

## LAND DRAIN IMPROVEMENTS

- I. Land drain size determination
  - A. The minimum land drain size shall be 8 inch.
  - B. The land drain shall be sized to carry 0.8 cfs per 100 acres of developed area.
  - C. The land drain line shall have a minimum flow velocity of 1 fps.
  - D. The minimum slope on a land drain mainline pipe shall be 0.4%.
  
- II. Land drain line operation
  - A. Land drain lines shall be required in all areas of the City where footing and foundation drains are required per Layton City Municipal Code 18.40.020. Land drains shall also be required in all areas identified in the Geotechnical Report and as determined by the City Engineer. The proposal to place homes on-grade will not eliminate the need for the land drain system.
  - B. A land drain system shall be a separate system from the storm drain system. Land drain laterals shall not connect to storm drain lines.
  - C. Individual pumps or lift stations that serve one resident or business unit are allowed under specific guidelines in Section V. Combined lift stations or pumps that provide land drain service for more than one residential home or business are not allowed under any circumstance.
  
- III. Land drain line placement
  - A. The land drain system lines are typically placed 10.0 feet north and east of the street centerline.
  - B. Land drain lines shall not be placed in sidelot or rearlot property lines unless all alternatives are exhausted.
    1. The developer may be required to change street alignment to accommodate land drain line placement.
    2. Land drain lines that are approved for sidelot or rearlot installation shall have a 20-foot easement provided. 10 feet will be added to the easement width for each additional utility.
    3. Land drain lines that are approved for sidelot or rearlot installation shall provide for vehicular access to all manholes.
  - C. The lines shall be installed with a minimum cover of 4.5 feet from the top of the pipe to the finish ground elevation.
  - D. The lines should run parallel to and between 0.5 feet and 1.0 foot above or below the sanitary sewer line. The design should insure that there will be no conflict between the land drain line laterals and the sanitary sewer line laterals.
  - E. The lateral line will be installed within 5 feet of a common property line, at the lowest corner of the property. The contractor will install identifier tape one foot over the lateral, running the length of the lateral, with the wording 'Land Drain' on tape.
  
- IV. Manhole size and placement determination.
  - A. Manholes shall be installed as follows:

1. Maximum spacing is 400 feet.
  2. Change in alignment.
  3. Change in slope.
  4. Junction with other lines.
  5. Within 10 feet of the upstream and downstream ends of an augured or trenched casing.
- B. Minimum size manhole is four-foot (4') inside diameter.
- C. Five-foot (5') inside diameter manholes shall be used for all locations as follows:
1. Intersection of three land drain lines.
    - a. A 6-inch multi-user/commercial line connecting to an 8 inch or larger requires a manhole.
    - b. NOTE - No more than four lines will be permitted in one manhole.
  2. Change of grade with an algebraic difference of five percent (5.0 %).
    - a. Cast-in-place manhole required.
  3. Change in alignment where the interior angle is greater than 70° but less than 90° and at 90° bends.
    - a. Pipeline alignments that have interior angles less than 70° shall have two manholes placed to divide the angle.
- D. Manholes shall be placed at the end of all lines with service connections attached to the line. This includes cul-de-sac lines, and/or lines intended for future extension.
- V. Land drain service lateral size and placement
- A. All residential connections shall have an individual service connection. The sharing or joint use of lines is not allowed.
1. In the case where a land drain lateral is extended to the building lot, but is at an elevation higher than the anticipated lowest floor elevation:
    - a. The developer shall define on the dedication plat the elevation of the land drain lateral and a note indicating gravity service is not available below that elevation.
    - b. The use of individual land drain pumps or lift stations is acceptable in locations where gravity drain systems cannot be constructed, only if the pump and pressurized lines remain on the individual lot that utilizes the pump station.
- B. Residential service lines shall be 4-inch PVC pipe.
1. The service lateral shall be installed 5 feet uphill from the downstream property corner.
  2. The service lateral shall be either a wye or a tee on the mainline.
  3. The service lateral shall be installed so that the top of the 4-inch line is no lower than the top of the mainline.
  4. The service lateral shall extend to the property on a minimum slope of 2.0%.
  5. The contractor will install identifier tape one foot over the top of the lateral the entire length of the lateral and the tape will say "Land Drain."
- C. All commercial connections shall have individual connections based on unit

ownership.

1. If one building has one owner but is divided into two or more units, one connection will be allowed. If several buildings are built on separate lots or on a single lot with different names, one connection per unit will be required.

VI. Pipe line materials, construction and testing.

- A. 4 inch and 6 inch service lines shall be PVC 3034 pipe.
- B. 8 inch to 12 inch land drain lines shall be PVC ASTM 3034 pipe. 15-inch and larger lines shall be extra strength concrete.
  1. PVC pipe shall have a minimum of 12 inches of 1 1/2-inch minus sewer rock, for bedding, blinding pipe sides and cover over the line.
  2. PVC lines shall be tested for deflection after the trench has been backfilled, compacted and/or settled.
  3. Concrete pipe shall be bedded in 6 inches of gravel (to spring-line).
  4. The backfill around and over the pipe shall be compacted to a minimum of 95%. Import borrow material is required for trench backfill between November 1 and April 1. This requirement may be extended by the Public Works inspector, dependant on the condition and quality of the native soils.
  5. Compaction test shall be conducted every 200 linear feet along the trench for each soil lift. (Maximum lift is 18 inches).
- C. All land drain lines shall be televised after construction.
  1. The video recording will be reviewed to determine that the laterals are correctly installed.
  2. The recording will determine that no "low-spots" exist.
  3. The recording will determine that the line has been properly cleaned by power flushing equipment, ensuring that all sediment and waste materials have been vacuumed from the system.
  4. The Contractor shall furnish a CD of the lines televised. Each manhole section video shall be a separate file on the CD. The Contractor shall also furnish a map of the lines televised with each manhole/box labeled according to the corresponding number/name found on the video and a hard copy of an information sheet for each manhole section video which will need to include the development name, the excavation contractor name, and the location of any defects found.
- D. Manhole bases may be pre-cast using the design as a guide for stub orientation, and shall have a trough design similar to sanitary sewer manholes.
  1. Pre-cast manholes are not allowed where the change of grade has an algebraic difference of 5.0 % or greater.
  2. Pre-cast manhole bases shall be placed on a minimum of 8 inches of gravel rock.
- E. Poured-in-place manhole bases shall conform to the following standards:
  1. The concrete base shall be at least 10 inches thick.
  2. The sub-grade material shall be gravel rock where the existing material is

wet or is unstable.

- F. Manhole sections shall be tongue & groove, pre-cast concrete sections with cast-in-place vinyl steps.
- G. The frame and cover shall be cast iron, similar to the D&L Supply model #A-1180.
- H. Steel Casing Construction
  1. ASTM A53, Grade B steel pipe for jacking operations, minimum wall thickness of 0.375 inch, minimum yield strength of 42,000 psi. Use a casing with a diameter equal to the outside bell diameter of the pipe plus a minimum 4 inches.
  2. Fillet weld joints continuous around casing and reinforce joints to withstand jacking operations.
  3. Use casing spacers CCI Pipeline Systems Model CSP or CSC or acceptable equal to center pipe within casing. Minimum of three spacers per length of pipe.
  4. Install neoprene rubber end seal with stainless steel bands CCI Pipeline Systems Model ESC or ESW as applicable or acceptable equal at each end of casing.