

STANDARD OPERATING PROCEDURE FOR

DECOMMISSIONING PIPES IN THE INFLUENCE ZONE

(20 July 2022)

Decommissioning pipes, whether essential to the operation of the levee (gravity drains, toe drains, etc.) or non-essential (utility lines, conduits, etc.), is an alternative to removing them from the ground, but its use is contingent upon the belief that the soil surrounding the pipe within the influence zone has not been unacceptably compromised. The limits of the influence zone for decommissioning are comprehensively depicted in Figures 6-2 through 6-10 of EM1110-2-2902, but in general are defined by lines that extend horizontally 15 feet from each levee toe or floodwall face and then continue down into the ground on 1H:1V slopes (45 degrees), as shown by the light-colored zone in Figure 1 below. Essential pipes may only be decommissioned after USACE approval of a Levee System Alteration Permission Form (CELRL-803) with the accompanying plans, specifications, and analyses proving that removal from the drainage system will not cause flooding within the leveed area.

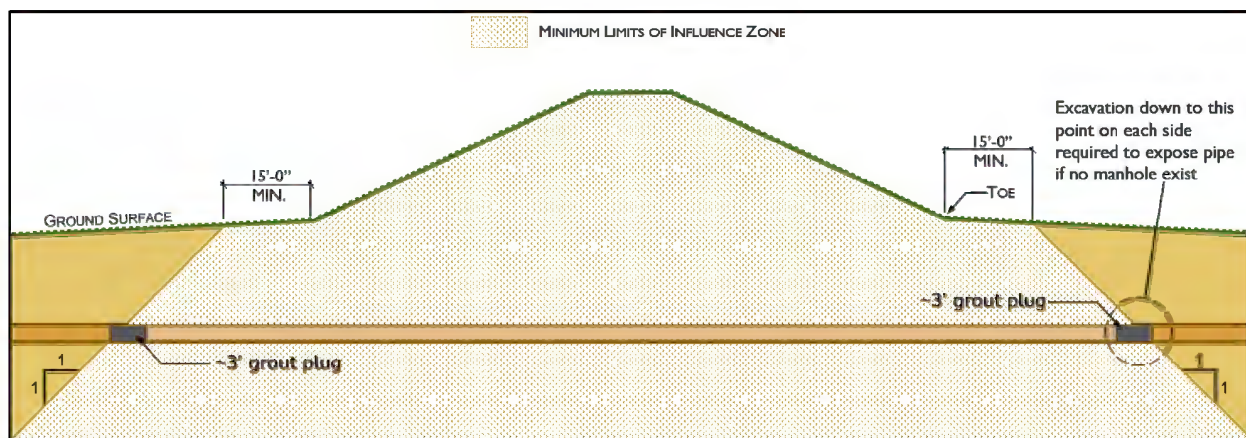


Figure 1: Limits of influence zone and desired pipe plugging locations

Pipes that must be decommissioned by completely filling them:

Metal pipes – A levee system may continue to serve its associated community for many decades after a pipe is decommissioned; therefore, complete filling is required due to their potential for corrosion and collapse.

Pipes with compression joints not encased in CLSM – The joints of compression fittings are susceptible to soil intrusion if there is excessive movement/settlement or the gasket material was damaged or distorted during installation or it deteriorates.

Pipes larger than 12 inches in diameter – Although the pipe material and joining method may render soil infiltration unlikely, pipes of this size and larger present a potentially large soil loss volume should damage occur to the pipe (exploratory drilling or pole installation for example) or a latent defect is exposed (such as a defective or improperly placed gasket).

Prior to decommissioning by filling, the pipe must be cleaned (or in a clean condition) and then video-inspected to determine its condition. Cleaning aids the assessment and provides a better bonding surface for the grout, but cleaning too aggressively can damage the pipe so the precautions within Chapter 7 of EM1110-2-2902 should be followed. The pipe must be completely filled with a shrinkage-compensating grout that produces a 24-hour penetration resistance of no less than 100 psi (ASTM C403). Table 1 provides an example mix design for a non-structural grout that will produce a foamed density of about 45 pcf and yield approximately 2.7 cubic yards. A pipe may also be decommissioned using a non-foamed, shrinkage-compensating, structural grout. Table 2 provides an example mix design for such a material. If a different grout mix is chosen, it must include a shrinkage compensating admixture dosed at a rate recommended by the manufacturer. The non-structural grout viscosity should be 20 seconds or less as tested according to ASTM C939, and the foaming agent is recommended to promote flow. The grout must be used within an hour of batching (unless a retarding admixture is used) to prevent placing partially cured material that is too viscous to flow properly.

Table 1: Example Non-Structural Foamed Grout Mix Design

Portland Cement	1750 lbs.	Batches ~ 1yd ³	Batches ~ 2.7yd ³
Class 'F' Fly Ash -or- Ground Granulated Blast Furnace Slag	(Optional - will lower early strength) Weight of these materials to be used must be deducted from the cement weight so that the total weight of the two will not exceed 1,750 lbs.		
Water	960 lbs.		
Sand	376 lbs.		
Foaming Agent Admixtures	108 lbs.		

Table 2: Example Non-Foamed, Shrinkage-Compensating, Structural Grout Mix Design

Type 1 Portland Cement	455 lbs.	Batches ~ 1yd ³
Class 'F' Fly Ash -or- Ground Granulated Blast Furnace Slag	195 lbs.	
Water	295 lbs.	
Sand	2100 lbs.	
Pea Gravel	950 lbs.	
Meyco Fix Flowable	25 lbs.	
Mid-Range Water Reducing Agent	32 oz.	

Pipes that may be decommissioned by plugging them:

Pipes with compression joints encased in CLSM – Although compression fittings have the potential to allow soil intrusion, encasement in CLSM essentially ensure no soil loss.

Non-metallic pipes smaller than 12 inches in diameter – Non-metallic pipes are not susceptible to corrosion, their joints are typically sealed very well, and the size poses little concern for damaging soil loss.

In both these cases, soil infiltration is unlikely and therefore sealing the last three feet of each end of the pipe at the limits of the influence zone, as depicted in Figure 1, is sufficient to consider the pipe properly decommissioned if either a rudimentary video inspection or pressure test verifies the pipe's integrity. The material used to seal the ends must not shrink or degrade; however, the material used as a temporary internal bulkhead to hold the sealant only needs to last through curing.

Documentation

Documentation shall be submitted to the USACE Louisville District Levee Safety Area Representative upon completion of decommissioning. That documentation shall include the As-Built stationing, a map showing the pipe location, location coordinates (reference SOP for *Documentation of Levee System Feature Locations in the field*, dated April 2015), method used, details of the decommissioning, and photos prior to, during, and after completion of work.