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Standard Practice for Installation of Underground Precast Concrete Utility Structures¹

This standard is issued under the fixed designation C 891; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice describes the procedures to be followed in the planning, site preparation, and installation of underground precast concrete utility structures. Concrete pipe and box culverts are not covered under this practice. Also, precast concrete manholes covered in Specification C 478 are excluded from this practice.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 478 Specification for Precast Reinforced Concrete Manhole Sections²

3. Survey

3.1 The installation area shall be surveyed using the workprint and a checklist to identify the work to be done and to determine that the plans are correct.

3.1.1 The location of the utility structure should be where it will cause minimum interference with traffic and shall be clearly defined on work prints.

3.1.2 All underground facilities and structures such as gas, water, sewer, power, telephone cable, etc. shall be located and identified. Location markings shall be placed by the affected utilities in advance of the construction.

3.2 The survey shall identify any obstacles such as overhead wires, building structures, etc. that will interfere with crane operations, work progress, or create a safety hazard. Precautionary arrangements shall be made before excavation begins.

3.3 The survey shall give consideration to the soil structure so that proper shoring, sloping, or both, may be planned in advance of the excavation work.

4. Planning

4.1 Permits required to do work in accordance with the

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² *Annual Book of ASTM Standards*, Vol 04.05.

detail plans shall be secured before starting the job. All permits or a record of the permits shall be retained on the job for immediate reference.

4.2 All utilities and owners of surface and subsurface facilities and structures in the area shall be given advance notification of proposed excavation. Every effort shall be made to avoid damage to the facilities of others. If any damage occurs, the owner of the damaged facility shall be notified immediately.

4.3 Planning shall include the coordination of all responsible parties to ensure that arrangements for removal of broken pavement, rocks, excess spoil, etc. have been made. Responsible parties shall arrange for the delivery, distribution, and storage of required material. If such material cannot be stored on the site, other storage areas must be provided.

4.4 Should it appear that a structure location will interfere with traffic, review the situation with the engineer and notify appropriate authorities.

4.5 Provide for access to call boxes, fire hydrants, etc.

5. Safety Requirements

5.1 Safety requirements for construction shall be in accordance with all federal, state, and local regulations.

5.2 The utility structure or any sections that comprise the structure assembly shall only be lifted at the lifting points so designated by the manufacturer.

6. Excavating

6.1 Coordinate the various excavation operations from the point of opening the pavement to completion of backfill so that the work area thus occupied is kept to minimum consistent with the conditions governing the work. This is particularly important where an excavation is adjacent to hospitals, police and fire department buildings, service stations, etc.

6.2 If unforeseen facilities or obstructions are encountered, stop excavating operations immediately. Expose the obstructions with wood handled digging tools and investigate them with caution. If there is any doubt as to the type of obstruction exposed, request positive identification from those suspected of owning the facility and then proceed as circumstances dictate.

6.3 Buried work frequently requires the use of heavy construction equipment and transport of heavy loads. Certain soil conditions may be encountered that will not support these loads. To avoid hazards and unnecessary delays caused by cave-ins or equipment becoming mired, carefully observe the

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prevailing conditions beforehand and take appropriate preventive measures.

6.4 When excavating across highways, streets, alleys, drives, and walks, perform the work in a manner that will minimize interference with traffic. If necessary, bridge the opening with a structure of adequate strength to support any traffic likely to pass over it. Handrails are required for structures bridging sidewalk openings.

6.5 Inspect excavations after every rainstorm or other hazard-increasing occurrence, and increase the protection against slides and cave-ins, if necessary.

6.6 In dewatering excavations, make certain that the discharge is carried to a suitable runoff point.

6.7 The excavation size must allow for the overall assembled height of the utility structure plus the height of collar sections, a manhole frame and cover, and any bedding material required. A clearance of 12 in. (300 mm) around the sidewalls of the structure is recommended for ease of installation.

7. Shoring

7.1 Shoring for construction shall be in accordance with all federal, state, and local regulations.

7.2 Install shoring by starting at the top of the excavation and working down. Take care to place braces and jacks in a true horizontal position with proper vertical spacing. Braces must be firmly secured to prevent kickouts.

7.3 All materials used for shoring must be in good condition and of the right size. Do not use timbers with large loose knots. Prefabricated box type shoring is permitted provided it is clean and structurally sound after previous use.

7.4 Installation of the shoring should follow closely the excavation work even if no work is being done in the excavation. The longer an excavation is left unsupported, the greater the chance of a cave-in.

7.5 As soon as the work in the excavation is completed and the utility structure has been installed, remove the shoring and complete the backfilling, unless otherwise instructed by authorities. Remove the shoring from the bottom up. Release the jacks or braces slowly. Use chains or wire ropes to pull out the jacks or braces from above.

8. Installation Procedures

8.1 Consult the detailed plan for the proper orientation of the precast concrete utility structure to ensure proper alignment with entering cables, pipes, or conduits.

8.2 Do not place damaged precast concrete sections unless approved by the customer.

8.3 Do not field modify the structure unless it is determined that such modifications (for example, cuts to form slots or holes) will not adversely affect the strength of the structure.

8.4 Do not install structures under conditions known to result in loads heavier than that for which the structure was designed.

8.5 After the excavation has been completed to the required dimensions specified on the detailed plan, level off the area where the base section will be located. If necessary, to provide

a more level and solid foundation, fill in and compact the fine soil, sand, or gravel. Set the base as level as possible so any water in the structure will drain toward the sumps.

8.6 Assemble the multisection utility structures by lowering each section into the excavation. Lower, set level, and firmly position the base section before placing the additional sections.

8.7 Where the possibility exists of a watertight structure becoming buoyant in a flooded excavation, take necessary steps to avoid flotation of the structure.

8.8 To ensure joint integrity when joining sections of precast concrete structures, give particular attention to removing all foreign materials such as dirt, mud, and stones from joint surfaces and see that all sealing materials are placed properly.

8.9 The sealing material provided for the joints between sections may be installed at the job site or at the manufacturer's plant.

8.10 If a mortar grout is to be used as a seal, clean and moisten all surfaces to be grouted. The grout should be of a consistency so that it will not flow when applied. Apply the mortar grout in a manner to ensure filling of all voids in the joint being sealed.

8.11 Apply the mortar grout in an amount to provide a minimum of $\frac{3}{8}$ -in. (10-mm) thickness of mortar on all joint surfaces. After assembly, dress the interior joints to remove excess mortar.

8.12 If a misalignment of sections occurs during installation, remove the appropriate section. If the sealing material is damaged, clean the joint surfaces before repairing or placing new sealing material. Avoid misalignment of sections by using guide devices attached to the lower section to position the upper section into place.

9. Backfilling and Restoration

9.1 Do the backfilling as soon as practicable after the utility structure has been placed.

9.2 Excavations shall meet or exceed requirements of the local permit granting authority and backfilled with a granular material free from large stones, rocks, pavement, etc. Expansive soil material shall not be used as backfill around the structure.

9.3 When a precast concrete utility structure is placed in an unpaved area, slope the area around the entrance frame and cover to provide drainage away from the entrance cover. Slope the final grading upward to within 1 in. (25 mm) of the top surface of the frame and cover.

9.4 *Backfill Procedures*—Backfilling shall be achieved by using lifts (layers) or flooding (jetting) the excavation to the required compaction.

9.5 Restoration of the area where the utility structure was installed shall meet the requirements of the local granting authority or the property owner.

9.6 Followup inspections for settlement are required. Should settlement occur, the contractor shall be responsible for the necessary repair to restore the area to its original condition in accordance with the terms of the agreement.

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