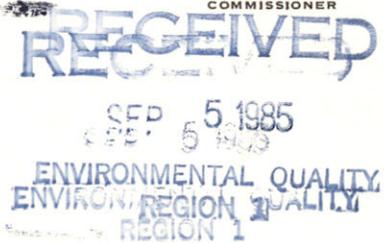


FRANCIS T. PURCELL
COUNTY EXECUTIVE



COUNTY OF NASSAU
DEPARTMENT OF PUBLIC WORKS
MINEOLA, NEW YORK 11501

LUDWIG C. HASL, P.E.
COMMISSIONER



September 3, 1985

New York State Department of Environmental Conservation
Division of Regulatory Affairs
Building 40 SUNY Rm. 219
Stony Brook, NY 11794

Attention: Mr. Albert Machlin

Re: Mitchel Field Transit Facility
Project 91250

Gentlemen:

Attached for review and comments is the specification for the monitoring wells which is to be included in Addendum No. 3.

There will be two clusters of three monitoring wells (future recovery wells, if needed) in the bus storage area as shown in drawing no. 3A.

Since time is of the essence (bids are due shortly) we request your comments as soon as possible.

Very truly yours,

S. S. DeFrancisci, P. E., R.A.
Project Manager

SSD:jh
Attch.

cc: Sue Ennis, NYSDOT, w/attch.
Herbert Libert, N.C.P.C.

SECTION 02700

MONITORING WELLS

Applicable provisions of the "Conditions of the Contract" shall govern all work under this Section.

1. SCOPE

- a. Provide all labor, materials, equipment and services and perform all operations to complete the installation of all work of this Section and related work as indicated on the Drawings and specified herein, including, but not necessarily limited to the following:

- (1) Six (6) wells of two (2) clusters with three (3) wells in each cluster.
- (2) Well casing.
- (3) Well screen.
- (4) Manholes with deep skirt and cover gasket.
- (5) Wall sleeves

2. SHOP DRAWINGS

- a. Submit samples for Architect's approval, in accordance with the applicable provisions of the Contract Documents.

- (1) Drawings shall indicate details of fabrication and installation.

3. REFERENCE TO STANDARDS AND REGULATIONS

- a. The latest revisions of standards of AWWA, ASTM and API shall apply as referenced herein. Standards shall include, but are not restricted to the following:

- (1) ASTM Plastic Pipe Standards, F442-77 and D 1785.
- (2) ASTM PVC Compounds Standards D1784.
- (3) U.S. Department of Commerce Product Standard PS 21-70.

- b. The latest revisions of the NY Environmental Conservation Law, Art. 15.

4. PERMITS

- a. The Contractor shall be responsible for obtaining any Federal, State, or Local Permits required for constructing the wells, discharging water from the site, or clearing the site for work or access.

- b. The Contractor shall furnish separate copies of all permits to the County as the permits are received.

5. DESCRIPTION OF THE WELLS

- a. All of the specified wells shall be a minimum of 4 inches in diameter. Each well will consist of a PVC well casing and a minimum of 10 feet of well screen.
- b. The wells will be constructed as follows:
 1. Two clusters with one 60-foot well, one 95-foot well, and one 160-foot well in each cluster.

6. QUALIFICATIONS

- a. The Contractor responsible for constructing the wells shall be licensed by the State of New York as a water well contractor employing only competent workmen for the execution of this work, and all such work shall be performed under the direct supervision of an experienced well driller satisfactory to the County.
- b. The well driller shall be capable of identifying geologic formation, maintaining complete and current well logs and daily notes for the well completion report, and developing and testing the wells.
- c. The County may make any other investigations deemed necessary to determine the ability of the Contractor to perform the work, and the Contractor shall furnish to the County all such information and data for this purpose as the County may request.
- d. The Contractor shall furnish satisfactory evidence upon request that all materials to be furnished in performing the specified work are new and all equipment to be used is in good working order.
- e. The Contractor shall complete the work described in this section in accordance with applicable portions of the New York Environmental Conservation Law.

7. SUBMITTALS

- a. Copies of all materials required to establish compliance with the specifications shall be submitted to the County.
- b. During drilling of each well, the Contractor shall maintain at the well site a complete log setting forth the following:

SUBMITTALS (continued)

- (1) The reference point for all depth measurements.
 - (2) The depth at which each change of formation occurs.
 - (3) The identification of the material of which each stratum is composed.
 - (4) The depth interval from which formation samples were taken.
 - (5) The depth at which hole diameters (bit sizes) change.
 - (6) Other pertinent data requested by the County.
- c. During drilling of each well, a daily detailed driller's report shall be maintained and submitted as requested by the County. The report shall give a complete description of all formations encountered, number of feet drilled, number of hours on the job, shutdown due to breakdown, feet of casing set, and other pertinent data requested by the County.
- d. During drilling of each well, formation samples shall be collected, and preserved, immediately after retrieval, in a manner approved by the County. Samples shall be clearly and indelibly labeled with the following information:
- (1) Location of the well.
 - (2) Name or number of the well.
 - (3) Depth interval represented by the sample.
 - (4) Date taken.
 - (5) Time taken.
- e. Upon completion of each well, the Contractor shall also submit to the County a report to include the following:
- (1) The total depth of the complete well.
 - (2) The depth of location of any lost drilling fluid, drilling materials or tools.

SUBMITTALS (continued)

- (3) The depth of the steel surface casing.
 - (4) The nominal hole diameter of the well bore above and below the casing.
 - (5) The amount of cement (number of bags) used for the top seals.
 - (6) The amount of bentonite pellets (number of pounds or cubic feet) used for the seal.
 - (7) The depth and description of the well casing.
 - (8) The complete description (including length, diameter, slot sizes, etc.) of well screens.
 - (9) Copies of geophysical logs.
 - (10) Other pertinent data requested by the County.
- f. Sample containers shall be as approved by the County.
- g. The Contractor shall make arrangements for geophysical logging of each 160 foot deep bore hole. The well shall be at least gamma ray and electrically logged. Field copies of the logs shall be evaluated by the County prior to setting the casing and well screen in any well installed under these specifications.

8. HANDLING OF MATERIALS

- a. All equipment, parts and materials, shall be properly protected so that no damage or deterioration will occur during a prolonged delay from time of shipment until installation is completed and the units and equipment are ready for operation.
- b. All equipment, parts and materials shall be properly protected against damage during a prolonged period at the site. Any equipment, parts, and materials damaged, or deemed unacceptable by the County, shall be removed from the site and replaced with new like equipment, parts, or materials by the Contractor at no additional cost to the County.
- c. The Contractor shall provide a clean portable drilling mud waste storage tank or container with a capacity of at least 50% greater than anticipated drilling waste per drill hole.

HANDLING OF MATERIALS (continued)

- d. Well Development Water - Well development water shall be pumped into tank or container parked or located near the well. No water shall be allowed to flow on the site surface. If the development water volatile organic concentration exceeds 5.0 ppm as measured by the County representative it must be aerated by the Contractor on-site. Aeration must continue until head-space analysis indicates less than 5.0 ppm volatile organic concentration.

When the quality of the well development water has reached acceptable levels, it shall be conveyed to a County sanitary sewer within one mile of the site for disposal.

- e. The Contractor shall contain all spent drilling mud, and cuttings in 55 gallon "ring top" drums". The waste material shall be transported to off-site disposal in these same drums. Materials extracted from any hole shall not be retained on site. Waste materials shall be disposed of as directed by the County and as approved by the New York State Department of Environmental Conservation.

9. WELL ACCEPTANCE CRITERIA

- a. Wells will be accepted by the County when the well is developed to the point that it is producing water free of drilling fluid additives and is sand and sediment free.
- b. Sand-free shall be defined as not more than 0.01 ml of sand as collected in a 1,000 ml graduated Imhoff cone.
- c. To be accepted, all wells shall be sufficiently straight and plumb to permit passage of a 3 5/8" diameter by 36" long submersible pump or dummy to the top of the well screen.
- d. No payment will be due the Contractor if he fails to meet these requirements.

10. WARRANTY

- a. All equipment supplied under this Section shall be warranted for a period of 1 year from date of acceptance by the Contractor and equipment manufacturers. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period.
- b. The wells shall be warranted to be free from defects in workmanship, design, and materials. If any part of the wells should fail during the warranty period, it shall be replaced and the wells restored to service at no additional expense to the County.

11. MATERIALS

a. Casing

- (1) All well casing shall be new, Schedule 80, flushed coupled, square threaded, PVC pipe. Casing shall be a minimum of 4 inches in nominal diameter.
- (2) Casing shall be as manufactured by TIMCO Manufacturing Company, or approved equal.
- (3) Casing shall be screwed together in the field. No cement or glue will be permitted.
- (4) Surface casing incorporated into the finished well construction shall be 4-inch nominal diameter schedule 40 steel manufactured to comply with ASTM-A-53 standards. A threaded steel adapter shall be installed to joint the PVC casing to the steel surface casing.
- (5) If any surface casing is intended for construction purposes only, it shall be reasonably watertight, and of such weight and design as necessary to prevent entrance of sand and to permit its installation and removal without distortion or rupture to the specified depth and dimension.

b. Screen

- (1) Well screens shall be a minimum of 4 inches nominal diameter, new stainless steel, flush threaded on one end and sealed with a threaded plug on the other end. Slot size shall be as approved with a threaded plug on the other end. Slot size shall be as approved by the County following sieve analysis and gradation curve for each well prepared by the Contractor of sand samples of the native formation.
- (2) Well screens shall be as manufactured by Johnson Div./UOP Inc., or approved equal, providing a "Vee" slot configuration.
- (3) Screens shall be attached to the casing by screwing the threaded joints together. No cement or glue will be permitted.

c. Gravel Pack

- (1) A Cape May, or approved equal, gravel shall be employed as a gravel pack material in each well.
- (2) Gravel shall be well rounded, washed, sized, gravel with a diameter and gradation determined concurrently with the establishment of the well screen slot size to provide compatibility with the native sand aquifer formation and the selected wells screen slot size. Samples of gravel proposed by the Contractor, for the well installations shall be submitted to the County for approval.

d. Caps and Protective Covers

- (1) Each well and well casing shall be protected from entry of foreign materials at all times and upon well completion fitted with a temporary welded 1/4 in tick steel cap.
- (2) Temporary well guard and identifying flagging shall be provided and installed immediately upon well completion and prior to removal of the Contractor's well rig and/or development rig from the well site.

e. Bentonite Seals

- (1) The bentonite for bentonite/cement (or bentonite pellets for formation sealing of 60-foot wells only) shall be of the type manufactured by Sinco, American Colloid Company, Terra-Metric, or an approved equal.
- (2) Bentonite pellets, as approved for seals in 60-foot wells only, shall not exceed 1/2 in-inch in diameter.

f. Geophysical Logs

- (1) As a minimum, gamma ray, resistivity, and spontaneous potential geophysical logs shall be made for each 160 foot deep well as approved by the County.
- (2) The geophysical well logger shall be approved in advance by the County.

g. Manholes

- (1) Manholes shall be as manufactured by Dover Corporation OPW Division, OPW 104-B 10" x 4" with deep 7 1/2" skirt, cover gasket or approved equal.

12. BORE HOLE CONSTRUCTION

- a. In general, the drilling procedures to be employed at this site consists of mud rotary drilling and sampling. The overall procedures for the work are as follows:
 - (1) Clean equipment per Paragraph 13.
 - (2) Drill 8 3/4"-in diameter (or larger as necessary) bore hole to depth determined in the field by the County. A portable mud pit shall be employed for this work.

BORE HOLE CONSTRUCTION (continued)

- (3) Bore hole sampling shall consist of the collection of "wash" samples collected and bottled every 5-ft. or as otherwise directed. Provision for collection of split spoon or Shelby tube samplers shall be made and collected as directed by the County.
- (4) Drilling fluid shall consist of approved clean water and bentonite based mud additive (pure Wyoming bentonite with no organic polymer additives) of a weight equal to approximately 9.0 lb/gallon or more and a marsh funnel viscosity of approximately 50 seconds. No other fluids or additives shall be used unless approved by the County. A thin mud may be employed as the bore hole is advanced into the aquifer of interest to reduce the risk of formation clogging.
- (5) One bore hole flush and equipment cleanup shall be performed on each of the 95' and 160' deep bore holes as directed by the County. These periodic flushes shall be in accordance with Paragraph 13.

13. CASING AND SCREEN INSTALLATION

- a. Casing and screen shall be installed by screwing together the individual pieces and installing them as one unit.
- b. Every effort shall be made on the part of the Contractor to assure casing plumbness and centralization within the bore hole.
- c. Centralizer may be employed by the Contractor as an optional method of assuring centralization and plumbness, with prior approval of the County.
- d. The casing and screen column shall be secured approximately 1 foot above the bottom of the bore hole to allow the gravel pack to form beneath the screen.
- e. Casing and screens shall be cleaned as necessary and as directed by the County.
- f. All casings and screens shall be constructed plumb and true to line. The deepest anticipated well depth will be 160 feet. If, in the opinion of the engineer, a well might be out of plumb or alignment, it shall be tested at the Contractor's expense in accordance with Section 1-6.2 and 1-6.3 (AWWA).
- g. All 95' and 160' wells shall be grouted with a cement bentonite grout from the top of the gravel pack to the water table. Grout shall be placed by the tremie method or as otherwise approved by the County.

14. CLEANING PROCEDURES

- a. All drilling equipment and materials (i.e., drill bits, tremie pipe, portable mud pit, rods, kelly, casings, screens, and sampling equipment) shall be steam cleaned and void of any external oils and greases prior to each well nest. All contact equipment (sample pumps and hoses, mud pits, drill string, mud pump, water tank, etc.) shall be flushed with water before each use and as directed during the program (during fluid changes). Drill pipe lubrication shall be Dow Corning Hi-vacuum Silicon Grease.
- b. All equipment shall be stored above ground in a clean and approved manner.
- c. All sampling equipment (tubes and split spoons) shall be either steam cleaned or cleaned with pesticide grade menthanol between uses.
- d. Drilling fluid changes during the construction shall include cleaning of all drilling equipment in the manner described in paragraph 13 a.; in addition to the removal of drilling fluid in the bore hole by flushing, bailing or jetting with new fluid, as necessary to ensure clean fluid in the bore hole.
- e. All cleaning equipment shall be provided by the Contractor.
- f. All cleaning equipment is subject to the approval of the County.
- g. All water used in the drilling operation shall be provided by the Contractor. Transport and storage of all water will be the responsibility of the Contractor. All water used for drilling and cleaning must be potable and as approved by the County.

15. GRAVEL PACK INSTALLATION

- a. The gravel pack shall be placed in the well by means of a tremie pipe to insure that no bridging of the hole occurs and shall extend from the bottom of the bore hole to above the top of the screen a distance equal to 1/2 the installed length of the screen. The gravel pack shall be a minimum of 2 1/2 inches thick. Gravel pack material may be placed by pumping in place if method and equipment is approved in advance by the County, and the results are satisfactory to the County.

16. BENTONITE SEALS AND GROUT

- a. A bentonite seal shall be placed above the gravel pack of each well.
- b. All cement/bentonite grout or bentonite pellets shall be installed using a tremie pipe or other method as approved by the County.

BENTONITE SEALS AND GROUT (continued)

- c. All cement/bentonite grout used shall consist of the following mixture:

120 gallons of clean water
40 lbs pure Wyoming bentonite
9 - 100 lb. bags Type 1 cement
5 teaspoons aluminum hydroxide

All grout shall be allowed to cure for a minimum of 12 hours or as necessary to provide a proper cure prior to starting the next phase of work.

- d. Backfill above the grout shall be clean low permeability fill or drill cuttings as approved by the County.

17. WELL DEVELOPMENT

- a. Each well shall be developed by surging, compressed air, interrupted over-pumping, or other methods approved by the County for a minimum of 4 hours. Development shall continue until the well contains less than 0.01 ml of sand (paragraph 9) per 1,000 ml of water at pumping rates up to that which would result in a drawdown 3 feet above the top of the well screen of the well or as specified in paragraph 13c. The sand free condition is to be measured within the first 15 minutes of pumping following start-up. If the sand has not been effectively and satisfactorily developed out, the well will not be accepted.
- b. The wells shall be developed to the extent that they are responsive to increased production with continued development of 5 percent or more, improvement in specific capacity during the preceding hour of development.
- c. All wells shall be tested for development (sand free condition) and yield by pumping for a minimum of one hour. Pumping shall be sufficient to drop the water level in the well to within 3 feet of the screen or to within 3 feet of the screen of the shallow well at each site or 70 gpm.

18. PROTECTIVE COVERS

- a. The steel protective cover and separate temporary flagging shall be as required and as approved by the County.

19. WELL ABANDONMENT

- a. In the event that the Contractor shall fail to sink the well to the depth specified or to such lesser depth as directed by the County, or should abandon the well because of loss of tools or for any other cause, he shall, if requested and as directed by the County, plug the well with non-shrink cementitious grout from the bottom of the hole upwards to ground level in one operation at no additional cost.

20. PROTECTION AND SITE CLEAN-UP

- a. At all times during the progress of the work the Contractor shall use all reasonable precautions to prevent either tampering with the wells or the entrance of foreign material into them.
- b. Immediately upon completion of a well, the Contractor shall remove all of his equipment, materials, and supplies from the site of the work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started. The site shall be thoroughly cleaned and approved by the County. Not more than two weeks will be allowed for this work, and the Contractor shall complete all cleaning within that time. Failure to comply with these requirements shall be the authority of other contractors or workmen directed by the County to enter upon the site and complete the cleaning up, grading, etc. The cost of this work shall be deducted from any money due or to become due the Contractor for construction fo the wells.