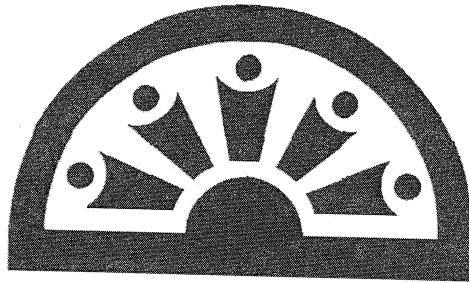


**CITY OF**



**WEST POINT  
WATER SYSTEM**

**STANDARD FOR DESIGN AND  
CONSTRUCTION SPECIFICATIONS**

## TABLE OF CONTENTS

		PAGE
	PREFACE	1
I.	GENERAL	2
II.	DESIGN CRITERIA	5
III.	DESIGN CAPABILITIES & WATER DEMANDS	8
IV.	CONSTRUCTION DRAWINGS	12
V.	INSPECTION OF WORK	14
VI.	MATERIALS	15
VII.	HANDLING MATERIALS	24
VIII.	EXCAVATION	25
IX.	CONSTRUCTION ALONG HIGHWAY, STREETS & ROADWAYS	28
X.	LAYING & JOINTING PIPE & FITTINGS	30
XI.	THRUST RESTRAINT	32
XII.	BACKFILLING	33
XIII.	REMOVING AND REPLACING PAVEMENT	35
XIV.	BORING	36
XV.	STREAM & DITCH CROSSING	38
XVI.	TESTING	40
XVII.	DISINFECTION OF WATER MAINS	41
XVII.	DISINFECTION OF WATER MAINS	41
XIX.	MARKING TAPE & TRACER WIRE	42

XX	CONSTRUCTION DRAWINGS: SILT FENCE DETAIL ¾" AND 1" AIR RELEASE VALVE ASSEMBLY 2" AIR RELEASE VALVE ASSEMBLIES ¾" AND 1" LONG TAP ASSEMBLIES ¾" AND 1" SHORT TAP ASSEMBLIES 2" LONG TAP ASSEMBLIES 2" SHORT TAP ASSEMBLIES 2" BLOWOFF HYDRANT DETAIL FOR PERMANENT DEAD-END MAINS TEMPORARY DEAD END ASSEMBLY FIRE HYDRANT DETAIL Picture of STORZ Connection on Fire Hydrant FIRE HYDRANT REFLECTOR DETAIL GATE VALVE INSTALLATION DETAIL BUTTERFLY VALVE DETAIL CASING PIPE AND CONCRETE PROTECTION DETAIL CONCRETE ENCASEMENT DETAIL PRE-CAST VAULT TOP VIEW 4" METERS AND LARGER PRE-CAST VAULT SIDE VIEW 4" METERS AND LARGER THRUST BLOCKING DETAIL	43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
XXI	ACRONYMS	62

## STANDARDS FOR DESIGN

### CONSTRUCTION SPECIFICATIONS FOR WATER DISTRIBUTION

**PREFACE:** This Guideline and Standards Book contains information to assist planners and engineers with the design and construction of water facilities. The City of West Point's intent is to ensure uniformity of design concepts, formats, methodologies, procedures, construction materials, types of equipment and quality of work products. These standards have been produced and adopted to encourage exceptional quality while using current technology for all City of West Point Water facilities.

The Guidelines and Standards are not a substitute for good Engineering. Sound judgment must be exercised in all applications to create quality and cost efficient facilities.

## **I. GENERAL:**

### **A. Applicable Standards:**

Supply all products and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), National Sanitation Foundation, American National Standards Institution (ANSI), The City of West Point Cross Connection Control and Backflow Prevention Policy, or other recognized standards. Latest revision of all standards are applicable. If requested by the City, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

### **B. Substitutions:**

Whenever a product is identified in the Specifications by reference to manufacturer's or vendor's names, catalog numbers, etc., the Contractor/Developer may freely choose from these referenced products which ones he wished to provide.

Any item or product other than those so designated shall be considered a substitution. The Contractor/Developer shall obtain prior approval for an approved equal from the City for all substitutions.

### **C. Warranty:**

Water distribution systems installed by Contractor/Developers which are accepted by the City for ownership, operation and maintenance shall be warranted and guaranteed for a period of one year from the date of final acceptance that the completed system is free from all defects due to faulty products or workmanship, and that the Contractor/Developer shall make such corrections as may be necessary by reason of such defects upon notice by the construction have been paid prior to final acceptance by the City.

Contractors/ Developers must provide a maintenance bond or letter of credit for 100% of the construction cost of the system for a period of one year to begin on the date of written acceptance by the City, or as evidenced by the City's signature on a final plat in the case of new developments. Prior to the end of the one-year period, the City will perform an additional inspection. A final list of deficiencies will be sent to the Contractor/Developer for immediate correction. Release of bond or letter of credit will not be made until all deficiencies have been corrected.

**D. System Ownership:**

Any water system tied to or served from a water supply already owned, maintained, or operated by the City will become the property of the City and will be maintained by the City after the specified developer maintenance period and final acceptance.

**E. Qualification for Installers:**

Installers of water system expansions must be a utility contractor licensed in Georgia and approved by the City prior to the beginning of any work. This requirement will apply to all subcontractors who install water or utilities. Contractors who perform substandard work may be disallowed from any future work on projects which will become owned by the City.

Minimum insurance requirements are as follows:

- (1) Worker's Compensation – statutory limits
- (2) Contractors General Liability – Comprehensive General Liability (including Premises – Operations; Independent Contractors' Protection; Products and completed Operations; Broad Form Property Damage and Owners Protective Liability):

Bodily Injury:

\$1,000,000 Each Occurrence  
\$1,000,000 Annual Aggregate, Products and Completed Operations

Property Damage:

\$1,000,000 Each Occurrence  
\$1,000,000 Annual Aggregate

Property Damage liability insurance shall provide Explosion, Collapse and Underground coverage where applicable.

Personal Injury, with employment exclusion deleted

\$1,000,000 Annual Aggregate

- (3) Comprehensive Automobile Liability

Bodily Injury:

\$1,000,000 Each Person  
\$1,000,000 Each Accident

Property Damage:

\$1,000,000 Each Occurrence

The Contractor must provide certificate of coverage to City to show:  
1. Limits as shown, 2. 30-day cancellation notice, and 3. City as additional insured.

**F. Easements and Rights of Way:**

Water distribution systems installed by a Contractor/Developer, which are accepted by the City for ownership, operation and maintenance shall be installed in either dedicated road rights of way or utility easements.

Utility easements shall be properly executed and recorded. The easements shall be cleared of all structures, trees, shrubs, brush, logs, upturned stumps and roots of downed trees and similar items.

No permanent structure shall be built on the easement. Non-structural encroachments such as fences, landscaping, etc. can be installed on the permanent easements, but the Owner shall obtain a written permission of the City before the installation of such encroachments. If fences or other structures must be removed for maintenance of water or sewer lines it will be the responsibility of the property owner to reinstall or replace such structures.

The standard minimum easement width will comply with the City of West Point Placement Standards in subdivisions where applicable, and will normally be twenty feet (20') in width otherwise.

## **II. DESIGN CRITERIA:**

### **A. Minimum Water Main Sizes**

Water mains less than six (6) inches in diameter will not be allowed within the City's water distribution system, except: 1. in the end loop of residential cul de sacs, or 2. on minor extensions where the furthest customer is no more than two hundred fifty (250) feet from a fire hydrant and there is no potential for extension of the line in the future.

Required sizes may be larger depending on the size required to meet the demand of the proposed development, The City may require a larger pipe size if payment is made by the City for the difference in cost either in cash or in Capital Recovery Fee equivalents.

### **B. Valve Placement:**

Valves are to be placed at street intersections and on each smaller main as it leaves other larger mains. In commercial, residential and industrial locations, all tees and crosses shall have valves on all sides.

Valves shall be placed at both ends of the crossing:

1. Under a multi-lane road, creek and railroad tracks.
2. When crossing a bridge.

Maximum spacing of valves along a water main shall be no more than two thousand (2,000) feet.

### **C. Fire Hydrant Location:**

All fire hydrants shall be located on the backside of the ditch area, usually one (1) foot within the right-of-way. Fire hydrants, or blow-offs, are also required at the end of all water mains. On new water main construction, the spacing between fire hydrants shall be no more than the distance shown for development types as follows: five hundred (500') feet apart for single family residential developments, multi-family residential developments, and mobile home parks; three hundred (300') feet apart for industrial/commercial developments, and one thousand (1,000') feet apart for existing county roads.

Hydrants shall be furnished with a mechanical joint shoe connection to the spigot of the six (6) inch hydrant lead or mj anchor coupling. A fire hydrant tee shall be installed on the main. The fire hydrant valve shall be directly connected to the tee and to the hydrant lead or mj anchor coupling. Fire hydrants will have three (3) way connections as follows: two (2) – two and one half (2 ½") inch NST



threaded connections and one (1) – five (5") inch storz connection. All connections must have appropriate caps.

Standard depth of bury shall be four (4) feet. Provide extension section where necessary for vertical installation and in accordance with manufacturer’s recommendations.

**D. Fire Hydrant Reflectors**

Each fire hydrant must have a blue hydrant reflector placed in the center of the driving lane adjacent to the fire hydrant. See construction drawing details at the rear of this manual.

**E. Fire Protection**

Minimum flow rate at twenty five (25) psi residual pressure by type of development is as follows:

(1) One and two family dwellings not exceeding two stories in height (excluding basement) Source: ISO Fire Suppression Rate Schedule Guidelines.

Side Yard Setback	Distance Between Buildings	Minimum FireFlow (gpm)
Greater than 50	>100	750
Greater than 15, but less than or equal to 50	31-100	750
Greater than 5ft., but less than or equal to 15ft.	11-30	1000
Less than or equal to 5 ft	10 or less	1500

(2) All other dwelling units and commercial and industrial facilities:

- i. Needed fire flow shall be calculated in accordance with the ISO Fire Suppression Rating Schedule Guidelines or other applicable codes in force at the time.
- ii. Calculations and analysis shall be presented to verify needed fire flow.
- iii. Analysis shall consider the following factors:
  - Construction factor
  - Occupancy factor
  - Exposure factor
  - Communication factor

(3) Maximum fire flow that will be provided on a calculated “needed fire flow” basis by the City shall be 1000 gpm.

(4) When the calculated needed fire flow is greater than 1000 gpm, the developer shall consider ways to reduce the requirements. Options as outlined in ISO Guideline include:

- i. Reduction in building size
- ii. Change in construction materials
- iii. Change in spacing in between buildings
- iv. Install approved firewalls
- v. Install approved sprinkler system in accordance with NFPA Guidelines
- vi. Construct on-site fire protection facilities that would not be owned, operated and maintained by the Department.

(5) Higher needed fire flow can be allowed in special districts as designated by the City in which the water system is designed to provide higher flows. Example would be an industrial corridor or park.

**F. Service Laterals and Connections**

Service laterals shall be located with a minimum bury of eighteen (18") inches.

Service connection stubs will be required on all new development to be accepted by the City for ownership and operation.

**G. Temporary Line Ends**

A gate valve and a minimum of 36 (two (2) coupler joints) feet of pipe shall be provided at the end of all lines for phased developments. Lines shall be plugged at the ends and shall have temporary thrust blocking or other approved means of restraint.

### III. DESIGN CAPACITIES AND WATER DEMANDS:

An important factor in the planning and design of a water system is an accurate estimate of the quantities of water, which must be supplied to meet water needs. These estimates are pivotal to the entire design including the production of water, pumping, treatment, storage, and the distribution system. Each water system component is designed to meet certain flow requirements and to insure that water will be available at the various water use points throughout the system in adequate quantities to met demands.

#### A. Estimating Basic Water Demands:

(1) The various components of a water system are designed to meet specific water flow criteria which are dependent upon the type of water system and the objectives of the system.

(2) Average Daily Demand expresses the quantity of water used in a system in an average day. It is based upon experience from water meter readings in similar water systems over an extended period of time and reflects the normal seasonal and daily variations. For design purposes, it is usually determined by estimating the population or units of housing or other units and multiplying by an average per person or per unit water consumption derived from past experience. The average daily demand will be exceeded on many days (during peak demands), so it is not appropriate to design merely for the average. The greatest amount of water usage in one day or other period of time must be considered.

The following provides a guide for estimating the average daily demand for various types of establishments, in gallons per day per unit. The unit is persons per day unless otherwise indicated. The values are for normal water requirements and do not include special needs or unusual conditions. Additional allowances should be made for fire fighting, lawn watering, swimming pool, industrial or commercial process water and other special uses.

<u>Type of Establishment</u>	<u>Average Daily Use</u> (gallons per day)
This unit is per person unless otherwise stated	
Assisted Living Facilities (Per Room)	100
Assembly Halls (per seat)	2
Barber Shop (Per Chair)	20
Beauty Shop (Per Booth or Bowl)	50
Car Wash (Per Site)	1,500
Churches (Per Member)	1
Convenience Store (Per Bath Room)	125
Day Care Facilities	100
Factories, Sanitary uses, per shift	15-35
Food Service – Restaurants (Per Seat)	20

<u>Type of Establishment cont.</u>	<u>Average Daily Use</u> (gallons per day)
The unit is per person unless otherwise stated	
Food Service-Restaurants (Per Seat) Continued	
- With Bars (Per Seat)	25
- Fast Food (Per Seat)	15
Highway Rest Areas	50
Hotels (2 Persons Per Room)	60
Institutions – Hospital (Per Bed)	150
- Nursing Homes (Per Bed)	150
- Others	75-125
Office Buildings (Per Employee)	15
Laundries, Self Service (Per Machine)	200
Motels (Per Bed)	45
Parks – Day Use (With Flush Toilets)	15
- Mobile Homes (Per Unit)	200
- Travel Trailers (Per Unit)	75
Picnic Areas (With Flush Toilets)	15
Residential Communities	
Single Family Dwelling (Per Person)	100
- Single Family Dwelling (Per House Maximum)	400
- Multi-Family (Per Bedroom)	150
- Rooming House/Tourist Home (Per Bedroom)	100
Resort Motels and Hotels (Per Room)	200
Retail Stores (Per Toilet Room)	200
Schools – Day, No Showers or Cafeteria (Per Student)	15
- Day, With Cafeteria (Per Student)	25
- Day, With Showers and Cafeteria (Per Student)	50
- Residential Types (Per Student)	75-100
Shopping Centers, Per Sq. Ft. Sales Area	1.5
Swimming Pools and Beaches	200
Theaters – Drive-In (Per Car)	3-5
Others (Per Seat)	3

3. Maximum Daily Demand expresses the greatest amount of water a system will use in one day. Small residential water systems may experience that their maximum day is 1.5 to 2 times the average day. However, this ratio may not apply to other water systems. In general, the smaller the water system, the greater the variation between the average and the maximum day.

4. Maximum Hourly Demand expresses the greatest amount of water, which will be used in any hour during the day. This is sometimes referred to as the peak hour demand, although there will be short term peak demand rates lasting for several minutes which will exceed the maximum hourly demand rate. Each type of system exhibits its own maximum hourly and short-term peak demands and the hours of peak occurrence will vary. For example, shopping centers usually

experience hourly peaks in the early afternoon while residential communities may experience two peak hours, about 8:00 a.m. and 6:00 p.m. The maximum hourly demand is often expressed as a ration of the average daily demand, in gallons per minute. Generally speaking, the smaller the water system, the greater the maximum hour rate in respect to the average daily rate. The peak hourly demand at small residential communities may range about 6 to over 10 times the average daily demand.

5. Peak Demand (instantaneous demand) is the maximum amount of water necessary to meet the peak short-term demand rate which may occur several times during a day, usually occurring during the peak hour period. The instantaneous peak may last for several minutes. The rate is particularly important in considering the sizing of the storage tank in a hydropneumatic system. The effective storage capacity is usually designed to meet these short-term peaks. The minimum effective storage volume of pressure tanks, in gallons, shall equal the peak demands, in gallons per minute (gpm), minus the pumping capacity (gmp), multiplied by 20. In the absence of sufficient effective storage to meet peak demands, the wells and pumps must be capable of meeting the peak demands. The smaller the water system, the greater the ratio of the peak demand to the average demand.

**Instantaneous (Peak) Demand for Residential Communities**

<u>Number of Connections</u>	<u>Gallons Per Minute</u>
10	40
15	50
20	58
25	66
30	73
35	80
40	85
45	91
50	96
55	101
60	106
70	115
80	124
90	132
100	140
125	160
150	175
175	195
200	205
250	230
300	255
400	295
500	335

