HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

SECTION 027300

MONITORING WELL ABANDONMENT

PART I GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

B. Equality of material, article, assembly or system other than those named or described in this Section shall be determined in accordance with the provisions of the CONTRACT AND GENERAL CONDITIONS.

1.02 DESCRIPTION OF WORK

A. Contractor shall furnish all labor, materials, equipment, and services for abandonment/decommissioning of monitoring wells as called for in these specifications. Wells to be removed are designated on the plans.

B. Copies of available boring logs for the monitoring wells to be abandoned and decommissioned, and sketches showing the approximate locations of the monitoring wells are included as an attachment to these specifications.

C. The Work, to be performed by a registered well driller in Massachusetts, consists of furnishing all labor, materials and equipment required for the performance of all operations in connection with the following items:

1. Clear wells of all obstructions such as pipes, valves, pumps and any obstacles of debris that may have entered the well.

2. For monitoring wells, well abandonment shall be conducted in accordance with Mass DEP Policy WSC #91-310 Standard References for Monitoring Wells.

3. For hand driven well points remove the well point and grout to surface.

4. Provide final surface finish.

1.03 RELATED WORK

A. Section 013543 – ENVIRONMENTAL PROTECTION PROCEDURES

B. Section 312000 – EARTHWORK

1.04 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only. The list provided below is not intended to be all inclusive of each regulation prevailing over the work. The latest version of the document listed shall govern the work performed.

A. Massachusetts Department of Environmental Protection, 310 CMR 40.0000, Massachusetts Contingency Plan.

B. Massachusetts Highway Department, Standard Specifications for Highways and Bridges, 1988.

C. Massachusetts Highway Department, Supplemental Specifications to the 1988 Standard Specifications for Highways and Bridges, 2006.

D. Massachusetts Department of Environmental Protection, Standard References for Monitoring Wells, Policy #WSC-91-310, Section 4.6 Decommissioning of Monitoring Wells.

E. Massachusetts Department of Environmental Protection, 310 CMR 46.00, Certification of Well Drillers and Filing of Well Completion Reports.

F. American Society for Testing Materials, Standard Specification for Portland Cement, C150-07.

1.05 DEFINITIONS

All terms not defined herein shall have the meaning given in the applicable publications and regulations.

A. ASTM: American Society for Testing and Materials.

B. Contractor: Refers to the General Contractor and/or Subcontractor responsible for the Work under contract with Project Manager.

C. DCR: Massachusetts Department of Conservation and Recreation

D. DPS: Massachusetts State Department of Public Safety.

E. Engineer: Authorized representative of the Harvard Project Manager. Engineer shall be the Architect or Designer of Record for the project.

F. Mass DEP: Massachusetts Department of Environmental Protection

G. OSHA: Occupational Safety and Health Administration.

H. Harvard Project Manager: A representative of the Property Owner, President and Fellows of Harvard College.

1.06 SUBMITTALS

A. The well contractor shall complete well abandonment records of the decommissioning procedure. The decommissioning report shall include:

1. Method of well abandonment/decommissioning.

2. Depth sealed: The depth of all plugging materials should be recorded.

3. Quantity of sealing material: The quantity of sealing material used. Measurements of static levels and depths should be recorded.

4. Changes recorded: Any changes in the well made during the plugging, such as perforating casing, should be recorded in detail.

B. The driller shall complete a well abandonment completion report in accordance with 310 CMR 46.00 and Policy # WSC-91-310. This report must be filed with the MassDEP with a copy to the [Cambridge/Boston] Board of Health, and to the Harvard Project Manager and Engineer.

C. The Contractor shall, prior to the delivery of any incoming topsoil to be used at the project site, provide the contact information for the facility in which the topsoil originates, and the results of analytical testing of representative samples of the material for review and acceptance. The Contractor shall demonstrate that the incoming backfill material is naturally deposited soil, meets Harvard's soil Group I-1 and I-2 categories, and the analyte concentrations of the topsoil do not exceed the Reportable Concentrations RCS-1 of the MCP. More specifically:

1. The Contractor shall provide the name and address of the source from which the topsoil originates, type and operation of the facility where the topsoil originates, volume of soil coming from each source area, and the name of the qualified firm and analytical laboratory that performed the material sampling and testing.

2. The Contractor shall provide soil analyses for the following parameters: MCP 14 metals; TCLP for any RCRA metal with a total concentration in excess of the "20X rule"; Extractable and Volatile Petroleum Hydrocarbons (EPH/VPH) by Mass DEP methodologies; Volatile and Semi-Volatile Organic Compounds (by EPA Method 8260B with Method 5035 and EPA Method 8270, respectively), herbicides/pesticides and PCBs. The soil shall not contain any visual evidence of asbestos containing materials (ACMs).

3. The Contractor shall collect one soil sample for analysis stated above (1.06 C (2)) from each location identified for backfill material. For project extending beyond one year, annual analysis of the location's soil shall be required.

4. The Contractor shall test the topsoil at a frequency of one sample for every 500 cubic yards (cy) for the first 5,000 cy of material, and then one sample per 1,000 cy of material thereafter for the analysis stated above. The Contractor shall demonstrate that the soil meets Harvard's soil Group I-1 and I-2 and the analyte concentrations of the backfill soil do not exceed Reportable Concentrations RCS-1 of the MCP.

5. No backfill will be accepted from off-site sources that are now or were formerly listed as sites regulated under the MCP, unless approved by the Project Owner's LSP, and under other corrective actions including CERCLA and RCRA.
6. Urban backfill will not be accepted from off-site sources.
7. Test results must be submitted a minimum of four (4) weeks prior to use of topsoil to provide for data review by Owner.
8. The Contractor shall provide an LSP opinion indicating the topsoil material meets the criteria established above.

PART 2- PRODUCTS

2.01 MATERIALS

A. Neat Cement Grout

1. Cement conforming to ASTM standard C150 and water, with not more than six gallons of water per 94 lbs. Type II cement, must be used for openings less than or equal to one and one-half (1-1/2) inch openings.

B. Cement-Bentonite Grout

1. 20 parts of cement conforming to ASTM Standard C150 to 1 part bentonite. The ratio of cement to water shall be 94 lbs of cement to eight gallons of water. Type H cement must be used for openings larger than one and one-half (1-1/2) inches.

C. Regardless of the type used the grout:

1. Shall be sufficiently fluid so that it can be applied through a tremie pipe from the bottom of the well upward.
2. Shall remain as a homogeneous fluid when applied to the subsurface rather than desegregating by gravity into a two-phase substance.
3. Shall be resistant to chemical or physical deterioration.
4. Shall not leach chemicals, either organic or inorganic, that will adversely affect the quality of the groundwater where it is applied.

D. Concrete

1. Portland Cement: ASTM Specification C150, Type 1, Type II, and Type III, of American manufacture.
2. These different types of cements shall not be used interchangeably in the same element or portion of the work.
3. Fine Aggregate: shall be graded natural sands - conforming to ASTM C150.
4. Coarse Aggregate: shall be hard, durable, uncoated crushed stone or gravel conforming to ASTM C 33.

E. Topsoil

1. Topsoil required to complete the work of this Section, if necessary, shall be from off-site sources furnished and transported to the Site by the Contractor. Topsoil shall be natural, fertile, friable, loam, typical of cultivated topsoil of the locality. All topsoil shall be of good, rich, uniform grade without admixture of subsoil material. The cost for placement of the topsoil required to be procured to provide soil cover in the areas disturbed during construction shall be part of the Contractor's Base Bid.

2. Topsoil shall be free from hard clods, stiff clay, hardpan, sods, large stones, lime, cement, bricks, coal, ashes, cinders, glass, slag, concrete, tar or its residue, tarred paper, boards, stocks, roots or other detritus material.

3. Topsoil to conform to Section 751 of the Massachusetts Standard Specifications for Highways and Bridges.

4. Topsoil shall conform with the requirements set forth in 1.06 (C).

F. Seed Mixture

1. Seed mixture: Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall be weed content exceeding 15 percent by weight. The seed shall be of a mixture of blue grass and fescue grasses, and allow for optimal growth and rooting. The mixture shall be furnished in new, clean, sealed and properly labeled containers. Seed that has become wet, mold, or otherwise damaged, is not acceptable.

2. Seed Mixtures: The seed mix for all areas to be seeded shall be as follows:

Species	Percent (raw Seed)
Creeping Red Fescue	30%
Annual Ryegrass	25%
Timothy	15%
White Clover	10%
Little Bluestem	10%
Red Top	5%
Sidoats Grama	5%

3. The seed mix shall be New England Erosion Control/Restoration Mix by New England Wetlands Plants, Inc. or equivalent approved by Engineer.

4. All seeding materials shall conform to Section 765 of the Massachusetts Standard Specifications for Highways and Bridges.

PART 3- EXECUTION

3.01 PREPARATION OF SITE

A. Remove all materials from the well.

3.02 WELL CASING REMOVAL

A. The monitoring well construction is generally shallow (less than 25 feet) water table wells. In accordance with Mass DEP's Standard References for Monitoring Wells (MADEP Policy #WSC-91-310) two options are available: removal of casing or plug the well in place.

B. If the casing is pulled and the hole collapses, the material in the hole must be compacted to avoid subsidence at the surface and the remainder of the annulus plugged with cement-bentonite grout.

C. If the casing is not pulled or the hole does not collapse upon removal of the casing, the well shall be plugged with cement-bentonite grout.

D. If the casing cannot be pulled, the top three feet of the casing shall be cut and the well annulus shall be plugged using neat cement grout.

3.03 WELL PLUGGING

A. Neat cement (or cement-bentonite grout) shall be inserted into the well casing or open portion of the borehole as specified in Paragraph 3.02.

B. To assure that a well is properly plugged and that there has been no bridging of the material, verifying calculations and measurements shall be made by the well contractor to determine whether the volume of material placed in the well equals or exceeds the volume of the hole that has been plugged.

C. The plugging materials shall be introduced at the bottom of the well (or borehole) and placed progressively upward to a level approximately four feet below grade and should be terminated approximately 4 feet below grade with a 1 foot thick concrete plug atop the grout. The remaining 3 foot portion of the borehole should be filled to grade with materials compatible with the abutting land surface and properly compacted to minimize subsidence. Sealing materials shall never be poured from the land surface into the well, borehole, or annular space being sealed. The grout pipe (or tremie pipe) method, either with or without a grout pump, will achieve all the objectives of the well plugging program.

3.04 FINAL SURFACE FINISH

A. The Contractor shall finish the ground surface above the abandoned well to match existing conditions in the surrounding area.

B. The Contractor is responsible for material, labor and equipment for the placement of loam and seed, asphalt pavement and/or concrete to the ground surface in the area of work.