

18. Manhole Depth Design.

a. General.

- 1) For design purposes, the manhole depth is measured from the top of the manhole frame and cover (rim) to the invert of the manhole (the invert of the channel at the center of the manhole).
- 2) Design all new manholes as precast concrete manholes.

b. Precast Concrete Manholes.

- 1) Precast concrete manholes 48-inch diameter, see Standard Detail S/1.0, minimum depth of four (4) feet and maximum depth of twenty (20) feet, measured from the rim to the invert of the manhole. When the manhole depth is 4 feet or less, but not less than three (3) feet, provide a shallow type manhole, see Standard Detail S/3.2. Maximum pipe size for shallow type manholes is 12-inch diameter.
- 2) Precast concrete manholes 60-inch, 72-inch, 84-inch and 96-inch diameter, see Standard Detail S/1.1 for 60-inch diameter manholes and S/1.2 for 72-inch, 84-inch and 96-inch diameter manholes. Minimum depth of six (6) feet, measured from the rim to the invert, for 60-inch diameter manholes and four and one half (4-1/2) feet for 72-inch, 84-inch and 96-inch diameter manholes. When the manhole requires less than the minimum standards above, provide special details on the drawing modifying the Standard Details, see requirements under Part Three, Section 6 (Modifications to the Specifications and Standard Details).
- 3) For all precast concrete manholes provide the following, at the depths noted below.
 - a) For all size precast concrete manholes, when the depth exceeds sixteen (16) feet, a note must be provided on the drawings calling for pipe to manhole connections according to Standard Detail S/3.02.
 - b) For 48-inch diameter precast concrete manhole depth would be twenty (20) feet or greater, instead provide a 60-inch diameter manhole and equip the manhole with a fall prevention system, see requirements in Part Two, Section 20 (Fall Prevention Systems).
 - c) for 60-inch, 84-inch and 96-inch diameter precast concrete manhole depth is twenty (20) feet or greater, equip the manhole with a fall prevention system, see requirements in Part Two, Section 20 (Fall Prevention Systems).
 - d) For all precast concrete manholes, when the depth would exceed twenty-four (24) feet, redesign the alignment so that the manhole depth is less than twenty-four (24) feet or request an exception from WSSC. If this exception is approved, include in the design of the manhole the following:
 - (1) Check the manhole for flotation, see requirements under Part Three, Section 4 Buoyancy of Pipelines).
 - (2) Verify that the exterior water pressure on the precast concrete manhole section joints from the ground water conditions will not exceed the requirements of ASTM C443 and the Specifications.



- (3) Verify that the water pressure on the pipe to manhole connections from the ground water conditions will not exceed the requirements of ASTM C 923 and the Specifications.
- 4) Precast concrete manholes built over existing sewer pipelines, for minimum and maximum depths of manhole diameters of 48-inch, 60-inch and 72-inch (Standard Detail S/2.0, S/2.1 or S/2.2), see above for precast concrete manholes.
- 5) Precast concrete manholes 84-inch and 96-inch diameter built over existing sewer pipelines - not directly covered by standard details, provide design on the drawing for the following:
 - a) When 84-inch and 96-inch diameter precast concrete manholes built over existing sewer pipelines are required, provide a reference to Standard Detail S/2.0, S/2.1 or S/2.2 and include a design on the plans for the bottom slab. Provide design calculations and details for the bottom slab of the built-over manhole, see requirements under Part Three, Section 6 (Modifications to the Specifications and Standard Details).
 - b) For minimum and maximum manhole depth requirements, see requirements for 72-inch diameter manholes built over existing sewers.

c. Brick Manholes.

- 1) New brick manholes are not allowed, design all manholes as precast concrete.
- 2) When the design requires modifications to an existing brick manhole, use the following design guidelines to determine if the existing brick can be modified in place. If not, design the manhole to be replaced with a precast concrete manhole.
- 3) Do not connect new PVC sewer pipelines to existing brick manholes.
- 4) Provide the design of the brick manhole wall thickness on the profiles. Show the elevation of the change in wall thickness and the wall thickness, see Table "17".

TABLE "17"

Wall Thickness for Depth of Brick Manholes

Manhole Depth (to invert of manhole)	Required Thickness of Manhole Walls
Under 12'- 0"	8-inch
12'- 1" to 16'- 0"	12-inch
16'- 1" and over	Requires special design

- 5) Depth requirements for brick manholes:
 - a) When the depth exceeds the maximum depths for brick manholes, the following are required:
 - (1) When a brick manhole depth exceeds sixteen (16) feet, provide wall thickness design calculations/details.
 - (2) When 48-inch diameter brick manhole depth is twenty (20) feet or greater, provide a new 60-inch diameter precast manhole and equip the manhole with a fall prevention system, see requirements in Part Two, Section 20 (Fall Prevention Systems).



- (3) When 60-inch, 84-inch and 96-inch diameter brick manhole depth is twenty (20) feet or greater, equip the manhole with a fall prevention system, see requirements in Part Two, Section 20 (Fall Prevention Systems).
 - (4) For manhole depths exceeding twenty-four (24) feet, redesign the alignment so that the manhole depth is less than twenty-four (24) feet or request an exception from WSSC.
- b) Minimum depths for brick manholes are as follows:
- (1) For 48-inch diameter brick manholes, eight (8) feet from the channel invert to the rim elevation.
 - (2) For 60-inch diameter brick manholes, eight feet four inches (8'-4") from the channel invert to the rim elevation.
 - (3) For 72-inch diameter brick manholes, nine feet three inches (9'-3") from the channel invert to the rim elevation.
 - (4) For 84-inch diameter brick manholes, eleven (11) feet from the channel invert to the rim elevation.
 - (5) Minimum depth dimensions above are based on Standard Detail S/3.0. If it is necessary to modify this standard detail, provide a special design which typically will include a top slab similar to the Standard Detail S/3.2 and requirements under Part Three, Section 6 (Modifications to the Specifications and Standard Details).

