SP-230013
(New)

SPECIAL PROVISIONS
FOR
DEWATERING IN LEVEE CRITICAL AREA

Fremont County
STP-333-1(030)--2C-36

Effective Date
October 17, 2023

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230013.01 SCOPE OF WORK.

A. General.

1. The work of this special provision includes site dewatering necessary to lower and control groundwater levels and hydrostatic pressure to permit excavation and construction of the reinforced concrete pipes and associated structures to be performed properly under dry conditions in the levee critical area. The levee critical area is defined as the area extending from 300 feet riverward to 500 feet landward of the levee centerline.

2. The groundwater within the limits of the reinforced concrete pipe excavations shall be lowered and maintained to an absolute minimum of 3 feet or lower below the lowest excavation at all times during construction of the pipe and foundations.

B. Dewatering operations shall be adequate to assure the integrity of the finished project. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

C. The Contractor shall bear the sole responsibility for the design, installation, operation, monitoring, removal, and abandonment of the dewatering system to comply with the requirements of this section and any applicable regulatory agencies. The Contractor shall be required to install additional dewatering equipment as may be required throughout the duration of the project to maintain groundwater levels as described in Article 230013.01, A.

D. The Contractor shall be responsible for submitting the applications and obtaining the required permits for the well construction. The Contractor shall also be responsible for filing a Field Office Notification (FON) with the Iowa DNR and developing a Well Water Pollution Prevention Plan for the discharge of wastewater from well construction activities per the Iowa DNR NPDES General Permit #6. Copies of these guidelines and blank forms are available from the Iowa DNR.

E. The Contracting Authority will notify the Contractor of any demands brought upon the project by the Iowa DNR. The Contractor shall cooperate with the Contracting Authority in its efforts to comply with the site-specific guidelines provided by the Iowa DNR, including the possibility of adjusting the dewatering system if the discharge exceeds limits imposed by the Iowa DNR. The Contractor shall be responsible for the costs of sampling and testing required by the Iowa DNR.

230013.02 QUALIFICATIONS.

A. The Contractor shall employ the services of a Dewatering Specialist.

B. Prior to commencement of construction, the Contractor shall submit qualifications of the Dewatering Specialist.

1. The dewatering specialist shall have been engaged in providing dewatering services to the construction community for the last 5 years.

2. References shall be provided where the Dewatering Specialist performed similar services for at least three other construction projects of similar nature and magnitude.

3. The Dewatering Specialist shall be a Professional Engineer licensed in the State of Iowa.

230013.03 SCHEDULE AND PLAN.

A. Prior to commencement of construction, the Contractor shall submit a detailed dewatering plan. Submittal shall include:

1. Plan location of the temporary berms, dewatering wells and piezometers.

2. Well and piezometer construction details including the diameter, depth, screen size, screen location, filter pack location and gradation, list of equipment and estimated pumping rates.

3. Discharge pipe location, size, and details. If a pipe will be run up and over the levee, then a ramp shall be detailed to allow access to be maintained along the crest of the levee. Pipe discharge will not be allowed within 15 feet of the toe of the levee. An energy diffusor and revetment will be required to prevent erosion at the discharge location. A plan view location of the ramp and discharge pipe shall be included along with a cross section for any levee crossing and discharge revetment section.

4. Abandonment plan for both the dewatering wells and piezometers. At a minimum, cement-bentonite grout backfill shall be used the full depth of the well or piezometer. The top 3 feet of casing below final grade should be cutoff and a 6-inch concrete cover placed over the cutoff casing. The backfill above the concrete cover can consist of compacted backfill of similar classification as the surrounding soils. If the wells casings and screens are removed, then bentonite grout backfill shall be used the full depth of the well or piezometer. Any granular annulus material shall be removed above Elevation 890 feet prior to the placement of cement-bentonite grout backfill. The top 3 feet shall consist of compacted backfill of similar classification as the surrounding soils.

5. Removal plan for temporary berms.

B. Geotechnical information collected for the project is provided in the USACE Section 408 submittal. Fluctuations of the groundwater level can occur due to seasonal variations in the amount of rainfall, runoff, stage level of the Missouri River, and other factors not evident at the time the borings were completed. The geotechnical information was prepared for design purposes only and may not be adequate for a Contractor to evaluate construction conditions or design the dewatering system. The Contractor should independently interpret the

soil/groundwater conditions taking into consideration their intended means and methods of construction, and the Contractor may perform additional exploration and laboratory testing at their own expense as necessary for design of the dewatering system.

C. Due to possible variations of soil conditions and groundwater levels between soil boring locations, the Contractor shall be responsible for changing or modifying the dewatering system to accommodate such variations.

D. At completion of construction, the Contractor shall submit copies of the drilling logs, finished well construction diagrams, and well abandonment diagrams for the installed dewatering wells and piezometers. Coordinates for each well and piezometer shall be included with the submittal.

230013.04 CONTROL AND OBSERVATION.

A. Adequate control shall be maintained by the Contractor to ensure that the stability of the subgrade and excavated slopes are not adversely affected by water, that erosion is controlled and that flooding of excavation or damage to structures does not occur. The Engineer assumes no responsibility for site safety; the above information is provided for consideration by the Contractor only.

B. A minimum of one piezometer shall be installed at the mid-point between every dewatering well along each line of dewatering wells. If additional wells are needed to confirm that the drawdown requirements are met, the Contractor shall add piezometers as needed at no additional cost.

230013.05 INSPECTION.

A. During or after any excavation, if Contractor observes sufficient soil instability present that may prevent proper installation of backfill and compaction, then Contractor shall call for inspection of conditions by the Engineer. The Engineer will inspect the conditions and determine if they are unacceptable for the installation.

B. If after dewatering has lowered the groundwater level as specified and unacceptable conditions are found by the Engineer, then the Contractor may be directed to increase dewatering pumping rates or install additional wells to lower the groundwater to an acceptable level lower than that defined in Article 230013.01, A. If more extensive dewatering is required the Contractor shall achieve the revised acceptable groundwater level before construction may continue.

230013.06 CONSTRUCTION.

A. The Contractor shall furnish, install, and operate pumps, pipes, appliances, and equipment of sufficient capability to maintain the absolute minimum or lower groundwater elevation described in Article 230013.01, A within the excavation limits until the excavation is backfilled, unless otherwise authorized by the Engineer.

B. No dewatering features (wells, piezometers, piping) may be installed through the existing and proposed levees, as well as within the footprint of the proposed levee embankment.

C. The Contractor shall provide any temporary ground surface piping necessary to convey dewatering well water discharge to an acceptable storm sewer intake or waterway with the capacity to convey said discharge. Any rerouting of temporary ground surface piping, necessary to complete the project, shall be provided by the Contractor. Discharge directly onto the ground surface shall not be allowed. The Contractor shall supply a clean tapping device at each well location to allow easy discharge water sampling by the Engineer.

D. An adequate system shall be designed, installed and maintained to lower and control the groundwater elevations as described in Article 230013.01, A to permit excavation, construction of

structures, and placement of fill materials to be performed under dry conditions as indicated on the plans.

E. The system shall be placed into operation, prior to beginning excavating below the natural groundwater level, to lower the groundwater to the elevation as described in Article 230013.01, A and shall be operated continuously 24 hours a day, 7 days a week until the construction is complete.

If the dewatering system shuts down or if pumping is suspended, the groundwater levels will need to be lowered to the required level, as described in Article 230013.01, A, and verified by the Engineer before continuing any construction, including excavation or backfilling. The Engineer will also require any compaction, moisture and/or other soils testing, as determined necessary, of any backfill that is prematurely subjected to groundwater to verify said soils stability prior to placement of additional backfill. If said soils are determined to be unacceptable, the Contractor shall remove and replace damaged soils at their own expense.

If the Contractor cannot maintain the required groundwater levels, as described as described in Article 230013.01, A, the Contractor shall backfill the excavation until the required groundwater levels are achieved.

F. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of subgrade soils at the bottom of the proposed excavation.

G. Piezometers shall be installed in accordance with the USACE Standard Operating Procedure provided in Appendix A.

230013.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

The measurement and payment for all work covered under this specification will be made at the contract lump sum price for Dewatering in Levee Critical Area which shall constitute full compensation for obtaining any necessary permits and furnishing all equipment, labor, and materials to install, operate, maintain, monitor, and remove the dewatering system in accordance with all applicable regulations.

A. No payment shall be made to the Contractor until copies of the permits are supplied to the Contracting Authority.

B. The cost of piezometers sufficient to meet the requirements stated in Article 230013.03, C shall be considered incidental to the lump sum pay item Dewatering in Levee Critical Area. If the additional piezometers are needed, they shall be done at the sole expense of the Contractor.

C. The cost of sampling and testing the discharge water shall be considered incidental to the lump sum pay item Dewatering in Levee Critical Area.

D. The Contractor shall be required to submit a schedule of values to the Engineer to explain the breakdown of the lump sum price. This schedule of values will only be used to determine the appropriate amount of the lump sum to be attributed to each progress payment. The following list contains items that should be used, at a minimum, for the schedule of values:

- Obtaining permits and complying with permit requirements.
- Installing temporary berms
- Drilling the wells and piezometers.
- Installing the pumps.
- Installing power supply.
- Discharge and/or manifold piping.
- Sampling and testing the discharge water.
- Removal of temporary berms.
- Removal and abandonment of wells and piezometers.

APPENDIX A
USACE Standard Operating Procedure
Open Tube Piezometer Installation

SOP #5: Open Tube Piezometer Installation

1 GENERAL

This Standard Operation Procedure (SOP) outlines the general requirements, methodology, and documentation required for this task. Site-specific requirements for the number, location, and other specific information or considerations are specified in **Appendix A** of this Scope of Work.

2 REQUIREMENTS

Installation includes the entire designed length of the open tube piezometer's screen, riser, filter pack, and annular seals along with surface completion. The open tube piezometer is to be fully installed, developed, and response tested (if required) as designed.

The Contractor is responsible for obtaining all equipment, supplies, and personnel required to complete successful installation of all components of the open tube piezometer(s). The Contractor shall review the open-tube piezometer design criteria (provided in the site-specific section of this SOW [**Appendix A**]) and become familiar with the location and level of effort required to fulfill all components of the installation process. All work completed under this SOP shall be detailed in the Contractor's final work plan prior to initiation of any field efforts.

For this task, the Contractor shall adhere to all provisions outlined in the Scope of Work (SOW), this SOP, the site-specific requirements detailed in **Appendix A**, and the most recent revision of the following reference materials, as applicable.

PUBLICATIONS

ER 1110-1-1807. U.S. Army Corps of Engineers, Engineering Regulation (ER) 1110-1-1807, *Procedures for Drilling in Earth Embankments*.

EM 1110-1-1804. U.S. Army Corps of Engineers, Engineering Manual (EM) 1110-1-1804, *Geotechnical Investigations.*

ASTM D 1586. American Society for Testing and Materials (ASTM) D 1586, *Penetration Test and Split-Barrel Sampling of Soils*.

ASTM D 1587. American Society for Testing and Materials (ASTM) D 1587, *Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes*.

ASTM D 2488. American Society for Testing and Materials (ASTM) D 2488, *Standard Practice for Description and Identification of Soils (Visual Manual Procedure).*

FORMS

ENG FORM 1836/1836A. U.S. Army Corps of Engineers, Engineering Form 1836 and/or 1836A, *Drill Log Form.*

ENG FORM 1742. U.S. Army Corps of Engineers, Engineering Form 1742, *Sampling Labels (Example)*

MRO (NWO) FORM 1241. U.S. Army Corps of Engineers, Omaha District Form 1241, *Sample Transmittal Form (Example)*

Piezometer Construction Diagram Form (Example)

Open Tube Piezometer Development Log (Example)

3 PROCEDURES

3.1 Field Activities

Outlined below are the field activities for open tube piezometer drilling and sampling, installation, and development. If required, the response testing shall be preformed using SOP #5: Response Testing. Restoring the site to acceptable pre-work conditions after completion of all work efforts shall also be the responsibility of the Contractor. Procedures used shall be thoroughly described in the Contractor's work plan.

3.1.1 Drilling, Logging, and Sampling

Borings shall be drilled with 3 ¼-inch (or larger) inner diameter hollow stem augers to produce a boring of sufficient diameter and depth to meet design requirements of the open tube piezometer as set forth in **Appendix A**. The drilling method shall be such as to maintain borehole stability and keep the drill string free of heaving formation materials, thereby allowing proper placement of the screen and riser and the subsequent installation of the filter pack and other annular seals. It should be noted that a single boring from which logging and sampling requirements can be fully completed that meets design requirements of the piezometer (i.e., diameter and depth) is acceptable. The drilling method shall allow the open tube piezometer, to include the borehole wall and adjacent formation, filter pack, and screen, to be developed to provide maximum hydraulic connection between the piezometer's screen and the monitoring zone's groundwater.

Soils shall be logged, classified, and sampled in accordance with **SOP #4** and **Appendix A**.

3.1.2 Open Tube Piezometer Installation

The open tube piezometer shall be installed immediately after each boring is complete to the design depth specified in the site-specific section of the SOW (**Appendix A**). Generally, the open tube piezometer shall be constructed of 2-inch nominal diameter, schedule-40, PVC casing with 0.010-inch-slot, continuous wrap screen, with 20-40 gradation clean silica sand filter pack, with specific details supplied in **Appendix A**. Criteria for the anticipated screen placement shall be identified in the Contractor's Work Plan; however, the actual screen placement **shall be confirmed** with the USACE- Primary Technical POC (or the USACE- Dam Safety Engineer) **prior to installation**. If the design screen length is not factory standard or custom manufactures, it can be custom fitted in the field from screen (meeting same construction material type/slot width and type as designed) to meet the design length to reflect the zone targeted for monitoring. The entire length of the open tube piezometer shall be installed centrally and straight in the borehole to allow the required thickness of filter pack to be tremied into place surrounding the well screen, as well as efficiently allowing all other annular seals to be properly placed. All seals shall be placed by tremie methods. Filter pack shall extend 1-foot below the bottom of the

screen and 2-feet above the top of the screen unless otherwise specified in **Appendix A**. A 3-foot-thick layer of ⅜ to ½-inch diameter, bentonite pellets will be placed above the filter pack sand and allowed to hydrate before the remaining borehole annulus is filled with a cement-bentonite grout. The grout will be injected through a tremie pipe to within 1-foot of the ground surface and allowed to settle. After settlement has occurred, the grout will be topped off to 1-foot of the ground surface. Natural soil will be mounded at the ground surface to promote water drainage away from the piezometer. Grout will be a mixture of one bag (94 pounds) of Portland cement, 7 gallons of water, and 3 percent by weight bentonite powder. Grouts shall be placed using a side-discharge tremie pipe that remains submerged in the grout during the grouting process. The remaining borehole annular space and surface completion shall be completed as specified in **Appendix A**. Filter pack gradation, screen slot opening width, screen type, annular seals, and surface completion materials (concrete pad, protective casing, protective posts, lock) planned to be used during installation shall be specified in the Contractor's work plan and be based on design criteria presented in **Appendix A**. An Open Tube Piezometer Installation form shall be completed (**Attachment 4**).

3.1.3 Open Tube Piezometer Development

The water level, depth, and diameter shall be measured and recorded on **Attachment 5**. The piezometer shall be surged with an appropriately functioning surge block supporting a relief valve. Then the water and any sediment in the piezometer shall be evacuated by use of a pumping method (e.g., airlift, etc.) capable of removing water and sediment from the piezometer. Alternating surging and pumping efforts shall continue until all sediment is removed from the piezometer and the water is clear. The Open Tube Piezometer Development Log (**Attachment 5**) shall be fully completed for all development activities and results. A labeled photograph of pre- and post-development water placed in a clear glass jar shall be taken.

3.1.4 Open Tube Piezometer Disinfection

At completion of the rising-head response test (if performed), the piezometer shall be disinfected with a bleach solution. However, if the piezometer's screened zone is in impermeable materials (such as may be found in the embankment and potentially the foundation) the piezometer shall not be disinfected. The amount of bleach solution added to the piezometer shall be two times the static water volume in the piezometer or to a maximum level within 10 feet of the ground surface (if the two times static water volume is greater than 10 feet below the ground surface). The bleach solution shall be ratio of 1:250, 1 gallon of 5% bleach to 250 gallons of water (approximately 3 teaspoons of 5% bleach per 1 gallon of water). The bleach solution shall be added to the piezometer and allowed to infiltrate naturally. This effort shall be documented in the "COMMENTS" block on **Attachment 5**.

4 DOCUMENTATION AND REPORTING

The Contractor shall be responsible for recording, maintaining and submitting all documentation and reports associated with this SOP and the site-specific information provided in **Appendix A**. The following list includes documents and reports that shall be submitted to the Corps of Engineers per this SOP. This submittal list is not inclusive of all submittals required under the SOW. Submittal format requirements, reporting and planning requirements, and submittal deadlines are specified in the main body of the SOW. At a minimum, these include the following:

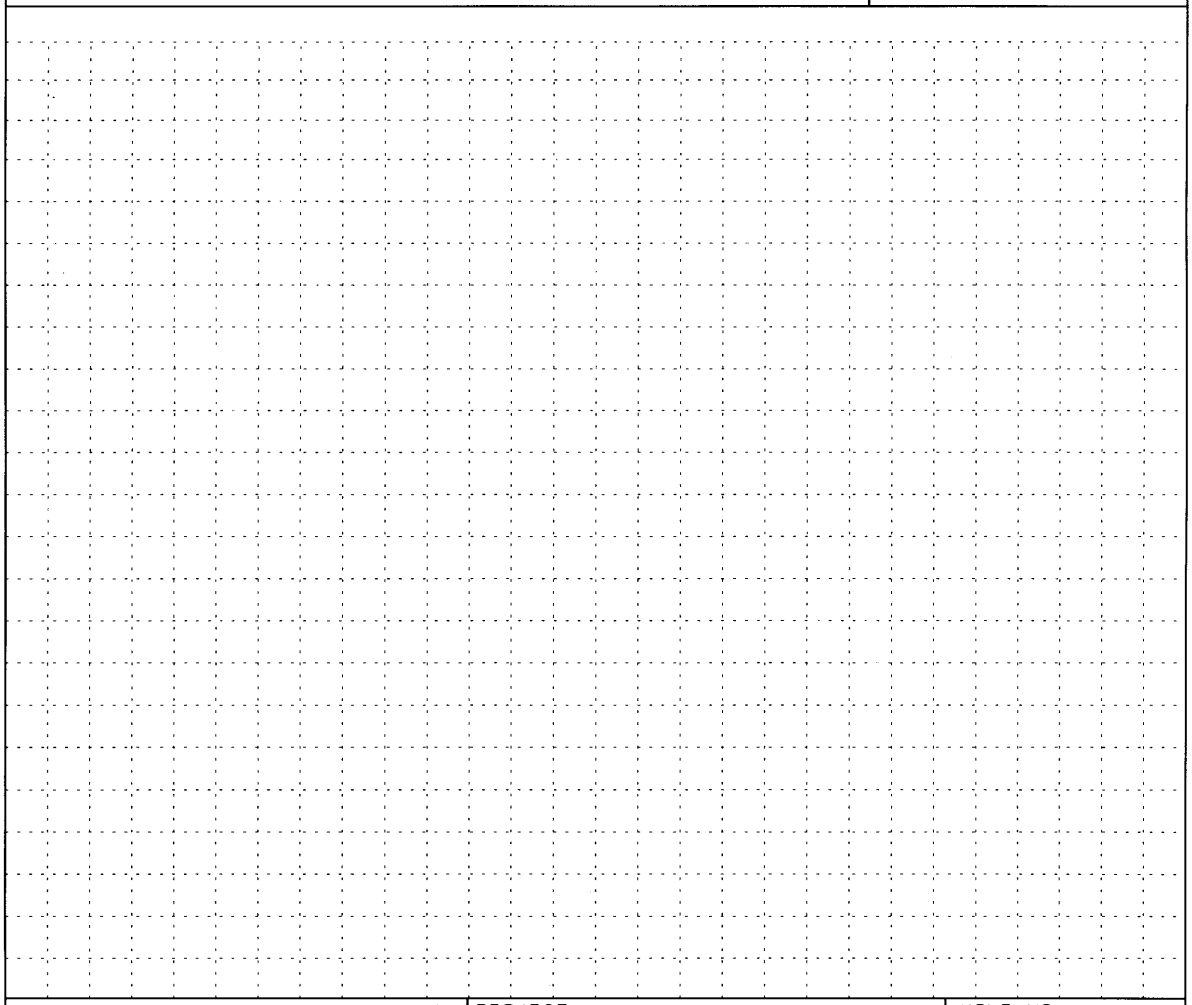
- Daily Quality Control Report (per SOP #1)
- Drill Log Form (including photo attachments)
- Sample Labels
- Sample Transmittal Record
- Open Tube Piezometer Installation Form
- Open Tube Piezometer Development Log including photo-documentation.
- Photographs at each piezometer location documenting all work efforts and pre-installation and post-installation site conditions

DRILLING LOG

DIVISION	INSTALLATION	HOLE NUMBER

1. PROJECT	10. SIZE AND TYPE OF BIT / SHEET SHEETS OF
2. LOCATION (Coordinates or Station)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY	12. MANUFACTURER'S DESIGNATION OF DRILL
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN / DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE / STARTED / COMPLETED
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR

LOCATION SKETCH/COMMENTS	SCALE



ENG FORM 1836	PROJECT	HOLE NO.

DRILLING LOG (CONT SHEET)

ELEVATION TOP OF HOLE		HOLE NUMBER
PROJECT	INSTALLATION	SHEET OF SHEETS

ELEV. (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (DESCRIPTION) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)

ENG FORM 1836 | PROJECT | HOLE NO.

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

	PROJECT		LOCATION
	HOLE NO.	DEPTH: FROM– TO–	
		ELEVATION	
	SAMPLE NO.	CLASSIFICATON	
	J-	TYPE: ☐ DISTURBED ☐ UNDISTURBED	
	REMARKS		
FROM	DATE	INSPECTOR	
ENG FORM 1 JAN 49 1742		☐ BAG ☐ JAR	OF

SAMPLE TRANSMITTAL RECORD

CORPS OF ENGINEERS LABORATORY

PROJECT	HOLE NO.
LOCATION: PLAN	TOP ELEVATION
SAMPLING METHOD	INSPECTOR

DATE SAMPLED	SAMPLE SIZE	SAMPLE TYPE	SAMPLE NO.	LAB. SER.NO.	DEPTH IN FEET	FIELD LOG AND REMARKS

SAMPLE RECEIVED BY:	DATE:

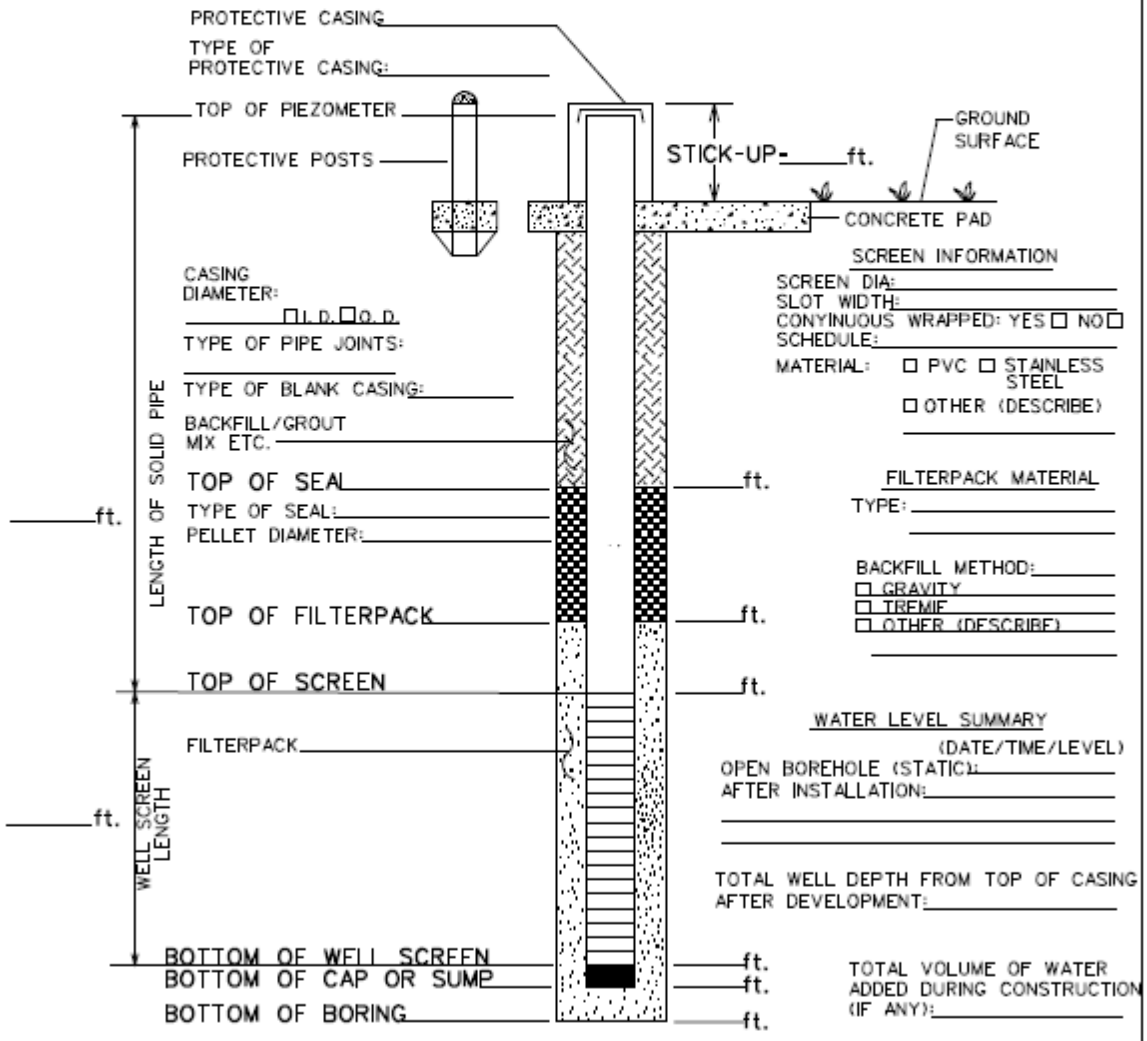
MRO FORM 1241
1 NOV 65

(Formerly MRD Form 0193, Which may be used.)

PROJECT			WELL NUMBER
DATE INSTALLED	STARTED	COMPLETED	LOCATION (Coordinates or Station)
SIGNATURE OF INSPECTOR/INSTALLER			ELEVATION OF HOLE
TOTAL DEPTH OF BOREHOLE	BORING DIAMETER		ELEVATION TOP OF INSTRUMENT CASING

PIEZOMETER CONSTRUCTION DIAGRAM

NO SCALE
(ALL MEASUREMENTS FROM GROUND SURFACE)



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OPEN TUBE PIEZOMETER DEVELOPMENT LOG

PROJECT NAME: _____

PIEZOMETER NUMBER: _____

OPENED: DATE _____ TIME _____		CLOSED: DATE _____ TIME _____	
Water Level (TOC)	ft	Water Level (TOC)	ft
Piezometer Depth (TOC)	ft	Piezometer Depth (TOC)	ft
Design Depth (TOC) *	ft	Design Depth (TOC) *	ft
Est. Sed. In Piezometer	ft	Est. Sed. In Piezometer	ft

* Design depth may have been modified after the surface completion.

SURGING/BAILING DATA

METHOD/EQUIPMENT OF DEVELOPMENT: _____

TIME		GAL RMVD	WATER CLARITY	REMARKS (Amt./Type of Sediment, etc.)
SURGING	PUMPING			

CONTINUOUS PUMPING DATA

PUMPING METHOD: _____

TIME	GAL RMVD *	TURB. (NTU)	REMARKS

* Total includes water removed during surging and bailing.

COMMENTS: _____

INSPECTOR: _____

PIEZOMETER DEVELOPMENT LOG (CONTINUED)

PROJECT NAME: _____

PIEZOMETER NUMBER: _____

TIME	TOTAL GAL. RMVD.	TURB. (NTU)	REMARKS

COMMENTS: _____

_____

_____

_____

_____

_____

INSPECTOR: _____