

### **SECTION 3: DESIGN OF WATER FACILITIES**

### 3.1. PURPOSE

MUPB's intent of this section describes the minimum requirements for design of water facilities. These requirements are listed to ensure that any development/extensions have adequate capacity to supply the average daily demand (ADD), maximum daily demand (MDD) and peak hourly demands (PHD) while maintaining a pressure of 30 psi at each meter. MUPB desires to maintain a static pressure of not less than 45 psi or better for all customers.

### 3.2. DESIGN APPROACH & CRITERIA

Proposed construction or expansion of water within the MUPB Service Area shall be in compliance with the Recommended Standards for Water Works (Commonly referenced as the 10 State Standards), the Kentucky Administrative Regulations (KAR) and guidelines defined in this Manual.

Any person, company, corporation, or other entity proposing to develop land or proposing to install new or replacement water 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 design standards referenced in these documents.

### 3.3. ESTIMATED CUSTOMER DEMANDS

MUPB has established the following tables to be utilized to determine the customer demand of proposed developments. These tables shall be considered the minimum demands. Alternative demand calculations may be presented to MUPB for consideration. MUPB determination is final on alternative demand calculations.

Types of Dwelling	Demand (gallons per day)
Apartment – 1 Bedroom	250
Apartment – 2 Bedroom, Mobile Home	300
Apartment – 3 Bedroom, Condo	350
Single Family Residence	400
Duplex	800

#### RESIDENTIAL WATER DEMAND



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## COMMERCIAL WATER DEMAND

Commercial Description	Demand (gallons per day)	
Bars (w. Food Service)	20 per seat <sup>1</sup>	
Bars (wo Food Service)	2 per seat <sup>1</sup>	
Bowling Alleys (w. Food Service)	75 per lane <sup>1</sup>	
Bowling Alleys (wo Food Service)	25 per lane <sup>1</sup>	
Motels	100 per unit	
Factory (w. Showers)	35 per person <sup>1</sup>	
Factory (wo Showers)	25 per person <sup>1</sup>	
Industrial (manufacturing, industrial parks, etc.)	2,000 per acre <sup>1</sup>	
Industrial – Light (distribution centers, etc.)	1,000 per acre <sup>1</sup>	
Shopping Centers (w Food Service or Laundries)	0.2 per square feet of space <sup>1</sup>	
Shopping Centers (wo Food Service or Laundries)	0.1 per square feet of space <sup>1</sup>	
General Commercial	5,000 per acre <sup>1</sup>	
Coin Laundries	400 per machine <sup>1</sup>	
Service Station	1,000 per 1 <sup>st</sup> Bay <sup>1</sup> 500 per each add bay <sup>1</sup>	

Note: <sup>1</sup> Demand based upon 8-hour shift or period.

# **INSTITUTIONAL WATER DEMAND**

Institutional Description	Demand (gallons per day)
Hospital	200 per bed
Institutions	100 per person
Nursing Home & Rest Homes	100 per person



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Institutional Description	Demand (gallons per day)
Youth & Recreational Camps	50 per camper
RV Camps	100 per site
Schools (elementary & middle schools)	15 per person <sup>1</sup>
Schools (high school)	20 per person <sup>1</sup>
Church	7 per seat <sup>2</sup>

Note: <sup>1</sup> Demand based upon 8-hour shift or period.

<sup>2</sup> Demand based upon 2-hour shift or period.

Average Daily Demand (ADD) will be determined by the above tables and summed together for all planned development types. Any development containing commercial and/or institutional demands shall calculate an equivalent residential unit (ERU) for the development.

Maximum Daily Demand (MDD) is to be calculated by using a peaking factor of 1.8 to ADD.

MDD (gpd) =  $1.8 \times ADD$  (gpd)

Peak Hourly Demand (PHD) will be calculated by using a peaking factor of 3.6 to ADD. PHD (gph) = (3.6 x ADD) ÷ 24

### 3.4. HYDRAULIC MODEL

MUPB requires a hydraulic model to be presented with submittal of plans for review. The hydraulic model shall be based upon a two-point flow test at the nearest available fire hydrants to the development/extension or model shall include all associated connections and include the nearest water storage facility. MUPB will provide OWNER/ENGINEER the necessary information regarding a two-point flow test, conducted by MUPB or assigned representatives.

As an alternate to providing a hydraulic model to MUPB, the OWNER/ENGINEER may elect to have MUPB develop the required hydraulic model of the development/extension with all associated connections and facilities necessary. In order for MUPB to develop the required hydraulic model, the OWNER/ENGINEER acknowledges that the cost for developing the model will be paid by the OWNER/DEVELOPER at the rate described below.

EXTENSION LENGTH (Total Footage)	FEE
Small Extension (<1,000 Total LF)	\$ 1,000



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

The Hydraulic Model shall follow guidelines set forth by Kentucky Division of Water (KDOW) in Construction Permit Application (DW-1). OWNER/ENGINEER shall submit the Hydraulic Model Information Sheet in APPENDIX G.

## 3.4.1 KDOW REQUIREMENTS

KDOW DW-1 requires at a minimum the following hydraulic information to be provided with the hydraulic model:

- A. Provide pump sizing calculations and the proposed pump's characteristics curve along with the efficiency, horsepower and NPSHR data, if applicable.
- B. Provide an Extended Period Simulation (EPS) for the addition of a storage tank to demonstrate a complete fill and drain cycle every 72 hours, if applicable.
- C. Model must demonstrate the availability of 30 psi under peak demand conditions.
- D. Model must demonstrate that the proposed water lines are capable of providing a flushing velocity of 2.5 ft per second while maintaining a minimum of 20 psi at all times.

### 3.4.2 MUPB REQUIREMENTS

MUPB requires the following information to be included in addition to KDOW requirements:

- A. A written hydraulic model summary, area map and electronic copy of the model for review. Identify the computer modeling software utilized and provide all related database files to ensure model will import to PIPE2020 or latest version.
- B. Provide a system map showing the modeled pipe network. Label all pipes, nodes, road names, north arrow, scale, number of units, unit type, demands, elevation contours and outline of the phasing, if applicable.
- C. Save files such that each file demonstrates that the development meets KDOW criteria separately. This ensures that during the review by MUPB it is an accurate representation of the model prepared by ENGINEER.
- D. The model must represent the entire development, including all known future phases.
- E. All existing demands shall be represented in model to accurately represent system flows and pressures.
- F. Identify the source of water (i.e. pressure zone) and type of pressure source being modeled (tank, PRV or two-point flow test curve).



- G. Provide a node report to display name, elevation, corresponding connected pipes, demand, hydraulic grade line (HGL) and pressure.
- H. Provide a pipe report to display name, diameter, flow, velocity, length and head loss.
- I. Provide a conclusion of results, table listing nodes with maximum and minimum pressures for all situations modeled. Table of Max/Min shall include 10% of the number of nodes within development, minimum of 5 for each.

### 3.5. WATER FACILITY EASEMENT

For public water mains, provide permanent easements with widths no less than fifteen (15) feet, centered upon installed pipe and temporary construction easements with widths no less than thirty (30) feet for water mains less than 36" diameter. All water mains shall be located a minimum of ten (10) feet from all permanent structures.

Where public water mains run along a lot line within a subdivision, locate the water facilities a minimum of 3 feet from the parcel or lot boundary line. Where public water mains parallels such lot line, the water easement shall straddle the parcel boundary, in order to allow MUPB access to both lots for maintenance work.

Where proposed construction is across land of others, temporary construction easements shall be established in sufficient widths to accommodate the work area, see SECTION 2.

Public water mains shall be located in areas (public right-of-way or easements with access adjacent to public right-of-way) with access available through and/or adjacent to proposed roadways. Public water mains laid in the back of properties with access only via entering private property is not permitted; however, a request may be made and will be reviewed by MUPB on a case-by-case situation.

Easement plats, instrument of conveyance and/or deed shall be reviewed prior to being executed and filed according to the procedures found in SECTION 2.

### 3.6. CONSTRUCTION PLAN REQUIREMENTS

Construction Plans are to be prepared by a licensed Professional Engineer with a valid and current license in the Commonwealth of Kentucky per KRS Chapter 322. Plans shall be submitted per Section 2 – Application for Service.