1R - 184

REPORTS

DATE:

2/1/1985

P.O. BOX 807
CLOVIS, NM 88101
(505) 762-3716

PETTIGREW & ASSOCIATES

P.O. BOX 5769
HOBBS, NM 88241
(505) 393-9827

RICHARD R. PETTIGREW, P.E.-L.S.

February 1, 1985

Department of Finance & Administration
Local Government Division
505 Don Gaspar
Santa Fe, NM 87503

ATTN: Jackie Block

RE: (Preliminary) Water Well
Plans and Specifications
for Monument, New Mexico

Dear Mr. Block:

Attached is the Preliminary Plans and Specifications for development of a new water supply for the Village of Monument, New Mexico. The Plans and Specifications are for your review process.

The General Specifications will be added to complete the Plans and Specifictions for the water well and forwarded to your office.

The Plans and Specifications for the transmission line are nearing completion and also will be forwarded to your office.

Should you have any questions concerning the Plans and Specifications for the water well, please do not hesitate to contact me.

Sincerely,

PETTIGREW & ASSOCIATES

Ray A. Hohstadt

Ray A. Hohstadt

RAH/bjc

Attachments

ONE GRAVEL-PACKED
WATER WELL
VILLAGE OF MONUMENT,
NEW MEXICO

Preliminary
DATE Feb. 1, 1985

ONE GRAVEL-PACKED WATER WELL
VILLAGE OF MONUMENT, NEW MEXICO

INDEX

TECHNICAL SPECIFICATIONS

SPECIAL SPECIFICATIONS

SECTION 1

WELL DRILLING

1. **DESCRIPTION:** The CONTRACTOR shall drill and construct one gravel-packed well by the cable tool method. The work consists of the construction, development and testing of a water supply and test well, complete, in accordance with the following specifications and drawings, and subject to the terms and conditions of this contract.

2. **LOCATION:** The well site is located approximately three miles north of the Village of Monument, New Mexico, in the S.E. 1/4, N.E.1/4, N.W.1/4 of Section 17, Township 19 South, Range 37 East. The specific location of the project is shown on Plates 1 and 2. The well construction site and well head location will be staked by the ENGINEER. The drawings which are part of the Contract Documents are included at the end of these specifications. The CONTRACTOR shall drill the well through the entire section of the Ogallala formation to the top of the Triassic "red-beds". The ENGINEER may, at his option, halt drilling at any lesser depth. In the event the drilling is authorized or ordered to depths deeper than herein specified, an equitable adjustment therefor will be made in the contract. The construction and overall diameter of the well is shown on the drawing and specified herein.

3. **GEOLOGY:** It is expected drilling will be in the Ogallala formation, which is the major water-bearing formation in the area, consisting of alternate layers of sand, gravel, clay and caliche. Drillers logs of wells in the immediate vicinity are shown on Plate No. 3. The lithology from the drillers log is provided to assist the Contractor in preparing a bid to drill a well. However, the OWNER or ENGINEER does not guarantee accuracy of this information.

4. GENERAL: Except as provided herein, all work and materials shall conform to the recommendations of the "American Water Works Association," as set forth in the latest edition of "AWWA Standard Specifications for Deep Wells".

5. CONTRACTOR'S EQUIPMENT AND METHODS: The CONTRACTOR shall develop the well by such methods as will effectively extract from the water-bearing formation the maximum practical quantity of sand, drilling mud and other fine materials in order to bring the well to maximum yield per foot of drawdown and to a sand-free condition. The CONTRACTOR, prior to the awarding of the bid, shall furnish the ENGINEER a complete list of equipment which he proposes to drill, develop and test the well. The work shall not proceed until the ENGINEER approves the proposed construction methods and is satisfied that the listed equipment is adequate and will be at the site when needed. The CONTRACTOR shall employ competent personnel which will be supervised by an experienced driller satisfactory to the Engineer. Equipment and methods requirements shall be strictly enforced.

6. PILOT HOLE: The pilot hole shall be drilled by the cable tool method from the ground surface to the full well depth as indicated on Plate No. 4 or to any lesser depth as directed by the ENGINEER. The diameter of the pilot hole shall be 8 inches. The objective of the pilot hole is to determine the formation thickness and characteristics of all materials underlying the surface to the bottom of the hole, location of water-bearing strata and other geological and hydrological information and to obtain accurate depth determinations and reliable representative samples of cuttings. It is the responsibiltiy of the CONTRACTOR to maintain a record of the well which will include the following:

1. Maintain facilities for the collection of representative samples of the drill cuttings.
2. The static water level in the strata or each deeper stratum that yields water.
3. The data from a bailing test of each water-bearing stratum showing how much water was yielded, and how much the water lowered at the given rate of bailing.
4. Maintain reasonably constant consistency of the drilling slurry.

A. **ALIGNMENT:** The well shall be sufficiently straight and plumb to receive a deep well turbine pump of the line shaft or submersible type so that normal operation of the pump may be obtained. The well shall also be sufficiently straight and plumb to allow placement of the casing in accordance with the alignment as specified herein.

B. **COLLECTION OF DRILL CUTTINGS:** The CONTRACTOR shall construct a mud pit of adequate size to allow for settling of the drill cuttings. The pit shall be cleaned at intervals if necessary. Drill cutting samples will be obtained by the CONTRACTOR, under the supervision of the ENGINEER, for each 4 ft. interval. Drill cutting samples shall be washed by the CONTRACTOR at the time of collection and placed in approved cloth sample bags furnished by the CONTRACTOR. All pertinent data shall be recorded on a tag attached thereto. Sample bags shall be separated into groups representing 100 feet of the pilot hole depth.

C. **DRILLING FLUID:** The CONTRACTOR will add the necessary fresh water in the formations that do not provide adequate water to form a slurry for drilling. The use of drill mud shall be kept to a minimum, the CONTRACTOR shall consult with the ENGINEER regarding any proposed use of drilling mud. A drilling mud program shall be agreed upon and submitted to the ENGINEER for approval prior to use.

D. **WELL LOG:** An accurate written log shall be maintained and up-to-date at all times by the CONTRACTOR. The CONTRACTOR shall record the following:

1. Measurement for depths, using the surface ground level at the well site as the reference point.
2. Type, character, depth and thickness of strata encountered.
3. Depth of the water table.
4. Depth of lost tools.
5. Bit sizes.
6. Any additional information that may be helpful in interpreting the driller's log.
7. An accurate depth record shall be kept current at all times.

F. **DIMENSIONS:** The diameter and depth of the well shall be as shown on the attached drawings and as specified herein, except after the logs of the well have been analyzed, any of the various elevations indicated may be increased or decreased by the ENGINEER if more favorable strata will be encountered at different elevations than shown on the plans.

G. **GEOPHYSICAL LOGS:** Upon completion of drilling the pilot hole, open hole type geophysical well logs will be run on the entire length of the pilot hole. The geophysical well log apparatus shall be Wellex type or an approved equal. The following logs shall be run:

1. Compensated Density Dual Space Neutron Microlog.
2. Dual Induction Guard log.

The well logs shall have appended to them such information as the well location, drilling fluid (fresh water), bottom hole temperature and any other information necessary for the proper interpretation of the log. Two field copies and six final copies of each of the above-mentioned logs shall be furnished to the ENGINEER. The CONTRACTOR will pay for the logging services.

7. **PRODUCTION WELL:** All work in connection with the production well will commence with the permission of the ENGINEER, and after completion of all work pertaining to the pilot hole.

A. **METHOD:** The pilot hole shall be reamed out to the diameter of 24 inches as shown in Plate No. 4 to a depth of approximately 40 feet below the ground surface. The metal conductor pipe shall be installed and the annulus (space between the conductor and the drilled hole) shall be completely filled with neat cement grout. The grout shall be allowed to set for a period of not less than 12 hours or such longer period as may be directed by the ENGINEER.

The pilot hole below the casing shall be reamed to the diameter and depths as shown on Plate No. 4, or as directed by the ENGINEER. Blank casing and well screen shall be installed as specified by the ENGINEER.

B. DIMENSIONS: The diameter and depth of the well shall be as shown on Plate No. 4 and as herein specified, except that any of the various depths or lengths indicated may be increased or decreased by the ENGINEER, if the geophysical logs indicate favorable strata will be encountered at different elevations than shown on the plans.

C. ALIGNMENT: The well shall be as specified under paragraph 6-A.

D. CASING: The metal for all well casing shall be round from steel plates. The plates shall conform to the thickness as specified in Plate No. 4. Steel plates used in the manufacture of the casing shall conform to the physical properties of the American Society for Testing Materials, Specification A 139 Grade B containing not less than 0.20% copper. The CONTRACTOR shall furnish the ENGINEER a mill certificate of chemical and physical properties. Fabrication shall be in accordance with American Water Works Association Specification C 201, with the requirement for hydrostatic testing being waived. The diameter referred to shall be inside diameter (ID). The casing shall be factory assembled in at least 20-foot sections and shall contain not more than one longitudinal seam parallel to the axis of the casing and not more than one circumferential seam in 10 feet. All longitudinal and circumferential seams shall be butt welded from the exterior with either single or twin arc electrodes. All seams shall be automatically welded by an approved shielded arc process which protects the weld metal from the atmosphere while cooling, assuring full fusion with the parent metal and complete penetration.

Welded collars shall be utilized and shall be of the same thickness and have the same physical and chemical properties as the casing. The collars shall be 6 inches in width and three alignment holes 3/8" x 1" shall be provided for visual plumbing of the casing prior to welding. The ends of each casing joint shall be lathe trimmed perpendicular to the axis of the casing to insure the straightness of each assembled section.

1. Conductor Pipe: Conductor pipe shall be well casing conforming to the above requirements fabricated of 1/4 inch steel plates. The exact length of the conductor pipe shall be determined by the ENGINEER after the pilot hole is drilled. The space between the drilled hole and the conductor pipe shall be filled with grout. The top of the conductor pipe shall be provided with a 12" x 1/2" steel collar, welded to the circumference of the conductor pipe. (See Plate No. 4.)

2. Well Casing: The well casing shall be new black steel casing conforming to the above requirements. Casing shall be free of rust, pits or other defects. The well casing shall be of the diameter shown on Plate No. 4 for blank casing and shall have a wall thickness of 5/16 inch.

3. Well Screen: The well screen shall be a Johnson continuous-slot wire wound type or equal. The well screen shall be constructed of type 304 stainless steel metal and shall be fabricated by welding to insure high strength. It shall have adequate strength to resist the external forces to which it will be subjected during and after installation. Screen opening shall be V-shaped, widening inwardly to permit fine particles to pass through without clogging during the development of the well.

The width of the screen slot openings will be selected by the ENGINEER and based on the materials testing analyses of samples from the water-bearing formation.

The screen and all accessories required for satisfactory installation and operation shall be essentially standard products of a manufacturer regularly engaged in the production of such equipment. A shop drawing showing the details of construction and dimensions of the well screen and its accessories shall be submitted for approval of the ENGINEER.

F. **WELL CASING AND SCREEN INSTALLATION:** Casing and screen installation shall be by methods that will insure no damage to the well bore or casing. All the casing required for the well and equipment will be on the well site before installation begins. All well casing when finally set, shall be sufficiently round and plumb and true as to alignment details on Plate No. 4 and enable the free installation and operation of a submersible type deep well turbine pump of the size that will deliver 500 gpm from a pump setting of 160 feet below ground surface.

The casing shall be suspended above the bottom of the hole a sufficient distance to insure that none of the casing will be supported from the bottom. The casing and screen shall be fitted with at least 6 approved centering guides or brackets, as shown on Plate No. 4 or installed at points as directed by the ENGINEER, but no more than 50 feet apart in order to center and hold the casing and screen in proper position until the gravel is in place.

G. WELDING: All welding of casing shall be done by a competent, certified welder with adequate equipment, using the arc welding process. The work shall conform to the applicable requirements of the American Standards Association Code B 31.1. All joints of the casing sections shall be joined by a continuous weld with not less than a 5/16 inch full fillet.

H. GAUGE LINE: There shall be installed, as shown on Plate No. 4, a 1-1/2" inch threaded and coupled black steel pipe, tack welded to the outer surface of the inner casing at 6-foot intervals. The bottom of the gauge line shall terminate in a steel elbow welded to the casing with an opening into the casing as shown on Plate No. 4. Extreme care shall be taken to insure that the inner surface of the casing is not penetrated by the elbow or burrs from welding. Final length of gauge line to be installed in the well will be as determined by the ENGINEER based on the pilot hole log.

I. CASING GUIDES: At least one set of centering guides for each 50 feet of well casing shall be attached to the inner blank casing and the screen. Each set shall consist of 1/4" x 2" steel springs bent as detailed with the lower end only of each spring welded to the casing. (See Plate No. 4 for details and placement).

8. GRAVEL PACKING: After the assembled casing is centered in the bore hole, tubing with two close-fitting swabs, one located near the bottom of the screen and the other near the bottom of the blank casing, shall be inserted into the casing. Clear water shall be circulated in the hole until the mud slurry is watered back. The gravel shall be placed by pumping through a gravel feed line extending to the bottom of the casing hole annulus. The feeder line shall be gradually withdrawn as the gravel is placed. Swabbing and circulating shall continue during placement of gravel. Before the gravel packing operations begin, the CONTRACTOR shall make adequate preparations to insure that circulation will be continuous.

After the gravel is in place, the circulation and swabbing shall continue in stages opposite the entire length of the perforated interval until the gravel is consolidated and cleaned. As gravel settles, more shall be added. After the cleaning and compacting of the gravel, clear water and calcium hypochlorite mixture that will provide and maintain a chlorine residual of not less than 250 ppm shall be circulated throughout the entire gravel pack.

At the completion of this operation and upon removal of the swab, all rock, foreign materials and sand shall be removed from the casing. The CONTRACTOR shall provide means of measuring the volume of gravel as it is applied and continual checks must be made to insure against voids or bridging of the gravel pack. The minimum amount of gravel introduced in the hole shall be not less than the computed amount based on diameter and depth. Any amount placed that is less than the computed amount required shall be deemed a sign of voids or bridging and corrective measures shall be undertaken. Development and procedures to clean the well to produce water that is free of sand and silt must be started not more than 10 days after completion of placing the gravel and continued without interruption until the final production test has been completed. Production tests shall not start until after the well is producing water that is free of sand and silt.

A. GRAVEL PACK SPECIFICATIONS: The gravel to be installed shall have a chemical composition of at least 95% SiO_2 and shall be composed of sound, durable, well rounded particles, containing no silt, clay, organic material, flat or elongated particles, or deleterious materials. It shall be well graded within the following limits with minor variations as approved by the ENGINEER which may be required due to the gradation of particles in the aquifers to be developed. A certificate of chemical quality and gradation (cumulative percent passing with effective size and uniformity coefficient) from an approved testing laboratory or supplier shall be submitted to the ENGINEER.

Sieve Size	Percent by Weight Passing
# 4	100
# 6	90-95
# 8	70-80
#10	55-65
#16	17-25
#20	4-8
#30	0-2

9. **DEVELOPMENT BY SWABBING:** Within 5 days after completion of the gravel in the annulus, the CONTRACTOR shall swab the well (swab not more than 1/8" smaller than the inside diameter of the well casing and screen). A continuous stream of water shall be added to the gravel envelope from the top and swabbing shall be continued until there is no further settlement of gravel and until all sand, silt and mud have been washed from the gravel envelope. Material drawn into the well shall be frequently removed. During the swabbing, a suitable device shall be employed to measure the level of the gravel in the annulus. After swabbing, the gravel level shall reach the surface. The gravel envelope shall be a continuous column completely surrounding the casing and completely filling the annulus between the well casing and well bore. Upon completion of swabbing, the well shall be cleaned of all mud, sand and sediment.

The quantity of material removed and the quantity of gravel added shall be recorded. The amount of gravel placed in the annulus shall not be less than the computed volume of the annulus. A quantity less than the computed volume will be judged as an indication of voids and corrective measures shall be undertaken at the CONTRACTOR's expense.

10. DEVELOPMENT BY PUMPING: The CONTRACTOR shall furnish, install, operate and remove a deep well turbine pump for developing the well. The pump and prime mover shall have a capacity in excess of that required to pump 500 gpm from a depth of 160 feet.

The prime mover shall be a variable speed type. The CONTRACTOR shall furnish and install discharge piping of sufficient size and length to conduct the water to a point approved by the ENGINEER, together with suitable orifices, meters, or other approved devices which will accurately measure flow rate. However, water disposal shall remain the CONTRACTOR'S responsibility. An air line, complete with a properly calibrated gauge shall be provided to measure the elevation of water in the well.

The initial pumping rate shall be restricted and, as the water clears, shall be gradually increased until the maximum rate is reached. The maximum rate will be determined by the ENGINEER after consideration of the well's drawdown and discharge characteristics. At proper intervals the pump shall be stopped and the water in the pump column shall be allowed to surge back through the pump bowls and through the producing formation. While pumping and surging, a continuous stream of water shall be added to the top of the gravel envelope.

The cycle of pumping and surging shall be repeated until the discharged water is clear of sand, silt and mud, and until there is no increase in specific capacity during at least 24 hours of continuous pumping and surging. The CONTRACTOR shall continue development work until, in the ENGINEER'S opinion, the following conditions have been met.

1. The quantity of gravel placed in the annulus shall be at least as great as the calculated volume of the annulus.

2. There shall be no further settlement of the gravel envelope.

3. Sand production shall be less than 15 ppm within 15 minutes after commencement of pumping at the maximum pumping rate specified above or such other lesser pumping rate as approved by the ENGINEER. Average sand production shall not exceed 5 ppm for a two hour cycle. Sand production shall be measured by a sand separation (Rossum) meter as described in the journal of American Water Works Association, Vol. 46, No. 2, February 1954.

4. Specific capacity shall have reached a constant value; i.e., there shall be no change in specific capacity during at least 24 hours of continuous pumping and surging.

11. TEST PUMPING: The CONTRACTOR shall furnish all necessary equipment and materials and make a complete pumping test of the well following development work. The test pumping equipment shall have not less than the above-mentioned capacity listed in Paragraph 10 and shall be capable of delivering water from the given level below the ground surface. During the test, the pump shall be operated at successively diminished rates governed by the amount of water that enters the well within reach of the pump. Pumping shall continue at each rate until the level of the water within the well becomes stationary. At the maximum rate as specified above, or at such maximum rate as is obtainable within reach of the pump, pumping shall be continued without interruption for 24 hours after the level of the water within the well becomes stationary or for such continuous period as may be directed by the ENGINEER. During the progress of the test pumping, the CONTRACTOR shall provide an approved measuring device for measuring the rate of discharge of the pump, and the water level shall be made at intervals as directed by the ENGINEER, but in no case less frequently than every 30 minutes. Drawdown shall be measured by means of an air tube, pressure gauge and air pump unless otherwise directed by the ENGINEER. At the completion of the test pumping, all sand and debris shall be removed from the bottom of the well. Prior to completion of test pumping, water samples shall be collected as directed by the ENGINEER for bacteriologic and chemical analysis.

12. DISPOSAL OF WASTE WATER: Water produced by test pumping or other operations shall be disposed of by methods approved by the ENGINEER. Disposal of waste water will be by such methods and to such locations that damage to structures, roads or utilities or interference with same or interference with construction projects will be prevented. All costs incurred in connection with the disposal of waste water will be at the CONTRACTOR'S expense.

Waste drilling slurry or mud shall be ponded at the site upon completion of the drilling operations, allowed to dry and removed from the site by such methods and to such locations as approved by the ENGINEER. All cost incurred in connection with the disposal of drilling mud will be at the CONTRACTOR'S expense.

13. STERILIZATION: Following the test pumping and final cleanout of the well, it shall be completely sterilized. The sterilizing solution shall be a mixture of water and calcium hypochlorite having a concentration of not less than 250 ppm of available chlorine. The hypochlorite shall be 70% HTH or equal and contain not less than 70% available chlorine. At least 4.0 pounds of the hypochlorite per 100 ft. of water in the well shall be introduced into the well inside and outside the casing. The sterilization solution shall be left in the well for at least 24 hours.

14. WATER: It shall be the CONTRACTOR'S responsibility to provide and maintain at his own expense an adequate supply of water for his use for construction and domestic consumption and to install and maintain all necessary supply connections and piping for same, but only at such locations and in such manner as may be approved by the ENGINEER. All water shall be carefully conserved. Before Final Acceptance of the well, all temporary connections and piping installed by the CONTRACTOR shall be removed in a manner satisfactory to the ENGINEER.

15. GRAVEL FEED LINE: The gravel feed line shall be standard weight black steel pipe of the size and length shown on the drawings. The feed line shall be welded to the outer casing and shall be provided with a screw cap approved by the ENGINEER. Specific location of the gravel feed line for the well shall be as directed by the ENGINEER.

16. STEEL CAP PLATE: The steel cap plate, covering the space between the inner casing and the conductor pipe shall be of the thickness and of the size shown on the attached drawings, and shall be installed as detailed. All welds shall be continuous.

17. METAL CAP FOR CASING: The top of the inner casing shall be provided with a metal cap, approved by the ENGINEER to cover and protect the well until the pump installation has begun.

18. CLEANING WELL SITE: After the work is completed, the CONTRACTOR shall remove all debris, tools, equipment, supplies and excess material from the site and shall restore the site to its original condition as approved by the ENGINEER.

19. MEASURING AND PAYMENT: All measurements and payments will be based on completed work performed in strict accordance with the drawing and specifications and in accordance with contract unit prices. Incidental work and items not listed in the contract unit price schedule will not be paid for separately, but will be included in the payment for the listed item or items to which such incidental work applies.

A. MEASUREMENT:

(1) **Drilling**: Drilling the pilot hole will be measured from the top of the ground to the bottom of the pilot hole.

(2) **Reaming**: Reaming the pilot hole to receive the conductor pipe or well casing shall be measured from top to bottom of the various sizes reamed.

(3) **Conductor Pipe**: Conductor pipe will be measured from end of pipe to end of pipe acceptably installed.

(4) **Blank Casing**: Blank casing will be measured from end of blank casing to end of blank casing acceptably installed.

(5) **Well Screen**: Well screen will be measured from end of screen to end of screen for the various open areas acceptably installed.

(6) **Gravel**: Gravel will be measured in calibrated vehicles based on the total number of cu. yds. of material acceptably incorporated into the work.

(7) **Development**: Development will be measured per hour for development work actually performed, but will be exclusive of pump setting or removal time or breakdown time.

(8) **Test Pumping**: Test pumping will be measured per hour for test pumping work actually performed, but will be exclusive of pump setting or removal time.

(9) **Gauge Line**: Gauge line will be measured from end of pipe to end of pipe acceptably installed.

(10) **Geophysical Logs**: Geophysical logs will be measured per well the required logs acceptably accomplished.

B. PAYMENT:

(1) **Mobilization and Demobilization**: Mobilization and demobilization of well drilling, developing and testing equipment will be paid for at the contract price for the item which shall constitute full compensation for bringing to the site, from the point of origin, erecting, and for installing of the drilling, developing and testing equipment, demobilization of equipment, to the point of origin, disposal of excess materials and clean- up after completion of the work at the contract price.

(2) **Drilling Pilot Hole**: Payment will be made at the contract price per linear foot for drilling pilot hole as shown on the drawings and as specified herein.

(3) **Reaming**: Payment will be made at the contract price per linear foot for the various diameters acceptably reamed.

(4) **Conductor Pipe**: Payment will be made at the contract price per linear foot acceptably placed, which shall include grouting.

(5) **Blank Well Casing**: Payment for blank well casing will be made at the contract price per linear foot of blank well casing acceptably placed, which shall constitute full compensation for all labor, materials and equipment necessary to acceptably complete the work.

(6) **Well Screen**: Payment for the well screen will be made at the contract price per linear foot for the various open areas of well screen acceptably placed, which shall constitute full compensation for all labor, materials and equipment necessary to acceptably complete the work.

(7) **Gravel**: Payment will be made at the contract price per cubic yard for gravel which shall include all costs for furnishing and placing the material.

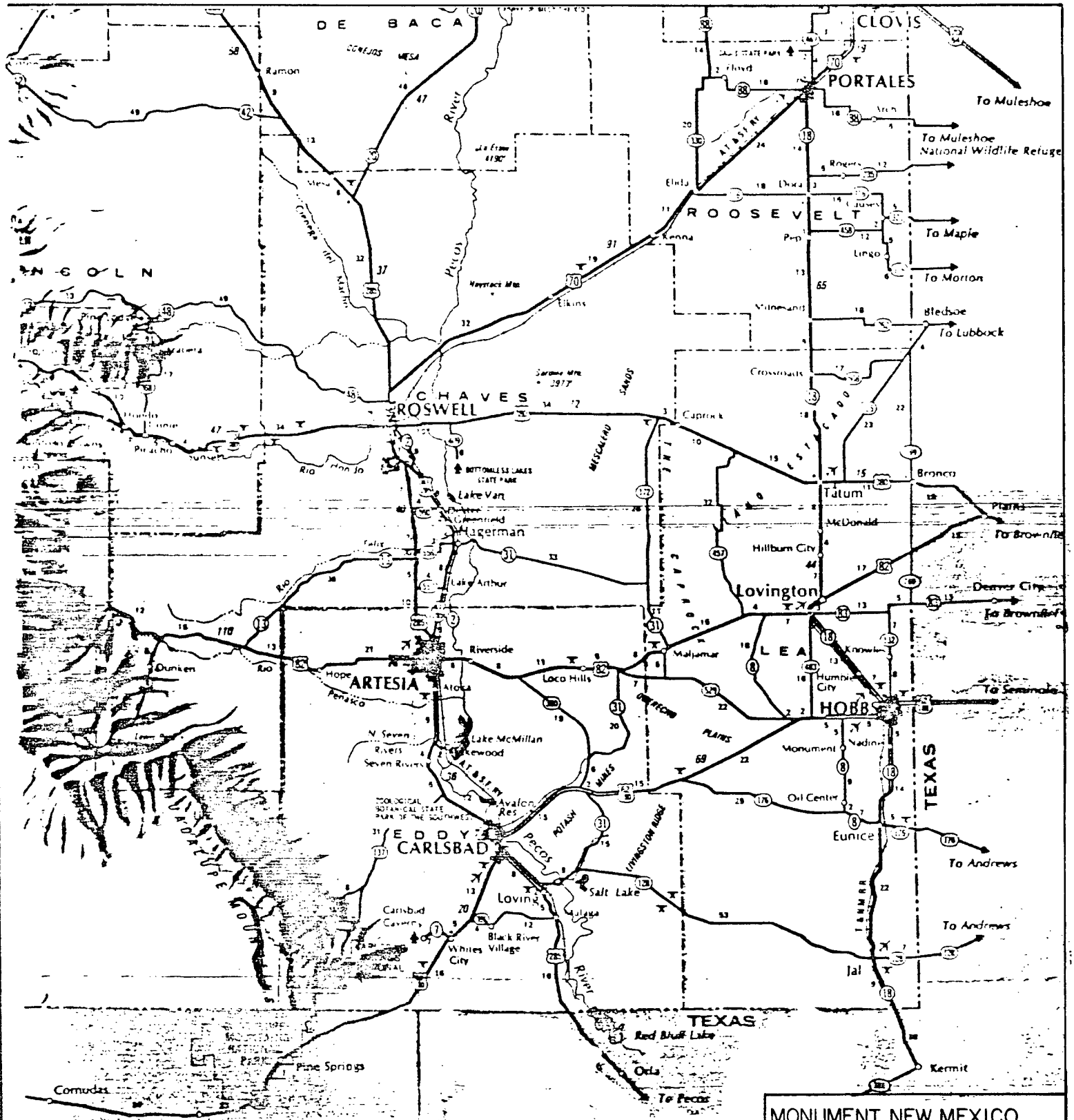
(8) **Developing**: Development will be paid for at the contract price per hour for development work acceptably accomplished.

(9) **Test Pumping**: Payment will be made at the contract price per hour for test pumping work acceptably accomplished.

(10) **Gauge Line**: Payment for gauge line pipe will be made at the contract price per linear foot acceptably installed, which shall constitute full compensation for all labor, materials and equipment necessary to acceptably complete the work.

(11) **Geophysical Logs**: Payment will be made at the contract price per well for logs acceptably performed.

(12) **Sterilization**: Payment shall be made at the contract price for the acceptable sterlization of one water well, which shall include all costs to complete the job.

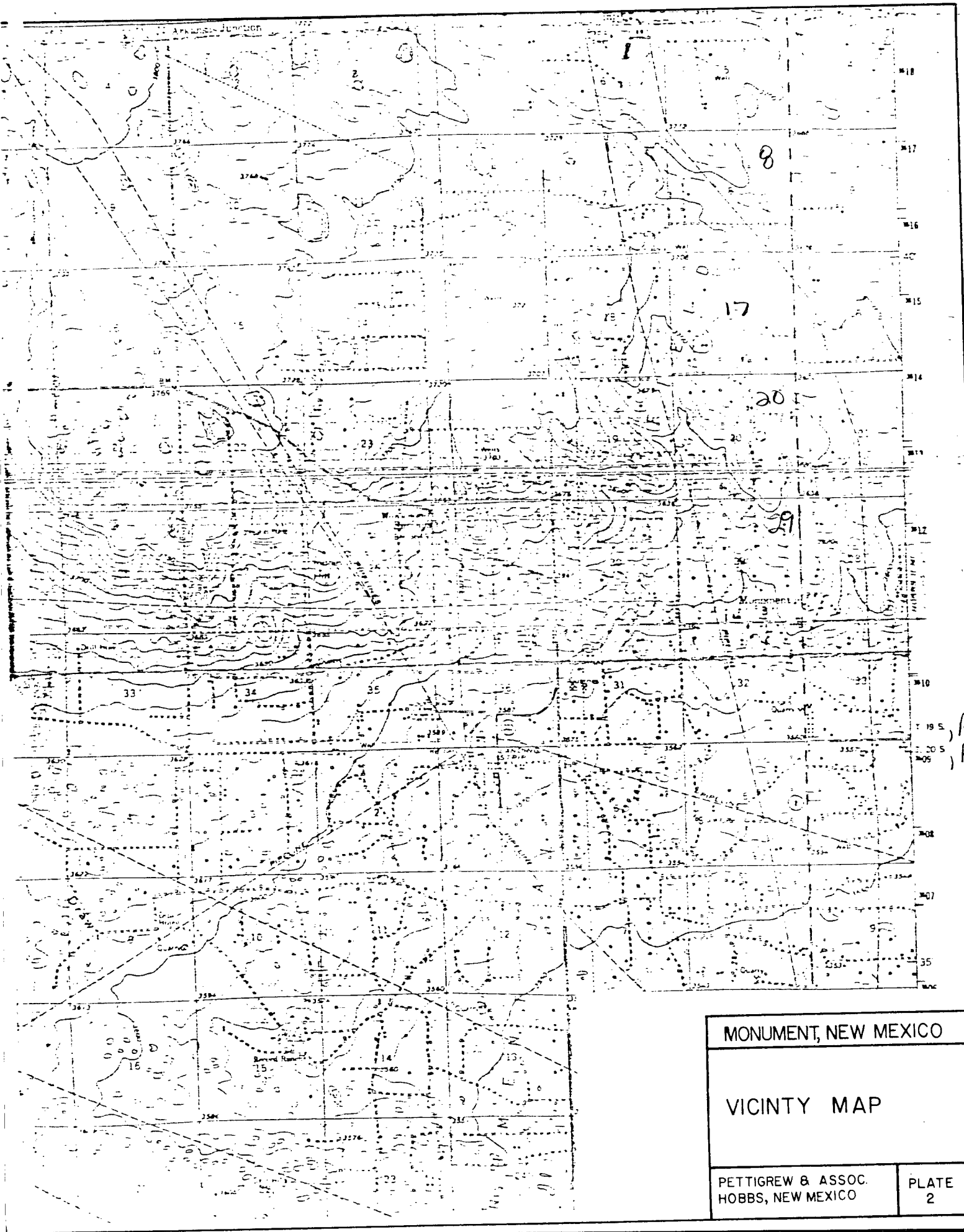


MONUMENT, NEW MEXICO

GENERAL LOCATION

PETTIGREW & ASSOCIATES
HOBBS, NEW MEXICO

PLATE 1



MONUMENT, NEW MEXICO

VICINTY MAP

PETTIGREW & ASSOC.
HOBBS, NEW MEXICO

PLATE 2

LOGS FROM NEARBY EXPLORATION

Virgil Linam
N.W.1/4, N.E.1/4, S.W.1/4, SEC 5,
TOWNSHIP 19 SOUTH, RANGE 37 EAST,
LEA COUNTY, NEW MEXICO

	Thickness (Feet)	Depth (Feet)
Surface		0
Soil	1	1
Caliche	20	21
Sand Rock	7	28
Tight Sand	3	31
Sand Rock	5	36
Water Sand	12	48
Sand Rock	2	50
Tight Sand	3	53
Sand Rock	3	56
Tight Sand	4	60
Sand Rock	2	62
Tight Sand	2	64
Sand Rock	3	67
Tight Sand	2	69
Sand Rock	2	71
Tight Sand	3	74
Sand Rock	4	78
Sand and Gravel	20	98
Red Clay	3	101
Water Sand	9	110
Sand and Gravel	16	126
Red Clay	2	128
	128	

Description	Quantity
Surface Elevation	3,705'
Water Bearing Strata	98'-126'
Flow Test (Est.)	900 gpm
Water Level (Below Surface)	36'

LOGS FROM NEARBY EXPLORATION CONTINUED

Famariss Oil Refining Company
S.E.1/4, N.W.1/4, N.W.1/4, SEC 8,
TOWNSHIP 19 SOUTH, RANGE 37 EAST,
LEA COUNTY, NEW MEXICO

	Thickness (Feet)	Depth (Feet)
Surface		0
Soil	4	4
Caliche	61	65
Hard Rock	5	70
Sand Rock	15	85
Fine Sand and Water	63	148
Sand	2	150
	150	

Description	Quantity
Surface Elevation	3,720'
Water Bearing Strata	85'-148'
Flow Test (Est.)	Not Reported
Water Level (Below Surface)	70'

LOGS FROM NEARBY EXPLORATION CONTINUED

R. H. Huston
N.W.1/4, N.W.1/4, S.E.1/4, SEC 8,
TOWNSHIP 19 SOUTH, RANGE 37 EAST,
LEA COUNTY, NEW MEXICO

	Thickness (Feet)	Depth (Feet)
Surface		0
Soil	2	2
Caliche	18	20
Hard Sand Rock	27	47
Water Sand	5	52
Sand and Shale	13	65
Sandstone	1	66
Sand and Shale	6	72
Water Sand	4	76
Sandstone	9	85
Water Sand	20	105
Hard Sand	15	120
Water Sand and Gravel	10	130
Red Bed	2	132
	132	

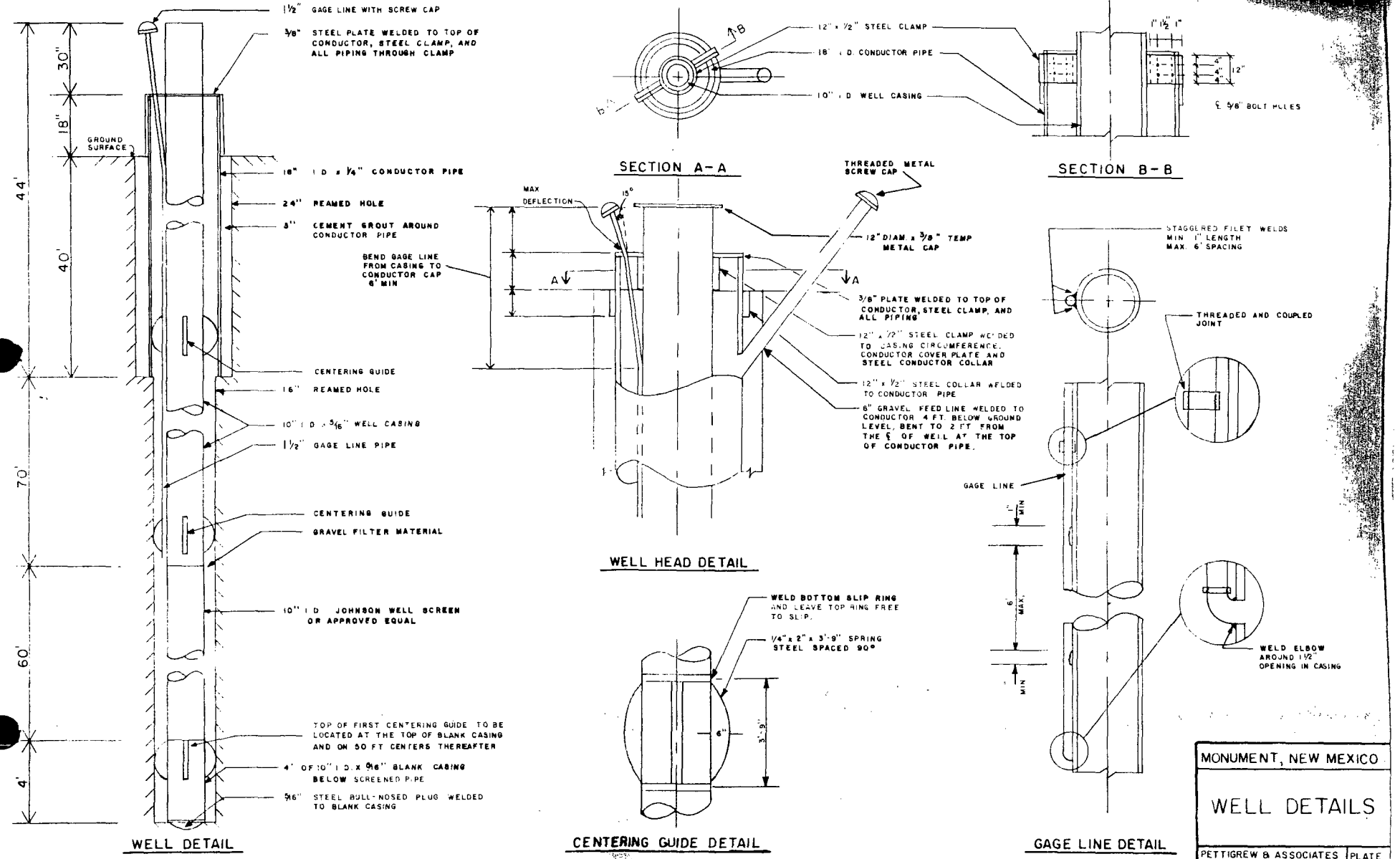
Description	Quantity
Surface Elevation	3,681'
Water Bearing Strata	47'-52', 72'-76', 85'-105', & 120'-130'
Flow Test (Est.)	Not Reported
Water Level (Below Surface)	47'

LOGS FROM NEARBY EXPLORATION CONTINUED

Famariss Oil Refining Company
S.W.1/4, S.W.1/4, S.W.1/4, SEC 8,
TOWNSHIP 19 SOUTH, RANGE 37 EAST,
LEA COUNTY, NEW MEXICO

	Thickness (Feet)	Depth (Feet)
Surface		0
Caliche and Sandy Caliche	20	20
Sand, few hard layers	14	34
Lime Rock and Sand Rock	9	43
Lime Rock and Sand Rock	3	46
Brown sand and few hard streaks	7	53
Hard Lime Rock	8	61
Rock	1	62
Sand, some thin layers of Fine Gravel and hard layers	77	139
Red Beds	3	142
	142	

Description	Quantity
Surface Elevation	3,708'
Water Bearing Strata	Not Reported
Flow Test (Est.)	Not Reported
Water Level (Below Surface)	Not Reported



MONUMENT, NEW MEXICO

WELL DETAILS

PETTIGREW & ASSOCIATES
HOBBS, NEW MEXICO

PLATE 4

P.O. BOX 807
CLOVIS, NM 88101
(505) 762-3716

PETTIGREW & ASSOCIATES

P.O. BOX 5769
HOBBS, NM 88241
(505) 393-9827

RICHARD R. PETTIGREW, P.E.-L.S.

January 28, 1985

Department of Finance & Administration
Local Government Division
505 Don Gaspar
Santa Fe, New Mexico 87503

ATTN: Jackie Block

Re: New Mexico Community Assistance for Monument, New Mexico

Dear Mr. Block:

Our firm herein is submitting a cost estimate to develop a new water supply for the Village of Monument, New Mexico. Page 1 of the attached cost estimate reflects the approved amount of $85,000 from the New Mexico Community Assistance Grant Program, and Page 2 indicates the total cost to complete the Project.

The Scope of Work consists of the construction, development and testing of a water supply and test well, construction of approximately three miles of transmission line and connection to the water storage reservoir.

As indicated on Page 1 of the cost estimate, it will require $76,144.60 for the construction and development of a water supply and property acquisition. The remainder of the $85,000 is shown as engineering and contingencies.

Page 2 of the cost estimate indicates the amount necessary to complete the Project as outlined in the above-mentioned Scope of Work, which will require $368,956.75 additional funding. The cost of the 8 inch transmission line, including trenching, bedding and backfilling, is $287,020.80. The trenching will be primarily in rock, which is the result of the high cost estimate for the pipeline construction. However, Texas-New Mexico Pipeline Company has indicated that they would work with the Village of Monument concerning the trenching since pipelines are their primary business. If the pipeline company provides the trenching, this would decrease the additional funding of the Project by $133,056. Texas-New Mexico Pipeline Company has indicated a commitment, one way or the other, after the bids for the transmission line have been opened.

Should you have any questions concerning this Project, please do not hesitate to contact me.

Respectfully submitted,

PETTIGREW & ASSOCIATES

Ray A. Hohstadt

RAH

Attachments

ESTIMATED PROJECT COSTS

WATER FIELD DEVELOPMENT IN OGALLALA

NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE	AMOUNT	
1)	DEVELOPMENT OF WATER WELL					
	MOBILIZE & DEMOBILIZE	1	ls	$1,000.00	$1,000.00	
	DRILL PILOT HOLE 8" DIA	160	ft	$14.00	$2,240.00	
	REAM PILOT HOLE 24" DIA	40	ft	$28.00	$1,120.00	
	REAM PILOT HOLE 16" DIA	120	ft	$18.00	$2,160.00	
	18" ID CONDUCTOR PIPE	40	ft	$31.64	$1,265.60	
	BLANK CASING, 10" ID	100	ft	$18.72	$1,872.00	
	WELL SCREEN	60	ft	$160.00	$9,600.00	
	GAUGE LINE	90	ft	$6.30	$567.00	
	GRAVEL PACK IN PLACE	10	cy	$150.00	$1,500.00	
	DEVELOPMENT	100	hr	$70.00	$7,000.00	
	TEST PUMPING	48	hr	$80.00	$3,840.00	
	GEOPHYSICAL LOGS	1	ls	$4,000.00	$4,000.00	
	WELL STERILIZATION	1	ls	$600.00	$600.00	
	PUMP	1	ea	$4,200.00	$4,200.00	
	WATER METER	1	ea	$1,050.00	$1,050.00	
	POWER LINE	3,000	ft	$3.41	$10,230.00	
	ELECTRICAL	1	ls	$2,500.00	$2,500.00	
	GATE VALVE	1	ea	$650.00	$650.00	
	CHECK VALVE	1	ea	$750.00	$750.00	
	TOTAL ESTIMATED COST OF WELL					$56,144.60
2)	PROPERTY, EASEMENTS & PERMITS				$20,000.00	
	TOTAL PROPERTY, EASEMENTS AND PERMITS					$20,000.00
	SUBTOTAL WATER SUPPLY DEVELOPMENT					$76,144.60
3)	ENGINEERING AND CONTINGENCIES				$8,855.40	
						$8,855.40
	TOTAL ESTIMATED COST OF NO.'S 1, 2 AND 3					$85,000.00

ESTIMATED PROJECT COSTS CONTINUED

WATER FIELD DEVELOPMENT IN OGALLALA

NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE	AMOUNT	
4)	8" TRANSMISSION LINE AND CONNECTION TO THE WATER STORAGE RESERVOIR.					
	TRENCHING	15,840	ft	$8.40	$133,056.00	
	BACKFILL, BEDDING, ETC.	15,840	ft	$3.12	$49,420.80	
	PIPE C-900 PVC	15,840	ft	$3.85	$60,984.00	
	TIE-IN, TESTING	15,840	ft	$2.75	$43,560.00	
					==========	
	TOTAL ESTIMATED COST OF TRANSMISSION LINE					$287,020.80
5)	ENGINEERING, ADMINISTRATIVE, LEGAL & CONTINGENCIES				$90,791.35	
	LESS ENGINEERING & CONTINGENCIES FROM PAGE 1				$8,855.40	
					==========	
	TOTAL ESTIMATED ENGINEERING, ADMINISTRATIVE, LEGAL & CONTINGENCIES					$81,935.95
						==========
	SUBTOTAL OF PIPELINE CONSTRUCTION COST					368,956.75
						==========
	TOTAL ESTIMATED COST OF PROJECT					$445,101.35