Type F.

4:06 SAND FOR PORTLAND CEMENT PLASTER

Sieve Opening Inches	U. S. Standard Sieve No.	Per Cent Passing
.187	4	100
.0937	8	90-100
.0661	12	80- 95
.0331	20	42- 70
.0197	35	22- 40
.0117	50	10- 20
.0059	100	0- 3

4:07 SAND FOR INTERIOR GYPSUM PLASTER

.187	4	100
.0937	8	90-100
.0661	12	82- 98
.0331	20	40- 92
.0197	35	14- 86
.0117	50	5- 30
.0059	100	0 - 5

4:08 GYPSUM LATH shall be "Gold Bond Perforated Lath" as manufactured by the National Gypsum Company.

APPLICATION OF LATH

4:09 GYPSUM LATH shall be applied using one and one-eighth inches (1-1/8"), thirteen (13) gauge, blued, five-sixteenths inch (5/16") flat head, smooth, diamond pointed nails. Nails shall be spaced approximately four inches (4") apart. First nail one-half inch (½") from edge of panel, working from center bearing to outer edges. Each nailing edge shall have at least five-eighths inch (5/8") bearing on all joists.

Lath shall be applied with the long dimension at right angles to the framing members, butted, with broken joints in each course.

Lath shall be tightly fitted around all electric outlet boxes and similar openings. Cutting of boards shall be done by scoring with a sharp hatchet or knife and then breaking down and up over a straight edge.

4:10 INSPECTION OF SURFACES TO RECEIVE PLASTER

All surfaces to receive plaster shall be inspected and approved before beginning plastering. Particular care shall be taken to protect all adjoining surfaces and materials of all kinds.

4:11 PREPARATION OF LIME PUTTY

HYDRATED LIME shall be mixed with water to form a putty and stored, with reasonable care to prevent evaporation for at least twenty-four (24) hours before use.

4:12 MIXING AND APPLICATION

Batches shall be of such size that they can be entirely used within one (1) hour. Each batch shall be mixed using a clean box and tools. There shall be no re-tempering of mortar nor use of anti-freezing compounds.

All sand shall be passed through a six (6) mesh screen before being measured for use unless otherwise specified.

INTERIOR CEMENT (GYPSUM) PLASTER

4:13 BASE COAT (two coat work) shall be mixed by weight as follows:

One (1) part - fibered Cement Plaster
Two (2) parts - dry Sand

Gypsum Lath shall not be wetted before applying plaster.

The coat shall be applied in two operations. First a thin layer of plaster shall be spread under pressure in order to obtain a good ket. This shall be followed immediately with a second layer which shall be straightened to a true, even plane, keeping back sufficiently from the grounds to allow for the finishing coat. The surface shall be broomed or otherwise roughened to afford bond for the finishing coat.

4:14 FINISH COAT (Sand Float Finish) shall be mixed as follows:

Using Prepared Sand Float Finish Plaster add water only according to manufacturer's directions. Base coat shall be set hard, about three-quarters (3/4) dry, before applying finish coat. Finish coat shall be applied with a trowel, first grinding in a thin coat and then coming back with a final coat laying it on an even surface. Float to a final, even, granular finish, applying water sparingly with a brush, being sure to complete floating before plaster has set. Avoid joining by working top and bottom of wall at same time. Finish coat shall not be less than one-sixteenth (1/16) nor more than one-eighth inch (1/8") thick.

4:15 PROTECTION AND CURING

Plastering shall be protected from too rapid drying and from frost. Temperature of spaces to be plastered shall be forty degrees F. (40° F.) or more while plastering is being applied and this or a higher temperature shall be maintained until plaster is dry. Temporary heat shall be of a type that will not cause damage from smoke or other causes.

Starting on the day following application of the finish coat of any Portland Cement plaster, the walls shall be dampened twice a day for two (2) days. A light fog spray shall be used for this work and the wall shall not be soaked down by means of an open hose.

4:16 PATCHING

After the work of other trades is finished, all plaster damaged by the work of such trades shall be patched and left in good repair.

4:17 CLEANING

At conclusion of work, all plaster spots shall be removed from glass, sash, trim, or other work, all equipment and rubbish resulting from plastering shall be removed, and all plastered rooms shall be left in a broom clean condition.

SECTION FIVE

LUMBER, CARPENTRY AND MILLWORK

5:00	Intention
5:01	Affidavits, Certificates, Substitutions
5:02 - 5:06	Lumber
5:07 - 5:21	Grades and Kinds of Lumber for use in Building Structures
5:22 - 5:27	Millwork
5:28 - 5:34	Miscellaneous Materials
5:35 - 5:47	Framing
5:48 - 5:49	Exterior Finish and Trim
5:50 - 5:54	Interior Finish and Trim
5:55	Rough Hardware
5:56	Cleaning
5:57 - 5:59	Finish Hardware

SECTION FIVE

LUMBER, CARPENTRY AND MILLWORK

5:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the Lumber, Carpentry, and Millwork as shown on the drawings, whether specifically mentioned or not.

All cutting and patching incidental to the work of the various trades shall be done by the carpenters who shall cooperate in coordinating this work.

Any work not detailed on the drawings shall be equal in quality to specifically detailed work.

5:01 AFFIDAVITS, CERTIFICATES, SUBSTITUTIONS

Affidavits and/or test and inspection certificates will be required from the manufacturers of all materials or items specified to conform to Federal Specifications. This requirement may be waived only by the written authorization of the Contracting Officer. Materials shall conform to the specifications listed below. Any additional materials required to finish the work as specified or shown on the drawings shall be furnished and shall be equal in quality to these.

Substitutions may be made for any manufacturer's product specified, provided it is listed and submitted in triplicate for approval within thirty (30) days after the "Notice to Proceed" and provided it is subsequently proven to the satisfaction of the Contracting Officer to be equal in quality to the item called for. No substitutions will be allowed after this date.

LUMBER

5:02 GRADING, INSPECTION

All lumber shall conform to Federal Specification MM-L-751, and shall be graded in accordance with the latest grading rules of the Lumber Manufacturer's Association under whose jurisdiction the lumber is manufactured and sold. Each piece of lumber, or each bundle in bundled stock, shall bear the "Grade Mark" and Mill Identification Number of the Association under whose rules it is graded.

If lumber is purchased of a mill that does not have grading arrangements, a certificate that the lumber meets the specifications for grade and kind will be accepted.

5:03 AMERICAN LUMBER STANDARDS

Use and size classification, and all other requirements pertaining to soft wood lumber, shall be in accordance with the United States Department of Commerce, Bureau of Standards Simplified Practice Recommendation R-16-29.

5:04 SIZES

All sizes specified or indicated are nominal dimensions, unless otherwise noted.

5:05 MOISTURE CONTENT

All lumber, except millwork, finish, and siding, shall be air or kiln-dried to a moisture content not exceeding twenty percent (20%). All millwork, finish, and siding shall be kiln-dried to a moisture content not exceeding twelve percent (12%).

5:06 SPECIAL CONDITIONS GOVERNING USE OF LUMBER

Serious defects in lumber shall be cut out. All lumber that is used where it will be exposed to view shall be free from objectionable marks, stains, scars or surface blemishes. The best face of sheathing shall be exposed at eaves and all other locations open to view. Form lumber may be re-used only in non-exposed locations for studs, blocking, sheathing, sub-flooring, furring strips, or shingle strips, but in all cases such reuse shall be subject to the approval of the Contracting Officer or his representative.

GRADES AND KINDS OF LUMBER FOR USE IN BUILDING STRUCTURES

5:07 The following grades and species shall govern the use of lumber in each structure.

5:08 ALL STRUCTURAL LUMBER on the drawings shall be Select Structural Douglas Fir or No. 1 Native White or Yellow Pine, Spruce or Larch.

5:09 RAFTERS, JOISTS, PURLINS, PLATES, HEADERS, TRUSS MEMBERS AND FINISHED FRAMING MATERIAL, unless otherwise specified, shall be No. 1 Common of Southern Yellow Pine, Douglas Fir, Native White Pine, Native Yellow Pine, Spruce or Larch.

5:10 STUDS, CRIPPLES, AND OTHER FRAMING MATERIAL, unless otherwise specified, shall be No. 2 Common of any of the following species:

Coast Type Red Cypress, Southern Yellow Pine, Ponderosa Pine, Port Orford Cedar, Douglas Fir, Larch, or No. 1 Heart Common Redwood.

5:11 EXPOSED STRUCTURAL MULLIONS AND OTHER EXPOSED FRAMING MATERIAL used in connection with door and window openings shall be any of the following grades and species:

"C" Finish	Douglas Fir
"C" Finish	Western Red Cedar
"C" Finish	Sitka Spruce
"C" Finish	Southern Yellow Pine
"D" Finish	Coast Type Red Cypress
"B" Finish	Redwood
No. 1 Common	Ponderosa Pine
No. 1 Common	Idaho White Pine
Dense Select Merchantable	Dimension Port Orford Cedar

5:12 ROOF SHEATHING shall be three-quarter inch (3/4") thick Douglas Fir, Native White or Yellow Pine, or Larch.

5:13 EXPOSED SHEATHING except where otherwise noted, shall be "C" Finish Douglas Fir or Southern Yellow Pine, No. 2 Boards of Idaho White Pine, Native White Pine, or Ponderosa Pine.

5:14 NON-EXPOSED SHEATHING, ROUGH BOARDING AND ALL GROUNDS, FURRING STRIPS, AND SHINGLE STRIPS shall be No. 2 Boards of Douglas Fir, Port Orford Cedar, Sitka Spruce, Western Red Cedar; No. 3 Boards of Southern Yellow Pine, Coast Type Red Cypress; or No. 4 Boards of White Fir, Idaho White Pine, Ponderosa Pine, or Larch.

5:15 VERTICAL BOARDS AND BATTENS shall be Clear All Heart Redwood or Clear Native White or Yellow Pine.

5:16 EXTERIOR TRIM shall be any of the following:

"C" Finish	E.G. Southern Yellow Pine
No. 1 Boards	Ponderosa Pine
No. 1 Boards	Idaho or Native White Pine
No. 1 Boards	Sugar Pine
"B" Finish	Redwood
"C" Finish	Western Red Cedar
"C" Finish	Sitka Spruce
"C" Finish	V.G. Douglas Fir
Dense Select Merchantable	Port Orford Cedar

5:17 MAILING BLOCKS AND OTHER WOOD EMBEDDED IN MASONRY shall be No. 1 Dimension Red Cypress, No. 1 Common Douglas Fir, or Dense Select Merchantable (one-hundred percent (100%) Heartwood) Port Orford Cedar.

5:18 ALL PLYWOOD shall be Douglas Fir Plywood conforming to United States Department of Commerce Commercial Standard CS-45-38, and all exposed plywood faces shall be "Sound" as defined under the grading rules of the Douglas Fir Plywood Association.

In addition, all plywood exposed to weather or moisture, or designated water-proof on the drawings, including panels in toilet and shower rooms and flush or recessed panels in exterior doors, etc., shall be of Exterior Grade Douglas Fir Plywood made by the synthetic resin-bonded process. All such plywood shall be stamped with the appropriate grade mark symbols of the Douglas Fir Plywood Association.

5:19 FLOORING(finish), shall be "C" Grade V.G. Douglas Fir or No. 1 E.G. Southern Yellow Pine., 1"x4" T.&G.

5:20 INTERIOR TRIM AND FINISH not otherwise specified or shown shall be any of the following:

"C" Finish	Southern Yellow Pine
No. 1 Boards	Ponderosa Pine
No. 1 Boards	Idaho White Pine
No. 1 Boards	Sugar Pine
No. 1 Boards	Coast Type Red Cypress
"B" Finish	Redwood
"C" Finish	Western Red Cedar
"C" Finish	Sitka Spruce
"C" Finish	Douglas Fir
Dense Select Merchantable	Port Orford Cedar

5:21 MOULDED TRIM shall be standard Moulding Grade of any of the species mentioned under Interior Trim and Finish.

MILLWORK

5:22 WINDOW AND DOOR FRAMES shall be No. 2 Frames of Ponderosa Pine, Sugar Pine, or Idaho White Pine, or Douglas Fir, "B and Better" V.G. Finish for the Sills and "C" Finish for other parts.

5:23 ALL SASH AND WINDOWS will be Truscon "Dura-War" Horizontal Pivoted type

MATERIAL, CONSTRUCTION AND TREATMENT: All frame, ventilator and muntin sections shall be made from clear Ponderosa white pine, not less than one and three-quarters inches (1-3/4") thick, kiln dried to a moisture content from seven to ten percent (7 to 10%), and shall be preservative treated with a combination toxic and water repellant at the factory to minimum standards of the N.D.M.A. Outside frame member where it contacts adjoining construction shall not be less than one and one-half inches (1-1/2") deep. Where window unit is added to the top of a standard size unit, provide inside and outside

cover member of Clear Ponderosa Pine. Mastic cement for bedding this joint shall be furnished by window contractor. All joints shall be mortised and tenoned and held together by not less than two (2) steel pins. Flat contact weathering shall be provided on all four sides of the ventilator. Ventilators shall be pivoted approximately two inches (2") above centerline. Pivots shall be three eighths inch (3/8") diameter removable steel pins bearing in steel bushings inserted in frame. Bushings and pins to be rust-proofed. Windows shall be designed for inside glazing. (Windows will be furnished for outside putty glazing when so specified.)

UNATTACHED HARDWARE: All ventilators to have rust-proofed steel spring latches (one per ventilator) to be attached to head of ventilator and operated by cotton cord. One rust-proofed steel cleat to be furnished per ventilator.

VERTICAL MULLIONS: Standard vertical mullions shall be furnished where two or more windows are used in same openings. Mullion will include 2x4 or 2x6 of No. 1 Structural Fir Surfaced, or equal, as required for various heights, and also exterior facia mould and two (2) inside jamb stops. (Vertical 2x4 or 2x6 may be omitted from window contract where desirable, but exterior facia mould and two (2) inside jamb stops will be supplied as an extra.) Horizontal mullion should always be specified elsewhere.

ERECTION: Erection fittings such as window and mullion anchors will be furnished with windows as required. Windows shall be set plumb and true in openings. The joint between window frame and masonry or adjoining construction shall be carefully caulked by Contractor. All hardware shall be attached and ventilators adjusted before glazing.

GLASS AND GLAZING: (Glass, putty and glazing points by Contractor.) All windows shall be interior glazed. All glass shall be bed-puttied and then face-puttied to a neat true line. Putty shall be made with a liquid containing a minimum of eighty percent (80%) linseed oil and held in place with zinc coated glazing points.

5:24 DRAINBOARD AND COUNTER TOPS shall be constructed of one and one-eighth inch (1-1/8") thick material of Clear Sugar Pine, "B and Better" Ponderosa Pine, or Supreme Idaho White Pine.

5:25 SPLASHBACKS shall be constructed of three-quarter inch (3/4") thick material of the same species used for Drainboard and Counter Tops.

5:26 EXTERIOR DOORS AND INTERIOR DOORS shall be No. 2 Doors of E.G. Southern Yellow Pine, Ponderosa Pine, or White Pine, or Grade "B" doors of Douglas Fir. Doors shall be as detailed or scheduled, using stock doors or members wherever possible. Built-up doors shall match wood walls in which they occur. They shall be made at the mill in presses.

5:27 ALL OTHER MILLWORK shall be constructed of Douglas Fir, Ponderosa Pine, or Idaho White Pine in shop grades suitable for the finish they are to receive.

MISCELLANEOUS MATERIALS

5:28 WATERPROOF SHEATHING PAPER shall conform to Federal Specification UU-P-536, Grade "A".

5:29 RIGID INSULATION BOARD shall be unfinished "Insulite Building Board" of size and thickness indicated on drawings.

5:30 INSULATING SHEATHING shall be "Celotex Granule Surfaced Siding" of size indicated on drawings.

5:31 TEMPERED HARD BOARD shall be "Masonite Tempered Presdwood". It shall be of thickness and sizes indicated on drawings.

5:32 WHITE CAULKING COMPOUND shall be waterproof Pabco "Hydroseal".

5:33 BLACKBOARDS - All blackboards shall be of Slateaplate, manufactured by the Beckly-Cordy Company, Chicago, Illinois, all to be one-quarter inch (1/4") thick and green surfaced. Lengths and heights to be as shown on drawings.

5:34 TACKBOARD - All tackboard will be one-quarter inch (1/4") cork board of heights and lengths as shown on plans.

FRAMING

5:35 SURFACED MATERIAL

In the preparation of drawings it has been assumed that all material will be surfaced four (4) sides and that finished dimensions will be in conformity with the use and size classification of the United States Department of Commerce, Bureau of Standards Simplified Practice Recommendations R-16-29. If the Contractor prefers, material surfaced one edge, or side and an edge, may be used, as required, where the material will be subsequently covered by finish material, and minor dimensions shall then be adjusted accordingly.

5:36 WORKMANSHIP, MINIMUM NAILING SCHEDULE

All framing shall be accurately cut, closely fitted, and rigidly secured. The following minimum nailing schedule using common nails shall govern the nailing of all framing:

Joists or rafters to sides of studs 8" or less	3 - 16d
For each additional 4" in depth	1 - 16d
Joists or rafters at all bearings-Toe nail each side	2 - 10d
Blocking between joists or rafters	
Toe nail each side, each end	2 - 10d
Toe nail each side to joist or rafter bearing	2 - 10d
Cross bridging between joists or rafters	
Toe nail each end	2 - 8d
Herring bone blocking	2 - 10d
Subfloor to bearing	2 - 8d
Sheathing at all bearings - 1"x6"	2 - 8d
1"x8"	3 - 8d
Plywood	8d @ 6"
Ribbons to studs 1" size	2 - 8d
2" size	2 - 16d
Double top plates -	
Lower plate to top of studs	2 - 20d
Upper plate to lower plate, staggered	12d @ 16"
Multiple Studs-Stagger for widths more than 4"	12d @ 12"
Corner studs and angles	12d @ 30"
Built-up beams, staggered	12d @ 12"
Double joists under partitions - At each block	2 - 20d
Bracing -	
1" to each bearing	3 - 8d
2" to each bearing	2 - 16d

Nailing of all other framing shall be consistent with the standard indicated in the above schedule, and not less than two (2) nails shall be used at each support or connection of any framing member or board.

5:37 NAIL PENETRATION AND SPACING

Nails shall not be driven closer together than one-half their length unless driven in bored holes, nor closer to the edge of the timber than one-fourth (1/4) their length. Holes for nails, when necessary to prevent splitting, shall be bored of diameters slightly smaller than the nails.

Nails shall be of such length that, when joining one timber to another, the penetration of the nail into the second or farther timber shall be not less than one-half the length of the nail.

5:38 JOISTS AND RAFTERS shall be of size and spacing, as shown, and run in the direction indicated on the drawings. All joists shall be placed with crown up. In all cases, lower edge shall be sound. Floor joists shall be doubled under all partitions parallel to floor joists. They shall be spiked together or separated by solid bridging not more than sixteen inches (16") o.c. to permit the passage of pipes.

All floor joists shall have a minimum bearing of two inches (2") unless supported on a let-in ribbon board of size not less than one inch by four inches (1" x 4"), lapped full width of adjoining studs and securely nailed thereto. Floor joists supported by beams shall bear on top of beam or on joist ledges to beam unless otherwise detailed. Under no circumstances shall joists be supported by toe nailing.

Cutting of wood beams or joists shall be limited to cuts and bored holes not deeper than one-fifth (1/5) of the beam depth from top, and located not farther from the end than three (3) times the beam depth.

Cuts in excess of the above will not be permitted unless special provisions are made for strengthening the member.

5:39 BRIDGING

Solid bridging shall be placed between joists at all points of support, except where resting on ribbons, and at all points where flooring is not continued.

Cross-bridging not less than two inches by three inches (2"x3") nominal section shall be so framed between all floor joists with spans exceeding eight feet (8') that the distance between rows of bridging will not exceed eight feet (8'); cross-bridging shall be placed between ceiling or roof joists where shown on drawings.

5:40 STUDS (except where otherwise shown) shall be two inches by four inches (2"x4") spaced sixteen inches (16") on centers. Cuts in excess of one-third (1/3) the depth of studs will not be permitted unless special provisions are made for strengthening the studs.

5:41 BRACING

All walls not to be diagonally sheathed or covered with plywood shall be adequately angle-braced to resist lateral stresses. Where locations of braces are not indicated, strut bracing shall be cut in so that it makes an angle as near forty-five degrees (45°) with the horizontal plane as possible. Ends of braces shall be at least one (1) stud space from a corner and a kick block at least one (1) full stud space in length shall be provided, or if this is impossible, the brace shall be dapped into the plate at least one foot (1'-0") from the end of the piece. Where the angle of cut-in bracing is greater than forty degrees (40°) from horizontal, thrust blocks one inch (1") thick, same width as studs, and at least twelve inches (12") long, shall be nailed to stud faces at each section of bracing.

5:42 TOP PLATES shall be doubled and lapped not less than two feet (2'-0"). Where joists, rafters, or trusses are not supported directly over studs, joints in plates shall be centered over studs.

All plates having more than half of their width cut to permit the passage of pipes or ducts shall have metal ties not less than three-sixteenths inch (3/16") thick and not less than one and one-half inches (1½") wide framed across the cut and extending at least twelve inches (12") beyond the cut on each side. These metal ties shall be fastened with not less than four (4) sixteen penny (16d) nails on each side of the cut plate. The metal shall be punched to receive the nails.

5:43 HEADERS

Unless otherwise indicated on drawings, all openings four feet (4') wide or less, shall be provided with double two inch by four inch (2"x4") headers placed on edge, or four inch by four inch (4"x4") solid headers, and all openings over four feet (4') wide shall be trussed or shall have headers designed to carry the actual load.

5:44 FIRE STOPPING

All studded partitions and walls shall have one or more continuous rows of fire-stop bridging of the same size as the studs framed between the studs in such a manner that there will be no hollow concealed space more than seven feet (7') high in the partition or wall.

5:45 BACKING shall be provided whenever needed to permit adequate nailing of plywood, insulating board, and all interior or exterior finish or trim.

For plywood roof sheathing, provide backing for bearing along all edges which span more than sixteen inches (16").

Adequate backing and/or framing shall be provided for the support of all built-in or wall-hung fixtures.

5:46 INSULATING SHEATHING OR SIDING shall be applied vertically with length parallel with framing members. Boards shall be of sufficient length to span completely between sills and plates or other structural nailing members. Where intermediate end joints are necessary, use two inch by four inch (2"x4") nailing headers between framing members as nailing base. All joints shall center over framing. Bring boards in close contact with frame members.

Apply boards with two inch (2") galvanized nails with three-eighths inch (3/8") or one-half inch (1/2") heads. Space nails six inches (6") apart on intermediate framing members and three inches (3") apart, three-eighths inch (3/8") in from edge at all edges. Nail first to intermediate framing members and then nail at edges. Drive nails until the heads are flush with the surface.

5:46 WOOD SHEATHING AND/OR SUB-FLOORING shall cover all areas as indicated on drawings and, unless otherwise shown, shall be one inch by eight inches (1"x8").

5:47 ROOF TRUSSES shall be made of dressed lumber. The lumber shall be selected pieces, straight and sound, free from large or loose knots and checks.

EXTERIOR FINISH AND TRIM

5:48 EXTERIOR FINISH AND TRIM shall be of pattern indicated on drawings.

5:49 BOARDS AND BATTENS to be left unpainted shall be nailed with six penny (6d) galvanized box nails. All other boards and battens shall be nailed with six penny (6d) cement coated box nails. Boards shall be nailed on one (1) side only at first, and a sufficient period of time allowed to elapse to permit the lumber to adjust its moisture content to that of the air before nailing the other side and applying the battens.

INTERIOR FINISH AND TRIM

5:50 WORKMANSHIP

All work shall be executed with accuracy and care. It shall be sanded smooth and left in proper condition to receive paint or stain. All wood work to be stained shall be free from marks and stains.

5:51 PLYWOOD AND RIGID INSULATION BOARD shall be applied to the walls and ceiling where indicated. Sheets shall be of size indicated on drawings. Full-sized sheets shall be used whenever possible and no odd-sized or scrap material shall be substituted. Joints shall be treated as indicated on drawings.

Insulation board shall be nailed on four inch (4") centers along edges and on eight inch (8") centers at intermediate supports using four penny (4d) galvanized box nails. Plywood shall be nailed on six inch (6") centers along edges and on twelve inch (12") centers at intermediate supports using No. 12 gauge steel wire brads one and one-half inches (1½") long which shall be set for putty stopping. In all cases nail first to intermediate supports and then around edges.

Joints in plywood shower stalls shall be set in white caulking compound as specified under Miscellaneous Materials in this section.

5:52 TEMPERED HARD BOARD

For all uses, apply Tempered Hard Board with three penny (3d) finishing nails. Nail first at intermediate points on twelve inch (12") centers and then around outside edges on six inch (6") centers.

5:53 TRIM shall be of size and pattern shown, accurately cut, and firmly nailed with suitable finish nails. Nails shall be set for putty stopping.

5:54 FINISHED FLOOR

Finished flooring shall be tightly driven and securely blind-nailed at each bearing and three inches (3") from all ends with eight penny (8d) common nails. All end joints shall be staggered not less than sixteen inches (16") apart in any three (3) adjacent boards.

ROUGH HARDWARE

5:55 Furnish all anchors, ties, bolts, column caps, etc., required to complete the work for installation by the various trades as their work progresses.

CLEANING

5:56 At the conclusion of the work all ground areas under floors shall be left clean and free of all pieces of wood, shavings, or other debris.

FINISH HARDWARE

5:57 INTENTION

All items of Builder's Hardware shall be furnished and installed as indicated by the list given in Section 5:59. It is not intended that this list be complete for all such items. In case of errors or omissions in this list, all necessary items needed for complete operation of doors, windows, etc., shall be furnished by the Contractor of a quality equal to listed items.

5:58 APPROVAL, SAMPLES

Within ten (10) days after the "Notice of Award" of the "General Contract", the Contractor shall submit in triplicate a complete listing of proposed items of hardware for approval by the Contracting Officer.

The articles listed in Section 5:59 by the catalogue numbers of a specific manufacturer are intended to be indicative of style and quality only, and equivalent items by other manufacturers will be considered.

5:59 QUALITY OF ITEMS

Butts,	Stanley 804K 4"x4"
Door Check	Corbin 3
Push Plate	Corbin 02325½ 12"x3"
Pull	Corbin 1148½
Dead Lock	Corbin 6011
Chain Bolt	Stanley 1055 K 6"
Cane Bolts	Stanley 1010 12" with concrete strike
Latch Set	Corbin 045x1419½ PW&R
Night Latch	Corbin 356½
Butts, 1 pr.	Stanley 242 P 3½"x3½"
Door Spring, 12"	Chicago 281½
Lock Set	Corbin 01839-3/4x1419½ PW&R
Panic Bolt	Corbin 3552

In the event that any of the proposed items are of different manufacture than those specified, a comparative list shall also be furnished, showing each such item as originally specified followed by the number, manufacturer's name, and catalogue page number of the proposed substitute. If any proposed substitute is not a standard catalogued item, a descriptive cut or sample of the article shall be furnished. Any additional samples which the Contracting Officer may require shall also be furnished.

SECTION SIX

SHEET METAL AND ROOFING

SECTION SIX

SHEET METAL AND ROOFING

6:00 INTENTION

This specification shall include everything necessary and reasonably incidental (miscellaneous flashings, etc.) to the completion of the Sheet Metal and Roofing as shown on the drawings, whether specifically mentioned or not.

Any work not specifically detailed on the drawings shall be equal in quality to specifically detailed work.

6:01 SUBSTITUTIONS

Substitution may be made for any manufacturer's product specified, provided it is listed and submitted in triplicate for approval within ten (10) days after the "Notice to Proceed" and provided it is subsequently proven to the satisfaction of the Contracting Officer to be equal in quality to the item called for. No substitutions will be allowed after this date.

MATERIALS

6:02 METAL SHEETS

Unless otherwise shown or specified, all sheet metal shall be twenty-two (22) gauge, black iron.

6:03 FLASHING

All flashing, counter-flashing, valleys, etc. shall be mineral surfaced roll roofing as before specified. Valleys to be doubled and mopped together with hot asphalt.

Flashings and counter-flashings shall be bent with all angles straight, sharp, and true. Flashings at intersections of roofs with walls or other vertical surfaces shall be not less than six inches (6") high and extend out on roof not less than four inches (4"). They shall be properly intergrated with the roofing material, and the joints between individual flashings shall be lapped not less than two inches (2") in the direction of flow.

Unless otherwise detailed on drawings, all vent stacks and flues extending through the roof shall be flashed and counter-flashed. Flashing shall be carried at least six inches (6") above the roof. On composition roofing flashing shall be placed between roofing sheets. Cap flashing shall lap flashing at least three inches (3") and vent stacks or flues two inches (2").

VENTILATORS

6:04 ROOF VENTILATORS shall be Globe Type of sizes indicated on drawings having manually operated dampers. They shall be constructed of twenty-four (24) gauge metal. Shop drawings of ventilator shall be submitted for approval by the Contracting Officer before installation.

COMPOSITION ROOFING

6:05 PREPARATION

Roof decks shall be clean, dry, smooth, and solidly built. Cover knot holes with sheet metal.

6:06 MINERAL SURFACED ROLL ROOFING

APPLICATION

Cover roof surface with a layer of 70# Mineral Surfaced Roll Roofing lapped two inches (2"), laid across slope of roof. Lap shall be embedded in Lap Cement.

Nail along laps every two and one-half inches (2½") with seven-eighths inch (7/8") large-headed galvanized roofing nails. Embed all roof edges in Lap Cement and nail.

SECTION SEVEN

FLOOR FINISHING AND COVERING

7:00	Intention
7:01	Substitutions
7:02 - 7:04	Materials
7:05	Floor Finishes
7:06	Cleaning and Finishing Floor Surfaces

SECTION SEVEN

FLOOR FINISHING AND COVERING

7:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the "Floor Finishing and Covering", whether specifically mentioned or not.

7:01 SUBSTITUTIONS

Materials shall conform to the specifications listed below. Any additional materials required to finish the work as specified or shown on the drawings shall be furnished, and shall be equal in quality to these. Substitution may be made for any manufacturer's product specified, provided it is listed and submitted in triplicate for approval within ten (10) days after the "Notice to Proceed", and provided it is subsequently proven to the satisfaction of the Contracting Officer to be equal in quality to the item specified. No substitutions will be permitted after this date.

MATERIALS

7:02 PIGMENT STAIN: Color in oil mixed with boiled linseed oil and turpentine. Vehicle shall consist of one (1) part boiled linseed oil and four (4) parts turpentine.

7:03 SEALER (for wood floors): "Floor Seal" M-34, Pacific Paint and Varnish Company, Berkeley, California.

7:04 MACHINE SAND ALL WOOD FLOORS which are to be finished. Avoid sanding marks near walls.

7:05 FLOOR FINISHES

STAIN AND SEALER FOR WOOD FLOORS

a. One (1) coat of pigment stain.
b. Two (2) coats of sealer well brushed out. Allow to dry thoroughly between coats.

Samples of stain shall be submitted on pieces of flooring for approval. These shall be made up in duplicate and properly identified so that the set submitted may be retained in the office.

7:06 CLEANING AND FINISHING FLOOR SURFACES

All floor surfaces shall be left in a clean and perfect condition after laying.

SECTION EIGHT

GLASS AND GLAZING

SECTION EIGHT

GLASS AND GLAZING

8:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the "Glass and Glazing" as shown on the drawings, whether specifically mentioned or not.

MATERIALS

8:01 Symbols after materials are Federal Specification Symbols as listed in the Federal Standard Stock Catalogue.

CLEAR GLASS	"B" Quality	DD-G-451 Type B

All lights with least dimension not over twenty-four inches (24") shall be single strength. All glass larger than this shall be double strength.

OBSCURE GLASS	DD-G-451
PUTTY	TT-P-791 Grades A & B

Whiting putty shall have ten percent (10%) white lead paste added before using.

8:02 PREPARATION

All sash, doors, or frames to be glazed shall have been primed before glazing, as specified in Sections on "Painting".

8:03 GLAZING

Bed glass in putty, fasten with zinc glazing points and back putty. All puttying shall be neatly done and run in straight lines.

Where wood glazing beads are used, glass shall be bedded in putty.

At the time of acceptance all broken glass shall have been replaced by the Contractor.

Cleaning of glass is provided for under "Painting".

SECTION NINE

PAINTING

9:00	Intention
9:01	Affidavits, Certificates, Substitutions
9:02	Delivery
9:03	Color Schedules and Samples
9:04	Materials
9:05	Preparation of Surfaces
9:06	Protection
9:07	Application
9:08	Priming
9:09 - 9:15	Exterior Finishes
9:16 - 9:20	Interior Finishes
9:21	Miscellaneous Painting
9:22	Cleaning

SECTION NINE

PAINTING

9:00 INTENTION

This specification shall include everything necessary and reasonably incidental to the completion of the "Painting", whether specifically mentioned or not.

9:01 AFFIDAVITS, CERTIFICATES, SUBSTITUTIONS

Affidavits and/or test and inspection certificates will be required from manufacturers of all materials or items specified to conform to Federal Specifications, before delivery to the site. This requirement may be waived only by the written authorization of the Contracting Officer.

Substitution may be made for any manufacturer's product specified, provided it is proved to the satisfaction of the Contracting Officer to be equal in quality to the item called for.

All paint materials to be used on the project must be approved by the Contracting Officer before delivery to the site.

9:02 DELIVERY

All painting materials shall be delivered to the site in the manufacturer's original sealed container with labels intact and seals unbroken, and shall be kept in a locked room provided by the Contractor. Open containers of stains, varnishes, or driers, shall be kept in a well-ventilated room or shed.

9:03 COLOR SCHEDULES AND SAMPLES

Requests for Color Schedules should be made at least ten (10) days before the start of the painting to avoid delay in the work.

Color Schedules will be furnished by the Contracting Officer, for all work to be painted, but not until all paint materials to be used on the project have been approved.

Color samples of all paints shall be prepared on one-quarter inch (1/4") plywood, four inches by nine inches (4"x9"), according to the color schedules for the approval of the Contracting Officer, who will have a representative present when color samples are mixed.

Samples of stains or natural finishes shall be prepared on the same materials to be used in the building, and delivered to the office of the Contracting Officer for approval. Stains for plywood shall

be one-quarter inch (1/4") Douglas Fir Plywood of uniform size, four inches by nine inches (4"x9").

Stain and paint samples shall be properly identified so that the submitted set may be retained by the Contracting Officer.

Samples must be approved before starting painting.

9:04 MATERIALS

Note: Mineral spirits shall not be used in Lead and Oil Paint.

Materials shall conform to the specifications listed below. Any additional materials required to finish the work as specified or shown on the drawings shall be furnished and shall be equal in quality to these.

Symbols after materials are Federal Specification Symbols as listed in the Federal Standard Stock Catalogue.

PAINT MATERIALS

Oil, boiled linseed	JJJ-O-331
Oil, raw linseed	JJJ-O-336
Turpentine for Paint - Type I	LLL-T-791a
Thinner, mineral spirits	TT-T-291
Drier, paint, liquid - Type I or II	TT-D-651
Colors, ground in oil (where applicable)	TT - group
White lead; dry and in oil - Type A, B, or C	TT-W-251a

EXTERIOR PAINTS

Controlled Penetration Primer	Pure Prepared Undercoater Pacific Paint & Varnish Co., Berkeley, Calif.
Trim Paint	Cabot's Gloss Collopakes, Gunn, Carle & Co., distributors, San Francisco

METAL PRIMERS

Synthetic Red Lead	Synthex Red Lead Paint Pacific Paint & Varnish Co.
Cement Paint (Oil Type)	Cemolike Concrete & Stucco Paint - Pacific Paint & Varnish Co.
Galvanized Iron Primer (Gray Ready-mixed)	No. 4080 Chromate Primer W. P. Fuller Company

INTERIOR PAINTS AND PRIMERS

Eggshell Enamel	Satin Interior Finish Pacific Paint & Varnish Co.
Synthetic Flat Paint	Syn-kal Flat Paint No. 2533 Pacific Paint & Varnish Co.
Pigmented Sealer	Synthex Pigmented Sealer Pacific Paint & Varnish Co.
Interior Texture Paint	Cewesco Powder Paint (Sanded) Wesco Waterpaints Inc.
Texture Paint Primer	Wesco Resin Sealer Wesco Waterpaints Inc.

VARNISHES AND PENETRATING OIL FINISHES

Flat Varnish	Dull Finish Varnish Pacific Paint & Varnish Co.
Wood Sealer	Synthex Flor-seal M-34 Pacific Paint & Varnish Co.

9:05 PREPARATION OF SURFACES

All surfaces to be painted or stained shall be in a proper condition to receive such finish. They shall be clean, and any abraided shop coats shall be spot painted.

WOOD SURFACES shall be sanded smooth, and all sap streaks and knots shall be shellacked. After application of priming coat, all nail holes, cracks, etc., shall be puttied and sanded smooth.

GALVANIZED IRON surfaces shall be washed with a dilute solution of acetic acid (vinegar), or a solution of four (4) ounces copper sulphate to a gallon of water. Allow to dry, then rinse with clean water.

9:06 PROTECTION

During painting operations, all adjacent surfaces, fixtures and materials of all kinds, shall be protected with drop cloths or by other methods. All cloths, waste, etc., which have been used in the application of inflammable paint materials shall be burned or placed in covered metal containers at the end of eac h day's work.

9:07 APPLICATION

Painting shall not be done when the surface is wet, either from rain, dew, or any other cause, or when the temperature is below forty degrees (40°), except surfaces to receive water type cement paint which shall be clean and damp when paint is applied. All paint shall be well brushed on, except as hereinafter provided, and shall be evenly spread so as to avoid drops, runs or sagging of paint. The finishing coat shall be free from noticeable laps and brush marks.

9:08 PRIMING

Unless otherwise specified, paints made from white lead paste and oil shall be mixed at least twenty-four (24) hours before using, and kept in a covered container. They shall be thoroughly stirred and strained before application. Drier, if used, shall be added just before applying paint.

ALL SASH AND DOORS shall be primed upon delivery to the site.

ALL EXTERIOR MILLWORK, FRAMES, ETC., shall be primed on backs and on all exposed faces upon delivery to the site.

PLYWOOD OR TEMPERED HARDBOARD FOR SHOWER STALLS shall be primed on backs and edges before placing.

EXTERIOR FINISHES

9:09 EXTERIOR WOOD

LEAD AND OIL FINISH (shall be mixed on the job)

a. Priming Coat

100 lb. white lead in oil (heavy paste)
4 gallons boiled linseed oil
2 gallons turpentine

b. Second Coat

100 lb. white lead in oil (heavy paste)
1½ gallons boiled linseed oil
1½ gallons turpentine

c. Third Coat

100 lb. white lead in oil (heavy paste)
3 gallons boiled linseed oil
1/4 gallon turpentine

9:10 TWO COAT LEAD AND OIL FINISH

a. Priming Coat

Controlled Penetration Primer

b. Finish Coat

100 lb. white lead in oil (heavy paste)
3 gallons boiled linseed oil
1/4 gallon turpentine

9:11 RED IRON HYDROXIDE AND IRON OXIDE FINISH

a. Priming Coat

Controlled Penetration Primer

b. Finish Coat

Red Iron Hydroxide and Iron Oxide

9:12 OIL STAIN FINISH

One (1) coat of pigment color in oil and white lead paste mixed with two (2) parts linseed oil to one (1) part turpentine.

9:13 LEAD AND OIL TRIM FINISH

a. Priming Coat

1 gallon Gloss Collopakes
1 quart turpentine (or 50/50 mixture of turpentine)

b. Second Coat

Gloss Collopakes from container or thinned slightly with linseed oil to improve brushing quality.

EXTERIOR METAL GALVANIZED

9:14 LEAD AND OIL FINISH

a. Priming Coat

One (1) coat of Galvanized Iron Primer applied according to manufacturer's directions.

b. Second and Third Coats (See Paragraph 9:09)

Lead and Oil Paint

EXTERIOR METAL - Black Iron or Steel

9:15 LEAD AND OIL PAINT

a. Priming Coat

One (1) coat of red-lead brushed on.

b. Second and Third Coats (See Paragraph 9:09)

Lead and Oil Paint

INTERIOR FINISHES

9:16 ALL INTERIOR WOOD, metal work, plumbing pipes, electrical conduits and unfinished portions of plumbing fixtures, not otherwise specified, shall be painted two (2) coats of lead and oil paint of color selected by the Contracting Officer's Representative, in addition to a priming coat.

INTERIOR WOOD

9:17 TINTED VARNISH FINISH (Flat)

a. First Coat

Flat Varnish six (6) parts
Eggshell Enamel one (1) part (color as selected)
Turpentine one (1) part

b. Finish Coat

Flat Varnish

9:18 STAIN

One (1) coat of oil stain. Vehicle shall consist of two (2) parts linseed oil to one (1) part turpentine, and approved pigment color.

INTERIOR METAL

9:19 LEAD AND OIL FINISH (Galvanized Metal)

a. Priming Coat

One (1) coat of Galvanized Iron Primer

b. Finish Coat (See Paragraph 9:09)

One (1) coat lead and oil paint

9:20 LEAD AND OIL FINISH (Black Iron or Steel)

a. Priming Coat

One (1) coat Synthetic Red Lead

b. Finish Coat (See Paragraph 9:09)

Two (2) coats of lead and oil paint

9:21 MISCELLANEOUS PAINTING

Paint top and bottom edges of all doors, after fitting, with one (1) coat of lead and oil paint. Paint edges of door stiles with same treatment as face of door.

Prime mortices for locks before setting hardware in exterior doors.

9:22 CLEANING

At the completion of this work, all staging, scaffolding, containers, debris, etc., shall be removed from the premises. All painting shall be left in a perfect and clean condition.

All glass, mirrors, plumbing fixtures and fixture trim, (faucets, fixture traps, tubing supplies, etc.) shall be scraped with razor blades to remove paint spots, etc., and thoroughly washed. Also remove all paint spots from wood or concrete floors.

SECTION TEN

HEATING

SECTION TEN

HEATING

10:01 SCOPE

a. All heating equipment and accessories shown or required within the building necessary to provide a complete heating system.

b. Related items necessary to complete the system, either specified or shown on the plans, or that may be required to complete this contract unless specifically excepted.

c. Equipment and material throughout shall conform to the latest ruling of the War Production Board. No additional priority assistance will be given the Contractor to obtain critical material.

10:02 GENERAL REQUIREMENTS

a. For work under this division, the Contractor's particular attention is directed to the General Conditions.

b. Refer to architectural interior details, floor plans, elevation and structural drawings.

c. Layout of piping, equipment, and accessories under this division is generally diagrammatic, unless specifically dimensional. Check project drawings and details before installing work, for interferences as governed by structural, architectural, or other obstructions. The right is reserved to make any reasonable changes in location of such piping systems, equipment, and accessories prior to roughing-in, without involving additional expense to the Government. Should any work installed under this division interfere with the architectural design, as shown on the drawings, the Contractor shall at his own expense make such changes in his work as directed by the Contracting Officer's Representative, to permit the architectural design to be followed.

10:03 DESCRIPTION OF HEATING SYSTEM

a. The building will be heated from two (2) low pressure steam boilers installed in the boiler plant.

b. Heating will be by means of tubular radiators located in rooms to be heated.

c. Steam and return mains will be located in crawl space below first floor.

d. All additional excavation necessary to install piping not shown on the plans or specified shall be done under this division of the specification. Earth shall be kept at least one foot (1'-0") from all pipe and insulation.

10:04 MATERIAL AND EQUIPMENT

a. Material and equipment shall conform to applicable Federal Specification, American Society of Testing Materials, or American Standards Association as standards of quality or type.

Material and Service	Kind	Fed. Specs. or other Designation
b. Pipe (1) Entire System	Steel-Standard Weight-Black	WW-P-403a Types I and II
c. Fittings-Screwed Ends (1) Entire System	Black Cast Iron Standard Weight	WW-P-501 Type A, Class I
d. Fittings-Flanged Ends (1) Where Required	Black Cast Iron Standard Weight	Plain or Raised Face, Dimensioned and Drilled to Conform to A.S.A. Standards
e. Unions (Screwed Ends) (1) Where Required	Malleable or Cast Iron - Black - Standard Weight	WW-V-531 Type A.
f. Unions (Flanged Ends) (1) Where Required	Cast Iron-Standard Weight-Black, Plain or Raised Face	
g. Insulation (1) Steam Supply Only. Piping throughout below First Floor and in Boiler Room	Four (4) Ply Air Cell not less than Standard Thickness, with Pasted Jacket	Fed. Specs. where applicable.
(2) Boilers and Breeching	Air Cell Blocks wired on, finished with 1/2" coat of Asbestos Cement trowelled smooth. Provide 1" Air Space around breeching	Fed. Specs. where applicable.

g. Insulation (cont'd.)

Material and Service	Kind	Fed. Specs. or other Designation
(3) Fittings on Covered Lines	Asbestos Cement same Thickness as Covering	HH-M-61

(4) Contractor has the option of substituting insulating material suitable for the service intended, provided such material has a conductivity not more than the insulation specified. Minus tolerances of not over 2% will be acceptable.

(5) Where steam or return piping is exposed to freezing temperatures or is installed in outside walls, an extra thickness of air cell covering shall be applied, and the entire covering shall be wrapped with hair felt securely wired.

(6) The entire heating return shall be uncovered except as noted in paragraph above.

h. Nipples shall be same material, composition and weights as the pipe to which connected.

i. Gaskets, where required, shall be one-sixteenths inch (1/16") thick, ring type.

j. Valves

(1) Stop valves shall be gate type. Valves throughout shall be of the iron body type wherever possible, using a minimum of critical material.

(2) The Contractor has the option of using either flanged or screwed valves.

(3) Check valves installed in conjunction with the boiler return trap shall conform to the manufacturer's recommendation.

k. Hangers

(1) All piping shall be firmly supported from building construction above by means of steel or iron hangers.

(2) Radiators in Girls and Boys Locker Room shall be suspended from the ceiling above by means of three-eighths inch (3/8") rods, equipped with necessary nuts and washers.

l. Escutcheons will not be required, but care must be taken to provide a neat hole through floors and walls, around the piping, with approximately one-quarter inch (1/4") clearance for movements of the pipe.

m. Radiators (cast iron) shall be of best quality gray iron and, except where otherwise noted, of the narrow tube hot water pattern with standard legs. Radiators supported on walls or from ceilings shall be of the legless tube pattern. Connections between sections shall be metal to metal with malleable iron nipples of either screw or slip type; each radiator to be tested at factory and made tight under hydrostatic pressure of eighty pounds (80 lbs.) per square inch gauge, certification for which shall be furnished the Government if requested. Radiators shall be thoroughly cleaned of core sand at the factory.

(1) Manufacturer's Standard catalog ratings will be acceptable for all radiators. Sections shall be one and three-quarters inches (1-3/4") in length.

(2) Ship radiators prime coated from factory, with loose wooden plugs or metal seals in threaded openings. All air vents shall be plugged. Return bushings shall be eccentric.

n. Radiator valves shall be installed on the steam supply to each radiator. Valves shall be the quick opening type with mushroom handles made of hardwood or composition.

o. Steam traps, for all drips, shall be of the float and thermostatic type cast iron body with bucket or float to operate the trap mechanism. Traps shall pass air and water without passing steam. Thermostatic elements shall be positive in action and free from noise under all operating conditions.

Thermostatic traps may be used for dripping branch steam mains under the stage.

p. Thermostatic traps shall be installed on the return end of all radiators. These traps shall have cast iron bodies and must comply in all respects with the War Production Board's Schedule VIII of Limitation Order L-42, pertaining to vapor and vacuum heating specialties. Any standard thermostatic radiator trap may be used if same can be obtained without additional priority assistance.

10:05 BOILER ROOM AND AUXILIARY EQUIPMENT

a. Two (2) boilers shall be installed where indicated on the plans.

(1) Boilers shall be horizontal cast iron sectional type, without jacket, each having a net I.B.R. rating as indicated on the plans of actual standing cast iron radiation. Radiation is based on 240 B.T.U. per square foot. Boilers to be hand fired with coal having 11,000 B.T.U. per pound, and must operate on the drafts available. Water line of boiler shall not exceed five feet (5'-0") above the floor.

(2) Grates shall be of the shaking and dumping type suitable in all respects for the coal used on this project.

(3) Breeching shall be number twenty (20) gauge black steel. Provide damper, check draft and locking device for each boiler. Provide opening for flue from hot water heater.

(4) A pressure type damper regulator shall be installed on each boiler complete with pulleys, chains, weights, damper arms, etc. Dampers shall operate the drafts to maintain an even firing rate.

(5) Boilers must fit the space allotted and shall be installed and piped in accordance with all local and national codes that may apply.

(6) If boilers during normal operation show wide or abnormal fluctuations in the water line, or develop other serious defects, boilers must be removed and satisfactory boilers fulfilling all requirements of the specification shall be installed without expense to the Government.

(7) Provide one (1) complete set of firing tools, including slice bar, hoe, shovel, and flue brush.

(8) Install a compound pressure and vacuum gauge on each boiler graduated 0-30 pounds pressure and 0 to 30 inches of vacuum. Install a combination cast iron water column with gauge glass, drain-cocks and gauge-cocks on each boiler. Water column may be integral with the boiler or not.

(9) Install safety valve on each boiler set to open at fifteen pounds (15 lbs.) pressure.

(10) Provide blow-off cocks or valves at low points of boilers to allow for blow down and drainage.

(11) Provide a three-quarter inch (3/4") valved water connection to each boiler. Valves shall be located at side near front.

b. Boiler Return and Vent Trap

(1) Install on heating return in the boiler room a boiler return and vent trap in strict accord with the manufacturer's recommendation.

(2) This equipment shall function with the pressure available and must be complete with check and gate valves, unions, etc.

(3) Properly support or anchor to eliminate vibration during operation.

(4) Equipment shall have a capacity of not less than radiation indicated on the plans plus condensation in mains. Sizes and location shall be such that heating returns will be kept dry during maximum operation of plant.

10:06 INSTALLATION

a. General Requirements. Install and connect the complete heating system and associated equipment as specified or shown to give proper and continuous service under all circumstances and conditions.

b. Joints shall be threaded clean cut and tapered. Remove all burrs and cuttings. Contractor may weld any piping he desires except boiler connections to headers.

c. Piping. Install to provide clearance for work of other trades. Use eccentric reducers for changes in steam pipe sizes except as drip points.

(1) Supply mains shall in general pitch in the direction of flow not less than one inch (1") in thirty feet (30'). If main pitch against the flow, pitch shall not be less than one inch (1") in fifteen feet (15'). Pitch supply and return radiator branches down toward mains not less than one inch (1") in ten feet (10'). To provide proper clearance between extreme ends of steam and boiler water line it will be necessary to raise and drip the main at certain intermediate points. Wherever supporting beams interfere with proper elevation of steam mains,

piping shall be installed between floor joists above beams, starting again close to underside of floor joists. Contractor shall carefully check elevations before installing mains.

(2) Return mains shall grade in the direction of flow not less than one inch (1") in twenty feet (20'), without lifts or pockets. In the boiler room the return main shall be not less than two feet, four inches (2'-4") above the water line of the boiler.

(3) Take connections for branches from mains to radiators from top or at angle of forty-five degrees (45°) and provide for expansion and contraction. Return connections may be taken into side of main if necessary.

(4) Provide drips at all points where supply main rises, ends of mains, and where necessary for proper drainage or to maintain quiet operation.

(5) In boiler room provide two inch (2") equalizer and drip from bottom of steam header to return main at rear of boiler.

(6) Make provision for expansion and contraction by means of swing joints, bends, or long offsets wherever required.

(7) Provide dirt pockets with caps at all drips.

d. Valves shall be installed where shown on the plans, specified or required.

e. Hangers shall be installed approximately twelve feet (12') apart and set to maintain proper grading and prevent vibration. Multiply or trapeze hangers may be used wherever practicable.

f. Radiators shall be set with legs firmly resting on floor, parallel with walls and kept clear of all equipment and other fixtures. Radiator connections in general shall be top and bottom opposite ends. Radiators shall in general be centered on window openings and must not project above the openings.

g. Drip traps shall have a cooling leg five feet (5') long on inlet side of trap. Dirt pockets shall be six inches (6") long.

h. Keep all ends of piping closed during construction, with pipe plugs or caps.

i. Insulate all steam supply pipe, fittings, boilers, and breeching. Cooling legs and the entire heating return system shall not be covered. Apply covering on piping with sections closely butted together. Extend canvas jacket over all joints and paste. Insulate fitting with two (2) coats, the second coat trowelled smooth. Flanges or unions shall not be covered.

Insulate exposed surface of boilers and breeching except doors, manhole, or handholes. Wire blocks on and seal joints with cement. Apply finishing coat and trowel smooth. One (1) part Portland cement may be mixed with two (2) parts insulating cement for finish coat.

10:07 TESTS AND ADJUSTMENTS

a. When system is complete, a steam pressure of ten pounds (10 lbs.) shall be generated throughout the entire system. A temporary connection shall be made between the steam and return main to allow pressure to enter the return system.

b. Boilers shall be fired and all condensate wasted to sewer until system is free of all oil and grease.

c. Boiler cleaning compound shall be put in the boilers, pressure generated and water discharged through a surface blow-off until boilers are clean and water line is steady.

d. All leaks developed during these tests must be fixed. Caulking of threads, sand holes, etc., will not be permitted. Defective material must be replaced.

e. When system is ready for operation, temporary connections shall be removed, outlets plugged, and steam shall be circulated to all radiators. Steam must circulate without noise and reasonably uniform throughout. Necessary adjustments shall be made to all equipment.

10:08 GUARANTEE

The entire system shall be guaranteed for one (1) year after final acceptance. Any defective material or equipment must be replaced without expense to the Government.

SECTION ELEVEN

PLUMBING

SECTION ELEVEN

PLUMBING

11:01 SCOPE

a. Plumbing work necessary to provide a complete installation and related items as specified or shown.

(1) Drainage system within buildings.

(2) Hot and cold water supply systems within buildings.

(3) Plumbing fixtures.

The plumbing system shall comply in all respects to the "Plumbing Manual" of the National Bureau of Standards, Department of Commerce Report BMS-66. General conditions shall govern where applicable. Equipment and material throughout shall conform to the latest rulings of the War Production Board. No additional priority assistance will be given the Contractor to obtain critical material.

11:02 GENERAL REQUIREMENTS

a. Layout of equipment, accessories and piping systems under this division is generally diagrammatic unless specifically dimensional. Check project drawings and details before installing work for interference as governed by structural or other conditions. The right is reserved to make any reasonable change in location of plumbing equipment and piping system prior to roughing-in without involving additional expense to the project. Should any work installed under this division interfere with the architectural design as shown on the drawings, the Contractor shall, at his own expense, make such changes in his work as directed to permit the architectural design to be followed. Provide plugged outlets in soil, waste, vent, cold and hot water lines, where indicated.

11:03 MATERIALS

a. Materials shall conform to applicable ASTM Standards or Federal Specifications as to standard of quality and type, and shall be new and of the best quality and grade.

b. DRAINAGE

SYSTEM	MATERIAL	FED. SPECS.
(1) Interior pipe and fitting and to 5'0" outside of building wall	Standard weight cast iron soil pipe and fittings (caulked joints)	WW-P-401-a where applicable
(2) Waste and vent piping 2" and smaller, above the ground	Cast iron threaded pipe-standard.	WW-P-356
	Steel pipe-standard	WW-P-403a
	Copper bearing steel-standard	WW-P-403a
(3) Waste fittings	Recessed drainage	WW-P-491
(4) Vent fittings	Malleable iron-standard	WW-P-521
	Black cast iron-standard	WW-P-501

c. WATER

(1) Piping	Galvanized steel-pipe-standard	WW-P-403a
	Galvanized malleable standard	WW-P-521
	Galvanized cast iron standard	WW-P-501
d. VALVES	2" and smaller	WW-V-766 BNT-1
	2½" and larger	WW-V-766 INT-1

Contractor shall use iron bodied valves and cocks wherever possible.

e. UNIONS

(1) On water system Malleable or cast iron

11:04 MISCELLANEOUS STANDARDS	MATERIAL	FED. SPECS.
a. Screwed fittings - American National taper pipe thread		GGG-P-351
b. Caulking lead		QQ-L-156
c. Packing - for hub and spigot or packing of hemp or oakum		HH-P-117
d. Ferrules - Solder nipples and bushings		WW-P-401 and commercial standards

11:04 (cont'd.)

MISCELLANEOUS STANDARDS	MATERIAL	FED. SPECS.
e. Setting compound	- For connecting fixtures to floor flanges	HH-E-536
f. Gaskets	- For connecting fixtures to floor flanges	HH-G-116
	Miscellaneous compressed asbestos sheets	HH-P-46
g. Floor Flanges		WW-P-541a
h. Sillcocks	- Brass 1/2" or 3/4" with hose end and wall flange. (optional use of anti-freeze sillcock, similar to Crane Co. #C43810, with inside shut-off valves omitted, will be acceptable)	
i. Traps	- Self-cleaning, same nominal size as the drain	WW-P-541a
j. Pipe Cleanouts	- Cast iron with screwed plugs	WW-P-401
k. Floor Drains		WW-P-541
l. Nipples	- Same material and composition as the pipe	
m. Escutcheons	- None required. Cut holes neatly around piping.	
n. Hangers	- Iron or steel from construction above - Brick piers optional	
o. Plumbing Fixtures		WW-P-541a
p. Black steel	- Painted for roof flashing	QQ-I-695
q. Terne Plate	- Painted for roof flashing	QQ-T-301
r. Insulation - for all hot and cold water piping	Standard thickness Wool Felt insulation. Pasted jackets. Wrap with hair felt covering, wired on, where exposed to freezing temperature or in outside walls.	Fed. Specs. where applicable.
s. Insulation-fittings	Asbestos cement same thickness as covering. Protected as above against freezing.	

11:05 EXCAVATION AND BACKFILL

a. Excavate trenches for underground pipes to required depths. Provide bell holes to insure uniform bearing. Where rock is encountered, excavate to a grade three inches (3") below the lowermost part of the pipe. Refill excavation below pipe grade with sand or gravel. Sheath, brace, pump or bail as necessary. After pipe lines have been tested and approved, backfill trenches

to grade with approved material, tamped or puddled compactly in place.

b. Elevation and location of outside sewers must be carefully checked before proceeding with inside drainage installation. Any necessary changes in direction must be made, at no extra cost, to allow for properly connecting inside drainage to sewers.

11:06 INSTALLATION

a. Provide labor, material and equipment required or necessary for a complete plumbing installation. Under each of the following headings is given a brief description of the work required.

11:07 BUILDING DRAINS

a. Building drains shall terminate approximately five feet (5'-0") outside of walls.

b. Building drain shall receive all connection from soil, waste and drainage within the buildings.

11:08 SOIL, WASTE, AND VENT LINES

a. Erect soil, waste, and vent stacks of sizes shown and extend above roof. Minimum size of all vents through the roof shall be three inches (3").

b. Branch soil, waste and vent connection shall be run to the soil stack, waste stack, building drain, or vent stacks as shown or required.

c. Vent from any fixture when connected to a vent line serving other fixtures shall be extended at least six inches (6") above the topmost plane of fixtures on which the vent is to be connected.

d. Horizontal drainage piping shall be installed in practical alignment within the building at a uniform grade of not less than one-eighth inch (1/8") fall per foot. Install piping without undue strains or stresses. No structural member shall be weakened or impaired by cutting, notching, or otherwise, unless provision is made for carrying the structural load and approved by the Contracting Officer's Representative.

e. Changes in direction in drainage piping shall be made by the appropriate use of cast iron forty-five degree (45°) wyes, long sweep sixth, eighth, or sixteenth bends, or by combinations of these fittings; or by use of equivalent threaded fittings or their combinations,

except that sanitary tees may be used on vertical stacks and short quarter bends may be used in drainage lines where the change in direction of flow is from the horizontal to the vertical. Tees and crosses may be used in vent pipes. No change in direction greater than ninety degrees (90°) shall be made in drainage pipes. Where different sizes of pipes and fittings are to be connected, standard increasers and reducers shall be employed. Reduction of size of drain pipes in the direction of flow is prohibited except for the use of a three inch by four inch (3"x4") water closet connection.

11:09. JOINTS AND CONNECTIONS

a. Joints and connections shall be made permanently gas and water tight.

b. Joints in vitrified clay and concrete pipe or between such pipe and metal shall be hot-poured asphaltum compound or cemented joints. Pack hot-poured joints with approved packing and fill with approved jointing compound at one pouring. Pack cemented joints with approved packing and secured with Portland cement.

c. Caulked joints on cast-iron soil pipe shall be firmly packed and secured with well-caulked lead, not less than one inch (1") deep. Caulking lead shall only be used on suspended pipe; whenever possible a compound similar to "leadite" shall be used for bell and spigot joints.

d. Screwed joints shall be made with a lubricant on the male thread only. Remove all burrs or cuttings.

e. Cast-iron joints may be either caulked or screwed.

f. Wrought iron or steel to cast-iron joints may be either screwed or caulked joints.

g. Wipe joints in lead pipe or between lead pipe and brass or copper pipes, ferrules, soldering nipples, bushings, or traps, in all cases on the sewer side of the trap and in concealed joints on the inlet side of the trap, shall be full-wiped joints, with an exposed surface of the solder on each side of the joint not less than three-quarter inch (3/4") and a minimum thickness at the thickest part of the joint of not less than three-eighths inch (3/8").

h. Lead to cast iron, steel, or wrought iron joints shall be made by means of a caulking ferrule, soldering nipple, or bushing.

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Denver, Colorado

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PEAKS VISIBLE FROM THE TOWER

	Altitude
MOUNT EVANS	14,260 feet
Mount Evans highway, the highest auto road in America.	
PIKES PEAK, the most famous peak in all America	14,109 feet
Colorado Springs and the Garden of the Gods at its base.	
LONGS PEAK, snow-covered most of the year	14,255 feet
Estes Park nestles at its feet.	
JAMES PEAK houses the famous Moffat Tunnel, 6.4 miles under the Continental Divide	13,260 feet
LOOKOUT MT. and PARK, site of Buffalo Bill's grave,	7,400 feet

8

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1877

Boulder,

Lumber dealer Inc.

Colony People

34-½ Wall Board,

Millwork

~~Hallock~~ Howard

i. Slip joints and unions shall be used only in trap seals or on the inlet side of the trap.

j. Floor connections for water closets and other fixtures shall be made by means of an approved cast iron floor flange caulked to the drain pipe. The joint between the fixture and floor flange shall be made tight by means of an approved fixture setting compound or gasket.

k. Any fitting or connection which has an enlargement, chamber or recess with a ledge, shoulder or reduction of the pipe area, that offers an obstruction to flow through the drain is prohibited.

11:10 TRAPS AND CLEANOUTS

a. The minimum size (nominal inside diameter) of trap and fixture waste branch for a given fixture shall be not less than shown in the following table:

Kind of Fixture	Size (in inches) trap and branch
Floor drains	2
Lavatories	$1\frac{1}{4}$
Slop Sinks	2

b. Trap each fixture separately and as near to fixture as possible except that two lavatories may connect with a single trap, with trap located under sink and waste outlet not more than twelve inches (12") from floor. Loop venting of waterclosets and urinals will be permitted as outlined in the "Plumbing Manual" B.M.S. 66.

c. Set traps true with respect to their water seals and protected from freezing.

d. Floor or wall connection of fixture traps bolted or screwed to the floor or wall shall be regarded as a pipe cleanout.

11:11 OPEN ENDS

a. Ends of pipes, including those extending above roof, drains, water and fixture outlets, shall be kept closed during construction with caps or plugs, so as to prevent dirt or building material from getting into pipes and traps.

11:12 HANGERS

a. Support piping from the building structures by means of hangers to maintain required grading and pitching of lines to prevent vibration.

11:13 FLASHINGS

a. Make pipes through roof water tight with terne plate or roofing tin, flashing extending not less than eight inches (8") around the pipe, and terminate by turning into top of pipe as a cap or by caulking into hub.

11:14 WATER SUPPLY

a. Extend water service five feet (5'-0") outside of building wall with a plugged end. Depth of this shall be the same as outside water piping on the project. Install cold water mains, risers, and branches to all fixtures, hose bibs, sill-cocks, and equipment.

b. Provide valve as entry point of service main with drain valve at all low points. Install on hot and cold water mains a stop and waste valve for each toilet room or group of fixtures to provide for repairs or replacement without shutting down the entire main.

Provide a stop and waste valve on connections to all outside hose bibbs except where anti-freeze hose bibbs are used.

Make all connections to domestic hot water heater and storage tank in boiler room as required. Provide circulating line from tank to heater.

Leave outlet for water connection to boilers.

c. Provide all connections to fixtures from top of mains and arrange piping so that entire system can be drained at low point.

d. Rough fixture branches from wall, centered to fixture outlets.

e. Locate sillcocks approximately twenty-four inches (24") above grade.

f. Schedule of pipe sizes for water connections to fixtures:

	Cold water (minimum)	Hot water (minimum)
Water closets (low down tanks)	3/8"	-
Lavatories	3/8"	3/8"
Sinks	1/2"	1/2"

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g. Hot water supply shall be installed from storage tank in boiler room with a hot water connection to each fixture, except water closets and urinals. A recirculating hot water line shall be extended from the ends of the hot water supply, back to the storage tank in the boiler room.

Hot water supply and recirculating mains shall be graded to allow for thermal circulation of water, with drainage provided at all low points. Branch connections to fixtures must be taken from the top of mains to allow for expelling air through fixture connection.

h. Set, adjust, and connect ready for operation the entire hot water equipment.

i. No plumbing fixture device or construction shall be installed which will provide a cross connection between a distributing supply for drinking and domestic purposes and a polluted supply, such as a drainage system, a soil or waste pipe, so as to permit or make possible the back flow of sewage, polluted water, or waste into the water supply system.

j. Insulate hot, cold, and recirculating water piping in all crawl spaces and boiler room with sectional wool felt covering. Butt all joints tight and paste jackets.

Where exposed to freezing temperature, provide extra thickness of sectional covering and wrap with double thickness of hair felt securely wired on.

11:15 FIRE HOSE AND RACKS

a. Where indicated on the drawings, install fire hose, racks, valves, etc., in accordance with Fig. 112 Paragraph E-39h-ER of Fed. Spec. WW-P-541, with valve located approximately six feet (6'-0") above the floor. Malleable iron or steel racks. Valve and nozzle shall be of ferrous metal. Tail pieces shall be malleable iron.

11:16 PLUMBING FIXTURES

a. Fixtures shall be of the best quality as fabricated by a manufacturer of established reputation whose products have been in constant use for not less than six (6) years.

11:17 FIXTURE TRIMMINGS

a. Traps and tail pieces shall be steel, cast iron or plastic. Faucets shall be iron-bodied with brass trimmings and must comply with the latest rulings of the

War Production Board.

b. Air Gaps - The fixtures specified hereafter, with faucets or other supply fittings properly assembled, shall provide between the level of all supply openings and the water level at points of unrestricted external overflow, a mean vertical distance of air gap as follows:

FIXTURE	Max. Diameter of Effective Opening Inches	Minimum Air Gap Inches
Lavatory supply spout	0.50	1.0
Sink	0.75	1.5

c. All fixtures requiring hot and cold water shall have cold water faucet on right side and hot water faucet on left side of fixture.

d. All faucets shall have metal indices and shall be of one pattern or design.

11:18 GROUNDS AND SUPPORTS

a. Secure fixtures to partitions by means of wood supports.

11:19 QUANTITIES

a. The Contractor is referred to the architectural and mechanical drawings for the quantities of fixtures to be furnished complete with all necessary trimmings. Fixtures in general shall comply with Federal Specification WW-P-541a as applicable and amended by the latest "Emergency Alternate Federal Specification".

11:20 WATER CLOSETS

a. White vitreous china, wash down type, Fig. 3. Paragraph E-3, E-3a, low down tank, E-3d. Piping E-3c. Wall thickness not less than 0.032 gauge, Seat Type QRTB Fig. 71, concave or flat bottom set without cover. Flush pipe shall be ferrous metal not less than 0.025 inch thick, or non-metallic material not less than 0.062 inch thick.

11:21 LAVATORIES

Size not less than nineteen inches by seventeen inches (19"x17") vitreous china with faucets, one and one-quarter inches (1¼") tail piece, metal trap, china stay, beaded chain and stopper. Trap shall have iron, steel or non-metallic cleanout plug. Trap may be adjustable with swivel joint in trap seal, without cleanout plug.

11:22 SLOP SINKS

a. Vitreous china or earthenware, twenty-two inches by eighteen inches (22"x18"), adjustable wall outlet without back. No rim guard. In lieu of trap standard, an assembly consisting of three inch (3") cast iron "P" or "S" trap as required, and suitable fittings, may be furnished. Trap shall have front cleanout and supports to floor.

11:23 URINALS

Urinals shall be of the "wall hung" type of vitreous china, flat back with flushing rim and integral strainer. With top spud inlet and outlet spud as required and integral trap and all necessary connections similar to Standard Sanitary Manufacturing Company's Figure 6240 C or equal. Flush pipe shall be of composition similar to water closets flush pipe.

Flush valve shall be three-quarter inch (3/4") with vacuum breaker.

11:24 DRINKING FOUNTAINS

Shall be wall type with bracket self-closing valve, angle stream bubbler vitreous china or earthenware bowl similar to Standard Manufacturing Company's figure number F-8364-N, having steel or plastic trap all installed complete, with loose key regulating stop. Strainer shall be plastic or metal. Valves, stops and faucets shall be ferrous metal or of alternate materials.

11:25 KITCHEN SINKS

Kitchen sinks will be made of wood, furnished and set in place under another division of the specification.

The Contractor shall furnish and install piping, trap, faucets, strainer, tail piece, etc., and make all necessary connections.

11:26 SHOWER HEADS

Shall be non-metallic plastic type installed complete, properly braced, without ball joint.

11:27 HOT WATER STORAGE TANK AND HEATER

a. In the boiler room install a four hundred gallon (400 gal.) hot water storage tank. Tank shall be tested to a minimum hydrostatic pressure of two hundred fifty (250) pounds per square inch and designed for a working pressure of one hundred pounds (100 lbs.). Tank shall be black steel,

painted inside and out with heat-resisting, waterproofed paint. Tank shall be set on a pipe or angle iron frame above hot water heater. Install thermometer and relief valve. Thermometer shall be graduated up to two hundred forty degrees F. (240° F.). Relief valve shall be set to open at approximately twenty-five pounds (25 lbs.) in excess of the normal working pressure at the site. Pipe outlet of relief valve to floor at wall.

b. Under the storage tank install a water heater capable of raising two hundred fifty (250) gallons of water per hour through one hundred degrees F. (100° F.). Water heater shall be tested same as storage tank. Heater shall be arranged for coal firing by hand, using coal having 11,000 Btu per pound. Heater shall be of the cast iron sectional type. On the boiler install a thermostatic damper regulator complete with pulleys, chains, lever arm, weights, etc. to maintain an even water temperature. Furnish suitable grates and shaker bar.

c. The pressures noted above are based on a normal working pressure on the site not exceeding seventy pounds (70 lbs.). The Contractor shall carefully check the pressure available, and, if greater than seventy pounds (70 lbs.), storage tank, heater and relief valve shall be changed accordingly.

d. Install breeching from heater to chimney of twenty-two (22) gauge black steel with damper and check draft.

e. Insulate heater and storage tank with one inch (1") of air cell blocks wired on. Over this apply a one-half inch (1/2") coat of magnesia cement trowelled smooth.

f. Connect heater and storage tank to provide satisfactory circulation of water between this equipment. Provide drain cock at low point. Connect valved cold water to heater or tank.

11:28 <u>SUMP PUMP</u>

a. In the boiler room install a self-contained sump pump capable of discharging continuously ten (10) gallons of water per minute against a twenty foot (20') head. Pump shall be directly connected to a vertical forty degree (40°) C capacitor motor. Motor shall be wound for the current available in this building.

b. Provide unit with enclosed floatswitch. Make and break motor line circuit by means of a float and float switch.

c. Impeller shall be of the non-clogging type.

d. The sump pit will be installed under another division of the specification.

e. Connect discharge of pump to nearest drainage line with a union, check valve, and gate valve.

11:29 FIXTURE PROTECTION

a. Protect against injury from building materials, acids, tools, and equipment, all plumbing fixtures with substantial cover. Damaged fixtures by any cause shall be replaced at no cost to the Government.

11:30 CLEANING UP

a. Thoroughly clean all fixtures and trimmings, and leave every part in perfect condition ready for use.

11:31 TESTS

a. Water test or roughing-in work - Apply a water test to the entire sanitary drainage system. Test may be applied in sections. Close tightly openings of the section to be tested except the highest opening above the roof, and the system filled with water to the point of overflow above the roof. No part of the system shall be tested with less than ten-foot (10') head of water except the uppermost ten feet (10') of system.

11:32 WATER SUPPLY SYSTEM

a. Test entire water supply system to a hydrostatic pressure approximately fifty percent (50%) above the normal working pressure on the site. In no case shall the test pressure be less than seventy pounds (70 lbs.).

11:33 GENERAL REQUIREMENTS

a. Make repairs to piping system with new material. No caulking on screwed joints, cracks, or holes will be acceptable.

b. Test and adjust all parts of the plumbing system and associated equipment and leave in good operating condition.

c. Notify Contracting Officer's Representative in advance of tests, who shall be represented at all tests and all tests shall be conducted to his entire satisfaction.

11:34 GUARANTEE AND ADJUSTMENTS

a. The Contractor shall make all necessary adjustments to the system to provide for quiet and efficient operation.

b. The Contractor shall guarantee the entire system for one (1) year after final acceptance. Any defective material and equipment shall be replaced without cost to the Government.

SECTION TWELVE

ELECTRICAL WORK

12:00	Intention
12:01	Affidavits, Certificates and Substitutions
12:02	Rules and Regulations
12:03 - 12:22	Materials - Interior Wiring
12:23	Fire Alarm System
12:24 - 12:47	Workmanship - Interior Wiring

SECTION TWELVE

ELECTRICAL WORK

12:00 INTENTION

It is intended that this section, together with other related portions of the specifications, shall provide for a complete system of electrical work, but not including fixtures or globes.

The drawings for electrical work are intended to show details of methods and construction, but not to include construction details which are definitely covered by inspection rules and authorities. All work shown, or intended, shall comply with the specified "Rules and Regulations".

12:01 AFFIDAVITS, CERTIFICATES AND SUBSTITUTIONS

Affidavits and/or test and inspection certificates, will be required from manufacturers of all items specified to conform to Federal Specifications before delivery to the site. This requirement may be waived only by the written authorization of the Contracting Officer for small quantities.

Materials shall conform to the specifications listed below. Any additional materials required to finish the work as specified or shown on the drawings shall be furnished and shall be equal of those specified.

Within ten (10) days after receiving the "Notice to Proceed", or before starting any work, the Contractor shall submit, in triplicate a list of the materials he proposes to furnish for all electrical work covered by this section. Failure to submit the required list within ten (10) days before starting work will automatically require the Contractor to furnish and install all articles strictly as specified or directed herein.

12:02 RULES AND REGULATIONS

All work shall be installed in conformity with the requirements of the National Board of Fire Underwriters, or Applicable State Codes.

MATERIALS FOR INTERIOR WIRING

12:03 GENERAL

The materials and requirements listed under this heading are only certain items of general application to the work as a whole. All other materials and equipment are listed in connection with the particular class of work in which they are used.

12:04 UNDERWRITER'S APPROVAL

Materials specified to conform to the requirements of the Board of Fire Underwriters shall bear their label of inspection, or be listed as complying with their specifications.

12:05 WIRE shall be delivered to the job in unbroken packages, for all requirements in excess of full coil lengths.

12:06 WIRE FOR USE IN CONDUIT or other raceways, not exposed to moisture, shall be Hazard Company's "Hazacode", rubber insulated wire for six hundred (600) volts, of the sizes shown and/or called for.

12:07 NON-METALLIC SHEATH CABLE shall be General Electric Company's "Braidex" of the sizes shown and/or required.

12:08 INSULATING TAPE

All rubber insulating tape shall be three-quarter inch (3/4") wide, shall conform to Federal Specification HH-T-111, and shall be Okonite Rubber Tape, or equal.

All friction tape shall be three-quarter inch (3/4") wide, shall conform to Federal Specifications HH-T-101, and shall be Manson Friction Tape, or equal.

12:09 GROUND RODS

Driven ground rods shall be Hubbard copperweld ground rods No. 9439 with No. 9492 clamps.

12:10 GROUND CLAMPS shall be galvanized malleable iron, with terminal lug of copper, designed for rigid conduit, having a protected terminal and U bolt or clamp for the water pipe attachment. They shall be GE SP 825, P & B 3100 series, or equal.

12:11 FLUSH TUMBLER WALL SWITCHES, unless otherwise specified, shall be Bryant No. 4961-RH series, rated ten (10) amperes, one hundred twenty-five (125) volts, and with Rubber Handle.

12:12 FLUSH WALL RECEPTACLES, unless otherwise specified, shall be Hubbell No. 9595 for duplex, double "T" slot type, and Hubbell No. 7590 for single type as shown and/or specified.

12:13 SWITCH AND RECEPTACLE PLATES, except as otherwise specified, shall be Uniline Bakelite or other approved molded composition, brown in color and finished with a mat of fine line surface.

12:14 SWITCH AND CONVENIENCE OUTLET BOX COVERS shall be of the proper metal type where surface mounted.

12:15 CONDUIT AND CONDUIT FITTINGS shall be General Electric White Conduit, and fittings shall be galvanized or sherardized, and shall be approved by the Board of Fire Underwriters.

12:16 METALLIC TUBING AND FITTINGS shall be Youngstown. Couplings and Connectors shall be "watertight" fittings and shall be Thomas and Betts. All metallic tubing and fittings shall be approved by the Board of Fire Underwriters.

12:17 ALL OUTLET BOXES, Plaster Rings, and/or Switch Covers shall be "National" and "Underwriter Approved", of the proper type for the wiring method employed.

12:18 PANELBOARDS AND CABINETS, unless otherwise shown or specified, lighting panelboards shall be Square "D", Type N.M.M. cabinets equipped with a single door, flush catch and flush lock, and the cabinet shall be for flush mounting. Four (4) keys shall be supplied with each cabinet installed.

Panelboards shall be equipped with solderless lugs in mains, and circuit breakers, as required for the circuits they are to protect.

Service protection shall be by Type MB and/or M-2 circuit breakers as indicated on the plans.

Wherever the MB or M-2 multi-breakers are used for service protection or service switching, the Square "D" SK 2665 locking device shall be installed.

12:19 PANEL DIRECTORIES in each panel containing a door, on the inside of the door there shall be a circuit directory made neatly, typed or in ink, with one-quarter inch (1/4") letters and held in place under glass.

Besides each multi-breaker panel and/or load-center, a four inch by six inch (4"x6") (approximately) picture frame with glass, shall be mounted and contain a circuit directory typed or in ink.

12:20 CARTRIDGE FUSES shall be Buss-Super-Lag-Non-Renewable, of the correct amperage and voltage required to protect the circuit in which they are installed. Each switch shall be provided with three (3) spare fuses of the proper size.

12:21 SOLDERLESS LUGS for conductors used on inside wiring shall be Thomas E. Betts, Tite-Bind.

12:22 CONDUCTOR TERMINALS shall be Thomas E. Betts, Wedge-On.

12:23 FIRE ALARM SYSTEM, to be "Faraday Fire Alarm System - CR", using Monitor non-guarded gongs Model 5150 and Faraday Fire Alarm Control Cabinet. Gongs to be at rear entrance of each wing and control to be in office.

WORKMANSHIP - INTERIOR WIRING

12:24 FITTING

The installer shall familiarize himself thoroughly with all the structural framing, architectural and plumbing plans furnished herewith, and shall conduct any and all installations in such a manner that proper structural finishing may be obtained. In any installation in any building, a true and proper fit shall be maintained.

12:25 CUTTING AND PATCHING

Work shall be performed in such a manner as to minimize to the greatest possible degree all cutting and patching. In cases where patching is necessitated, it shall be performed in a workmanlike manner, to provide a neat and proper appearance upon completion.

12:26 NON-METALLIC SHEATH CABLE shall be of the sizes shown and/or required, and shall be installed in a manner to prevent injury to the conductors. Twists shall not be pulled into the runs.

12:27 CONDUITS AND CABLES shall be securely fastened to the structure within twelve inches (12") of each outlet box. In addition, the assembly shall be securely fastened to the outlet box so that the assembly and/or the connector will completely fill the knockout opening.

12:28 OUTLET BOXES shall be placed flush with the finish; the boxes and wire assemblies connected thereto shall be securely fastened to the structure.

12:29 OUTLET BOXES for use with non-metallic cables shall be provided with means for tightly gripping the assemblies, and at the same time effectively closing the knockout opening.

12:30 OUTLET AND SWITCH BOXES shall be of the proper type for their application and/or equipped with the proper fittings. (i.e. boxes equipped with "Loom" clamps shall not be used on non-metallic sheathed cables, etc.)

12:31 WHERE SWITCH AND CONVENIENCE OUTLET BOXES are surface mounted, the proper metal box covers shall be used, and not the surface wall plates.

12:32 LOCATION OF THE OUTLETS, SWITCHES, PANEL BOARDS, EQUIPMENT, ETC. is indicated on the drawing, but the Contractor shall check the location of all outlets with the Contracting Officer's Representative before making the installation.

The right is reserved to make slight changes in the location of any switches, bracket, ceiling or other outlet in any room before it is permanently installed. Such change shall be made at the order of the Contracting Officer's Representative, and without extra cost to the Government.

Except as otherwise provided or ordered, wall switches shall be located four feet (4'-0") above the floor, and appliance (convenience) outlets shall be located one foot, six inches (1'-6") above the floor.

12:33 WHERE STUDS AND/OR JOISTS are notched or drilled for conduit, wires or tubing, the conduit, wires, or tubing shall be protected by an approved plate, against puncture by nails.

12:34 ALL SWITCH AND RECEPTACLE PLATES shall fit flush with the surface to leave no points or sharp edges. If necessary, panels shall be furred or framed.

12:35 NO WIRING shall be "closed in" until after approval by the Contracting Officer's Representative. He shall check for the boxes being flush with the surface and mechanically secure.

12:36 THE LOAD WITHIN THE PROJECT shall be balanced as nearly as possible between the phases or between coils on single phase transformers.

12:37 THE CONDUIT SYSTEM in each building shall be effectively grounded onto the water and gas system (if either or both are in the building, otherwise a ground rod shall be used) as per code.

12:38 NO BRANCH CIRCUIT WIRE shall be smaller than No. 12, unless it is an extension of an existing circuit, or it is otherwise specified.

12:39 CONVENIENCE OUTLET RECEPTACLE circuits shall be twenty (20) ampere circuits. (This is waived when the receptacle is an integral part of a lighting fixture).

12:40 ATTENTION is called to the workmanship and materials as are included on the details on the plans, as they are mandatory, and only may be waived by written permission from the Contracting Officer's Representative.

12:41 CONDUIT BUSHINGS will be required on all connectors and conduit ends where Type "R" wire is used.

12:42 WHERE A RUN OF CONDUIT OR NON-METALLIC SHEATH CABLE runs between the chords of roof trusses, a one inch by four inch (1"x4") S4S board shall be placed across the chords and the conduit or non-metallic sheath cable fastened to the top of this board.

12:43 CARE SHALL BE TAKEN that all bare wires in each breaker cabinet shall be either taped or carefully fastened down to the back of the cabinet.

12:44 SERVICE HEADS shall not be omitted from any location without the written permission of the Contracting Officer's Representative.

12:45 ALL SERVICE ENTRANCE FEEDERS shall be run in conduit. In no event can service entrance or service drop cable be applied directly to the walls of a building unless so specified or shown elsewhere.

12:46 TERMINAL SCREW CONNECTIONS

All solid wires shall be neatly looped where set under terminal screws.

Lugs shall be used on all wires No. eight (No. 8) and larger.

Only one (1) wire may be looped under each terminal screw.

12:47 EVERY MULTI-BREAKER PANEL AND SERVICE SWITCH shall be individually grounded. The grounding wire shall be armored on in conduit.

Main Switch	400 Amp. 2 Pole SN.
Panel A Stage	22 Circuits
Power-Basement	60 Amp.
Panel B Elec. Control Room	8 Circuits
Panel C Janitors Closet	8 Circuits
Panel D " "	8 Circuits
Exit Panel	1 Circuit Stage
Distribution Panel Elec. Control Room	3-60 Amp., 2 Pole Pull-out Blocks
Main Feed	3" Conduit. 3-350,000 CM R.P. Wire
Sub Feed	2½" Conduit. 3-250,000 CM R.P. Wire
Sub Feed to Wings	1½" Conduit. 3-#2 Wires Type R
$L - Lock Type - Key Switch	
Fire Alarm System	110 volt #12 Wire As Spec.
Bell System	2 Bells as directed 110 Volt
Bell System	1 Push Button in Office

School - Class Room	150 Watts
Office	200 "
Kitchen	200 "
Rest Rooms	100 "
Toilets	100 "
Teachers Rooms	100 " plus 50 Watts
Library	200 "
Halls	100 "
Vestibules	100 "
Outside	100 "
Exits Lights	2 - 50 Watts each
Foot Lights	3 - 8' Sections Wired 3 colors
Auditorium	200 Watt

Standard Form No. 20
Approved by the President
Nov. 19, 1926

PART I SECTION A

STANDARD GOVERNMENT FORM OF INVITATION FOR BIDS

(CONSTRUCTION CONTRACT)

War Relocation Authority, Central Region,
(Department)

Denver, Colorado

(*Place*) Denver, Colorado

(*Date*) November 4, 1942

SEALED BIDS, in ~~xxxxxx~~ {duplicate / triplicate} subject to the conditions contained herein, will be received by the Project Director, Heart Mountain Relocation Center, 708 Kittredge Bldg. Denver, Colo. until 10 AM, MWT., November 16, 1942, and then publicly opened, for furnishing all labor and materials except cement in sacks, and wood flooring and performing all work for the construction of two elementary schools and one combined junior-senior high school, according to the plans and specifications for same listed in Special Conditions, prepared by the FSA for the WRA. 10—1769

OBTAINING PLANS AND SPECIFICATIONS.

The Contract Documents, including Plans and Specifications are on file at the office of the Regional Director, War Relocation Authority, 708 Kittredge Building, Denver, Colorado, and Project Director at the site. Copies of the documents may be obtained by communicating with the WRA at the above addresses.

Attention is called to the Mandatory Minimum wage rates, etc., as prescribed by the United States Department of Labor for this project.

Bids not posted in the United States Mail may be delivered to the War Relocation Authority, 708 Kittredge Building, Denver, Colorado, prior to the specified time for opening of bids. Bids posted in the United States Mail will require the postage paid by the bidder, but shall be submitted in the envelopes furnished therefore by the Government.

Where copies of plans are requested, a deposit of $ 25.00 will be required to insure their return.

Guarantee will be required with each bid as follows: Certified check or bidder's bond for 5% of the amount bid.
(See paragraph 8 of Instructions to Bidders)

Performance bond will be required as follows: 50% of the contract price. Payment Bond will be required as follows: 50% of the contract price.

Liquidated damages for delay will be None.

Partial payments { will / ~~will not~~ } be made as estimate can be drawn.
(See Article 16 of contract)

Article on patents { will / ~~will not~~ } be made a part of the contract.
(See directions on back of contract)

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for 3 schools

To be opened November 16, 1942
10:00 A.M., MWT

C. E. Rachford
Project Director
War Relocation Authority
708 Kittredge Building
Denver, Colorado

NOTE.—See Standard Government Instructions to Bidders and copy of the Standard Government Form of Contract, Bid Bond, and Performance Bond, which may be obtained upon application.

GOVERNMENT PRINTING OFFICE 10—1769