NAVDOCKS
SPECIFICATION
NO. 24218/59
ADDENDUM NO. 1

REHABILITATION OF RAW WATER SUPPLY

at the

U.S. MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT NBy-24218

SECTION 1. GENERAL CLAUSES

1.9 Specifications and standards. In the list of specifications, make the following changes:

BUREAU OF YARDS AND DOCKS

7Yg - Change to include addenda nos. 1 and 2.

13Ye - Change to include addendum no. 1 only.

21Yd - Change date to read "Mar. 1957".

MILITARY AND JOINT ARMY-NAVY

JAN-P-735 - Change date to "Feb. 18, 1949"; add "including amendment 1."

MIL-V-1174A - Change date to "Jun 19, 1952".

Delete MIL-P-15149A in its entirety and substitute the following therefor:

"MIL-P-15145A	June 20, 1955	Paint, zinc dust (for fresh water tanks)(formula No. 102); including amendment 2."

Add the following new specification to the list:

"MIL-P-15149	May 15, 1950	Paint, stencil."

FEDERAL

W-C-581 - Change date to "Aug. 1, 1939"; add "including amendment 1."

W-P-131a - Change date to "Sep. 26, 1941"; add "including amendment 2."

DD-G-451a - Change date to "Dec. 9, 1949"; add "including amendment 2."

FF-H-106a - Change date to "Nov. 23, 1948"; add "including amendment 1."

FF-H-116c - Change date to "July 3, 1957"; add "including amendment 1."

QQ-L-156 - Change to read "QQ-L-00156a"; change date to "Feb. 27, 1959".

QQ-S-00695a - Change date to "Feb. 3, 1953"; add "including amendment 2."

QQ-S-00693a - Change date to "Feb. 4, 1953"; add "including amendment 1."

SS-S-164 - Change date to "Feb. 12, 1952"; add "including amendment 1."

TT-A-468a - Change date to "Oct. 7, 1949"; add "including amendment 1."

TT-E-489b - Change date to "May 12, 1953"; add "including amendment 1."

TT-E-508 - Change date to "May 7, 1946"; add "including amendment 2."

TT-C-598 - Change date to "Apr. 25, 1942"; add "including amendment 2."

TT-O-364 - Change date to "Feb. 3, 1948"; add "including amendment 2."

TT-P-25a - Change date to "Jan. 11, 1951"; add "including amendment 1."

TT-P-86a - Change date to "May 4, 1949"; add "including amendment 1."

TT-P-102 - Change date to "Mar. 21, 1951"; add "including amendment 2."

TT-P-781a - Change date to "Jul. 12, 1941"; add "including amendment 1."

TT-W-570a - Change date to "Jan. 27, 1956"; Add "including amendment 1."

WW-C-581c - Change date to "Jul. 30, 1954"; add "including amendment 1."

WW-T-799a - Change date to "Dec. 23, 1943"; add "including amendment 1."

1.21.1 Where it is necessary to excavate in streets..... Next to last line, change "traffics" to "traffic".

1.22 Operation of station utilities. Second line, change "contract" to "control".

SECTION 2. EARTHWORK

2.2.4 Burning. Next to last line, delete "the".

2.9.3 Trench backfill. First through third lines, delete "As soon as practicable..... degree of hardness", and substitute the following therefor: "The trench shall be backfilled as soon as practicable after the pipe has been installed and joints have acquired a suitable degree of hardness. The joints shall remain exposed until the pipe is satisfactorily tested." Eleventh line, delete "railroad crossings" and substitute "sidewalks".

SECTION 4. CONCRETE CONSTRUCTION

4.1 General requirements. Third line, change "13Yc" to "13Ye".

SECTION 11. PIPING, VALVES, ACCESSORIES AND MECHANICAL EQUIPMENT

11.6.10 Motors.... First and second lines, delete "fully enclosed" and substitute "drip-proof" therefor.

SECTION 12. ELECTRICAL DISTRIBUTION

12.13 Fuse cutouts.... Second line, change "7.2 KV" to "15 KV".

At the end of the section, add the following new paragraph:

"12.18 Pole numbering. Provide on the new poles a pole designation on the side facing the road, with the code letters arranged horizontally and the numerals arranged vertically not less than 1 inch and not over 2 inches below. The height of mounting shall be 7 feet above the adjacent road grade to the bottom of the lowest numeral.

"12.18.1 Letters and numerals shall be 2 inches high embossed from polished aluminum and of Arabic type. Each numeral shall have a minimum of two nail holes and letters shall have a sufficient number of additional nail holes to insure firm support to the pole of all portions of the letter. Both the letters and numerals shall duplicate those on existing poles."

NOTICE

Each bidder shall refer in his bid to all addenda to this specification; failure to do so may constitute an informality in the bid.

Headquarters, Fifth Naval District
U.S. Naval Base, Norfolk 11, Va.
27 May 1959

A. J. FAY, REAR ADMIRAL, CEC, USN
Officer in Charge of Construction

SPEC 10/70 - ADD. NO. 1

NOTICE:-
Bids to be opened at 2:00
p.m., e.s.t. JUN 23 1959
at the District Public Works Office
Headquarters, Fifth Naval District,
U. S. Naval Base
Norfolk 11, Virginia

NAVDOCKS
SPECIFICATION
NO. 24218/59

REHABILITATION OF RAW WATER SUPPLY

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U. S. MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT NBy-24218

Appropriation: 1791106.11 MCT&F 59

A priority rating in consonance with the rating system in effect at the time of award of this contract, will be issued by the Bureau of Yards and Docks.

All questions concerning the bidding or any other phase of the plans and specifications occurring prior to bid opening, shall be presented to the Design Division, DPWO, Bldg. N-26, Room 345, Telephone MA 2-8211, Extension 3129.

To inspect the site of the work before bid opening, prior appointment must be made with the Resident Officer in Charge of Construction, Marine Corps Base, Camp Lejeune, North Carolina, Telephone Jacksonville, N. C. 2111, Extension 7-5615.

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14. Field Painting

15. Basis of Bids

16. Bids

SECTION 1. GENERAL CLAUSES

1.1 General intention. It is the declared and acknowledged intention and meaning to provide and secure rehabilitation of raw water supply complete and ready for use.

1.2 General description. The work includes provision of approximately 29 back pressure valves on existing deep well pump discharge lines; four new deep wells complete with masonry houses, electric motor driven deep well turbine pumps, valves, piping and controls; raw water collection lines ranging from 12 to 16 inches in diameter; electric distribution line; three vertical, turbine type electric motor driven raw water pumps of 6, 5, and 4 million gallons per day capacity, new masonry pump room, electrical connections and control including a 300 KVA overhead substation, piping, valves and incidental related work.

1.3 Location. The work shall be located at the Marine Corps Base, Camp Lejeune, North Carolina, approximately as shown. The exact location will be indicated by the Officer in Charge.

6. Miscellaneous Iron and Steel Work

7. Metal Doors and Windows

8. Carpentry and Joinery

9. Roofing and Sheet Metal Work

10. Wall Construction

11. Piping, Valves, Accessories
and Mechanical Work

12. Electrical Distribution

13. Interior Electrical Work

14. Field Painting

15. Basis of Bids

16. Bids

SECTION 1. GENERAL CONDITIONS

1.1 General Intention. It is to be declared and acknowledged intention and meaning to provide and secure rehabilitation of raw water supply complete and ready for use.

1.2 General description. The work includes provision of approximately

new deep wells complete with masonry houses, electric motor driven vertical well turbine pumps, valves, piping and controls; raw water collection lines feeding from 12 to 16 houses in nine dry riverbeds

line; three vertical, turbine type electric motor driven raw water pumps of 6, 5, and 4 million gallons per day capacity, new masonry pump room, electrical connections and control including a 300 KVA overhead substation, piping, valves and incidental related work.

1.3 Location. The work shall be located at the Marine Corps Base, Camp Lejeune, North Carolina, approximately as shown. The exact location will be indicated by the Officer in Charge.

1.4 Form of Contract. The contract will be executed on U. S. Standard Form No. 23, revised March 1953, and will include U. S. Standard Form No. 23A, March 1953, General Provisions, and form NAVDOCKS 113, revised November 1957, Additional General Provisions, with the following modifications: The phrase "including connection charges" is inserted after the word "utilities" in the fifth sentence of Clause 43, "GOVERNMENT UTILITIES" of form NAVDOCKS 113. The following clauses are added to NAVDOCKS 113:

"65 CODIFICATION OF PROCUREMENT AND REAL ESTATE LAWS INTO TITLE 10, U. S. CODE

Public Law 1028, 84th Congress, repealed certain laws relating to military procurement and codified their provisions in certain sections of Title 10 of the United States Code. Accordingly, any reference in this document to any provision of law codified in Title 10 shall be deemed to refer to the corresponding provision(s) of Title 10."

"66. BUY AMERICAN ACT

"Clause 17 is deleted and the following clause is substituted therefor:

"(a) The Buy American Act (41 U. S. Code 10 a-d) provides that the Government give preference to construction materials which have been mined, produced, or manufactured in the United States. For the purpose of this clause:

"(i) the term "construction materials" means articles, materials, and supplies, which are brought to the construction site for incorporation in the building or work;

"(ii) the term "components" means those articles, materials, and supplies, which are directly incorporated in construction materials; and

"(iii) the term "domestic construction material" means an unmanufactured construction material which has been mined or produced in the United States, or a manufactured construction material which has been manufactured in the United States if the cost of its components which are mined, produced or manufactured in the United States exceeds fifty percent (50%) of the cost of all its components. A component shall be considered to have been mined, produced, or manufactured in the United States (regardless of its source in fact) if the construction

material in which it is incorporated is manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

"(b) The contractor agrees that there will be used in the performance of this contract only domestic construction materials, except as to particular construction materials which the Government has determined are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality, or which are noted in the clause of this contract entitled Nondomestic Construction Materials as being excepted from the Buy American Act."

1.5 Performance and payment bonds, executed on U. S. Standard Forms Nos. 25 and 25A, respectively, will be required as stipulated in U. S. Standard Form No. 20, revised March 1953, Invitation for Bids.

1.6 Time for completion. The entire work shall be completed within 200 calendar days after date of receipt of a notice of award or any other communication authorizing the contractor to proceed.

1.7 Damages for delay in accordance with Clause 5 of U. S. Standard Form No. 23A shall be at the rate of $100.00 per calendar day. The Government will take no action pursuant to Clause 5, Liquidated Damages, to terminate the right of the contractor to proceed or to assess liquidated or actual damages where the failure of the contractor to complete the work within the time specified elsewhere in this contract is due solely to the operation of the priorities and allocations system and is not otherwise caused by the fault or negligence of the contractor. It is understood and agreed that such delays will be considered an act caused by the Government and as such will be excusable within the meaning of Clause 5, and the contractor will be entitled to a time extension by reason thereof.

1.8 Drawings accompanying specification. The following drawings accompany this specification and are a part thereof. Drawings are the property of the Government and shall not be used for any purpose other than that contemplated by the specification.

DPW Dwg. No.	Y&D Dwg. No.	Title
55749	842849	Location Map, Plot Plan & Index to Drawings.
	842850	Plot Plan, Main Water Plant
	842851	Foundation Plan and Details, New Pump Room.
	842852	Floor Plan, Elevations and Details New Pump Room.
	842853	Mechanical Work, New Pump Room.
	842854	New Well Construction.
	842855	New Well Houses, Architectural, Mechanical & Electrical.
	842856	New Raw Water Main, Sneads Ferry Road to New Well 36.
	842857	New Raw Water Main, Holcomb Blvd. to Existing Main Near Lyman Rd.
	842858	Diagrams of Existing Piping in Existing Well Houses.
	842859	Back Pressure Valve Installation and Water Main Supports.
	842860	New Pump Room Electrical.
	842861	New Wells Electrical Distribution.
55762	842862	New Wells Electrical Distribution Details.

1.9 Specifications and standards. The specifications and standards in the following list, mentioned elsewhere herein, or reference in these specifications or standards (including the addenda, amendments, and errata listed) shall govern in all cases where references to specifications or standards are made. In case of difference between these specifications or standards and this specification or its accompanying drawings, this specification or its accompanying drawings shall govern. Especial care shall be exercised to refer in requests for quotations, in orders, and in subcontracts to the specifications and standards and to all modifications thereof. The requirements for packaging, packing, marking and preparation for shipment or delivery included in the referenced specifications shall apply only to materials and equipment which are furnished directly to the Government and not to materials and equipment which are to be furnished and installed by the contractor. Unless specified otherwise in this specification, the following requirements included in referenced specifications are modified as follows:

Radio interference suppression - not required
Fungus control - not required
Identification or name plate - manufacturer's standard acceptable.
Technical publications - Manufacturer's standard acceptable.
Production test model - in lieu of tests performed on a production test model such tests if required at the manufacturer's plant shall be performed on the equipment being furnished under this specification.

BUREAU OF YARDS AND DOCKS

7Yg	Jan.2,1934	Roofing, siding, and sheet metal work; dampproofing and membrane waterproofing; including addendum no. 2.
9Yg	Sept. 1956	Electrical apparatus, distributing systems, and wiring.
10Yc	Jan. 1938	Metal Windows.
13Ye	Nov. 1955	Concrete Construction, Including Addendum no. 5.
21Yd	Mar. 1941	Steam Power Plant, Heating and Ventilating equipment and piping, including erratum no. 1.

22Yc	May 1955	Structural steel work, including addendum no. 1.
28Yc	Oct. 1944	Carpentry and joinery; including errata no. 1.

MILITARY AND JOINT ARMY-NAVY

MIL-STD-101A	Mar.16,1954	Color code for pipe lines and compressed-gas cylinders.
JAN-P-735	Dec.4,1950	Primer, paint, zinc-chromate, alkyd type.
MIL-V-1174A	Jan.19,1952	Varnish, spar, water resisting (formula No. 80).
MIL-S-12935A	Jan.13,1955	Sealer, surface, knot.
MIL-P-15149A	Sept.7,1956	Paint, zinc dust pigmented, fresh water tank protective, formula No.102.
MIL-C-15328A	Mar.17,1952	Coating, pretreatment (Formula No. 117 for metals).

FEDERAL

W-C-581	May 23,1946	Conduit and fittings, fiber, bituminized.
W-P-131a	Apr.13,1951	Panelboards; equipped with automatic circuit-breakers.
W-R-00151b (Navy Docks)	Sept.30,1957	Receptacles, attachment-plug-caps, cord-connector-bodies; 125,250,and 600 volts; and wall plates.
W-S-00865b (Navy Docks)	May 22,1957	Switches, enclosed (safety) surface mounted.
DD-G-451a	June 15,1951	Glass, flat and corrugated, for glazing, mirrors and other uses.

FF-H-106a	Dec.10,1952	Hardware, builders; locks and door-trim.
FF-H-116c	Jan.3,1958	Hinges, hardware, builders.
HH-F-341a	Nov.23,1951	Filler, expansion-joint, preformed, nonextruding and resilient types (for concrete).
QQ-C-576a	June 30,1955	Copper plates, rolled bars, sheets, and strips.
QQ-L-156	Nov.18,1946	Lead, calking.
QQ-S-632	June 24, 1957	Steel bar, reinforcing, (for) concrete.
QQ-S-00695a (Navy Ships)	Jan.11,1956	Steel, sheet, for the manufacture of metal furniture.
QQ-S-00693a (Navy Ships)	May 25, 1953	Steel, sheet, hot-rolled.
SS-B-656	June 28,1932	Brick, building (common) clay.
SS-C-192b	July 2,1956	Cements, portland.
SS-L-351	Oct.14,1930	Lime, hydrated, for structural purposes.
SS-P-351a	Oct. 7,1953	Pipe, Asbestos cement.
SS-Q-351	Aug.19,1930	Quicklime, for structural purposes.
SS-S-159	Feb. 13,1952	Sealer;cold-application mastic type, for joints in concrete.
SS-S-164	July 20,1954	Sealer; hot-poured type, for joints in concrete.
TT-A-468a	Aug.2,1951	Aluminum-pigment; powder and paste, for paint.
TT-E-489b	Nov.9,1955	Enamel, gloss, synthetic (for exterior and interior surfaces).

TT-E-506c	Mar.26,1954	Enamel, tints and white, gloss, interior.
TT-E-508	July 31,1953	Enamel, interior, semigloss, tints and white.
TT-E-543	Oct.25,1949	Enamel-undercoat, interior, tints and white.
TT-C-598	July 26,1951	Compound, calking; plastic (for masonry and other structures).
TT-O-364	Sept.11,1951	Oil; linseed, boiled (for use in organic coatings).
TT-P-25a	Aug.2,1951	Primer, paint, exterior (undercoat for wood, ready-mixed, white and tints).
TT-P-51d	Dec.28,1953	Paint, oil, interior, flat, white, and tints.
TT-P-86a	Apr. 27,1951	Paint, red-lead-base, ready mixed.
TT-P-102	July 31,1953	Paint (titanium-lead-zinc and oil, exterior, ready-mixed, white and light tints)
TT-P-781a	July 20,1943	Putty and elastic-compound for metal-sash glazing.
TT-V-81b	Feb.10,1949	Varnish, mixing, for aluminum paint.
TT-W-556b	Feb.1,1955	Wood preservative; coal-tar-creosote.
TT-W-570a	May 11,1956	Wood preservative; pentachlorophenol, solid.
WW-C-581c	Oct.8,1954	Conduit, steel, rigid, zinc-coated.
WW-P-421a	Mar. 2,1955	Pipe, cast-iron, bell-and-spigot, water.
WW-T-799a	June 27,1946	Tubing, copper, seamless (for use with solder-joint or flared-tube fittings.

NON-GOVERNMENT

NOTE: Non-Government standards are not available for distribution by the Department of the Navy; application therefor should be made to the issuing organization. They may be examined at the office where the bids are being received.

American Association of State Highway Officials,
National Press Building, Washington 4, D. C.

Test, T99-49 The compaction and density of soils.
T147-54 The field determination of density of soil in place.

American Society for Testing Materials, 1916 Race St.,
Philadelphia 3, Pennsylvania.

Specifications:

A126-42 Grey Iron Castings for Valves, Flanges, and Pipe Fittings.

A122-54T Zinc-coated Steel Wire Strand "Galvanized" and Class A ("Extra Galvanized") (Tentative)

B62-52 Composition Brass or Ounce Metal Castings.

A7-46 Steel Parts.

A47-47 Malleable Iron.

A153-47T Galvanizing.

A185-56T Welded steel wire fabric for concrete reinforcement.

American Standards Association, 70 East 45th St.,
New York 17, N. Y.

A21.10-1952 Short body cast-iron fittings.

C5.1 -1953 Protection of persons.

C8.18-1948 Weather-Resistant (Weatherproof) wire and cable (URC type)

C57.12-1956 Distribution, power, and regulating transformers, and reactors other than current-limiting reactors, requirements, terminology and test code for. (Includes revisions of C57.12-1949, C57.12-1954 and C57.22-1948; editorial consolidation with C57.12b-1954, C57.10-1953 and C57.11-1953.)

American Water Works Association, 521 Fifth Ave., New York 17, N. Y.

Standard Specifications:

C500-52T Gate valves for ordinary water works service.

C601-54 Fire hydrants for ordinary water works service.

C800-48 Standard Specifications for Threads for Underground Service Line Fittings.

American Wood Preservers Association, 839 17th Street, Washington 6, D. C.

Manual of recommended practice, (current edition).

Edison Electric Institute

Specifications:

TD-1 Machine Bolts, carriage bolts, and double arming bolts.

TD-4 Eye bolts.

Southern Pine Inspection Bureau, National Bank of Commerce Building, New Orleans 4, Louisiana

Standard grading rules for southern pine lumber; 1956.

Steel Joist Institute, 1346 Connecticut Avenue, Washington 6, D. C.

Standard specification for open-web steel joist construction; 1956.

National Electrical Manufacturers' Association, 155 East 44th St., New York 17, N. Y.

1c-1 - 1954 Industrial Control

1.10 "General specification for inspection of materials" (issued by the Department of the Navy), with such appendices thereto as may be applicable, of the issues in effect on the date of the invitation for bids, shall govern for the factory inspection of materials and equipment required under the contract including materials and equipment specified in detail herein or covered by standard specifications. (See also Clause 9 of U.S. Standard Form No. 23A.) This factory inspection shall apply specifically, but not necessarily exclusively, to the following:

Back Pressures Valves

Raw Water Turbine Type Pumps

Factory inspection of other materials and equipment for which tests at the place of manufacture are required may be waived at the option of the Government, provided notarized copies of factory test reports are furnished which show compliance with the specification requirements. Factory inspection will not be required for lumber provided it is grade-marked and trade-marked by the association under whose rules it is graded, or provided it is accompanied by certificates of inspection issued by the association under whose rules it is graded or by another inspection agency which is satisfactory to the Officer in Charge. The Government reserves the right to charge to the contractor any additional cost of Government inspection and testswhen materials and equipment are not ready at the time such inspection and tests are requested by the contractor.

1.11 Samples. The contractor shall submit for approval samples of the following and of such other materials and equipment as may be required whether mentioned specially herein or not:

Paint Colors

1.12 Drawings required of the contractor. Before commencing the installation of any of this work, the contractor shall submit for approval, and in accordance with Clause 29(f) of NAVDOCKS 113, such drawings as may be required, including those showing reinforcing steel, steel joist, windows and doors, pump foundations.

1.13 Information required of the contractor. Within 15 days after the award of the contract, the contractor shall furnish the names and addresses of the manufacturers of the following, together with catalog information or other identifying description:

Back pressure valves;
Pipe;
Valves and fittings for raw water mains;
Pumps;
Circuit breakers;
Switches;
Motor starters;
Transformers;
Fused cutouts, and
Electric meters.

1.14 Rates of wages at the site (see clause 20 of U. S. Standard Form 23A). The contractor shall pay mechanics and laborers employed or working directly upon the site of the work wage rates not less than those contained in the wage determination decision of the Secretary of Labor No. T-19,898 which is attached hereto. Any class of laborers and mechanics not listed in the Secretary's decision, which will be employed on the contract, shall be classified or reclassified by the contractor or subcontractor conformable to the Secretary's decision subject to the approval of the contracting officer. In the event of any difference between the contractor and the Government concerning the proper wage rates to be paid, the classification of employees, the amount of wages due employees, or any other application of the labor standards provisions in this contract, the difference shall be referred to the contracting officer (the Chief of the Bureau of Yards and Docks or his specially authorized representative), and the contracting officer shall determine the matter with advice from and reports to the Secretary of Labor as required by Department of Labor regulations. This determination shall not be appealable under the Disputes clause, and the contractor shall promptly comply with the determination of the contracting officer. If the contracting officer determines that the contractor has not satisfied his obligations under the labor standards provisions of the contract, the contracting officer will forward a report on the violations to the Department of Labor and the Comptroller General for appropriate action.

1.14.1 Required by Davis-Bacon Act. The wage determination decision of the Secretary of Labor attached hereto is made a part of this contract solely for the purpose of setting forth the minimum hourly wage rates required to be paid by the Davis-Bacon Act and is not to be considered as a guaranty, warranty, or representation as to the wage determination decision, the wage rates therein, the prevailing wages, or the availability of labor at the wage rates indicated. Bidders are advised to make their own investigations and to rely solely upon their own information as to local labor conditions, such as wage rates necessary to attract labor, the length of the work day and work week, overtime compensation, health and welfare contributions and available labor supply,

and as to prospective changes or adjustments of wage rates or employment conditions in the area concerned which might affect operations under the contract. Neither a mistake in attaching the wage determination decision of the Secretary of Labor or in the determination or statement of the wage rates set forth therein, nor the payment of higher wage rates than those set forth therein shall entitle the bidder to the cancellation of his bid or contract, to an increase in the contract price, or to other additional payment or recovery, except when the contracting officer modifies the specified wage rates and when the requirements of the sub-paragraph 1.14.2 below are satisfied.

1.14.2 Modification of minimum wage rates. The contracting officer reserves the right to require the contractor to pay the minimum wages set forth in the wage determination which is applicable to this contract and in effect at the time of award (irrespective of the wage rates set forth in the specification) and, if necessary, to modify the contract accordingly. The Government shall not be liable to the contractor to increase the contract price or to make any other additional payment as a result of any such modification made by the contracting officer in the specified wage rates, except that an equitable contract price adjustment shall be made (1) when the contractor clearly demonstrates that his investigation of the wage rates at the site did not, and that a reasonable investigation could not, disclose that wage rates higher than those previously specified would have to be paid, and (2) when the contractor clearly demonstrates that he actually and reasonably based his bid or proposal upon wage rates lower than those required to be paid by such modification.

1.14.3 Apprentices employed pursuant to this determination of wage rates must be registered in a bona fide apprenticeship program registered with a state apprenticeship council recognized by the Federal Committee on Apprenticeship, U. S. Department of Labor, or if no such recognized council exists in a state, it shall mean a program registered with the Bureau of Apprenticeship, U. S. Department of Labor.

1.15 Work outside regular hours. If the contractor desires to carry on work outside the regular hours or on Saturday, Sundays or holidays, he may submit application to the Officer in Charge but shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night he shall light the different parts of the work in an approved manner.

1.16 Optional requirements. Where a choice of materials and/or methods is permitted herein, the contractor will be given the right to exercise the option unless stated specifically otherwise.

1.17 Definitions. Where "as shown", "as indicated", "as detailed", or words of similar import are used, it shall be understood that reference to the drawings accompanying this specification is made unless stated otherwise. Where "as directed", "as required", "as permitted", "approved", "acceptance", or words of similar import are used, it shall be understood that the direction, requirement, permission, approval, or acceptance of the Officer in Charge is intended unless stated otherwise. As used herein, "provide" shall be understood to mean "provide complete in place", that is, "furnish and install".

1.18 Safety requirements. Copies of the Department of the Army, Corps of Engineers, "General Safety Requirements" referenced in clause 28(d) of form 113 may be obtained on application to the office where the bids are being received. Prior to commencement of the work the contractor shall meet in conference with representatives of the Officer in Charge to discuss and develop mutual understandings relative to administration of the safety program.

1.19 Security requirements. No employee or representative of the contractor will be admitted to the site of the work unless he furnishes satisfactory proof that he is a citizen of the United States or if an alien, his residence within the United States is legal.

1.20 Approval of samples, cuts, and drawings. Matter submitted for approval shall be accompanied by complete information concerning the material, articles, and/or design proposed for use in sufficient detail to show compliance with the specification; and shall be approved before incorporation into the work. Approval thereof will not be construed as relieving the contractor of compliance with the specification, even if such approval is made in writing, unless the attention of the Officer in Charge is called to the noncomplying features by letter accompanying the submitted matter. Partial submittals, or submittals of less than the whole of any system made up of interdependent components, will not be considered. Approval of drawings, cuts, and samples by the Officer in Charge shall not be construed as a complete check or approval of the detailed dimensions, weights, gauges, and similar details of the proposed articles. The conformance of such details with the contract requirements, together with the necessary coordination of dimensions and details between the various elements of the work and between the various subcontractors and suppliers, shall be solely the responsibility of the contractor, approval of submitted matter notwithstanding.

1.21 Methods and schedules of procedure. The work shall be executed in a manner and at such times that will cause the least practicable disturbance to the occupants of the buildings and the normal activities of the station. Before starting any work, the sequence of operations and the methods of conducting the work shall have been approved. Generally the following conditions will govern unless modified by the Officer in Charge.

1.21.1 Where it is necessary to excavate in streets and paved areas the contractor shall organize his work in a manner so that traffic may be maintained. Four lanes of traffic shall be maintained at all times on Holcomb Boulevard except during the hours from 9:00 A.M. to 3:30 P.M. During the hours from 9:00 A.M. to 3:30 P.M. at least two lanes of traffic shall be maintained. Appropriate barricading at existing crossovers to provide two way traffic on either side may be used to have two directional traffics facilitated on Holcomb Boulevard.

1.21.2 The contractor shall request and receive approval to proceed prior to connecting new work to existing utilities. Where such connections will interrupt the service of the existing utility the contractor shall plan and organize his work in a manner that will hold the interruption to a minimum. The interconnection of new raw water mains and existing mains shall be scheduled to be accomplished at such times as to assure an adequate supply of water at the Main Treatment Plant.

1.21.3 The crossing of the railroad at Sneads Ferry Road shall be accomplished between 4:30 P.M. Friday and 6:00 A.M. Monday.

1.21.4 The construction of all distribution electric systems shall be performed in such a manner with sufficient rubber protecting accessories to limit all outages not to exceed eight hours and in no case to exceed two consecutive hours for the duration of outages as approved.

1.22 Operation of station utilities. The contractor shall not operate nor disturb the setting of any contract devices in the station utilities systems, including water, sewer, electrical and steam services. The Government will operate the control devices as required for normal conduct of the work. The contractor shall notify the Officer in Charge, giving reasonable advance notice when such operation is required.

1.23 Examination of premises. Before submitting proposal, bidders are expected to visit and inspect the site of the work and satisfy themselves as to the physical conditions at the site; the general and local conditions, including availability of labor; the nature and extent of the work; the character and effect of existing adjoining and/or adjacent work; and other factors that can affect the cost of the performance of the contract to the extent that such information is reasonably obtainable.

1.24 Changed conditions. Wherever changed conditions as defined in clause 4 of form no. 23A are encountered, and wherever conditions exposed during the course of the work necessitate a change from quantities indicated or specified as either estimated quantities or as a basis for bids, whether or not provision for a change in price for such variation is specified, the Officer in Charge must be notified in writing and written direction to do so must be obtained before quantities stated in the contract documents are exceeded.

1.25 Protection and repairs. The contractor shall comply with the fire prevention requirements, security rules, and regulations of the activity; and shall provide approved means necessary for the protection of all Government and private property, including contents of buildings affected directly or indirectly by his operations. All damage to Government or private property, resulting directly or indirectly from the contractor's actions, shall be made good by him without expense to the Government.

1.26 Existing work damaged or otherwise affected by the contractor's operations shall be restored to a condition as good as existed before the work was commenced, except where indicated or specified otherwise. Where new construction adjoins, connects to, or abuts the existing work, the junction shall be made in a substantial workmanlike and weathertight manner as the case requires. All new work shall match, as nearly as practicable, the existing adjoining and/or adjacent similar work unless indicated or specified otherwise. Except where specifically designated as being retained by the Government or to be reinstalled in the new construction, all materials, fixed equipment and/or debris resulting from demolition and removal operations shall be removed by the contractor from the limits of the Government reservation at such times during the progress of the work as directed.

1.27 Accident reports. The contractor and his subcontractors shall maintain an accurate record of, and shall report to the Officer in Charge, exposure data and all accidents resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies,

1.23 Examination of premises. Before submitting proposal, bidders are expected to visit and inspect the site of the work and satisfy themselves as to the physical conditions at the site; the general and local conditions, including availability of labor; the nature and extent of the work; the character and effect of existing adjoining and/or adjacent work; and other factors that can affect the cost of the performance of the contract to the extent that such information is reasonably obtainable.

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1.26 Existing work damaged or otherwise affected by the contractor's operations shall be restored to a condition as good as existed before the work was commenced, [illegible] or specified otherwise. Where new construction adjoins, connects to, or abuts the existing work, the junction shall be made in a substantial workmanlike and weather-tight manner [illegible]. All new work shall match, as nearly as practicable, the existing adjoining and/or adjacent similar work unless indicated or specified otherwise. Except where specifically designated as being retained by the Government or to be reinstalled in the new construction, all materials, fixed equipment and/or debris resulting from demolition and removal operations shall be removed by the contractor from the limits of the Government reservation at such times during the progress of the work as directed.

1.27 Accident reports. The contractor and his subcontractors shall maintain an accurate record of, and shall report to the Officer in Charge, exposure data and all accidents resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies,

and equipment incident to work performed under the contract. The report shall be submitted on Standard Form 92 and shall be in accordance with "Instructions to Contractor for Preparation of Supervisors Report of Accident"; the "Instructions" and the required forms will be furnished by the Officer in Charge.

1.28 Lines and grades required for execution of the work shall be established by the contractor from the horizontal and vertical controls shown on the drawings.

1.29 Government work and material. The Government will furnish the following work and material:

1.29.1 The Government will move such cultivated shrubbery which it desires to save and which may be destroyed in the prosecution of the work.

1.29.2 The Government will furnish water and electricity at the nearest existing standard service outlet for use in performance tests at the job site.

1.30 Payrolls and affidavits. The prime contractor, subcontractors and sub-subcontractors will be required to submit a copy of each weekly payroll together with a Contractor's Weekly Statement of Compliance covering the payroll to the Officer in Charge of Construction within seven days after the regular payment date of the payroll period. The receipt of these payrolls and statements is made a condition precedent to payment for any amounts due under the contract.

1.30.1 Payroll. The payroll shall be identified by the name of the contractor, contract number and the location of the site of the work. Payrolls shall state accurately and completely for each employee, his name, classification, social security number, rate of pay, daily and weekly hours worked, wages earned, all deductions from such wages and the actual weekly wages paid. Contractors are required to submit employee's address with the payroll on which the employee's name first appears.

1.30.2 Contractor's Weekly Statement of Compliance shall be executed on the form furnished for the purpose by the Officer in Charge. Contractors shall list by title or name, all deductions made, omitting from the listing the dollar amount of the deductions.

1.30.3 A sworn affidavit accomplished by the contractor, stating that he and his subcontractors have complied with the labor standards provisions of the contract, must accompany each request for reimbursement. Affidavit form will be furnished by the Officer in Charge of Construction.

1.31 Subcontractors and personnel. Promptly after the award of the contract, the contractor shall submit to the Officer in Charge of Construction, in triplicate, a list of his subcontractors and the work each is to perform. On this form shall appear the names of the key personnel of the contractor and subcontractors, together with their home addresses and telephone numbers, for use in event of any emergency. From time to time as changes occur and additional information becomes available, the contractor shall amplify, correct and change the information contained in previous lists.

1.32 Storm protection. Should warnings of winds of gale force or stronger be issued, the contractor shall take every practicable precaution to minimize danger to persons, to the work, and to adjacent property. These precautions shall include closing all openings; removing all loose materials, tools, and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

1.33 As-built drawings. On completion of the work, one print of each of the drawings accompanying this specification shall be neatly and clearly marked in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, and delivered to the Officer in Charge. Where a choice of materials and/or methods is permitted herein; and where variations in the scope or character of the work from the entire work indicated or specified are permitted either by award on bidding items specified for that purpose or by subsequent change to the contract; the as-built drawings shall define the construction actually provided. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as may be necessary for legibility and clear portrayal of the as-built construction; the marked prints shall be subject to approval before acceptance.

1.34 Procurement of materials from Soviet-controlled areas. No materials, supplies or manufactured products originating from sources within Soviet-controlled countries or areas shall be used, furnished or installed under this contract. The prohibited areas presently include: Albania, Bulgaria, China, including Manchuria (and excluding Taiwan (Formosa)) (includes inner Mongolia; the provinces of Tsinghai and Sikang;

Sinkiang; Tibet; the former Kwantung leased territory, the present Port Arthur Naval Base area and Lisoning Province), communist-controlled area of Viet Nam and Communistic-controlled area of Laos, Czechoslovakia, East Germany (Soviet zone of Germany and the Soviet section of Berlin), Estonia, Hungary, Latvia, Lithuania, North Korea, outer Mongolia, Poland and Danzig, Rumania, Union of Soviet Socialist Republics.

1.35 Priorities, allocations and allotments. The contractor agrees, in the procurement and use of materials required for the performance of this contract, to comply with the provisions of all applicable rules and regulations of the Business and Defense Services Administration, including Defense Materials System regulations. If the initial contract price hereunder does not exceed $100,000 this project is made a rated order pursuant to DMS Regulation 2 and is assigned DO rating C-2. The contractor is hereby made a self-authorizing contractor as defined in Section 3(u) of that regulation and is required to use the self-authorization provisions of Section 15 in obtaining controlled materials, as well as products and materials other than controlled materials, needed to fill this rated order.

1.36 Responsibility for testing. Where tests are specified to be made by the Government, the Government will make the initial tests at its expense. Should the initial samples fail to meet the requirements of the specifications, all succeeding tests of additional samples shall be made by an approved testing laboratory or agency at the expense of the contractor.

1.37 Schedule of prices. Upon receipt of a notice of award the contractor shall prepare a detailed breakdown of the contract price giving the quantities of the various kinds of work and the unit and total prices therefor. This breakdown shall be submitted promptly to the Officer in Charge on NAVDOCKS Form 83 in octuplicate. The forms will be furnished by, and shall be executed in a manner satisfactory to the Officer in Charge. The submission of the required data shall not otherwise affect the contract terms.

1.38 Prints furnished to contractor. Five prints and one reproducible print of each drawing accompanying this specification will be furnished the contractor without charge. Additional prints required by the contractor shall be reproduced by him at his own expense.

1.39 Radio-interference suppression. Electric motors shall comply with specification no. MIL-I-16910A relative to radiated and conducted radio-interference. Tests for radio-interference will not be required for motors that are identical physically and electrically to those that have previously met the requirements of specification no. MIL-I-16910A. Radio-interference suppression and tests will not be required for electric motors without commutation or slip-rings having not more than one starting contact and operated at 3600 revolutions per minute or less.

1.40 Location of underground utilities. Where existing piping, utilities and underground obstructions of any type are indicated in locations to be traversed by new piping, ducts, and other work provided hereunder, and are not indicated or specified to be removed, the elevations of the existing utilities and obstruction shall be determined before the new work is laid closer than the nearest manhole or other structure at which an adjustment in grade could be made. For any additional work required by reason of conflict between the new and existing work, an adjustment in contract price will be made in accordance with clause 4 of form no. 23A.

1.41 Information regarding Buy American Act.

(a) Pursuant to the Buy American Act (41 U.S. Code 10 a-d), it is generally required that only domestic construction materials will be used in the performance of the contract. See clause entitled "Buy American Act", of NAVDOCKS Form 113. This requirement does not apply to construction materials or their components, included in the list set forth in paragraph 6-206 of the Armed Services Procurement Regulation.

(b) Additional exceptions are permitted if the Government determines as to particular construction materials that the requirement would be impracticable or would unreasonably increase the cost. Therefore, bids or proposals proposing the use of nondomestic construction materials (other than those referred to in paragraph (a) above) may be eligible for award if such nondomestic construction materials are specifically designated in the bid or proposal and if accompanied by data demonstrating that, as to each such designated nondomestic construction material, use of any corresponding domestic construction

material would be impracticable or would unreasonably increase the cost. If the Government determines that an exception from the Buy American Act should be made, an exception for the particular construction materials designated will be noted in the contract and the findings which justified the exception may be inspected upon request.

(c) To show that the use of a particular domestic construction material would unreasonably increase the cost, accompanying data must show that the cost of any available acceptable domestic construction materials, delivered at the construction site, would exceed by more than six percent (6%) the cost of the designated nondomestic construction material delivered at the construction site (including any applicable duty). The accompanying data shall reflect a thorough canvass of dealers and suppliers handling the construction materials involved.

1.42 Quarantine. The entire Camp Lejeune reservation, including Camp Lejeune, Camp Geiger, and Marine Corps Air Facility, Peterfield Point (New River) have been quarantined by the United States and North Carolina Departments of Agriculture for the White Fringed Beetle. Compliance with the Quarantine regulations established by these authorities as set forth in the U.S.D.A. Quarantine No. 72 and North Carolina State Quarantine No. 7 is required for operations hereunder. Pertinent requirements of the quarantine include the following:

1.42.1 Certification is required for the following articles and they shall not be moved from the reservation unless accompanied by a valid inspection certificate issued by an authorized White Fringed Beetle Inspector.

(a) Soil, sand or gravel moved independently or attached to other articles, such as heavy equipment including drag lines, road grading machines, ditch diggers, bulldozers, and equipment with tracks or cleats.

(b) Nursery stock, plants and sod.

(c) Scrap metal.

1.42.2 Authorization for movement of equipment shall be obtained from the Officer in Charge, and requests for inspecting shall be made sufficiently in advance of the date of movement, to permit arrangements for the services of authorized inspectors. The equipment shall be prepared and assembled so that it may be readily inspected. Articles and materials requiring certification for movement shall be removed from the equipment by washing with water and such other means as are necessary to accomplish complete removal. Resulting spoil shall be wasted as directed.

1.43 Cleaning-up. Upon completion of the work the contractor shall remove all debris from the site. All debris shall be hauled to a Government dump, a distance not exceeding 6 miles from the site of the work, and placed where directed and the premises shall be left free from all litter and refuse; exterior grounds shall be left in a raked, clean condition.

1.44 Schedule of progress. Within 10 days after receipt of a notice of award or other advice to proceed, the contractor shall prepare and submit for approval a detailed schedule of expected progress of the work under the contract. This schedule shall be graphic in form, shall identify items or groups of items tabulated in the Schedule of Prices, and shall show the approximate dates on which each part or division of the work is expected to be begun and finished. This schedule shall be submitted to the Officer in Charge in quadruplicate. The forms shall be furnished by and shall be executed in a manner satisfactory to the Officer in Charge. The required data, when approved by the Officer in Charge, will serve as a basis for evaluation of the performance of the contractor and for scheduling utilization of the completed work by the Government.

1.45 Construction equipment. Entry of construction equipment on the job site shall conform to the approved progress schedule. After entry on the job site, major construction equipment shall not be removed without approval of the Officer in Charge. Major construction equipment includes all equipment items more than 2 HP in size or not hand-held for operation.

SECTION 2. EARTHWORK

2.1 Elevations and obstructions. Bids shall be based on the following:

(a) That the surface elevations are as indicated;

(b) That no pipes or other artificial obstructions, except those indicated will be encountered; and

(c) That hard material will not be encountered.

In case the actual conditions differ substantially from those stated and/or shown, the provisions of Clause 4 of U. S. Standard Form No. 23A respecting an adjustment for changed conditions shall apply, subject to the requirement of notification thereunder being given. Hard material shall be defined as solid ledge rock, boulders more than one-half cubic yard in volume or any cemented material requiring blasting for removal.

2.2 Clearing and grubbing.

2.2.1 General. Brush, woods and other symbols indicating vegetation are not all inclusive and are shown in approximate locations only. Clearing shall be performed within the limits as follows:

(a) New Well Houses as indicated.

(b) Underground utility lines, a minimum of 5 feet each side of the center line and to the construction requirements otherwise.

(c) Power lines, 25 feet each side of the center line, including all projecting limbs or branches within these limits and all dead limbs, dead trees and leaning timber outside of the clearing line which may endanger or constitute an incipient hazard to the new line in falling.

2.2.2. Clearing shall include the cutting, removal and satisfactory disposal of all trees, brush and undergrowth including those described on the power line. All vegetable growth shall be cut off flush with the ground. Trees from which saw logs, pulpwood, posts, poles or ties can be produced shall be considered merchantable timber. All merchantable timber shall be trimmed of limbs and tops and shall be sawed into merchantable lengths and stockpiled on the site where directed.

SECTION 5. EARTHWORK

5.1 Excavation and Obstructions. Work shall be based on the following:

(a) That the surface elevations are as indicated;

(b) That no pipes or other artificial obstructions, except those indicated will be encountered; and

(c) That hard material will not be encountered.

In case the actual conditions differ substantially from those stated above, the provisions of Article 1.4 of Section No. 234 respecting an adjustment for changed conditions shall apply. Subject to the requirement of certification thereunder being given, hard material shall be defined as solid ledge rock, boulders more than one-half cubic yard in volume or any cemented material requiring blasting for removal.

5.2 Clearing and Grubbing.

5.2.1 General. Brush, weeds and other growths indicating vegetation are not all inclusive and are shown in approximate locations only. Clearing shall be performed within the limits as follows:

(a) Pre Work Items as indicated.

(b) Underground utility lines, a minimum of 5 feet each side of the center line and in the construction requirements drawings.

5.2.2. Clearing shall include the cutting, removal and disposal of all trees, brush and undergrowth (excluding shrubbery adjacent to the house). All vegetation shall be cut off flush with the ground. Trees from which saw logs, pulpwood, posts, poles or ties can be produced shall be considered merchantable timber. All merchantable timber shall be broken of stubs and logs and shall be sawed into merchantable lengths and stockpiled on the site where directed.

2.2.3 Grubbing shall be performed within the area designated for clearing only to the actual construction limits and shall include the removal of all vegetation and other objectionable material under foundations to a depth of 18 inches; to a depth of 6 inches below trench bottoms; and to a depth of 6 inches below subgrade or natural ground within remaining area.

2.2.4 Burning. All shrubs, brush, stumps, matted roots, refuse and other objectionable material shall be burned within the cleared area, except that when permitted, large stumps and other material that will not burn may be otherwise disposed of. Material that will not burn will be considered debris and disposed of as specified elsewhere. All fires for burning refuse shall be at locations where directed and shall be tended in a manner to eliminate all hazards to buildings, structures, trees and other property. Approval shall be obtained prior to the setting of all fires. Disposal by burning shall be under the constant attendance until members have burned out or have been extinguished.

2.5 Topsoil. Material from the excavation suitable for topsoil shall be deposited in piles separate from other excavated material. Piles of topsoil shall be so located that the material can be used readily for the finished surface grading in the areas designated for planting, and the topsoil shall be protected and maintained until needed. Topsoil shall be spread to a uniform thickness of four inches over the ground in the areas where the natural soil condition has been disturbed as a result of the operations of this contract except topsoil shall not be required over the following areas:

(a) On Raw Water main from station 0 + 50 to station 42 + 35 along Trailer Court Road;

(b) on Raw water main from Holcomb Boulevard to Sneads Ferry Road between stations 1 + 70 and 3 + 75; and

(c) along the new power line along Trailer Court Road.

If sufficient topsoil cannot be secured from the project area site, it shall be secured from borrow pits less than five miles distant. Where used for finished grading of the surfaces to be planted to grass, topsoil shall be spread uniformly over the designated areas. Such borrow pits are Government owned. Stripping, loading, hauling and distribution shall be at the Contractor's expense.

2.6 Shoring and pumping. Excavations shall be shored and braced by members of suitable sizes and arrangement where necessary to prevent danger to persons or structures, injurious caving, or erosion. Shoring, bracing and sheeting shall be removed, as the excavations are backfilled in a manner such as to prevent injurious caving. All excavations shall be kept free from water while construction therein is in progress.

2.7 Location and protection of existing utility lines. Existing utility lines are shown approximately. It shall be the contractors responsibility to locate accurately these lines prior to the use of mechanical equipment for excavation purposes. All underground electrical, telephone, and fire alarm cables shall be protected by supporting in an enclosed box or channel.

2.8 Excavation.

2.8.1 Excavation for structures. All materials shall be excavated to the dimensions and levels indicated or as required. Excavations carried below the depths indicated, without specific directions, shall be refilled to the proper grade with thoroughly compacted, suitable fill, except that in excavations for footings the concrete shall be extended to the bottom of the excavations; all additional work of this nature shall be at the contractor's expense.

2.8.2 Trench excavation. Pipe trenches shall be excavated true to line and grade and of width to provide accurate working and inspection. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of pipe and shaped to fit the lower 1/4 of the circumference of the pipe on firm soil throughout its length, except for portions of the pipe sections where it is necessary to excavate for bell holes and the proper sealing of the pipe joints. Such excavation shall be made after the trench bottom has been graded.

2.9 Filling, backfilling, and grading.

2.9.1 All backfill about the structures shall be placed, as far as practicable, as the work of construction progresses, except that backfilling against foundation walls shall be done only when directed.

2.9.2 Material for fill and backfill shall be free from vegetable matter, roots, refuse or other unsuitable material and the moisture content shall be such that proper compaction will be obtained. All fill and backfill shall be placed in thoroughly compacted layers of not more than 6 inch thickness. All fill and backfill shall be compacted to a density of 95 percent at optimum moisture content as determined by compaction test specified hereinafter.

2.9.3 Trench backfill. As soon as practicable after the pipe has been installed and joints have acquired a suitable degree of hardness, backfilling of the space between pipe and sides of the trench shall be packed by hand shovel with selected sand and thoroughly compacted with hand tamper as fast as placed up to a level one foot above top of pipe. The fill shall be placed uniformly on both sides of the pipe and neither horizontal nor vertical alignment of the pipe shall be disturbed. The remainder of the trench shall be filled with clean earth free from vegetable or other objectionable material and thoroughly compacted in layers not exceeding 12 inches in depth by rolling or mechanical tamping; except that under all roadways, service drives, railroad crossings, and other travelled areas, backfill shall be compacted by mechanical tamping in 6 inch layers for the entire depth of the trench. If required, the backfill material shall be wet by sprinkling before rolling or tamping. Care shall be taken that lumps shall not become nested and that all voids between lumps shall be completely filled with fine material. No large masses of backfilling material shall be dropped into the excabation, as from a grab bucket, in such a manner as to disturb pipe or structure. The trench backfill shall be compacted to a density of 95 percent at optimum moisture content as determined by compaction test specified hereinafter.

2.9.4 Grading. The contractor shall perform all grading in the areas so indicated. Fill shall be brought to finished grades indicated and shall be graded to drain water away from structures. Existing grades which are to remain and which are disturbed by the contractors operations shall be graded to provide surfaces suitable for the proper use of mowing machines.

2.10 Borrow. It is not anticipated that any borrow will be required, but, if such becomes necessary it shall be taken only from an approved location as directed. Borrow pits shall be so excavated that drainage is provided and shall not be left in unsightly or unsanitary condition. Stripping, loading, hauling and placing of borrow shall be at the contractor's expense.

2.11 Disposition of surplus material. Surplus material not required for filling, backfilling or grading shall be wasted as directed, waste haul shall not exceed 6 miles.

2.12 Compaction tests.

2.12.1 Wherever in the specifications percentages of density are called for the maximum density at optimum moisture content shall be determined in accordance with A. A. S. H. O. Standard Method T99-49, modified as follows:

(1) Test material preparation. All material retained on the 3/4 inch sieve shall be removed and replaced with an equal quantity (by weight) of the sample material which passes the 3/4 inch sieve and is retained on the number 4 sieve. The resulting material, when thoroughly mixed, will then be used in making the moisture-density determinations.

(2) Apparatus and methods

(a) Laboratory method
Mold - Standard C. B. R. Mold
Hammer - Weight 10 lbs., diameter 2"
Drop - 18"
Layers - 5
Blows - 55 per layer

(b) Field method
Mold - Standard Proctor Mold
Hammer - Weight 10 lbs., diameter 2"
Drop - 18"
Layers - 3
Blows - 25 per layer

After these two methods have been checked using material occurring in the work, use of the field method may be authorized for control expediency. If the results of the two methods do not compare favorably, the laboratory method shall be used. The contractor shall furnish all equipment and materials for the test and shall perform the tests as required. The tests will be witnessed by the Government.

2.13 Pavement cuts. Wherever necessary pavement may be carefully cut to permit the installation of any type utility. Trenches shall be cut on a straight line to width required for the particular utility, in no case less than 12 inches. After the utility has been installed, the backfill shall be brought to an elevation 1 inch above the existing pavement and left open to traffic for a period of not less than 14 days. Any subsidence shall be promptly repaired. Before removing the excess earth for the concrete base, the existing pavement shall be cut back on each side of the break not less than 6 inches and for the full length of the pavement and then excavated for the depth of the concrete base. The concrete for the base shall be Class D and shall be placed for the full width of the break. The concrete shall be placed to a uniform thickness of 5 inches and the top left in a level and rough textured finish. The materials for the asphalt top shall be of the same composition as the existing pavement. The asphalt shall be placed 1/4 inch above the existing pavement and featheredged on each side.

(b) Apparatus and methods

(i) Laboratory method

2.14 Restoration. All existing pavement or other construction through which trenches are cut, either within or without the designated project area or that may be otherwise damaged as a result of the operations of the contractor, shall be restored to the original condition upon completion of the work.

2.15 Seeding and grassing. Areas specified to receive topsoil shall be seeded and a stand of grass produced. The quality of all fertilizer, lime and seed and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Fertilizer, Lime and Seed Law; and with the rules and regulations adopted by the North Carolina Board of Agriculture in accordance with the provisions of said law.

2.15.1 Seeding operations shall be completed during the following period: between 1 April and 15 September. Bids shall be based upon seeding with Bermuda grass. Should work operations be such that completion occurs outside of the above dates, lime, fertilizer and seed shall be turned over to the Government and an adjustment in the contract price will be made in accordance with Clause 4 of Standard Form 23A.

(a) Lime and fertilizer shall be uniformly spread over the area and thoroughly disced, harrowed or raked into the top one and one-half inches of surface, and watered. The lime will be applied at the rate of 20 pounds per 1,000 square feet and fertilizer at the rate of 20 pounds per 1,000 square feet at least three days before seeding. The lime shall be an approved hydrated agricultural lime. The fertilizer shall be ready-mixed fertilizer or organic base bearing analysis of a recognized authority. Formula for the fertilizer shall contain 6% nitrogen, 8% phosphoric acid, and 6% potash. Both lime and fertilizer shall be delivered on the job in the manufacturer's container, plainly marked and unopened.

(b) The seed shall be delivered to the job in the original containers showing the guaranteed seed:

100% Bermuda(hulled)

No seed in the mixture shall show a purity of less than 90% or germination quality of less than 85%. The seed shall be uniformly sown, at the rate of five pounds per 1,000 square feet of area, by hand or approved seeding equipment. The surface of the seed bed shall be lightly raked or otherwise worked to cover the seed with a layer of soil not more than one-fourth inch in depth, after which it shall be rolled with an approved lawn roller, not less than 18 inches in diameter, weighing not more than two hundred ten pounds per foot of width, and watered with a fine spray.

(c) No lime, fertilizer or seed shall be applied when the wind is strong or when the soil is extremely wet or otherwise unworkable. No rolling shall be done if precipitation after seeding should make the operation detrimental to the seed bed. The contractor shall notify the Officer in Charge and receive his approval before performing any planting operation.

2.15 Grassed area. A grassed area shall be considered established when it presents a green appearance from eye level fifty feet away and the specified grass is vigorous and growing well in each square foot of seeded area. It is not required that the seeded area be thick and heavy as an old established lawn.

2.16 Existing shrubbery in tilled areas along Holcomb Boulevard, Sneads Ferry Road and at the Main Water Plant which may interfere with the construction and which the Government may wish to preserve will be removed by the Government. The contractor shall notify the Officer in Charge of such obstructions, in writing, prior to starting work in that particular area. Should the Government not wish to preserve any or all of such shrubs the contractor shall dispose of them in the same manner as specified for clearing and grubbing at his own expense.

SECTION 3. WOOD PILING

3.1 Piles shall be in accordance with Specification No. MM-P-371a Class B yellow pine or Douglas Fir Type II. They shall be given a preservative treatment with coal-tar creosote oil by the full-cell pressure process. The retention of oil per cubic foot of wood shall be not less than 16 pounds for yellow pine and 12 pounds for Douglas fir. The creosote oil and method of preservative treatment shall be in accordance with the current edition of the Manual of Recommended Practice of the American Wood Preservers' Association.

3.2 Certification of Treatment. The contractor shall furnish the Government certification that creosote treatment is in accordance with the materials, method, and amounts of retention specified in this section.

3.3 Precautions in handling and driving creosoted piles. Care shall be taken in handling and in driving to prevent damage to the shell of creosoted wood and every effort shall be made to prevent damage to piles, particularly in portions which will be exposed to marine borer attack or decay. Piles will be inspected in the leads and, where the protective shell of creosoted wood is impaired between cut-off and a point which will be not less than 10 feet below ground, the piles shall be repaired by approved methods, unless the pile is damaged to an extent such that it is rejected. In general, all holes in the portion of the pile subject to exposure shall be plugged neatly and tightly with creosoted wood. Abrasions or other damage which cannot be repaired with plugs shall be given a surface treatment as specified hereinafter for cut surfaces.

3.4 Lengths and numbers of piles. The drawings indicate the number of two-pile bents required. Piles shall be of sufficient length as to provide a minimum penetration of 15 feet below the indicated ground elevation. Lengths shall be the purchased length. The excess of length ordered over the indicated length shall be the responsibility of the contractor. Should the total number of piles, or the minimum or maximum length directed to be used vary from that specified hereinbefore, an adjustment in the contract price and/or the time for completion will be made in accordance with Clause 4, of the contract. If, in driving, it is found that any bearing pile is longer than necessary to obtain the bearing power specified, the pile shall be cut off at the proper elevation provided the minimum penetration below cut-off has been reached; however, no change in the contract price and/or the time for completion will be made by reason thereof. If in driving, it is found that any bearing pile is not of a length sufficient to give the bearing power specified, the contractor shall follow one of the following methods as may be directed:

(1) An additional pile of the length directed shall be driven adjacent to the first pile;

(2) The first pile shall be pulled and a longer pile of the length directed driven.

For such additional work and/or materials, an adjustment in the contract price and/or the time for completion will be made in accordance with Clause 4 of the contract.

3.5 Bearing power. Each pile shall be driven to a minimum penetration of 15 feet below ground plus additional penetration as necessary to obtain a bearing power of not less than 20,000 pounds as determined by the formulas:

$$\frac{2E}{S + 0.1}$$ for double-acting steam hammers;

$$\frac{2Wh}{S + 0.1}$$ for single-acting steam hammers

in which, E equals the energy in foot-pounds per blow based on an acceptable certified statement from the manufacturer of the hammer, W equals the weight of the hammer or ram in pounds, h equals the fall of the hammer or ram in feet, and S equals the average penetration per blow for the last three blows in inches. An allowance shall be made for reduced penetration caused by shock absorption of pile caps and by material penetrated which will be removed after the pile is driven. Should the bearing power specified be developed before the minimum penetration below cut-off is reached, a water jet shall be used to secure such minimum penetration. Approved water jet equipment shall be used.

3.6 Driving. Piles shall be driven with an approved drop or steam hammer. The value of E shall be not less than 8,700 and not more than 20,000 foot-pounds. In jetting a pile, the use of the water-jet shall be discontinued before the minimum penetration below cut-off is reached and the pile shall be driven to such penetration using only the hammer. All piles shall be spaced accurately and shall be held during driving. Batter piles shall be driven in inclined leads to the angle indicated; all other piles shall be driven plumb. Piles shall have the heads and points squared to the driving axis. A suitable iron ring

and/or cap shall be used on the head during driving. All pile heads at cut-off shall be entirely sound. All injured piles shall be replaced with sound piles or shall have the damaged parts repaired, as may be directed; the repair or replacement shall be at the contractor's expense if the injuries are the result of his fault or negligence.

3.7 Fitting. After driving, the piles shall be secured in their proper alignment and cut off at the prescribed elevations. Workmanship shall be smooth and accurate.

3.8 Surface treatment. After piles have been driven and cut, the butts and cut and dapped surfaces shall be given two heavy brush coats of coal-tar creosote oil, the first coat being allowed to penetrate before the second is applied, and then coated with a mixture of creosote oil and coal-tar pitch mixed to a paste consistency. Creosote oil shall be in accordance with the standards of the American Wood Preservers' Association.

SECTION 4. CONCRETE CONSTRUCTION

4.1 General requirements. Concrete construction including reinforceing steel, except as specified otherwise herein, shall be in accordance with specification No. 13Yc. Ready-mixed concrete may be used. All concrete shall be compacted by means of approved, high frequency, mechanical vibrators.

4.2 Cement shall be type I conforming to specification No. SS-C-192a and shall be sampled and tested as prescribed in Federal Test Method Standard No. 158.

4.3 Classes of concrete. All concrete shall be normal concrete and shall be as follows:

Thrust-blocks for water main: D-1
Concrete pavement: D-1
All other concrete: E-1

4.4 Setting miscellaneous material. All pipe sleeves, anchors and bolts, including those for machine and equipment bases, angle frames or edgings, hangers and inserts, door bucks, pipe supports, pipe sleeves, pipes passing through walls, metal ties, conduits, flashing reglets, drains, and all other materials in connection with concrete construction shall, where practicable, be placed and secured in position when the concrete is placed. Anchor bolts for machines shall be set according to templates, shall be plumbed carefully, checked for location and elevation with an instrument, and be held in position rigidly to prevent displacement while concrete is being poured.

4.5 Reinforcement shall be grade A, B, C or E, Type II in accordance with Specification QQ-S-632. All bar chairs, spacers and other reinforcement accessories to be in contact with the forms shall be galvanized.

4.6 Finishes.

4.6.1 Standard finish shall be provided for all exposed concrete except floors.

4.6.2 Steel trowel finish shall be provided for all concrete floors. The concrete shall be brought to final elevation in one lift, thoroughly compacted, and struck off. The aggregate shall be forced away from the surface and the slab floated and screeded to a true, level surface at the elevations indicated on the drawings. After the concrete has set sufficiently to support the weight of the equipment, excess surface water shall be removed and the surface compacted with a heavy power driven rotary float of the metal disc type. Dry cement or cement-aggregate

mixtures shall not be sprinkled on the floor to absorb moisture. Following the compacting, and after water sheen has disappeared from the surface, the floor surface shall be troweled to a smooth, dense finish. Troweling shall be held to a minimum consistent with obtaining the desired finish. Concrete to be so finished shall not contain more than 5 gallons of water per sack of cement.

4.6.3 Nonslip finish, heavy duty type, shall be provided for all exterior platforms, steps and the New Pump Room.

4.6.4 Magnesium-fluosilicate treatment. All concrete floors and wearing surfaces within the buildings, except in pits and trenches, shall be scrubbed with a non-saponifying detergent, rinsed thoroughly with clean water, and allowed to dry. They shall then be given three coats of a solution composed of magnesium-fluosilicate crystals and water; the first coat shall be mixed in the proportions of one pound of dry crystals to one gallon of water, and the succeeding coats in the proportions of two pounds of crystals to one gallon of water. Each coat shall be brushed on liberally and allowed to dry. Following the application and drying of the third coat, spots appearing to be treated incompletely shall be given additional coats as necessary to produce a uniform finish.

4.7 Cleavage joints between vertical concrete surfaces and the floor slabs laid on the earth shall be not less than 1/2-inch wide except where indicated otherwise and shall extend for the full depth of the slab. All cleavage joints shall be filled with a premoulded joint material of the fiber type; the material shall conform to specification No. HH-F-341a. Following the installation of the premoulded material, the top of the joints shall be cleaned thoroughly and filled with a joint sealer conforming to specification No. SS-S-159, SS-S-164, or SS-S-171.

SECTION 5. BRICK MASONRY WORK

5.1 All brick provided shall be common brick and shall conform to specification SS-B-656: they shall have true faces, and straight and sharp edges and corners. Grade H brick shall be used for all brickwork in contact with earth and grade M shall be used elsewhere. The nominal dimensions of brick shall lie between the following limits: Thickness, 2-1/8 to 2-1/2 inches; width, 3-3/8 to 4 inches; and length, 7-3/4 to 8-1/2 inches, but the variations from the nominal dimensions of the brick used shall not exceed the tolerances given in specification SS-B-656; nor shall more than one nominal size brick be used throughout the entire work.

5.2 Mortar shall be mixed in the proportions by volume of one part portland cement, one part lime paste, and six parts sand, or of one part masonry cement and three parts sand. The aggregates shall be introduced and mixed in such a manner that the materials will be distributed uniformly throughout the mass, after which a sufficient amount of water shall be added gradually and the mass further mixed until a mortar of the plasticity necessary for the purpose intended is obtained. The mortar may be machine mixed in approved mixers of the type in which the quantity of water can be controlled accurately and uniformly. The mortar shall be used so that it will be in place before the initial setting of the cement has taken place; retempering of mortar in which cement has started to set will not be permitted. The color of the cement and sand used in the exposed exterior work shall produce, without the admixture of any coloring matter, a mortar of uniform shade that will match the mortar in the existing Main Water Plant building.

5.2.1 Portland cement shall be type I conforming to specification SS-C-192b.

5.2.2 Masonry cement shall be type II conforming to specification SS-C-181, except that it shall be bin or car tested in accordance with specification SS-C-158.

5.2.3 Lime paste shall be made with pulverized quicklime or with hydrated lime, which shall be allowed to soak not less than 72 hours before use, except that hydrated lime processed by the steam method shall be allowed to soak not less than 12 hours, and shall be made by adding the lime to the water. In lieu of hydrated-lime paste for use in mortar, the hydrated lime may, at the contractor's option, be added in the dry form. Pulverized quicklime shall conform to specification SS-Q-351, and shall pass a no. 20 sieve, and 90 percent shall pass a no. 50 sieve; hydrated lime shall conform to the requirements as to chemical

composition and fineness given in specification SS-L-351 and, in addition thereto, the total free (unhydrated) calcium oxide and magnesium oxide in the hydrated product as delivered shall not exceed 8 percent. After being soaked for the period specified, the lime paste shall pass the test for plasticity given in specification SS-L-351 for type F lime.

5.2.4 Sand shall be an approved grade, clean, and free from dirt, silt, organic matter, and other impurities.

5.2.5 Water for mixing shall be fresh and clean, and free from excess acids, alkalies, and other deleterious matter.

5.3 Joints. All exposed joints shall be uniform in thickness. Joints shall be not less than 3/8 nor more than 1/2 inch thick. All exterior and interior exposed joints shall be tooled slightly concave with sufficient force to press the mortar tightly against the unit on both sides of the mortar joint. Horizontal joints shall be tooled first. Tooled and troweled joints shall be brushed to remove all loose and excess mortar. All vertical joints shall be broken immediately over each other.

5.4 Coursing. The actual thickness of brick walls shall be governed by the size of the brick. Where the dimensions of the coursing are indicated, the thickness of joints shall be adjusted to meet the respective requirements; however, the joints, shall be of the same thickness throughout the work.

5.5 Workmanship. Brick shall be so handled that their edges and faces will not be chipped, spalled, or cracked. All beds on which masonry is to be laid shall be cleaned and wetted properly and, unless directed otherwise, all brick shall be wetted thoroughly before being laid and kept damp until placed in the wall. The work shall be built level, square, plumb, and true. All drilling, cutting, and fitting required by other work and for making good after such work shall be done as necessary. Bolts, anchors, plugs, ties, lintels, and other metal work specified elsewhere in connection with the work shall, where practicable, be placed in position as the masonry work progresses. Openings of approved dimensions for pipes and for other purposes shall be provided where necessary. The tops of exposed walls shall be covered with water-tight material while work thereon is not in progress. Unless specified otherwise, common brick shall be used for exterior wall facing, except that over or underburned, warped, spalled, cracked, or broken brick shall not be used where exposed, but may be used as back-up and where concealed. Common brick, where exposed, shall be selected for the better face for stretchers, and the better end for headers. Bonding and coursing for masonry work shall be established before the work is started.

5.5.1 Brickwork shall be laid in common bond with a through header course in every sixth course. Bats shall be used only for closures. All joints between bricks shall be filled completely with mortar. Bed joints shall be formed of a thick layer of mortar, which shall be smoothed, or furrowed slightly. Head joints shall be formed by applying to the brick to be laid, a full coat of mortar on the entire end, or on the entire side, as the case requires, and then shoving the mortar covered end or side of the brick tightly against the brick laid previously; the practice of buttering at the corners of brick and then throwing mortar or scrapings into the empty joints will not be permitted. Longitudinal joints within walls shall be formed as specified for head joints, or may be formed by applying the mortar to the surfaces of the bricks previously laid, and then shoving the brick into place. Closure brick shall be laid with a bed joint and with head joints, and the brick shall be placed carefully without disturbing the brick previously laid. Dry or butt joints will not be permitted. Grouting shall be done only where directed.

5.5.2 Parging. The back of the brick facing, if laid first, shall be parged with a uniform trowel coat of mortar before the backing is laid. If the backing is laid first, the outside face of the backing shall be parged with a uniform trowel coat of mortar before the facing is laid. When applying the parging, extreme care shall be taken not to disalign the facing and/or backing, nor to disturb or break the bond of the cement mortar jointing.

5.6 Brick sills. The bricks shall be laid on edge, sloped, and projected not less than 1/2 inch beyond the face of the wall to form a drip; all joints shall be filled solidly with mortar and troweled smooth.

5.7 Work in freezing weather. Masonry shall not be laid during freezing weather or when it appears probable that freezing weather will be encountered before the mortar has set, unless, subject to approval, proper precautionary measures are taken.

5.8 Cleaning. Upon completion, all masonry work shall be pointed where necessary. All exposed surfaces of exterior and interior common brick shall be washed with a suitable solution of muriatic acid and rinsed thoroughly with clean water. All other work, and adjacent existing work, that might be damaged, stained, or discolored, shall be protected during the cleaning, and all work so affected by the process of cleaning shall be replaced.

SECTION 6. MISCELLANEOUS IRON AND STEEL WORK

6.1 General requirements. Miscellaneous metal shall consist of standard shapes of commerical quality. Cast iron shall be soft, tough, gray iron; castings shall have sharp corners and edges, and shall be clean, smooth, and true to pattern. Welding shall conform to specification No. 22 Yc, except that the welding of pipe shall be in accordance with specification No. 21Yc; welding shall be done in a manner that will prevent permanent buckling and all welds exposed in the finished work shall be ground smooth.

6.2 Workmanship and finish. Workmanship and finish shall be equal to the best practice of modern shops for the respective work. Exposed surfaces shall have smooth finish and sharp, well defined lines and arises. Sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves. All necessary rabbets, lugs, and brackets shall be provided so that the work can be assembled in a neat and substantial manner. Holes for bolts and screws shall be provided. Fastenings shall be concealed where practicable. Thickness of metal and detail of assembly and supports shall provide ample strength and stiffness.

6.3 Shop painting. All surfaces of steel and iron work, except zinc-coated work, and work with bituminous or other priming, shall be shop painted in accordance with specification No. 22Yc.

6.4 Anchors and fastenings. Ties, anchors and other miscellaneous fastenings shown, specified or necessary for the securing of the work in place shall be furnished and installed. Bolts shall be provided with standard hexagon nuts and washers. Strap anchors for water main shall be shaped to the diameter of the pipe. All anchors and fastenings shall be hot-dipped zinc-coated.

6.5 Metal ladder shall be constructed of steel. Upright stringers shall be formed of flat bars 2 1/2 inches by 5/8 inch thick or 2 1/2 inch by 3/8 inch channels; rungs shall be 3/4 inch round bars, 24 inches long, cut through and welded to the stringers. Anchorage to walls shall be by offset brackets of steel 2 1/2 inches wide by 5/8 inch thick through bolted to the masonry walls. The ladder terminals at floor and coping shall be bent out at right angles to the flat side of the stringer and bolted to floor and coping with expansion shields.

6.6 Lintels of standard structural shapes shall be provided as indicated in masonry walls.

6.7 Steel joists shall conform to the current "Standard Specification for Open Web Steel Joist Construction" adopted by the Steel Joist Institute. Joists shall be provided with nailers on the top chord consisting of treated timber as specified in section of this specification titled "Carpentry and Joinery."

6.7.1 Accessories. Steel joists shall be provided with all wall anchors, suitable bearing plates, bridging, headers and other accessories in accordance with the requirements of the Steel Joist Institute Specifications. Bridging of the strut type, two rows, placed at the third points of the span shall be provided. Ends of bridging shall be anchored to the walls.

6.7.2 A notarized certificate stating compliance with the Steel Joist Institute specification for open web joist construction shall be submitted with shop drawings prior to the installation of joists.

SECTION 7. METAL DOORS AND WINDOWS

7.1 Metal doors and frames.

7.1.1 General requirements. Materials and methods of construction shall conform to the applicable requirements of specification no. 32Ya, except as modified herein. Glazing stops shall be placed on the interior side of exterior doors. Furniture steel shall conform to specification no, QQ-S-00695a (Navy Ships). Black sheet steel shall conform to specification QQ-S-00693a (Navy Ships).

7.1.2 Combination metal bucks, frames, and trim shall be provided for all metal door openings, except where other materials or types are indicated and/or specified. Frames shall be modified where necessary to suit the actual thickness of walls to obtain the finished conditions indicated. They shall be formed of furniture steel weighing not less than 3.125 pounds per square foot. All corners shall be mitered, welded the full length of the joints, and ground smooth. Each jamb shall be anchored securely to the wall construction with suitable strap anchors spaced not more than 2 feet on center, and an angle clip shall be welded to the bottom of each jamb which shall be secured to the floor construction with not less than two expansion bolts. All frames shall be reinforced as necessary for the proper installation of hardware. All anchors and bolts shall be concealed where practicable. Door stops shall be 1/2 inch wide.

7.1.3 Industrial steel doors shall conform to the applicable requirements of specification no. 32Ya for pressed steel doors, except as modified herein; they shall be of the panel and glazed type as indicated. Steel panels shall be secured in place by welding and in a manner to provide proper weathering and rigidity; continuous metal angles shall be provided for securing the metal panels in place; they shall be secured in place with self-tapping metal screws spaced not more than 6 inches on centers. The completed doors shall be free from twist, warp, or distortion, and shall fit the frames with a minimum amount of clearance. Stiles and rails shall be formed of seamless drawn steel tubing, or of steel plates welded together, or of pressed steel plates welded together. Metal for panels, stiles and rails shall weigh not less than 2.50 pounds per square foot. Bottom rails shall be not less than 6 inches wide and all other rails and stiles shall be not less than 4-1/2 inches wide; rails and stiles shall be not less than 1-3/4 inches thick. The doors shall have smooth finished surfaces, and all corners and edges shall be rounded slightly. The edges of stiles of doors shall be beveled 1/8 inch in 2 inches.

7.1 Materials and Finishes.

7.1.4 Rustproofing. The doors and frames shall be given a rust-resisting treatment and a baked-on metallic primer in accordance with the manufacturer's standard practice, or they shall be cleaned thoroughly of all rust and given a coat of type I red lead paint conforming to specification no. TT-P-86a. Upon completion of the shop work, all marred surfaces shall be recoated thoroughly.

7.1.5 Hardware. Metal door shall be provided with 1-1/2 pairs of butts, type 2107 USP, Size 5-inch in accordance with specification no. FF-H-116c. Lockset type 86 Fw-3 or 161D-2 shall be provided in accordance with specification no. FF-H-106a. Two keys shall be provided for the lock. Pump Room door shall be keyed to match with the Main Water Plant, well house doors shall key with existing well house doors and shall be keyed alike.

7.2 Steel windows, including frames and hardware shall conform to specification no. 10Yc, except as modified by the drawings and/or this specification. They shall be constructed of commercial grade new billet steel and shall be complete with hardware, anchors, operating mechanisms and all other appurtenances necessary for their proper installation and operation.

7.2.1 Hot dip galvanizing for steel windows. All steel material including screen frames shall be hot dipped galvanized and bonderized. The slab zinc (spelter) used shall conform to ASTM Designation B6-49 and shall be equal or better than the grade designated as "Prime Western". The thickness of the zinc coating shall be the normal coating to be obtained by immersion of the material in a bath of molten zinc at a proper temperature and allowing the materials to remain in the bath until their temperature becomes the same as the bath. The weight of the coating shall conform to class B1, ASTM Designation A153-53.

7.2.2 Windows shall be subjected to the loading test requirements of specification 10Yc, except that the windows shall show no permanent deflection greater than 1/32-inch for units three feet eight inches or less in width, or 3/32-inch for those more than three feet eight inches wide. Loading tests will be waived in cases where the contractor furnishes satisfactory evidence, including affidavits from the sash manufacturer, that units of a similar type, width and construction proposed have met such previous tests.

7.2.3 Steel windows shall be of the pivoted type and provided with continuous glazing stops.

7.3 Caulking. All joints between metal and other materials on the exterior of the building shall be filled and calked with calking compound in a manner to exclude dust, air, rain, and snow.

7.3.1 Caulking material shall be in accordance with specification No. TT-C-598, and shall consist of an approved light gray, elastic, waterproof and non-corrosive compound. When set, it shall be firm but not hard or brittle, and the oils shall not leave the body of the material to such an extent as to extend beyond the periphery of the material when it is applied to any type of masonry or wood, and shall be of such nature that it will not stain stone or corrode metal. It shall be non-bituminous and shall be composed of specially prepared porous pigments so treated that they will absorb and retain sufficient oil to provide long life, elasticity, and complete and permanent adhesion to wood, iron, glass, stone, tile and brick. After application, the compound shall not sag, pucker, crack or shrink under any weather condition. Oakum shall be untreated type, free of oil or grease, and shall be dry.

7.3.2 Preparation of surfaces. Joints and spaces to be caulked shall be thoroughly dry before installing the caulking compound and shall be raked and cleaned out to a depth of 3/4 inch. Joints and spaces which are deeper than 3/4 inch shall be filled solidly with genuine untarred oakum to within 3/4 inch of the surface.

7.3.3 Application. Caulking compound shall be applied by the gun method using nozzles of the proper size to fit the widths of the various joints. Where a suitable backstop has not been provided the back of the joint groove shall be packed with oakum. The compound shall be driven into the joint with sufficient pressure to force out all air and to solidly fill the joint groove. Calking, where exposed, shall be free of wrinkles and shall be uniformly smooth. Joints in horizontal or wash surfaces shall be filled slightly convex to obtain a flush joint when dry. Caulking around all openings in masonry shall include the entire perimeter of the openings. Upon completion of the caulking, any caulked joints not entirely filled shall be roughened and filled as specified and the exposed surface tooled smooth. The surfaces of all materials adjoining caulked joints shall be cleaned of any smears or compound or other soiling due to the caulking application.

7.4 Glazing.

7.4.1 General requirements. Glass shall conform to specification no. DD-G-451a; where applicable. Elastic glazing compound, type I, conforming to specification no. TT-P-781a shall be used for glazing metal sash and doors.

7.6 Caulking. All joints between wood and other materials on the exterior of the building shall be filled and caulked with caulking compound in a manner to exclude dust, dirt, rain, and snow.

7.4.2 Rolled glass. Type IIIa, clear wire glass, flat polished both sides and not less than 1/4-inch thick shall be used for all glass.

7.4.3 Setting. All glass shall be bedded and back puttied using the elastic glazing compound specified, shall be set without springing or forcing and shall be held in place with approved stops.

7.4.4 Cleaning. Following the completion of the work, all new glass shall be washed clean.

SECTION 8. CARPENTRY AND JOINERY

8.1 General requirements. Workmanship and materials shall be in accordance with specification no. 28Yc unless specified otherwise herein. All lumber shall be grade-marked and trade-marked in accordance with the lumber association under whose rules it is grade marked and trade-marked or accompanied by a certificate of inspection as required in the section titled "GENERAL CLAUSES". Moisture content shall not exceed 19 percent for framing or 15 percent for finish items. All lumber shall be S4S; all material for millwork shall be kiln dried.

8.2 Lumber grades shall be as follows:

8.2.1 All framing, nailers on steel joists, decking on steel joists: Number 1 dimension southern pine, or construction grade Douglas fir.

8.2.2 One-inch nominal thickness roof sheathing, blocking and wood cant strips: number 2 common, or equal grade Douglas fir.

8.2.3 Exterior trim: Grade B or better southern pine or Douglas fir.

8.2.4 Plywood: Type C-D sheathing, conforming to Commercial Standard specification CS45-55.

8.3 Wood treatment. All lumber provided shall receive a water-borne pressure preservative treatment in accordance with the current "Manual of Recommended Practice of the American Wood Preserver's Association. Lumber shall not be down-graded by the treatment, and shall be redried after treatment to the aforementioned moisture content.

8.4 Application of roof sheathing. All roof sheathing shall be tongue and groove material and shall bear over not less than two supports.

8.4.1 Two inch roof sheathing shall be blind nailed through the tongue and face nailed with two nails at each with one nail bearing. Nails shall be number 12 steel nails of the annular ring type. No more than three joints shall occur together at any one support.

8.4.2 One inch nominal roof sheathing shall be blind nailed through the tongue with one nail and face nailed with two nails at each bearing. Nails shall be number 8, steel nails of the annular ring type.

SECTION 9. ROOFING AND SHEET METAL WORK.

9.1 General requirements. Materials and methods of installation shall conform to the applicable requirements of specification 7Yg, except as specified otherwise herein.

9.2 Built-up roofing.

9.2.1 General requirements. All roof decks shall be dry, clean, smooth, and free from projections that might puncture the roofing felts. All roofing felts shall be kept dry, prior to, and during installation. Each days application of felt shall be protected and covered with at least a glaze coat of hot bitumen, using not less than 25 pounds of hot bitumen for each 100 square feet of roof surface. The application of any roofing materials will not be permitted on any roof deck when the temperature is below 40 degrees F.; when there is any ice, frost, surface moisture, or dampness visible on the roof deck. Slag or gravel surfacing shall be applied to all built-up roofing within a time period of not more than 48 hours after all felts are in place. For coal-tar-pitch roofing, the first two plies of felts applied shall be permitted to overhang all eaves and edges a distance of not less than 12 inches; after all the specified plies of felt are mopped in, the overhanging felts shall be turned back and over onto the roof deck and then mopped in. Storing, walking, wheeling, or trucking will not be permitted directly on insulated or uninsulated roof surfaces; smooth, clean board or plan walkways, runways, and platforms shall be provided as required; storage loading of platforms shall be limited to 50 psf uniformly distributed load. All roof deck surfaces and all sloped surfaces to roof drains and outlets shall be checked and approved before the installation of any roofing is started; any defects or inaccuracies in the roof deck surface shall be corrected in a satisfactory manner so as to eliminate poor drainage, hollows, and low spots.

9.2.2 Built-up roofing for application on wood roof decks shall be type 4TWS.

9.2.3 Gravel stops shall be cold-rolled copper material weighing not less than 16-ounces per square foot. Gravel stops shall be placed after the four plies of roofing have been applied. Top surface of gravel stop shall be covered with felt base flashing type FL using AA-15 felts, prior to finish surfacing. On the vertical surface, gravel stops shall be secured with an approved 20-ounce continuous copper clip. The lower edge of the gravel stop shall be hemmed to engage the clip and the clip shall be concealed in the finished work. Gravel stops shall extend

6-inches onto the roofs, 4-inches down the vertical surface and project 3/4-inch above the surface of the roofing felts.

9.3 Copper shall be provided for all metal flashings, gravel stops, fascias, gutters, downspouts, ventilators, louvers, and for all other sheet metal work not specified otherwise. Copper shall be cold-rolled material of the temper suitable for the respective forming conditions, weighing not less than 16 ounces per square foot, and conforming to specification QQ-C-576.

9.4 Gravity roof ventilators shall be of the rotary type conforming to the requirements of specification 7Yg, except that the 16 mesh insect screening specified shall be omitted and 3 by 3 mesh per square inch woven wire bird screening substituted; screen wire shall have a diameter of not less than 0.0475 inch. Screening shall be the copper as used for ventilators; it shall be installed in such manner that it can be removed readily for cleaning or rewiring. Ventilators shall be anchored to the curbs in a rigid and secure manner to provide weathertight construction and to prevent vibration and movement.

9.5 Hatchways through roof areas shall be covered with copper. A layer of rosin sized building paper shall be securely nailed to the surface to be covered. All seams in the copper covering shall be double locked and soldered. The copper shall be turned over the edge of the hatchway frame as indicated and provided with a drip. All edges shall be securely fastened to the hatch frame by means of concealed clips.

9.6 Soldering. Joints in copper gravel stops, fascias, gutters and all such metal work shall have locked and soldered or lapped, riveted, and soldered joints; the soldering being done in a manner that will completely fill the joints for their entire length and depth.

9.7 Felt base flashings shall be provided on all parapet walls and shall be type F-1 using RT-30 felts; the felts being extended up the vertical surface and under the coping to within one inch of the outside face of the parapet wall. Plastic cement shall be the coal tar base type in accordance with specification no. SS-C-153.

SECTION 10. WELL CONSTRUCTION

10.1 General requirements. The work includes the provision of four permanent, gravel wall wells, indicated as 33, 34, 35 and 36. The wells are designed to furnish a continuous supply of clear, potable water, conforming to the limits specified hereinafter, of not less than 200 gallons per minute, per unit, with a maximum drawdown of 28 feet.

10.2 Test wells have been driven at each well site and the geologic data obtained therefrom is indicated. Electric logs of each are available in the office of the Officer in Charge.

10.3 Permanent gravel wall wells.

10.3.1 A pit casing shall be installed by drilling a 24 inch diameter hole to the indicated depth for each unit and placing a 17 inch diameter outer casing of the type hereinafter specified.

10.3.2 Grouting. The area between the outer well casing and the native formation shall be thoroughly washed out and filled with Portland cement grout, by pumping with approved equipment. The grout shall be pumped under pressure through a temporary down feed pipe in the wall so arranged that the grout will be forced into the bottom of the annular space between the casing and the hole. Grout shall be pumped continuously, in one operation, until the annular space and all voids and fissures are completely filled, as evidenced by the grout overflowing on the surface. The grout shall be allowed 48 hours to set up before drilling operations are resumed.

10.3.3 Gravel packing. The hole drilled below the pit casing shall be drilled to the depths indicated for each well, and shall be 17 inches in diameter. Each indicated water bearing formation to be developed shall be under-reamed to at least 22 inches in diameter and held open for placing of gravel after the screens and the inner casing have been set. All drilling shall be accomplished with proper drilling clay of the bentonite type having a weight not to exceed 9 pounds per gallon at 15 centipoise viscosity. The Ph value of the drilling mud shall be maintained at 7.6 or more at all times. The drilling clay shall be of a type readily thinned with commercial mud thinners for easy removal from the walls of the wells and the introduced gravel. Screens of indicated lengths shall be provided at each indicated location. After introduction of the gravel is completed, the drilling clay shall be thinned and the well pumped free of all sand, mud, drillings, and other foreign matter.

SECTION 10. WELL CONSTRUCTION

10.1 General requirements. The work includes the provision of four permanent, gravel wall wells, indicated as 23, 24, 25 and 26. The wells are designed to furnish a continuous supply of clear, potable water, conforming to the limits specified hereinafter, of not less than 200 gallons per minute, per unit, with a maximum drawdown of 70 feet.

10.2 Test wells have been driven at each well site and the geologic data obtained therefrom is indicated. Electric logs of each are available in the office of the Officer in Charge.

10.3 Permanent gravel wall wells.

10.3.1 A pit casing shall be installed by drilling a 24 inch diameter hole to the indicated depth for each unit and placing a 17 inch diameter outer casing of the type hereinafter specified.

10.3.2 Grouting. The area between the outer well casing and the native formation shall be thoroughly washed out and filled with Portland cement grout, by pumping with approved equipment. The grout shall be pumped under pressure through a temporary down feed pipe in the well so arranged that the grout will be forced into the bottom of the annular space between the casing and the hole. Grout shall be pumped continuously, in one operation, until the annular space and all voids and fissures are completely filled, as evidenced by the grout overflowing on the surface. The grout shall be allowed 48 hours to set up before drilling operations are resumed.

10.3.3 Gravel packing. The hole drilled below the pit ... to the depths indicated for each well, and shall be 11 inches in diameter. Each indicated water bearing formation to be developed shall be under-reamed to at least 22 inches in diameter and shall ... gravel after the screens and the inner casing have been set. All drilling shall be accomplished with proper drilling clay of the bentonite type having a weight not to exceed 9 pounds per gallon at 15 centipoise viscosity. The Ph value of the drilling mud shall be maintained at 7.6 or more at all times. The drilling clay shall be of a type readily thinned with commercial mud thinners for easy removal from the walls of the wells and the introduced gravel. Screens of indicated lengths shall be provided at each indicated location. After introduction of the gravel is completed, the drilling clay shall be thinned and the well pumped free of all sand, mud, drillings, and other foreign matter.

10.4 Tests. Upon completion of the permanent wells, the contractor shall provide a temporary pump in each well for measuring the flow and drawdown. The temporary pump shall have a capacity of not less than 300 gallons per minute. After determining the static water level in the well, the pumping shall begin at a rate of approximately 75 gallons per minute and the drawdown checked at 15 minute intervals until it stabilizes, after which pumping shall be continued at that rate for 2 hours and the water level checked at 30 minutes intervals. The pumping rate shall then be increased in uniform increments not exceeding 40 gallons per minute and the described procedure repeated at each increment of increased rate until the capacity of the well at the specified drawdown is determined. After the safe maximum yield of the well has been determined, a continuous 24 hour pumping test shall be conducted at that rate and the drawdown checked at hourly intervals. A complete written log of the tests showing static water level, pumping rate, and drawdown at the specified intervals shall be furnished to the Officer in Charge. At the end of the 24 hour test, water samples shall be taken and tested by an approved testing laboratory for complete chemical and bacteriological analysis. Additional samples shall be furnished in suitable containers to the Officer in Charge.

10.5 Materials.

10.5.1 Casings. The outer pit casing, 17 inch diameter, shall be standard weight steel pipe. All other casings shall be genuine wrought iron pipe, conforming to specification no. WW-P-441b, Class A. Joints shall be either threaded and coupled; with heavy recessed-type couplings in which the ends of the pipe shall butt, or they may be field welded.

10.5.2 Well screen shall have an inside diameter of not less than 8 inches and be of not less than 6 gauge material, and shall be of corrosion resistant (stainless) steel type 304, with shutter type openings of proper size and design to hold back and support the gravel used in the gravel envelope around the screens. Joints shall be made with heavy butt-type couplings of the same materials, or by welding.

10.5.3 All gravel used for the gravel envelope around screens shall be round, hard, water-worn, nominal 1/8 inch size "shot" gravel. The gravel shall be of such size as will allow free flow of water in the well and positively prevent the infiltration of sand. It shall be of siliceous material, reasonably smooth and round, and shall be free of mat or elongated pieces as well as of dirt, vegetable matter, or other foreign material. The gravel shall be thoroughly sterilized with hypochlorite before being placed.

10.4 Tests. Upon completion of the permanent wells, the contractor shall provide a temporary pump in each well for measuring the flow and drawdown. The temporary pump shall have a capacity of not less than 350 gallons per minute. After determining the static water level in the well, the pumping shall begin at a rate of approximately 70 gallons per minute and the drawdown checked at 15 minute intervals until it stabilizes, after which pumping shall be continued at that rate for 2 hours and the water level checked at 30 minutes intervals. The pumping rate shall then be increased in uniform increments not exceeding 40 gallons per minute and the described procedure repeated at each increment of increased rate until the capacity of the well at the specified drawdown is determined. After the safe maximum yield of the well has been determined, a continuous 24 hour pumping test shall be conducted at that rate and the drawdown checked at hourly intervals. A complete written log of the tests showing static water level, pumping rate, and drawdown at the specified intervals shall be furnished to the Officer in Charge. At the end of the 24 hour test, water samples shall be taken and tested by an approved testing laboratory for complete chemical and bacteriological analysis. Additional samples shall be furnished in suitable containers to the Officer in Charge.

10.5 Materials.

10.5.1 Casings. The outer pit casing, 17 inch diameter, shall be standard weight steel pipe. All other casings shall be genuine wrought iron pipe, conforming to specification no. TT-P-441b, Class A. Joints shall be either threaded and coupled with heavy recessed-type couplings in which the ends of the pipe shall butt, or they may be field welded.

10.5.2 [illegible] screen shall have an inside diameter of not less than 8 inches and be of not less than 6 gauge material, and shall be of corrosion resistant (stainless) steel type 304, with [illegible] type or proper size and design to hold back and support the gravel used in the gravel envelope around the screens. Joints shall be made with heavy butt-type couplings of the same materials, or by welding.

10.5.3 All gravel used for the gravel envelope around screens shall be round, hard, water-worn, nominal 1/8 inch size "shot" gravel. The gravel shall be of such size as will allow free flow of water in the well and positively prevent the infiltration of sand. It shall be of siliceous material, reasonably smooth and round, and shall be free of pat or elongated pieces as well as of dirt, vegetable matter, or other foreign material. The gravel shall be thoroughly sterilized with hypochlorite before being placed.

10.5.4 Cement grout for sealing the space between the casing and the drilled hole, shall be composed of Portland cement, type I, conforming to specification No. SS-C-192b, and water. The mixed grout shall weigh not less than 14 pounds per gallon.

10.6 Air lines. Each well shall be provided with an air line as indicated. The pipe shall be 1/2-inch diameter wrought iron. Couplings, if used, shall be tack welded to the pipe.

10.7 Sterilizing. The well shall be sterilized by adding chlorine or hypochlorine solution to the water used for placing the gravel. Sufficient chlorine or solution to give the water a chlorine content of 50 P.P.M. shall be fed into the water continuously during the gravel placing operation.

SECTION 11. PIPING, VALVES, ACCESSORIES AND MECHANICAL EQUIPMENT.

11.1 General Requirements. The work includes:

(a) The disconnection of existing piping assemblies at 29 existing deep well pump locations and the provision of new piping, valves, fittings and accessories, and the reconnection of each existing well pump into the existing raw water collection system;

(b) provision of new deep well electric motor driven turbine type pumps complete with accessory equipment, controls and piping indicated, specified or required for proper operation at four new deep wells;

(c) provision of new raw water collection mains complete with valves, fittings and accessories to connect the new wells into the existing raw water collection system; and,

(d) provision of three new raw water, electric motor driven, turbine type pumps, accessory equipment, controls and piping, valves and fittings indicated, specified or required for proper operation.

11.2 Materials. The existing raw water collection mains are cement asbestos pipe and fittings. The feeder branches from the wells consist of outside-coated and cement-lined, cast-iron pipe and fittings. All new pipe and fittings provided in making connection of control valves at existing well assemblies shall be outside-coated, cement-lined, cast-iron. Feeder lines provided from new wells to existing collection lines shall be outside-coated, cement-lined, cast-iron pipe and fittings. Connections of new feeder lines to existing cement asbestos collection mains shall be made with outside-coated and cement-lined, cast-iron fittings and approved cement asbestos adaptors provided by the contractor. New collection lines shall be cement asbestos as specified hereinafter, except that piping supported on piers or piles and piping under streets, drives and railroads shall be outside-coated, cement-lined, cast-iron as specified hereinafter.

11.2.1 Cast-iron pipe shall be class 150, outside-coated, cement-lined, cast-iron pipe in accordance with specification no. WW-P-421a. At the option of the contractor joints may be type I, II or III except that connections to equipment and well control valves shall be flanged and connections between new pipe and existing pipe shall be the same as the existing pipe.

11.2.2 Cast-iron fittings and specials shall be class D, in accordance with the standards of the American Water Works Association, except that fittings for mechanical joint pipe may be short body fittings in accordance with American Standards Association no. A21.10-1952 with mechanical joints as specified for the pipe. Adaptors shall be provided for connection of bell-and-spigot and mechanical joint pipe to flanged accessories. Fittings shall be outside-coated and cement-lined in accordance with the applicable requirements of specification no. WW-P-421a.

11.2.3 Cement-asbestos pipe and fittings shall be class 150 in accordance with specification no. SS-P-351a.

11.2.4 Water piping two inches in diameter and smaller shall be type L copper tubing in accordance with specification no. WW-T-799a and soldered brass or copper composition fittings using 50-50 lead-tin solder.

11.3 Gate valves shall be of the double disc type with non-rising stems in accordance with American Water Works Association Standard AWWA C500-52T. Stems shall have nuts similar to those valves of the existing system. Gate valves shall be of one make, and shall open by a counter-clockwise rotation of the valve stem.

11.4 Check valves shall be of the swing check type, designed for a water working pressure of 150 pounds per square inch with a suitable opening for cleaning without disconnecting from the pipe; the valve shall be all bronze, or cast-iron body with brass or bronze trim, with pin, seat ring and disc face of brass or bronze.

11.5 Back pressure valves shall be flanged globe body, fully bronze mounted, external pilot operated, with free floating piston, single seat with seat bore equal to size of the valve. The piston shall be operated without springs, diaphram or levers. The minimum travel of the piston shall be equal to 25 percent of the diameter of the seat and for true alignment, to correct lateral thrust and stem binding, the piston shall be guided throughout its entire stroke with at least two-point contact alignment. The piston shall be cushioned and so designed as to assure positive closure. The valve shall be packed with leather or other soft, durable material, to insure tight closure and prevent metal to metal friction and seating, and shall be provided with indicator rod to show position of opening of the piston, and pet cocks for attachment to valve body for receiving gages for testing purposes. The design shall be such that repairs and dismantling internally of main valve may be made without its removalfrom the line.

11.5.2 Cast-iron fittings and specials shall be class D, in accordance with the standard of the American Water Works Association; except that fittings for mechanical joint pipe may be short body fittings in accordance with American Standards Association no. A21.10-1952 with mechanical joints as specified for the pipe. Adapters shall be provided for connection of bell-and-spigot and mechanical joint pipe to flanged accessories. Fittings shall be outside coated and cement-lined in accordance with the applicable requirements of specification no. WW-P-421a.

11.5.3 Asbestos-cement pipe and fittings shall be class 150 in accordance with specification no. SS-P-351.

11.5.4 Water piping two inches in diameter and smaller shall be type L copper tubing in accordance with specification no. WW-T-799a and soldered brass or copper composition fittings using 50-50 lead-tin solder.

11.6 Gate valves shall be of the double disc type with non-rising stems in accordance with American Water Works Association Standard AWWA C500-52T. Stems shall have nuts similar to those valves of the existing system. Gate valves shall be of one make, and shall open by a counter-clockwise rotation of the valve stem.

11.7 Check valves shall be of the swing check type, designed for a water working pressure of 150 pounds per square inch with a suitable opening for cleaning without disconnecting from the pipe; the valve shall be all bronze, or cast-iron body with brass or bronze trim, with pin, seat ring and disc face of brass or bronze.

11.8 Back pressure valves shall be flanged globe body, fully bronze mounted, external pilot operated, with free floating piston, single seat with seat bore equal to size of the valve. The piston shall be operated without springs, ... or levers. The minimum travel of the piston shall be equal to 26 percent of the diameter ... and for true alignment, to correct lateral thrust and stem binding, the piston shall be guided through ... the entire stroke with at least two-point contact alignment. The piston shall be cushioned and so designed as to assure positive closure. The valve shall be packed with leather or other soft, durable material, to insure tight closure and prevent metal to metal friction and battering, and shall be provided with indicator rod to show position of opening of the piston, and pet cocks for attachment to valve body for receiving gages for testing purposes. The design shall be such that repairs and dismantling internally of main valve may be made without its removal from the line.

11.5.1 Physical and chemical properties.

Flanges - 125 pound ASA standard for pressures up to 180 p.s.i.

Body - Constructed of first class grey iron free from cold shuts, defective or spongy spots and shall have tensile strength of at least 35,000 pounds per square inch.

Grey iron - ASTM A-126 Class B

Bronze - ASTM B-62

11.5.2 The valve shall be provided with:

(a) A pilot valve, diaphram operated, with ground metal seat or renewable composition seat. The upstream pressure, communicated to the underside of this diaphram shall, when it exceeds the predetermined setting of the valve, act to lift the stem and open the pilot valve and in turn open the main valve. The waste line from this pilot valve shall be discharged to waste at atmospheric pressure. The pilot valve shall be all bronze with loose adjusting key and shall be adjustable so that the indicated setting for each valve will fall approximately in the middle of the valve adjustment range. Valves shall be factory set for the required back pressure for each individual well. The indicated back pressures for new wells 33, 34, 35 and 36 may be varied as result of tests performed after the completion of each well.

(b) Needle valve which shall operate in conjunction with the pilot valve and shall be adjusted for proper timing of the main valve piston travel. The needle valve shall be capable of adjustment without shutting down the main valve. The needle valve shall be all bronze.

(c) Strainer with Monel metal screen and drain petcock. The strainer shall be such that it may be flushed without shut-down and shall be arranged for easy removal of the screen. The strainer body may be iron with bronze trim.

(d) Gate valves shall be provided in the sensing lines to afford shut-off of the flow to and from the pilot valve and the strainer. The gate vales shall be all brass.

(e) Sensing lines shall be of brass, of size as standard with the manufacturer and shall be provided with unions to enable disassembly.

11.6 Pumps provided for the four new wells 33, 34, 35 and 36 and in the new Pump Room shall be of the deep well, turbine type, and shall be complete with hollow shaft electric motor drive and all necessary equipment,controls, and piping indicated, specified or required for proper operation. Pump capacitors and operating heads shall be as indicated for each individual pump. Pumps provided for the four new wells shall be oil lubricated; pumps provided for the new Pump Room shall be water lubricated.

11.6.1 Final settings. The final settings for pumps provided at the four new wells shall be at least 20 feet below the water level in the well when the pump is discharging at the guaranteed capacity; final pumping conditions shall be determined after testing each permanent well and shall be approved by the Officer in Charge. The settings for pumps provided in the New Pump Room shall be as indicated.

11.6.2 Pump speeds. Pumps provided for the four new wells shall not exceed 1800 RPM. Pumps provided in the New Pump Room shall not exceed 1200 RPM. Electrical work shall be as specified in section titled "INTERIOR ELECTRICAL WORK".

11.6.3 Pump head shall be constructed from close grained cast iron, shall be of the heavy duty type, and designed for vertical hollow shaft drive. The pump shall have flanged, above the ground, discharge.

11.6.4 Column. The column pipe shall be of standard weight genuine wrought iron. It shall be in sections not to exceed ten feet in length. It shall be of proper diameter to eliminate undue friction when pumping at pump capacity.

11.6.5 Line shaft. The line shafting and sleeve shall be of stainless steel, ground and polished and of proper size to transmit the full horsepower of the pumping unit without distortion or vibration. The shaft shall be furnished in interchangeable sections not over ten feet in length and shall be fastened with threaded steel couplings having a strength of not less than 100 percent of the strength of the shaft after being assembled. The ends shall be machine finished and undercut for proper butting of the shafts. All threads shall be lathe cut.

11.6.6 Bearings. The pumping unit shall have sufficient guide bearings to maintain the alignment of the pump and shafting and to prevent vibration. The inner column couplings are to be of bronze and will also act as bearings for the line shaft, which must be turned and polished. Oil lubricated bearings shall be provided with oil grooves to effect passage of oil down through the entire length of oil tube and shafting. An automatic lubricator with capacity sufficient for one week of continuous operation shall be provided to feed oil to the bearings. Lubricator shall have sight glass and feed adjustment. Water lubricated bearings shall be of the water lubricated cut and throw rubber type.

11.6.7 Bowls. The pump bowls shall be made of close grained cast iron, free from blow holes, sand holes and all other defects which would impair their strength or durability for the service; accurately machined and fitted to close dimensions. Bowls shall have smooth, curved vanes to efficiently direct the flow of water and to prevent air locking. The bowls shall be of suitable thickness and strength to withstand the shut-off pressure of the unit. Bowls should be fastened together in such a manner that accurate alignment is assured and maintained. Guide passages for water shall be designed and finished as to reduce friction to a minimum.

11.6.8 Impellers shall be of the enclosed type, of stainless steel and heavy construction. Each impeller shall be carefully machined, finished all over, accurately fitted and perfectly balanced both dynamically and hydraulically. Impeller shaft shall be of high grade stainless steel, carefully ground and polished and furnished with lathe cut threads. No keyways shall be cut into the shaft. A long skirt shall be provided to eliminate by-passing under any adjustment of the impeller. Impellers shall have non-overloading characteristics and shall have head characteristics as steep as possible so that an increase or decrease in the operating head above the design point will not cause an excessive decrease or increase in pump capacity. Impellers shall be attached and locked to pump shaft in such a manner that they may easily be removed, and that they will not work loose for any reason.

11.6.9 Suction pipe and strainer. Each new pump in each new deep well shall be provided with a suction pipe of suitable diameter, 20 feet long; and a zinc-coated strainer having a net inlet opening area of not less than five times the area of the suction pipe. The strainer shall be located at the lower end of the suction pipe. The suction end of pump columns provided in the raw water storage reservoir shall be terminated with a bell-shaped intake as indicated.

11.6.10 Motors shall be vertical, hollow shaft, fully enclosed electric motors of the squirrel-cage induction type having ample capacity to properly operate the pumps through their entire head-capacity range without exceeding the rated capacity of the motor. The speed of the motor shall not exceed 1800 revolutions per minute. Motors and controls shall be in accordance with section of this specification titled "INTERIOR ELECTRICAL WORK".

11.7 Placing and laying pipe. All pipe shall be inspected in the sling before lowering into the trench. Metal pipe shall be tapped with a light hammer to detect cracks. Defective, damaged or unsound pipe shall be rejected.

11.7.1 Cast-iron pipe. Deflections from a straight line or grade, as required by vertical or horizontal curves or effects shall not exceed 6/D inches per lineal foot of pipe, where D is the nominal diameter of the pipe in inches, between the centerlines extended, of any two connecting pipes. If the alignment requires deflections in excess of that limitation, the contractor shall provide special bends or a sufficient number of shorter lengths of pipe to conform to the limitation specified. Except where necessary in making connections with other lines, pipe shall be laid with the bells facing in the direction of laying. Except at closures not less than 2 lengths of pipe shall be in position ahead of each joint, with packing installed and earth fill tamped alongside the pipe, before the joint is poured. Where cutting of pipe is necessary, it shall be done with approved mechanical cutters in a manner that will not damage the pipe. Where coatings are damaged, they shall be touched up with material similar to that used for the original coating.

11.7.2 Bell and spigot joints. Before jointing, all lumps, blisters and excess coating material shall be removed from the bell and spigot ends of the pipe. All oil or grease shall be removed. The outside of the spigot and inside of the bell shall be wire brushed and wiped clean and dry. Spigots shall be adjusted in the bells so as to give uniform space all around, and if any pipe does not allow sufficient space for proper calking, it shall be replaced with one of proper dimensions. Adjacent lengths of pipe shall be adjusted with reference to each; blocking or wedging between hub and spigot will not be permitted. Molded or tubular rubber, asbestos, or especially prepared paper rings treated to prevent deterioration or support of bacteria shall be used as gaskets. The gaskets shall be driven or caulked tightly into the annular spaces between the pipes, and shall be of proper size to seal the joint tightly and leave sufficient space for lead as specified. Where rubber rings are used as gaskets, a braided or twisted hemp or jute ring shall be calked into the joint after the rubber ring is placed

11.6.1? Pumps shall be vertical, pedestal? shaft, fully enclosed electric motors of the squirrel-cage induction type having ample capacity to properly operate the pumps through their entire head-capacity range without exceeding the rated capacity of the motor. The speed of the motor shall not exceed 1800 revolutions per minute. Motors and controls shall be in accordance with Section of this specification titled "ELECTRICAL WORK".

11.7 Handling and laying pipe. All pipe shall be inspected in the sling before lowering into the trench. Metal pipe shall be tapped with a light hammer to detect cracks. Defective, damaged or unsound pipe shall be rejected.

11.7.1 Deflection pipe. Deflections from a straight line or grade, as required by vertical or horizontal curves or offsets shall not exceed 6/D inches per lineal foot of pipe, where D is the nominal diameter of the pipe in inches, between the centerlines extended, of any two connecting pipes. If the alignment requires deflections in excess of that limitation, the contractor shall provide special bends or a sufficient number of shorter lengths of pipe to conform to the limitation specified. Except where necessary in making connections with other lines, pipe shall be laid with the bells facing in the direction of laying. Except at closures not less than 2 lengths of pipe shall be in position ahead of each joint, with packing installed and earth fill tamped alongside the pipe, before the joint is poured. Where cutting of pipe is necessary, it shall be done with approved mechanical cutters in a manner that will not damage the pipe. Where coatings are damaged, they shall be repaired with material similar to that used for the original coating.

11.7.2 [illegible] bell and spigot joints. Before jointing, all lumps, blisters, [illegible] shall be removed from the bell and spigot ends of the pipe. [illegible] outside of the spigot and inside of the bell shall be wire brushed and wiped clean and dry. [illegible] inserted in the bells so as to give uniform space all around, and if any pipe does not [illegible] space for proper caulking, it shall be replaced with one of proper dimensions. Adjacent lengths of pipe shall be adjusted with reference to each [illegible] between hub and spigot [illegible] [illegible] treated to prevent [illegible] shall be used [illegible]. The [illegible] shall be driven or caulked tightly into the annular space between the pipes, and shall be of [illegible] the joint [illegible] specified. [illegible] a [illegible] into the joint after the [illegible] is placed.

to prevent contact of the molten lead with the rubber. Gaskets shall not project into the bore of the finished joint. When the joints are approved for pouring, the joints shall be cleaned and the remaining space filled at one pouring with lead which shall be calked in a manner that will assure tight joints without overstraining the bells. The depth of lead shall be not less than 2-1/4 inches measured from the face of the bell. After calking, the lead shall be practically flush with the face of the bells. The lead shall conform to specification no. QQ-L-156.

11.7.3 Roll on joints shall be made with the standard materials furnished with the pipe, and in accordance with the recommendations of the manufacturer, subject to the approval of the Officer in Charge.

11.7.4 Mechanical joints. The jointing shall be in accordance with the recommendations of the manufacturer of the joint except as specified otherwise. Installation shall conform to the procedure recommended in specification no. WW-P-421a. Bolts, nuts and exposed threads shall be coated with asphalt varnish after installation.

11.7.5 Flanged joints shall be in accordance with the recommendations of the pipe manufacturer. Drilling, bolts, and gaskets shall be standard for the flange; flanges shall conform to the applicable requirements of the American Standards Association specifications for Class 125 flanges. The bolts shall be dipped in a rust-preventive material before placing and touched up after tightening.

11.7.6 Cement asbestos pipe shall be laid and connected in strict accordance with the manufacturer's directions utilizing couplings and sealing rings manufactured specially for the pipe provided. Ample special jointing tools of adequate size shall be provided. The contractor shall deliver to the Officer in Charge three (3) copies of the manufacturer's published installation directions prior to starting any work. Connections between cement asbestos pipe and cast-iron pipe shall be made with special adaptors and poured and calked lead joints using the same gaskets as specified for cast-iron pipe. Concrete thrust blocks of concrete, as specified in section titled "CONCRETE CONSTRUCTION", shall be provided at all bends, crosses, tees and line terminations.

11.8 Air release valve. Approved air release valves shall be provided to automatically permit air to escape while the pipe line is in service and under pressure. The valve shall be iron body, bronze mounted and designed for 125 pounds working pressure. The float shall be made of hard rubber with phosphor-bronze levers. The seat shall be hard rubber and plunger of hard quality soft rubber. The construction of the valve shall be such that valve seats may easily be replaced.

11.9 Corporation stops for mounting air release valve shall be 1 inch tapping stops with 1 inch inside thread and for iron pipe and shall be in accordance with AWWA specification C800-48. The installation of the stops shall be in strict accordance with the instructions of the manufacturer of the asbestos-cement pipe provided.

11.10 Manholes shall be provided to house each air release valve and blow-off valve. Manholes shall be of brick with concrete bottoms, complete with cast-iron ring and cover and steel or cast-iron steps as indicated. Brickwork shall be in accordance with section titled "MASONRY WORK". Concrete shall be class D-1 in accordance with section titled "CONCRETE CONSTRUCTION".

11.11 Roadway boxes. Each valve except blow-off valves and air release valves on underground piping shall be provided with an adjustable cast-iron roadway box of a size suitable for the valve on which it is used. The head shall be round and shall have the word "Water" cast upon it. The least diameter of the shafts of the boxes shall be 5.25 inches. Boxes shall be given a heavy coat of bituminous paint.

11.12 Setting valves and valve boxes. Valves and valve boxes shall be set plumb, and centered, with valve boxes placed directly over the valves. Valve boxes shall, if possible, be located outside the area of roads and streets. Earthfill shall be carefully tamped around the valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet.

11.13 Tests. Before being covered, the completed piping shall be subjected to a hydrostatic pressure test of 200 pounds per square inch maintained for 2 hours. All pipe, joints, valves and fittings in the test section shall be examined. Defective material disclosed as a result of the test shall be replaced and the test repeated; any joint showing visible leakage shall be made watertight.

11.14 Sterilization. Before being placed in service, the new piping shall be flushed and sterilized by chlorination in accordance with the American Water Works Association Standard AWWA C601.54. The chlorine solution shall remain in the system at least 24 hours. After final flushing, the quality of the water shall be approved by the Officer in Charge before acceptance.

SECTION 12. ELECTRICAL DISTRIBUTION

12.1 General requirements. The work shall include the providing of all poles, crossarms, wires and cables, insulators, guys and anchors, transformers, switches, lightning arresters, fuse cutouts, hardware, watthour meters, grounding, and all other apparatus and accessories indicated, specified, or necessary to extend, modify, and supplement the existing electrical distribution system to provide electrical service to the new pump room and the four new well houses.

12.2 Existing electrical distribution system is 7.2/12.5 KV three-phase, four-wire, grounded wye.

12.3 Material and workmanship shall conform to specification no. 9Yg and to the applicable codes, standards, regulations and specifications listed there, and to the applicable specifications listed in Section 1. Competent journeymen thoroughly versed in the requirements of the trade shall be employed to accomplish the work.

12.4 Wire and cable of the size and type indicated shall be provided. Conductor shall be installed and sagged in accordance with the manufacturer's recommendations. Copies of all manufacturer's sag and tension charts used in connection with conductor installation shall be provided to the Officer in Charge of Construction.

12.4.1 Bare conductor shall be no. 4 AWG solid medium hard drawn bare copper wire in accordance with American Standards Association standard no. C7.2-1953, revised 1957. Splices under tension shall be made with a compression type splicing tool and suitable copper sleeves. Tie wires shall be No. 6 AWG. Jumpers shall be the same size and type of wire as the line conductor. Care shall be taken in handling and stringing conductors to guard against cuts, scratches, or kinks. Injured portions of the wire shall be cut out and discarded.

12.4.2 Weatherproof wire for the substation secondary buses and service drop to the new pump room shall be No. 250 MCM, AWG, triple braid weatherproof wire in accordance with American Standards Association standard no. C8.18-1948.

12.5 Poles shall be treated Southern Yellow Pine conforming to American Standards Association standard no. C5.1-1948 and shall be of the size and class indicated. Poles shall be pressure treated with a wood preservative conforming to specification no. TT-W-556b and the treatment process shall result in a minimum preservative retention of 12 pounds per cubic foot of wood. Poles shall be roofed, gained, and

bored prior to treatment. Each pole shall be stamped or marked with the manufacturer's designation, the date of treatment, and the length and class of the pole, together with a horizontal mark indicating a location which is ten feet from the butt. Pole setting depths shall be as follows:

Pole Length	Setting Depth
35 feet	6.0 feet
40 feet	6.0 feet
45 feet	6.5 feet

Poles shall be set plumb and in alignment, they shall be thoroughly tamped the full buried depth and the excess dirt banked around the pole. Poles shall be set so that alternate crossarm gains face in opposite directions, except at deadends where the gains of the last two poles shall be on the side of the pole facing the deadend. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side of the pin against the pole.

12.6 Crossarms shall be treated Douglas Fir conforming to Edison Electric Institute specification no. TD-90 and shall be of the cross section and length shown. The preservative shall conform to specification no. TT-W-556b or no. TT-W-570. Crossarms shall be roofed and bored prior to treatment.

12.7 Structural timbers shall be pressure treated Southern Yellow Pine of the sizes shown. Treatment shall be as specified for crossarms.

12.8 Guys and anchors shall be provided where shown. Guy wire shall be 3/8" seven strand high strength grade double galvanized cable conforming to ASTM specification A122. Anchors shall be 10,000 pound expanding anchors with 3/4-inch diameter by 8 feet long galvanized rods or 8-inch diameter screw type anchors with 1-inch diameter by 5 feet 6-inches long galvanized rods. Guys and anchors shall be placed before any wire or conductor is strung. Anchors shall be installed in line with the strain with a maximum of 6-inches of rod extending above ground.

12.9 Insulators wet process porcelain and shall be marked with the initials or trademark of the manufacturer. The markings shall be plainly legible and durable. All new insulators of a type shall be of one size, rating, and manufacturer.

12.9.1 Pin insulators shall meet the following minimum requirements:

EEI-NEMA Class	55-4
Dry flashover	65 KV
Wet flashover	35 KV
Leakage distance	7 inches
Pinhole diameter	1 inch

12.9.2 Suspension insulators shall be of the clevis type and shall meet the following minimum requirements:

EEI-NEMA Class	52-1
Diameter	7-1/2 inches
Dry flashover	65 KV
Wet flashover	40 KV
Leakage distance	7 inches
Strength	15,000 pounds

12.9.3 Spool insulators shall be standard 3-inch groove diameter wet process porcelain insulators, brown finish.

12.10 Hardware, bolts, nuts, washers, screws, braces, etc. shall be in accordance with the apllicable Edison Electric Institute and American Society for Testing Materials standards and specifications listed in Section 1 of these specifications.

12.10.1 Pins. Steel pole top and crossarm pins shall have 1-inch lead thread and shall conform to Edison Electric Institute specification TD-71, with a minimum strength of 1500 pounds based on a 10^{o} deflection. Crossarm pins shall be furnished with 2-inch by 2-inch by 1/8-inch washer, nut, and locknut. The diameter of the shank shall be not less than 5/8pinch. The lead threads shall be securely bonded to the steel and carefully formed to fit the insulator threads. Lead tops shall be designed to prevent localized pressure on the insulator top when it is turned down too tightly.

12.10.2 All bolts shall be furnished with nuts and locknuts and shall be long enough to accommodate the necessary nuts, washers, etc. without projecting more than 1 1/2-inches at the free end, except that they shall not project more than 1/4-inch into the eye where an eyenut is installed.

12.11 Distribution transformers shall be designed, manufactured, and tested in accordance with National Electrical Manufacturers Association standard TR1 and American Standards Association standard C57.12. They shall be of the oil-immersed,self-cooled type suitable for outdoor service, and shall be complete with oil. The KVA rating shall be stenciled on each transformer beneath the secondary bushings. All transformers shall have two fully-insulated high voltage bushings.

12.11.1 New pump room transformers shall be 100 KVA, single phase, 60 cycle, 7200/12470 volts wye to 240/480 volts with four 2-1/2% full capacity taps below normal on the high voltage side. They shall be suitable for platform mounting as shown.

12.11.2 New well house transformers shall be 5 KVA, single phase, 60 cycle, 7200/12470 volts wye to 120/240 volts with four 2-1/2% full capacity taps below normal on the high voltage side. The transformers shall be provided complete with standard crossarm hangers.

12.12 Lightning arresters shall be distribution value type in accordance with National Electrical Manufacturer's Association standards LA1 and LA4, rated 9 KV for use on 7.2/12.5 KV grounded wye system. Arresters shall be provided complete with crossarm mounting brackets.

12.13 Fuse cutouts shall be single insulator, open type, rated for 100 Amperes continuous current at a minimum voltage of 7.2 KV, with a minimum interrupting capacity of 4000 Amperes. Cutouts shall be provided with crossarm mounting brackets.

12.14 Current transformers at the new pump room substation shall be "window" type, rated 600/5 amperes at a maximum primary voltage of 600 volts, suitable for metering service and outdoor mounting. Secondary terminals shall be enclosed in a suitable weather-resistant box with removable cover. The primary opening shall be large enough to accommodate the secondary cables indicated.

12.15 Watthour meters shall be provided on each new service. They shall be socket type complete with bases.

12.15.1 Well house watthour meters, shall be self-contained 3-element, 3-phase, 4-wire delta meters rated 15 amperes at 240 volts.

12.15.2 Pump room watthour meter shall be 2-element, 3-wire, 3-phase, transformer-type meter for use with the current transformers specified above, rated 5 amperes at 480 volts. Circuit-closing devices shall be provided in the socket to short the secondary of the current transformers automatically when the meter is removed.

12.16 Grounding. Each new pole shall be provided with a pole ground and each existing pole on which a transformer bank is being installed under this contract shall be provided with a new pole ground. Pole grounds shall be either the rod-type or the coil-type, as indicated. Resistance to ground for any individual ground shall not exceed 10 ohms.

12.17 Conduit shall be in accordance with the section of these specifications titled "INTERIOR ELECTRICAL WORK".

SECTION 13. INTERIOR ELECTRICAL WORK

13.1 General requirements. The work shall include the providing of all wires and cables, ducts and conduits, panelboards, lighting fixtures, receptacles, motors, starters, switches, circuit breakers, transformers, grounding and all other apparatus and accessories indicated, specified or necessary for a complete installation.

13.2 Electric services for the new facilities under this contract shall be from the new transformer banks specified in the section of the specifications titled "ELECTRICAL DISTRIBUTION". Service to the new pump room shall be 480 volts, 3-phase, 3-wire delta and shall be overhead. Service to the new well houses shall be 120/240 volts, 3-phase, 4-wire delta and shall be underground.

13.3 Material and workmanship, unless indicated or specified otherwise, shall conform to specification no. 9Yg and to the applicable codes, standards, regulations and specifications listed there, and to applicable specification listed in Section 1. In those instances where capacities, sizes, etc. of electrical equipment, devices, or materials as designated in these specifications or on the plans is in excess of the minimum requirements of the National Electrical Code, such designated capacities shall prevail. All wiring and equipment shall conform to the National Electric Code and shall bear the Underwriters' label. Competent journeymen thoroughly versed in the requirements of the trade shall be employed to accomplish the work.

13.4 Wire and cable shall be in accordance with the Underwriters' Laboratories Standard and shall bear its stamp of approval. Cables in conduits or ducts run in or under floors shall be type RHL and cable in conduits in walls or ceiling or exposed overhead shall be of the type shown. Lead-covered cables shall be terminated in approved compound-filled terminators which seal the end of the cable and provide a positive ground for the lead sheath. All wire No. 8 and larger shall be stranded. Splicing of wires and cables shall be in accordance with specification no. 9Yg. No wire smaller than No. 12 AWG shall be used.

13.4.1 Control cables from the new pump room to the new control panel in the existing water plant shall be 4-conductor 600 volt cable, each conductor consisting of 19 No. 25 AWG strands with RHW grade rubber insulation approximately 3/64 inches thick, with an outer covering of commercially pure lead sheath. Lead sheath shall be terminated as specified above.

13.5 Conduit. All wiring, unless shown otherwise, shall be installed in rigid steel conduit conforming to specification no. WW-C-581c. Underground conduit extending outside the buildings shall be encased in concrete in accordance with specification no. 9Yg. All conduit shall be run exposed.

13.6 Safety switches shall be in accordance with specification no. W-S-00865b heavy duty, medium duty, or light duty as indicated. Where no classification is indicated, the switches shall be medium duty. Two sets of fuses, of the rating shown, shall be provided for each switch.

13.7 Circuit breaker for protection of service to the new pump room shall be 3-pole, 800 ampere frame (LM), 400 ampere trip, 600 volts, with a NEMA interrupting capacity of 35,000 amperes at 480 volts. The circuit breaker shall be in a NEMA type 1 general purpose industrial enclosure.

13.8 Motors and motor controls

13.8.1 Motors for the new pumps shall be vertical, hollow-shaft, drip-proof squirrel-cage induction motors conforming to specification no. CC-M-641b. Horsepower and speed shall be as required for the pumps specified in the section of these specifications titled "PIPING, VALVES, ACCESSORIES AND MECHANICAL EQUIPMENT". Motors in the new pump room shall be for operation at 440 volts and motors in the new well houses shall be for operation at 220 volts.

13.8.2 Motor controls. Motor starters shall be magnetic starters conforming to specification no. 9Yg and National Electrical Manufacturers Association standard ICl.

(a) Starters in the new well houses shall be wall mounted, full-voltage starters of the size shown and shall have a maintained-contact "Hand-Off-Automatic" selector switch mounted on the cover.

(b) Starters in the new pump room shall be floor-standing auto-transformer type reduced voltage starters with "Start-Stop" pushbuttons mounted on the door, wired in parallel with the pushbutton stations mounted in the water plant. Control circuit voltage shall be 120 volts, obtained from a control circuit transformer in each starter.

13.8.3 Raw water pump control panel, to be located in the existing water plant approximately where shown, shall contain the momentary contact "Start-Stop" pushbuttons for each of the pumps in the new pump room, together with an indicating light which will indicate pump operation, and shall contain provisions for future control of a fourth pump. Pushbuttons shall be heavy duty units with double-break silver contacts. Legend plates shall be provided indicating the identification shown.

13.8.4 Well pump control relays shall be electronic dual-coded relay receivers, catalog no. 4073 as manufactured by the Simplex Time Recorder Co., to operate with the existing IBM well pump control system.

13.9 Lighting fixtures, unless otherwise specified herein, shall be in accordance with specification no. 9Yg and fixture numbers shown refer to the plates which are a part of that specification. Lamps of the wattage shown shall be installed in each fixture.

13.10 Duplex receptacles shall be 3-pole 2-wire with the third pole grounded, rated 10 amperes at 250 volts and 15 amperes at 125 volts in accordance with specification no. W-R-151a. They shall be surface mounted in cast metal boxes with metal cover plates.

13.11 Panelboard shall be of the circuit breaker type conforming to specification no. W-P-131a. Circuit breakers shall be Class A.

13.12 Dry type transformer shall be single phase, 2 KVA, 480 volts to 120/240 volts, with two 2-1/2 percent taps below normal on the high voltage side. The transformer shall be securely mounted on the building wall.

13.13 Grounding. Each interior electrical system, including metal castings, neutral conductors, conduit, panelboards, switches, outlet boxes, motors, control boxes, etc. shall be effectively and permanently grounded. Resistance to ground shall not exceed 3 ohms. The equipment ground conductor shall be Type TW wire, with insulation colored green, sized in accordance with the National Electrical Code. Grounding connection shall be made to the water piping system.

SECTION 14. FIELD PAINTING

14.1 General requirements. Surfaces to be painted shall be thoroughly clean and shall be dry when the paint is applied. Paint colors not specified otherwise shall be as directed. Surfaces which are inaccessible after erection shall be treated and primed prior to erection. Succeeding coats of the same type and/or color of paint shall vary sufficiently from the color of the preceding coat to permit ready identification. Damaged painting shall be retouched before applying the succeeding coat. Finished surfaces shall be smooth, even, and free from defects. The number of paint coats specified shall be in addition to the shop-priming coats. Storage of paints and paint materials and the mixing of paints shall be restricted to the locations directed.

14.2 Materials shall conform to the standard specifications listed and to the requirements given hereinafter. Paints and paint materials shall be delivered in unbroken original packages bearing the manufacturer's name and brand designation.

Knot sealer - MIL-S-12935

Pretreatment coating - MIL-C-15328

Exterior Wood primer - TT-P-25

Exterior titanium-lead zinc and oil paint - Class A of TT-P-102

RED lead paint - Type I of TT-P-86

Aluminum paste-pigment - Type II, Class B of TT-A-468

Aluminum mixing varnish - Type I, Class B of TT-V-81

Interior enamel undercoater - TT-E-543

Interior flat oil paint - TT-P-51

Interior gloss enamel - TT-E-506

Zinc chromate primer - JAN-P-735

Black stencil paint - MIL-P-15149

Boiled linseed oil - TT-O-364

14.3 Preparation of surfaces. All dirt, rust, scale, loose particles, disintegrated paint, grease, oil, and other deleterious substances shall be removed from all surfaces which are to be painted or otherwise finished.

14.3.1 Wood surfaces shall be free from dust and in proper condition to receive the paint or other finish. The use of water on unpainted wood shall be avoided. Prior to application of paint, knots and resinous wood shall be treated with an application of knot sealer. Puttying of cracks and nailholes shall be done after the priming coat has been applied and has dried properly. Sandpapering, when required, shall be done after the undercoats are dry. Wood trim shall be given the priming coat immediately following delivery to the job site.

14.3.2 Metal surfaces to be painted, including aluminum, brass, copper and zinc-coated surfaces and unprimed steel and iron surfaces, immediately after being cleaned, shall be given one coat of pretreatment coating to a dry film thickness of 0.3 to 0.5 mil. Aluminum surfaces to be painted shall be treated with a hot 10 percent solution of chromic acid for 3 to 5 minutes and thoroughly rinsed with clean, warm water prior to application of the pretreatment coating. Primer paint shall be applied over the pretreatment coating as soon as practicable after the coating has dried.

14.4 Workmanship shall be first class in every respect. Paint and enamel shall be applied carefully with good clean brushes, or approved rollers, or approved spraying equipment, except that the initial coat on any surface shall be applied by brush. The work shall be so conducted as to avoid damage of other surfaces and public and private property in the area; any damage thereto shall be made good by the contractor at his expense. Sufficient time shall be allowed between coats to assure thorough drying, and each coat shall be in proper condition before the next coat is applied; sanding and dusting, as required, shall be performed. Finish coats shall be smooth and free from runs, sags, or other defects. Each coat of paint shall be of sufficient thickness to cover completely the previous coat or surface. Exterior paint shall not be applied during foggy or rainy weather; the temperature shall be above 45 degrees F. and not over 95 degrees F. Interior paint may be applied at any time provided the surfaces to be painted are dry and the temperature can be kept above 45 degrees F during the application of ordinary paints, and between 65 degrees F and 95 degrees F during the application of enamels. All surfaces of woodwork which are to be concealed, except wood decking and sheathing, shall be primed prior to concealment. Each coat of enamel shall be sanded lightly before the succeeding coat is applied.

14.5 Wood, exterior. All exposed surfaces shall be given one coat of exterior wood primer. All exposed primed surfaces shall be given two coats of exterior titanium-lead-zinc and oil paint.

14.6 Exterior metal surfaces, except copper and work with an asphaltic primer, shall receive two coats of exterior oil paint. Surfaces with an asphaltic primer shall receive a field coat of asphalt varnish. Any such surfaces not shop primed shall receive a priming coat of red lead unless other primer is specified. Zinc coated surfaces shall be primed with zinc primer.

14.7 Wood interior exposed surfaces including joists and ceilings shall be primed with one coat of interior flat oil paint.

14.7.1 Exposed wood surfaces in new Pump Room including roof decking, nailers on steel joists, and plywood mounting panel shall, in addition to the prime coat specified above, receive one coat of interior enamel undercoater and one coat of gloss enamel.

14.7.2 Exposed wood surfaces in new Well Houses including wood joists and sheathing, in addition to the prime cost specified above, shall receive one finish coat of flat oil paint.

14.8 Metal surfaces interior. Shop priming coats and factory applied coatings, where damaged, shall be touched up with same materials used for the shop or factory coatings before additional paints are applied. Any surfaces not shop or factory primed shall be prepared, given a pretreatment coating and primed with red lead paint or zinc-chromate primer for ferrous metals and zinc-chromate for zinc-coated surfaces to a thickness of not less than 1.5 mils prior to finish painting. Surfaces fully factory finished; that is, having finish coatings in addition to the prime coating, shall be restored to their original finished condition wherever damaged and additional painting will not be required.

14.8.1 Steel joists and all other metal surfaces mounted on or near the wood ceiling within the New Pump Room shall receive the same finish as the wood ceiling.

14.8.2 Metal windows and doors (all buildings) shall receive two finish coats of exterior oil paint.

14.8.3 Water piping, valves, fittings and attachments (all buildings) shall receive one coat of aluminum paint.

14.9 Color schedule.

14.9.1 Exterior wood and metal and interior surfaces of doors and frames, windows and wood ceilings - white.

14.9.2 Exterior surfaces of electrical panels - clear blue.

14.9.3 Interior surfaces of electrical panel doors - vivid orange.

14.10 Other surfaces for which the type of paint has not been specified hereinbefore shall be painted as specified for surfaces having similar conditions of exposure.

14.11 Piping and conduit identification shall conform to the requirements of standard MIL-STD-101A, using black stencil paint for identification. Stenciling shall be placed in clearly visible locations. All piping and conduits not covered by the aforementioned standard shall be stenciled with approved names or code letters, using letters not less than 1/2 inch high for piping and not less than 2 inches high elsewhere. Arrow shaped markings shall be painted on the lines to indicate the direction of flow. Two copies of the complete color and stencil codes used shall be provided; they shall be framed under glass and shall be installed where directed.

14.12 Clean-up. Paint shall be removed immediately where spilled or splattered on surfaces adjacent to the work, including fixtures, glass and fittings. The premises shall be kept free at all times from accumulation of waste material and rubbish resulting from the work and upon completion of the work, all tools, scaffolding, surplus material and rubbish shall be removed and the premises left clean.

SECTION 15. BASIS OF BIDS

15.1 General requirements. Under the bidding items provided for that purpose, bidders shall state prices for each basis of bid given hereinafter. All requirements specified hereinbefore shall govern unless stated otherwise under the following basis of bids.

15.2 Basis of bid for Item 1 shall be the entire work complete in accordance with the requirements specified hereinbefore.

15.3 Basis of bid for Item 2 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 1 but with the omission of the provision of Well No. 36; the well house No. 36 and all mechanical and electrical work indicated or specified beyond the tee in the raw water main at Well No. 35; and, the raw water main from the tee at Well No. 35 to Well No. 36. The open end of the tee in the raw water main at Well No. 35 shall be plugged and provided with concrete blockage.

15.4 Basis of bid for Item 3 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 2 but with the omission of the provision of Well No. 35; the well house No. 35 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the tee at the intersection of Sneads Ferry Road and Trailer Camp Road to Well No. 35. The open end of the tee at Sneads Ferry Road shall be plugged and provided with concrete blockage.

15.5 Basis of bid for Item 4 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 3 but with the omission of the provision of Well No. 34; the well house No. 34 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the new connection with the existing 18 inch raw water main on Holcomb Road to and including the new connection with the existing raw water main at existing Well No. 605.

15.6 Basis of bid for Item 5 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 4 but with the omission of the provision of Well No. 33; the well house No. 33 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the well to and including the connection with the existing 18 inch raw water main along Holcomb Boulevard.

15.1 General requirements. Under the bidding items provided for that purpose, bidders shall state prices for each basis of bid given hereinafter. All requirements specified herein or indicated shall govern unless stated otherwise under the following basis of bids.

15.2 Basis of bid for Item 1 shall be the entire work complete in accordance with the requirements specified hereinbefore.

15.3 Basis of bid for Item 2 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 1 but with the omission of the provision of Well No. 39; the well house No. 36 and all mechanical and electrical work indicated or specified pertaining to the raw water main at Well No. 39; and, the raw water main from the tee at Well No. 35 to Well No. 36. The open end of the tee in the raw water main at Well No. 35 shall be plugged and provided with a concrete blockage.

15.4 Basis of bid for Item 3 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 2 but with the omission of the provision of Well No. 38; the well house No. 39 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the tee at the intersection of Canada Ferry Road and Traitor Camp Road to Well No. 38. The open end of the tee at Canada Ferry Road shall be plugged and provided with concrete blockage.

15.5 Basis of bid for Item 4 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 3 but with the omission of the provision of Well No. 37; the well house No. 38 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the tee at the intersection of Canada Ferry Road and Traitor Camp Road to Well No. 37. The open end of the tee at Canada Ferry Road shall be plugged and provided with concrete blockage.

15.6 Basis of bid for Item 5 shall be the entire work complete in accordance with the requirements specified under basis of bid for Item 4 but with the omission of the provision of Well No. 33; the well house No. 33 and all mechanical and electrical work indicated or specified therefor; and, the raw water main from the well to and including the connection with the existing 12 inch raw water main along Kuhls Boulevard.

SECTION 16. BIDS

16.1 Instruction to Bidders, U. S. Standard Form No. 22, revised March 1953, and Invitation for Bids, U. S. Standard Form No. 20, shall be observed in the preparation of bids. Bidders shall affix their names and return addresses in the upper left corner of bid envelopes. Envelopes containing bids must be sealed.

16.2 Bid guarantee will be required as stipulated on the reverse side of U. S. Standard Form 20.

16.3 Items of Bids. Bids shall be submitted, in duplicate, on U. S. Standard Form No. 21, revised July 1957, Bid Form, and in accordance with U. S. Standard Forms Nos. 20 and 22, upon the following items:

Item 1. Price for the entire work, complete in accordance with the drawings and specifications.

Item 2. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 2.

Item 3. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 3.

Item 4. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 4.

Item 5. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 5.

16.4 Telegraphic modifications of bids in accordance with U. S. Standard Form No. 22 may be made. Two signed copies of the telegram in a sealed envelope marked "Copies of telegraphic modification of bid for Rehabilitation of Raw Water Supply, Specification No. 24218/59", should be forwarded immediately to the office to which the written bids were submitted.

16.5 Reference to addenda. Each bidder shall refer in his bid to all addenda to this specification; failure to do so may constitute an informality in the bid.

SECTION 16. BIDS

16.1 Instruction to Bidders. A standard form (e.g. SF 22, revised March 1953, and Invitation for Bids, U. S. Standard Form No. 20, shall be observed in the preparation of bids. Bidders shall affix their name and return addresses in the upper left corner of the envelope. Envelopes containing bids must be sealed.

16.2 Bid guarantee will be required as stipulated on the reverse side of U. S. Standard Form 22.

16.3 Issue of bids. Bids shall be submitted, in duplicate, on U. S. Standard Form No. 21, revised July 1947, Bid Form, and in accordance with U. S. Standard Form No. 22, upon the following items:

Item 1. Price for the entire work, complete in accordance with the drawings and specifications.

Item 2. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 1.

Item 3. Price for the public work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 2.

Item 4. Price for the entire work, complete in accordance with the drawings and specifications as defined in basis of bid for Item 3.

16.4 Telegraphic modification of bids in accordance with U. S. Standard Form No. 22 may be made. Two legible copies of the telegram for modification of Raw Water Supply, Specification No. 2923B50", should be forwarded immediately to this office to uhich the written bids were submitted.

16.5 Reserves in addenda. Each bidder shall refer in his bid to all addenda to this specifications failure to do so may constitute an informality in the bid.

NOTICE

The Government forms, Bureau of Yards and Docks standard specifications mentioned, and other information necessary may be obtained from the District Public Works Officer, Headquarters, Fifth Naval District, U.S. Naval Base, Norfolk 11, Virginia. The remainder of the standard specifications and other material referred to may be examined at that District Public Works Office, or the standard Government specifications may be obtained from the Commanding Officer, Naval Aviation Supply Depot, 70Q Robbins Avenue, Philadelphia 11, Pennsylvania, Attention: Code CDS; requests for copies of specifications should indicate the contract for which required.

Headquarters, Fifth Naval District
U. S. Naval Base, Norfolk 11, Virginia
15 May, 1959.

A. J. FAY, REAR ADMIRAL, CEC, USN
Officer in Charge of Construction

DEPARTMENT, AGENCY, OR BUREAU
DEPARTMENT OF THE NAVY, BUREAU OF YARDS AND DOCKS

DECISION NO.
T - 19,898

DESCRIPTION OF WORK:
Miscellaneous building construction (including incidental utilities and incidental paving), dredging and marine construction.

54A

LAW CODE
DB

DATE OF DECISION
4-16-59

EXPIRES
7-16-59

LOCATION (CITY OR OTHER DESCRIPTION)
Camp Lejeune

SUPERSEDES DECISION NO.

STATE
North Carolina

COUNTY
Onslow

12 - N. C.
1 - C
2 - C

	Per Hour
Air tool operators (jackhammermen, vibrator)	$1.00
Asbestos workers	2.75
Asbestos workers improvers:	
1st year	1.25
2nd year	1.64
3rd year	1.85
4th year	2.07
Asphalt rakers	1.20
Boilermakers - blacksmith	3.60
Boilermakers helpers	3.35
Bricklayers	2.50
Cable splicers	2.50
Carpenters	1.65
Cement masons	2.00
Electricians	2.50
Elevator constructors	2.20
Elevator constructors helpers	1.54
Glaziers	1.64
Groundmen	1.25
Iron workers, structural	1.65
Iron workers, ornamental	2.50
Iron workers, reinforcing	1.00
Laborers	1.00
Lathers	2.75
Linemen	2.50
Marble setters	$2.75
Marble setters helpers	1.25
Mason tenders	1.00
Mortar mixers	1.00
Painters, brush	1.65
Painters, spray	2.00
Painters, structural steel	2.00
Piledrivermen	1.65
Pipe layers (concrete and clay)	1.50
Plasterers	2.50
Plasterers tenders	1.00
Plumbers	2.00
Roofers	1.65
Sheet metal workers	1.65
Soft floor layers	1.95
Steam fitters	2.50
Stone masons	2.50
Sprinkler fitters	3.55
Terrazzo workers	2.75
Terrazzo workers helpers	1.25
Tile setters	2.75
Tile setters helpers	1.25
Truck drivers	1.00
Welders — receive rate prescribed for craft performing operation to which welding is incidental.	

APPRENTICE SCHEDULE

PERIOD AND RATE *

Craft	Interval	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Bricklayers	6 mos.	40	45	50	60	70	80				
Carpenters	year	$1.05	1.15	1.25	1.40						
Cement masons	6 mos.	50	55	60	65	70	75	80	85		
Electricians	6 mos.	45	50	55	60	65	70	75	80		
Ironworkers	6 mos.	50	60								
Ironworkers	year		66-2/3								
Plumbers & Steam fitters	6 mos.	37½	40	45	50	55	60	66½	75		
Sheet metal workers	6 mos.	40	45	50	55	60	65	70	80		
Soft floor layers	year	$1.05	1.15	1.25	1.40						
Sprinkler fitters	6 mos.	63	66	69	72	75	78	81	84	87	90

** The apprentice rate is by percentage of the journeymen's rate unless otherwise indicated.*

12 - N. C. PEO

Power equipment operators:	Per Hour
Air compressors	$1.25
Backhoes	1.25
Boom hoist	2.125
Bulldozers	2.00
Cableways	2.125
Cranes	2.00
Derricks	2.125
Distributors, asphalt	1.35
Draglines	2.125
Dredges or other floating equipment	2.25
Finishing machine	1.35
Fireman	1.55
Front end loaders	2.00
Hoist, double drum	1.875
Hoist, one drum	1.625
Mechanics	2.00
Mixers (larger than 10-S)	$1.75
Mixers (smaller than 10-S)	1.625
Motor graders	2.00
Oilers	1.55
Pavers	2.125
Pile drivers	2.00
Pumps over 2" discharge	1.75
Pumps under 2" discharge	1.625
Rollers, ahphalt	1.35
Rollers, earth	1.75
Scrapers, wheel type	2.00
Shovels	2.125
Tractors, farm type	1.15
Tractors with attachments	2.125
Tractors without attachments	1.875
Trench machines	1.25
Truck cranes	2.125

	Per Hour
Dredging:	
Dipper and clamshell dredges:	
Assistant engineers	$1.70
Brestwire tender	1.36
Chief engineer	2.05
Deck hands	1.23
Firemen	1.48
Launchmen	1.38
Mates	1.53
Operators	2.10
Oilers	1.48
Scowmen	1.26
Hydraulic dredging 16″ and under:	
Assistant engineers	$1.50
Engineer	1.90
Laborers or deck hands	1.00
Launchman, 1st class	1.38
Launchman	1.30
Levermen	1.75
Mate	1.30
Mess boy	1.16
Off dredge clamshell operators	2.10
Oiler	1.15
Steward	1.39
Welders	1.50

	Per Hour
Dredging:	
Hydraulic dredging over 16″ to and including 24″:	
Deck hands	$1.00
First assistant engineer	1.70
Laborer	1.00
Launchman	1.15
Levermen	1.75
Mate	1.15
Oiler	1.00
Second assistant engineer	1.60
Third assistant engineer	1.50
Welder	1.35
Hydraulic dredging 26″ and over:	
Assistant mates	$1.25
Deck hand	1.00
Firemen	1.15
First assistant engineers	2.05
Handy-man	1.80
Laborer	1.00
Levermen	2.15
Mate	1.65
Oiler	1.20
Second assistant engineer	1.95
Third assistant engineer	1.90
Welder	2.05
Welder helper	1.00

CONTRACT #NOy-91286 RAW WATER
(1955) CONTROL SYSTEM MCB