CHAPTER ONE

GENERAL REQUIREMENTS
FOR WATER AND SEWER EXTENSIONS

I. STANDARD DEFINITIONS

A. Definitions

Wherever used in this Manual, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof. There are other terms used in this document, which are defined in the sections to which they apply.

Applicant - Person who is financially responsible for the proposed water distribution or sewer collection system construction or modification, and who shall maintain operational responsibility of said system unless fee simple title is granted to PWC. The Applicant becomes the "Permittee" under PWC's Local Permitting Authority when a Permit is issued, gaining new responsibilities and retaining all the same responsibilities as the Applicant has under Article VI, Chapter 31 of the Fayetteville City Code of Ordinances (hereinafter referred to as "Ordinance").

Application - Form or forms provided by PWC and completed by the Design Engineer and Applicant providing pertinent information regarding the proposed construction or modification of water distribution or sewer collection facilities. It includes all required associated documents.

Approving Authority - General Manager of the Public Works Commission of the City of Fayetteville, or his duly authorized deputy, agent or representative, who shall be responsible for the administration of the delegated local permitting authority as outlined in the Ordinance, and shall be the designated party to receive service of documents pertaining to such programs.

Approved Plans - Water and/or sewer system extension plans, which have been reviewed by and received the approval of the Water Resources Department of the Public Works Commission and/or the appropriate state and local agencies.

Capacity Factor - The mathematical value, varying inversely with the magnitude of the population, which is applied to the effective-population figure to provide for reasonable increases in population, variations in water demands and uncertainties as to actual water-supply requirements, and for unusual peak demands, the magnitude of which cannot be accurately estimated in advance.

Chief Financial Officer - The Chief Financial Officer of the Public Works Commission.

City – City of Fayetteville, North Carolina.

Commission - The term "Commission" refers to the Water Resources Engineering Department of the Public Works Commission and those persons employed by and authorized by the Public Works

Commission to act on the behalf of the Water Resources Engineering Department in the particular instance cited. Words such as "as required by the Commission" shall also refer to this Manual and the Public Works Commission Utility Regulations.

Commission's Representative - An authorized employee or representative of the Public Works Commission.

Contract Documents - The term "Contract Documents" shall refer to the project plans and specifications for water and/or sewer system extensions.

Contract for Service - Written agreement by and between the PWC and the Applicant stipulating the terms of extending utility service and the value of the improvements. By attachment the Contract shall also stipulate the project duration and the associated costs for PWC construction observation, basic and excess.

Contractor - The person, business, or corporation responsible for the performance of water or sewer system construction work.

Construction/Warranty Bond - Financial instrument provided by the applicant to PWC at execution of Contract for Services with PWC, with such bond being held to protect PWC during the construction and post acceptance warranty period. Such bond shall carry language satisfactory to PWC relative to Civil Penalties under the Local Permitting Authority Ordinance.

Department Engineer - The term "Department Engineer" refers to a Professional Engineer on the staff of the Water Resources Engineering Department of the Public Works Commission.

Design Engineer - Professional Engineer, licensed to practice in the state of North Carolina, responsible for performing the design and preparing the drawings and specifications for the proposed water distribution system and/or sewer collection system construction or modification(s), construction administration and certifying the completion of such construction or modification(s) in accordance with the approved plans and permit.

Design Population - The population figure obtained by multiplying the effective population figure by the proper capacity factor.

Developer - The person(s) or corporations financially responsible for the design and construction of a development for which water or wastewater service by the Public Works Commission will be requested.

Distribution Mains - The pipelines that comprise the water distribution system.

Documents - Any and all drawings, graphs, charts, calculations, compilations of data, writings, photographs, audio or video tape recordings or other such records from which project pertinent information can be obtained, extracted or translated in a usable form.

Engineering Manager - The Engineer Manager of the Water Resources Engineering Department of the Public Works Commission.

Feeder Mains - The principal pipelines of the distribution system.

Fire Demand - The amount of water in gallons per minute required during specified fire period. The fire demand is determined by the sum of the fire flow, fifty percent (50%) of the average domestic demand rate, and any industrial or other demand that cannot be reduced during a fire period. The residual pressure is specified for either the fire flow, or essential industrial demand, whichever is the higher. Fire demand will include quantities required for automatic sprinkler operation, in addition to direct hydrant fire-flow demand as appropriate, when sprinklers are served directly by the water-supply system.

Fire Flow - The amount of water in gallons per minute required at a specific residual pressure at the site of the fire for a specific period of time.

Fixture Value - A quantity in terms of which the demand producing effects on the plumbing system of different kinds of plumbing fixtures are expressed in accordance with a table of values representing the flow demand of each fixture when operating without the interference of other units.

Manual - The term "Manual" shall refer to all applicable standards, specifications, standard details and policies contained in or referenced by this document.

NCDENR - North Carolina Department of Environment and Natural Resources.

Non-Conformance Notice - Written notice to the Design Engineer and/or Applicant when construction performed under PWC's Local Permit Authority is found to not substantially conform with either the approved permit design, or the requirements of PWC or NCDENR, whichever is more restrictive.

Operating Agreement - Document prepared by the Applicant in accordance with NCDENR requirements to specifically retain operational responsibility for water distribution or sewer collection system features connected to PWC owned facilities, but for which fee simple title ownership has not been granted to PWC. Said agreement shall include language satisfactory to PWC, and a draft thereof shall be filed with the Application when an Application is filed.

Peak Domestic Demand - The peak domestic demand is assumed to be 2.5 times the daily average domestic requirements.

Permit - Written document which is issued by the City, through PWC and its Approving Authority, in accordance with the Ordinance, describing the specific construction and/or modification activity allowed, and including any and all general, supplemental and special conditions to the Permit, assigning construction responsibility under the Permit and providing operation responsibility (PWC or Private), for the facilities upon completion of the permitted work.

Permit Period - Duration during which a Permit is valid, commencing on the date of permit issuance by the Approving Authority, and unless suspended, modified or revoked for cause, shall be valid for the succeeding 24 months, or until work is complete, accepted and certified by the Design Engineer, whichever occurs first.

Person - Individuals, sole proprietorships, partnerships, limited liability corporations, corporations, professional associations, firms, joint ventures, businesses, institutions, municipal or other local government subdivisions, governmental agencies or any other body corporate or political, for profit or non-profit.

Pipe Backfill Zones - The following terms are used in reference to excavation and backfill for pipe. Refer to the standard detail entitled, "Sewer Bedding" for the Installation of Sanitary Sewer Pipe.

Bedding - That portion of the pipe support structure bounded by the Foundation or undisturbed trench bottom, the trench walls and the bottom of the pipe.

Final Backfill - That portion of the backfill lying above the Initial Backfill.

Foundation - That portion of the pipe support structure bounded by the undisturbed trench bottom, the trench walls, and the pipe Bedding. The construction of a pipe foundation is generally not required unless unstable materials are encountered in the trench bottom.

Haunching - That portion of the pipe support structure bounded by the Bedding, the trench walls, the outside of the pipe and a horizontal plane having an elevation equal to that of the spring line or the pipe.

Initial Backfill - That portion of the back fill lying above the spring line of the pipe and below a horizontal plane having an elevation which is one (1) foot above the top of the pipe.

Professional Engineer - A person who has been duly registered and licensed as a professional engineer by the North Carolina State Board of Examiners for Professional Engineers and Land Surveyors.

PWC - The Public Works Commission, of the City of Fayetteville.

PWC Certificate of Operation - Document issued by PWC documenting final acceptance of a permitted improvement for projects donated to PWC. Issuance of such is contingent upon specific actions by the Permittee and his Design Engineer.

PWC sewer collection system - Part or portion of the facilities owned by the City, through the PWC, which are used to collect and carry wastewater to the treatment works and ending at the sewer service lateral cleanout or other Contract for Service designated connection.

PWC water distribution system - Part or portion of the facilities owned by the City, through PWC, which are used to distribute potable water to its customers, excluding any supply, pumping, storage or treatment works, and ending at the water service metering point or other Contract for Service designated connection.

Rated Capacity - The rated capacity of a filter or pumping unit is the amount of water, which can be passed through the unit when operating under design conditions.

Record Drawing - Complete set of drawings composed of one (1) reproducible, one (1) bond

copy, and one (1) electronic copy of the original approved plans showing actual installed conditions tied to NAD 83 in accordance with PWC standard methods and reflecting finished locations sufficiently dimensioned to fixed objects and elevations tied to NGVD 29 vertical datum. Record Drawings shall be delivered to PWC concurrent with request for final inspection of permitted work, and prior to acceptance of the work by PWC.

"Red Line" Review - Plans and specifications reviewed by PWC staff indicating desired comments and changes. The Design Engineer must address the "red line" comments, to the satisfaction of PWC staff in order to receive approval to construct. PWC's original "red line" review plans and specifications must be furnished to PWC with the corrected resubmission.

Required Daily Demand - The total daily water-supply requirement is obtained by multiplying the design population by the per capita domestic water allowances, and adding to this quantity any special industrial, aircraft-wash, irrigation, air-conditioning, or other demands. Other demands include the amount necessary to replenish, in 48 hours, the storage required for fire protection and normal operation. Where the supply is from wells, the quantity available in 48 hours of continuous operation of the wells will be used in calculating the total supply available for replenishing storage and maintaining fire and domestic demands and industrial requirements that cannot be curtailed.

Required Fee - Fees levied by the City through the PWC, as established in adoption of the PWC User Charge System for construction observation, permit application, modification or renewal, as well as administrative review.

Service Lines - Small pipelines connecting buildings to distribution mains.

Sewer Collection System - The meaning as stated in North Carolina General Statute 143-213 (15) in its most current amended form.

Standards - Where this Manual makes a reference to published standards such as ASTM, ANSI, AWWA, etc., the latest revisions of such standard shall apply.

Stop Work Order - Order issued by the Approving Authority to the Permittee to cease and desist any further construction and/or modification of the work being performed under a Permit issued pursuant to the Ordinance, because of failure to correct construction deficiencies identified in a Non-Conformance Notice. In the case of imminent danger to persons, property and/or the environment, a Stop Work Order may be issued without being preceded by a Non-Conformance Notice. Ability to issue and/or actual issuance of a Stop Work Order shall in no way transfer any responsibility from the Permittee, his representatives, agents or assignees to PWC or the City of Fayetteville.

Supply Line - The pipeline from the source of supply to the treatment works or to the distribution system.

Supply Works - Dams, impounding reservoirs, intake structures, pumping stations, wells, and all other construction for the development of a source of water supply.

Terms and Conditions - The latest revision of the Terms and Conditions of Water and/or Sewer Service of the Public Works Commission's Utility Regulations, a copy of which is available upon request.

Treatment Works - Filtration plant, reservoirs, and all other construction required for the treatment of a water supply.

Utility Service Area - Area described in North Carolina General Statute 143.215.1(f) and North Carolina General Statute 130A-317(d) as the "service area" for a commission.

Utility Transfer Unit Value - Basis for establishing the Warranty Bond to be issued prior to acceptance of any utility improvement by PWC. Such bond is intended to be approximately one half (1/2) the installed value of the improvements, with such values established by PWC during the preparation of the Contract for Service.

Water Distribution System - The meaning stated in North Carolina Administrative Code Title 15A Subchapter 18C Rule .1801, "the network of pipes valves, hydrants and related appurtenances but does not include pumps, storage tanks, treatment devices, wells or other facilities."

Water Works - All construction for the collection, transportation, pumping treatment, storage, and distribution of water.

II. STANDARD ABBREVIATIONS

A

A&R R/R - Aberdeen and Rockfish Railroad

AASHTO - American Association of State Highway Transportation Officials

ABC - Aggregate Base Course

ACI - American Concrete Institute

ANSI - American National Standards Institute

API- American Petroleum Institute

ASTM - American Society for Testing and Materials

AWWA - American Water Works Association

C

CSX - CSX Transportation (Railroad)

D

DI - Ductile Iron

E

EA - Environmental Assessment

EEP - Environment Enhancement Program

EIS - Environmental Impact Statement

F

FEMA - Federal Emergency Management Agency

FIRM - Flood Insurance Rate Map

FONSI - Finding of No Significant Impact

G

gal/person - gallons per person

gal/unit - gallons per unit

gal/acre - gallons per acre

GPD - Gallons per Day

GPM - Gallons per Minute

H

HDPE - High Density Polyethylene

I

I/I - Inflow and Infiltration

M

MGD - Million Gallons per Day

N

NC - North Carolina

NCAC - North Carolina Administrative Code

NCDA - North Carolina Department of Administration

NCDEH - North Carolina Division of Environmental Health

NCDENR - North Carolina Department of Environment and Natural Resources

NCDOT - North Carolina Department of Transportation

NCDWQ - North Carolina Division of Water Quality

NEC - National Electric Code

N (cont'd)

NEMA - National Electric Manufacturer's Association

NFPA - National Fire Protection Association

NPDES - Non Point Discharge Elimination System

$NPSH_A$ - Net Positive Suction Head Available

$NPSH_R$ - Net Positive Suction Head Required

O

OSHA - Occupational Safety and Health Administration

P

PPI - Plastic Pipe Institute

psi - pounds per square inch

psig - pounds per square inch guage

PVC - Polyvinylchloride

PWC - City of Fayetteville Public Works Commission

S

SF - Safety Factor

T

TDH - Total Dynamic Head

U

UL - Underwriters Laboratories

USCE - United States Corps of Engineers

III. GENERAL REQUIREMENTS

A. Water Permits – For those water systems that have a master meter with PWC, and that system is owned, operated, and maintained by another entity, and that entity does not have its own Public Water Supply Identification number (PWS ID), PWC has the authority to permit any water extensions/expansions for that system. For example, under this scenario, PWC would be the permitting authority for Fayetteville State University, Methodist College, Kelly Springfield, Eastover, etc.

However, if the entity has a PWS ID number, owns, operates, and maintains its system, the water permit is reviewed and issued by the State. Therefore, PWC would not permit any water extensions/expansions by Brookwood-Lagrange, Spring Lake, Fort Bragg, or within the Town of Stedman. However, since PWC has an operation and maintenance agreement with the Town of Stedman, PWC will review all plans for water extensions, prior to being sent to the State for permitting.

For those systems owned, operated, and maintained by PWC, PWC will be the permitting authority.

B. Sewer Permits – For those areas or intergovernmental agencies that have wastewater collection systems that are tied to the PWC system and have a flow meter to measure the amount of waste being delivered to the PWC system, any extensions within those areas are to be permitted by the State. However, prior to submitting the application to the State, PWC will need to issue a flow acceptance letter for the additional flow. This situation applies to Hoke County, the Town of Stedman, NORCRESS, Eastover, etc. For those systems that PWC has operation and maintenance agreements with, PWC will review all plans for the proposed sewer extensions, prior to being sent to the State for permitting.

For those areas that are within PWC's service area that own, operate, and maintain their sewer system, discharge to the PWC system, and do not have a flow meter, PWC will be the permitting authority. These will be the "private" systems, such as Methodist College, Fayetteville State University, mobile home parks, etc.

For those systems owned, operated, and maintained by PWC, PWC will be the permitting authority.

The following situations must be permitted by the State, regardless of ownership:

a. Outfalls into a basin where sewer service has not yet been provided;
b. Low pressure sewer systems or STEP systems;
c. Projects involving Environmental Assessments; and
d. Any collection system where a variance from State regulations is required.

C. All PWC Standard Specifications and Standard Details shall be incorporated and become an integral part of the Plans, Specifications and Contract Documents submitted for review and approval. Deviations must be noted in writing and receive written approval from PWC prior to final Contract Document approval.

D. The Contract Documents shall insure that all structures, pavements, utilities, and other facilities, which may possibly be damaged as a result of project work, are replaced or repaired in a manner, which meets the approval of PWC or any governing bodies having jurisdiction.

E. No connection to, or alteration of any existing facilities owned or maintained by the PWC shall be permitted without the express permission of the PWC and, where required, the presence of the PWC's Representative except as directed by the PWC. Where a connection or alteration of any existing facilities is approved, the connection or alteration shall conform to the standards of the Manual for new installations.

F. All water and sewer extensions to be operated and maintained by PWC shall be designed and built in accordance with this Design Manual, and all applicable State and local regulations.

IV. SUBMITTALS AND GUIDELINES

A. REQUIRED COPIES OF CONTRACT DOCUMENTS FOR PWC APPROVAL

The Engineer should submit to PWC one (1) set of Contract Documents, including pertinent calculations, and shall have made application for applicable permits (see the following table) to PWC, for a preliminary review prior to submission of all Contract Documents necessary. The Department Engineer and his staff shall review such plans and make the appropriate notes and return the redlined drawings to the Engineer marked so that the necessary corrections can be made and the Contract Documents revised. Upon review by the Engineer of the "red lines", the Engineer may request to meet to discuss comments. All comments shall be addressed so as to comply or an explanation of reasons for not complying must be provided and approved by PWC. The corrected plans, applicable permit applications, and other supporting documentation shall be submitted for the approval by PWC and the appropriate state agencies, as appropriate.

B. ENGINEERING DESIGN CALCULATIONS & REPORTS

All Contract Documents submitted to PWC for approval shall be accompanied with the necessary design calculations as specified herein or requested by PWC. The calculations and any reports must be signed and sealed by a Professional Engineer. All design calculations based on data not contained herein shall be referenced to the origin. The calculations shall be submitted in duplicate, clearly referencing the project and presented in a neat, orderly, and logical procedure. All reports shall list the assumptions made in the report preparation.

C. WATER DESIGN CALCULATIONS

PWC will furnish the Design Engineer with information regarding the available flow and pressures near the proposed extension when PWC requires a hydraulic analysis. If requested by PWC, the Engineer shall provide calculations demonstrating that the new extension, to include each future phase of a project, will provide a minimum residual pressure of 20 psi at the minimum required fire flow plus and/or peak, whichever is greater demand (Note: Fire flow = hose stream requirement + sprinkler demand + ½ domestic demand). The calculations shall be based upon an energy balance accounting for friction and minor losses utilizing software such as Haestad Methods WaterCADD (Cybernet) or other PWC approved modeling software. The “C” factor shall be 120 for new systems and shall be chosen by the Design Engineer and approved by PWC for older system piping.

D. SEWER DESIGN CALCULATIONS

Sanitary sewer, force main and pump station extension calculations shall demonstrate adequate capacity to serve the entire contributing area. The calculations for the gravity mains shall be based on Mannings Formula, using a roughness ("n" factor) of 0.013. (See Chapter 2 for more information)

E. SUBMITTALS FOR APPROVAL

PWC shall require submission of the following number of sets of Contract Documents for the approval by PWC and/or the appropriate state agencies.

Table 1. REQUIRED SETS OF PLANS AND SPECIFICATIONS FOR PWC AND/OR STATE AGENCY APPROVALS

Type of Project	No. of Copies of Drawings	No. of Copies of Specifications	Permit Originals	Permit Copies	Application Fee	Submit Appl. to	Approving Authority
PWC Sewer Ext. Fast Track Form	1- Original 3 - Bond	1	1	0	$500	PWC	PWC
PWC Water Ext. FTA 09/03	1 - Original 3 - Bond	1	1	0	$500	PWC	PWC
NCDOT* Encroachment	1	0	0	0	N/A	PWC	DOT
Erosion Control	1 - Bond/ Blueprint	1	1 Financial Responsibility	1	$50 per acre or partial disturbed acre	NCDENR	NCDENR
Wetlands 404 Wilmington District	1 - Bond/ Blueprint	1	1	1	1	USCE Wilmington	USCE
Wetlands 401	7 - Bond/ Blueprint 11" x 17" Max	1	0	1	$0 for non-written confirmation $200 under 5 acres $400 over 5 acres	NCDWQ	NCDWQ
Easement Maps	1 - Vellum 8½" x 14" Only	1 Disk Legal Description in WORD format	0	0	0	PWC	PWC
R/R Encroachments	1 - Vellum 8½" x 14" Only	N/A	1	0	Varies by Railroad	PWC	Railroad

NOTE: NCDOT requires approved Erosion Control Certification prior to submittal of encroachment when applicable.

V. CONCEPTUAL PHASE

A. GENERAL

The Engineer and Developer shall become familiar with the water and sewer extension policies of the PWC prior to making conceptual plans for developments, which will require water and/or sewer service.

The Engineer or Developer should obtain the approval of the appropriate Planning and Zoning Commission or Board for any proposed projects under their respective jurisdiction prior to submission for water and sewer permits.

B. INITIAL CONFERENCE

Prior to finalizing any plans for water or sewer collection system extensions, the Developer or his Engineer shall consult PWC to determine if an initial conference will be necessary prior to the submission of plans for approval. If the scope of the proposed development is such that an initial conference will be beneficial prior to the development of final plans and specifications ("final - not released for construction"), the Developer or his Engineer will request scheduling of an initial conference. The Developer or his Engineer shall present the following:

a. Conceptual Plans: Submit two (2) copies of conceptual subdivision plans or site plans at a scale of 1 inch equals 200 feet (or larger scale) showing the proposed layout of the water, and sewer extensions. The conceptual plans should show all proposed pipelines and sizes, manholes, valves, fire hydrants and pump stations and the nearest existing water and sewer facilities to which the proposed new extensions will connect. All proposed easements shall be shown. Where extension of utility is anticipated, provide sketch of extension and projected inverts with service area for sanitary sewer.

b. Design: Preliminary engineering design calculations used to determine estimated water and wastewater demands use to size line and pump station and fire protection requirements including expected initial and future populations to be served. The nature of the water usage (domestic, commercial, etc.), and the probable character of the wastewater generated should be provided.

c. Estimated Time Schedules: Submit an estimated time schedule identifying the expected dates of completion of the final plans and specifications and expected beginning and completion dates of construction.

d. Projected Cost Estimate (PWC Projects): Submit a cost estimate prepared by an engineer for the proposed water and sewer extensions. The cost estimate shall be as detailed as possible with estimated quantities of specific items work and their projected unit costs.

VI. SAFETY

It is expected that Contractors will comply at all times with all OSHA Regulations. In addition, PWC has developed a Safety Manual that is available to all interested contractors and engineers. Please contact the PWC Safety Office at (910) 223-4117 to request a Safety Manual and for other information regarding safety regulations.

PWC assumes absolutely no responsibility for the safety of the construction personnel or any other persons at the jobsite other than PWC employees. Safety is the sole responsibility of the site employers and their workers.