

Section 65 Reinforced Concrete Pipe

4-6501 General

Reinforced concrete pipe is used for culverts, siphons, drains, and conduits. Section 65, “Reinforced Concrete Pipe,” of the *Standard Specifications*, includes specifications for circular reinforced concrete pipe, oval-shaped reinforced concrete pipe, and reinforced concrete pipe arch. The resident engineer and assistant resident engineers responsible for inspecting reinforced concrete pipe need to be familiar with the specifications and *Standard Plans* that provide for determining the physical characteristics of the pipe. The specifications provide options to the contractor for selecting the class of pipe and earthwork required for installing the pipe. The Office of Materials Engineering and Testing Services (METS) personnel will test and inspect the pipe during manufacturing, but the resident engineer and assistant resident engineers must ensure that the correct combination of class of pipe and earthwork methods are used in each location.

4-6502 Before Work Begins

Well before work begins, review the plans and specifications and inspect the sites of all planned installations. Reviewing these items sufficiently in advance helps prevent scheduling conflicts and errors in ordering materials. During the preliminary review and inspections, the resident engineers and assistant resident engineers should also do the following:

- Review the “Materials Information” from METS and ensure that the special provisions cover any special requirements.
- Note any unsolved drainage problems, and make any necessary changes by contract change order.
- As soon as final locations and lengths are determined, give the contractor a revised pipe list, including those pipes added or altered by contract change order.
- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials To Be Used,” which would cover reinforced concrete pipe of the type and class specified. Note that use of direct design method circular reinforced concrete pipe or nonreinforced pipe is permitted under those conditions enumerated in the specifications.

4-6503 During the Course of Work

During work operations, the resident engineer and assistant resident engineers should do the following:

- Once the pipe arrives at the job site, check the identification tags or marks to ensure a METS inspector has inspected the pipe at the source of origin.

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4-6502 Before Work Begins

4-6503 During the Course of Work

- Review backfill details on the contract plans, *Standard Plans*, or both. Determine that the class of reinforced concrete pipe and method of backfill selected by the contractor meet these details. Refer to Section 4-19, “Earthwork,” of this manual for additional instructions on excavation and backfill.
- Backfill may be done while the mortar in joints is plastic. However, after the mortar sets, do not permit backfill until 16 hours after sealing. Further, because free water may not contact the pipeline until seals containing portland cement have aged 24 hours, no backfill may be placed during this period if it must be watered in place. Require backfilling in a manner that will not damage seals, whether by direct impact or through displacement of joints. Imported structure backfill should be checked for pH and resistivity levels to verify that the service life of the pipe will not decrease. The limits of concrete backfill, when required, will be shown on the plans. Concrete backfill is paid for as a separate item. The contractor may use slurry cement backfill for backfilling culverts. When either concrete backfill or slurry cement backfill are used, observe carefully and ensure the pipe is not displaced or floated by uneven or too rapid placement. For fast-setting concrete or fast-setting slurry cement backfill, allow only nonchloride admixtures to accelerate the setting time.
- After the backfill of pressure pipes or siphons to 0.6 m over the crown, witness the specified hydrostatic tests. Require the repair of all obvious leaks and leak reductions to the maximum permitted.
- Require that minimum cover for construction loads, as shown in the *Standard Plans*, be placed over reinforced concrete pipe culverts.
- Insist that pipes be protected from damage during continuing operations. Periodically inspect pipes as work progresses. A particularly critical time to inspect comes after the completion of the grading plane and before the start of base and surfacing. During the final phases of the project, make another inspection, primarily to find any pipes that need cleaning.

4-6504 Measurement and Payment

The length of pipe to be paid for is the slope length designated by the engineer. This slope length is the length shown on the plans, plus or minus any changes the engineer makes, or the length as determined from the surveyors’ staking notes. If pipe is cut to fit a structure or a slope, the pay length is the length necessary to be placed before cutting, rounded up to the nearest one-meter increment. If the contractor forms the pipe out from a structure, the formed distance is also part of the length of the pipe necessary before cutting. If the pipe joins a structure at a skew, the length of pipe necessary to be placed before cutting is the longer side of the pipe. Pipe bends, wyes, tees, and other branches must be field measured in accordance with the specifications. The following are examples for measuring culvert pipe when the length to be paid for is the slope length designated by the engineer.

4-6504 Measurement and Payment

4-6504B Case II

PIPE PLACEMENT	CUT OR UNCUT PIPE	PAYMENT METHOD
Pipe between two structures.	Uncut	Pay the designated length.
<p>Example:</p> <ul style="list-style-type: none"> Slope length along centerline of the pipe between the two inside faces=44.4 m. Individual lengths of pipe placed total 44 m, plus additional length made up in joints or forming out from one structure, or both. <p>Therefore:</p> <p>Pay for 44.4 m</p>		

4-6504C Case III

PIPE PLACEMENT	CUT OR UNCUT PIPE	PAYMENT METHOD
Pipe placed from toe of fill to toe of fill.	Uncut	Pay the slope length the engineer designates.
<p>Example:</p> <ul style="list-style-type: none"> Designated length=44 m. Laid pipe=44.4 m, with the additional length due to the gain in joints. One end is allowed to extend the additional distance beyond the toe of fill. <p>Therefore:</p> <p>Pay for 44 m</p>		

Under the following circumstances, you may use field measurements in lieu of calculations or you may supplement calculations:

1. A culvert runs between two structures. After verifying that the structures are constructed as shown on the plans, you can determine designated length from a field measurement along the centerline of the pipe between the two inside faces. If the pipe is cut, make appropriate adjustments to the field measurement.
2. After verifying that a culvert is properly staked, you may use field measurements between stakes referenced to the ends of the culvert to determine the length designated by the engineer. If you use a field measurement to determine pay lengths, include on the quantity sheet an explanation of how the field measurement relates to the length designated by the engineer.