



## ***DESIGN and CONSTRUCTION MANUAL for MUPB UTILITIES***

### **SECTION 7: DESIGN OF LOW-PRESSURE SEWER SYSTEM**

#### **7.1. PURPOSE**

MUPB's intent of this section describes the minimum requirements for design of low-pressure sewer system (LPS) facilities. These requirements are listed to ensure that any development/extensions have adequate capacity to transport sanitary sewer from the development throughout the collection system. MUPB requires that planning of LPS systems shall be based upon ultimate development population and not just the first phase, to minimize maintenance and operational costs. The effects of the LPS upon the existing MUPB collection system shall be reviewed to ensure no surcharging or sanitary sewer overflows will occur due to the added flows.

This section describes the requirements of OWNER/DEVELOPER in requesting a LPS. A LPS will only be considered where a thorough study of all alternatives clearly indicates that a gravity sanitary sewer with or without a sanitary sewer lift station is not feasible and shall be considered at the sole discretion of MUPB. Cost shall not be considered a valid reason for consideration of an LPS. MUPB will not accept ownership, operational control or maintenance of any LPS that does not meet the requirements set forth in this manual.

#### **7.2. DESIGN APPROACH & CRITERIA**

Proposed construction or expansion of LPS facilities within the MUPB Service Area shall be in compliance with the approved MUPB Regional Facilities Plan, the Recommended Standards for Wastewater Facilities (Commonly referenced as the 10 State Standards), the MUPB Sewer Use Ordinance, the Kentucky Administrative Regulations, and guidelines defined in this Manual.

Any person, company, corporation, or other entity proposing to develop land or proposing to install new and/or replacement wastewater facilities within the MUPB Service Area must prepare, for review and approval by MUPB, planning and design documents according to the standards and requirements of this Manual. Planning and construction documents must be prepared and certified by a Professional Engineer licensed in the Commonwealth of Kentucky. The service level of proposed facilities shall be according to standards referenced in these documents. Design standards shall be those referenced herein.

##### **7.2.1. GUIDELINES**

MUPB has established the following guidelines to be followed for all proposed LPS systems. These requirements are mandatory and may be altered at MUPB's sole discretion.

- A. All grinder pumps and appurtenances from the grinder unit to the force main shall be owned by MUPB. Property owner shall be liable for the



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maintenance and operation of their lateral service from the housing plumbing to the grinder unit.

- B. The curb box located at the property line shall include a box and lid, stainless steel ball valve and check valve, that meets the standard details of MUPB.
- C. Curb boxes for opposite side services shall have stainless steel ball valve and valve box per standard details of MUPB.
- D. All lateral force mains shall be on the property of primary service and have a permanent dedicated easement.
- E. MUPB may require in-line or end-of-line flushing connections on force mains to provide periodic cleansing of the force main(s) at MUPB discretion.
- F. All force mains shall be sized according to the selected type of grinder pumps being utilized. The Rational Method shall be used for centrifugal type grinder pumps.
- G. Gate valves shall be required at junctions of force mains and shall be sized accordingly to the force main size.
- H. If the LPS discharge ultimately reaches an existing lift station, a hydraulic capacity analysis will be necessary to verify the existing lift station(s) and force main(s) are able to accept the flow or if additional capacity is necessary.
- I. LPS systems require easements from force main along the path of installation of the lateral force main to the grinder pump. Easements shall follow requirements as listed in SECTION 6 – Design of Sanitary Sewer Facilities.

### **7.3. LPS DESIGN REQUIREMENTS**

Two different designs may be required for LPS systems:

#### **7.3.1. NEW LPS SYSTEM TO EXISTING SEWER FACILITIES (FM OR MH)**

All phases will need to be modeled independent of the future phases, but includes all previous phases, thus allowing MUPB to determine the operation and maintenance expense of the partially constructed LPS system.

The LPS system shall be designed in accordance with the grinder pump manufacturer and the applicable design method (Rational Methods) per EPA Design Manual 625/1-91/024. Grinder pumps for the proposed development shall



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be homogenous in make, model and motor size shall be Liberty LSG200 or Liberty LSGX200 as the basis of design. Force mains shall be sized for ultimate buildout.

### **7.3.2. NEW GRINDERS CONNECTING TO AN EXISTING LPS SYSTEM**

Connection to an existing LPS system will require a hydraulic model of the existing LPS system and the proposed development. OWNER/DEVELOPER shall request hydraulic information from MUPB of existing LPS system (pipe diameters, pipe lengths, grinder types, number of active grinders, etc) and shall be incorporated in the hydraulic analysis of the proposed development. MUPB will provide all information that is available; however, the effort to verify that information is the responsibility of the OWNER/DEVELOPER.

The new LPS system shall not have adverse effects upon the existing LPS system. Grinder pumps for the proposed development shall be homogenous in make, model and motor size to those in the existing LPS system shall be Liberty LSG200 or Liberty LSGX200 as the basis of design. Force mains shall be sized for ultimate buildout.

### **7.3.3. LPS DESIGN SUBMITTAL**

The OWNER/DEVELOPER may request for MUPB to develop the required LPS Design Report. In order for MUPB to develop the required hydraulic model, the OWNER/DEVELOPER acknowledges that the cost for developing the report will be paid by the OWNER/DEVELOPER at the rate described below.

<b>EXTENSION LENGTH (Total Footage)</b>	<b>FEE</b>
Small Extension (<1,000 Total LF)	\$ 2,000
Medium Extension (1,001 to 5,000 Total LF)	\$ 3,000
Large Extension (> 5,001 Total LF)	\$ TBD

The following submittals shall be provided to MUPB for review of any proposed LPS system. Plans, specifications, and LPS Design Report shall be completed per the following guidance prior to being reviewed. Incomplete submittals will not be reviewed.

#### **A. Design Plans**

Three (3) copies of the design plans shall be provided to MUPB for review. The plans shall be 24" x 36" sheets. Plans shall be stamped and signed by licensed professional engineer in the Commonwealth of Kentucky. An electronic copy of the plans may be submitted in lieu of the three sets of plans.



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Plans shall have the following pages:

1. Cover Sheet
  - Development Name
  - Owner Name and Address
  - Engineer's stamp and signature
  - Date
2. Index Sheet
  - Location Map
  - Sheet Index of Plan Sheets
  - General Construction Notes
3. Plan & Profile Sheets
  - Plans shall be scaled to a maximum of 1" = 100' and minimum of 1" = 50'.
  - Overall schematic layout of the LPS system identifying the grinder pump stations, force mains, combination air release valves, and isolation valves.
  - Identify the force main size, pipe material & stationing of the force main.
  - Locate force main appurtenances: combination air release valves, valves, curb boxes, grinder units
  - Location of existing utilities
  - For Profile: show the existing ground line, proposed ground line (if applicable), force main test pressure between isolation valves, combination air release valves, valves, curb boxes, grinder units.
4. Specific Standard Details
  - Details for any specific item or design standard that is not included in the MUPB Standard Sanitary Sewer Details.
5. MUPB Standard Sanitary Sewer Details

**B. Design Report**

An electronic format of the low-pressure sewer system design report shall be provided in pdf format.

1. Title Page

Title Page shall include the following:

  - a. Development Name



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- b. Date of Submission
- c. OWNER/DEVELOPER Name, address, phone number & email.
- d. ENGINEER's name, company name, address, phone number & email.
- e. Professional Engineer's Stamp (signed and dated)

### **2. LPS System Information**

- a. Type, location and size of development
- b. Number of and range of lot sizes to be incorporated into the development.
- c. State if the development will be constructed in phases and provide a breakdown of the distribution of phases/development type per phase(s) and time period for each phase(s).
- d. Determine if adjacent areas will be incorporated into the LPS design.

### **3. LPS Hydraulic Analysis**

An electronic copy of the model shall be submitted via a USB thumb drive or DVD. The model must include either an USGS or aerial photos as a background image on Kentucky State Plane Single Zone coordinate system.

#### **a. Computerized Hydraulic Model**

ENGINEER shall provide a computer based electronic hydraulic model utilizing KYPIPE or other similar software programs as approved by MUPB. ENGINEER shall submit Tabulated Model – Pipe Results (See APPENDIX H). This table shall list every pipe upstream and downstream of the following:

- Pipe changes diameter
- A branch force main ties into the force main

A Tabulated Model – Grinder Pump Results spreadsheet shall also be provided (See APPENDIX H).

#### **b. Grinder Station Calculations**

ENGINEER shall provide the grinder pump manufacturer's specification for the grinder pump being utilized as part of the design. A pump curve shall also be provided and display the highest head operating point and the lowest head



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operating point on the pump curve with the grinder pump identification number, corresponding to the hydraulic model.

c. **Force Main Design Calculations**

ENGINEER shall provide force main sizing to achieve a flow rate of a minimum of 2 fps and a maximum of 8 fps.