16. Manhole Drop Connections.

a. General.

1) Manhole drop connections are to be in accordance with Standard Details S/3.1 and S/3.1a for 8-inch through 12-inch diameter sewers mains; S/3.1b and S/3.1c may also be used only for 8-inch diameter sewer mains. All other sizes of drop connections require special design. Larger size sewer pipelines are not usually specified because the fittings often exceed the space for their installation and/or the larger sizes of fittings may not be available.

2) Do not design drop connections for future connections.

3) Label the manhole drop connections in plan and profile, and design the drop connection with the same pipe material as the incoming (influent) sewer. The Standard Details for drop manholes are just a schematic of the piping arrangement and do not represent specific fitting locations.

4) If a drop connection is to be designed for an existing pipeline, verify and determine the existing pipe material. If the drop connection cannot be constructed with the same material as the existing pipeline, use another alignment, or provide two (2) manholes; one over the existing pipeline and the other near by to have a transition between the different pipe materials.

b. Design Requirements.

1) Determine the drop connection requirements using the following guidelines:

a) Standard Detail S/3.1, Type A drop manhole connections for 8-inch through 12-inch diameter sewer pipelines only. Maximum drop allowed at the manhole is 3'-9" and the minimum drop allowed is 2'-2".

b) Standard Detail S/3.1a, Type B drop manhole connections for 8-inch through 12-inch diameter sewer pipelines only and the minimum drop allowed at the manhole is 3'-9" and the maximum drop allowed is based on the following pipe slopes of the influent pipe entering the drop connection:

(1) Pipe slopes of five (5%) percent or less, the maximum drop allowed is twelve (12) feet.

(2) Pipe slopes of greater than five (5%) percent to fifteen (15%) percent, the maximum drop allowed is seven (7) feet.

(3) Pipe slopes of greater than fifteen (15%) percent to twenty (20%) percent, the maximum drop allowed is five (5) feet.

c) Standard Detail S/3.1b, Type B inside drop manhole for 8-inch PVC sewer pipelines connecting to precast concrete manholes. Only one inside drop can be constructed in the manhole, unless otherwise indicated on the drawings.

(1) Maximum pipe slope of the influent pipe is five (5%) percent.

(2) Verify the following before specifying an inside drop manhole connection for an existing manhole:

(a) Existing manhole is precast concrete.

(b) Adequate room for personnel to work inside the manhole.

(c) The inside drop connection piping is not within the area that is defined by the projection of the manhole entrance vertically down to the manhole bottom. If necessary, relocate the existing frame and cover, existing precast cone section and existing manhole steps to allow unobstructed entry and exit.

(3) This detail can be used for existing brick type manhole; the Designer must submit special design for approval.

d) Standard Detail S/3.1c, Type B inside drop manhole for 8-inch PVC sewer pipelines connecting to precast concrete manholes. Only one inside drop can be constructed in the manhole.

(1) Maximum pipe slope of the influent pipe is less than ten (10%) percent.

(2) Verify the following before specifying an inside drop manhole connection for an existing manhole:

(a) Existing manhole is precast concrete.

(b) Adequate room for personnel to work inside the manhole.

(c) The inside drop connection piping is not within the area that is defined by the projection of the manhole entrance vertically down to the manhole bottom. If necessary, relocate the existing frame and cover, existing precast cone section and existing manhole steps to allow unobstructed entry and exit.

(3) This detail can be used for existing brick type manhole; the Designer must submit special design for approval.

c. Design Considerations.

1) When designing the vertical sewer alignment, review the profile to determine if drop manhole connections should be included. The following should be considered:

a) The cost of the drop manhole connection versus the cost of having the pipeline deeper, which increases the amount of excavation.

(1) Distance between manholes should be sufficient to make the manhole drop connection cost effective.

(2) Maintaining the pipeline should be considered in determining cost differences between designing drop connections at manholes or lowering the pipeline. Items that should be considered are: maintenance cost for cleaning the drop, repairing the drop when the manhole settles, repairing the eroded channels, release of Hydrogen Sulfide (H_2S), etc.

b) When other utilities cross a sewer near a manhole, adding a drop connection to the sewer vertical alignment may provide needed clearances for the utility crossing the sewer alignment.

c) Hydrogen Sulfide (H_2S). The use of drop manholes is discouraged when it is found that Hydrogen Sulfide (H_2S) is already present or is predicted to be likely in the wastewater. This is especially true downstream from a pump station or pressure sewer/force main discharge. These

situations may result in the release of H_2S, which could likely corrode concrete manholes, concrete pipe, concrete lined pipe, or ferrous pipe materials. If drop manholes are required in these situations, evaluate the need for special provisions required to protect the pipe and associated structures. See Part Two, Section 28 (Hydrogen Sulfide Control) for additional requirements.

d. Special Designs.

1) Special design for drop manholes is usually required because the depth, pipe slope or pipe size of the incoming pipelines exceeds the requirements shown on the Standard Details S/3.1, S/3.1a, S/3.1b or S/3.1c. Consider the need for each drop on a case by case basis.

2) Show all necessary details on the drawings for all non-standard designs and modify the Standard Details to suit the special design for drop connections and indicate the required changes to the Standard Details on the drawings, see Part Three, Section 6 (Modifications to Specifications and Standard Details).

3) Examples for special designs for manhole drop connections.

a) When the incoming pipeline to the manhole drop connection has a pipe slope greater than twenty (20%) percent or the drop of the vertical pipe is greater than the allowable for Standard Detail S/3.1a, Type B drop connections, a special design, to be shown on the Drawings, could be made by changing the bend under the wye fitting from 1/8 bend to 1/16 bend.

b) Connecting to existing brick manholes.

c) Two (2) inside drop connections.