Appendix C **August 2009**

Engineering Report
For Extension of Water and Sewer Mains in the
City of Harrisonburg

Name of Proposed Project:

_____
_____

Owner's Name:

_____

Owner's Address

_____

Telephone (_____) _____

Engineer's Information:

Name _____
Address_____
Telephone (_____) _____
Contact Engineer _____

Date of Submittal _____

Reserved for Engineer's Seal
& Signature

Review Comments: Accepted_____
Not Accepted_____

Corrections:

_____
_____
_____
_____

Revisions:

_____
_____
_____

Review By: _____

Date: _____

ITEM 1 VARIANCES

Provide a narrative of any variance request of either design or construction procedures. (Approval, if granted, of this variance must be properly denoted on the cover sheet of the drawings) (Re: 4.3.1)

ITEM 2 GRADING & STRUCTURAL

Identify where this project impacts existing utilities in terms of cover depth, relocation requirements or denied/alternate access.

Provide ten-foot wide travel-way centered over proposed water and sewer utilities.

Provide calculations and design information on all casings.

Specify load concerns or design calculations for all pipe with less than three (3) feet of cover or greater than twenty (20) feet of cover; provide load calculations and available bearing strength (RE: 4.3.2)

ITEM 3 AVERAGE DAILY WATER AND SEWER DEMAND

A. Provide itemization of Average Daily Demand within all phases of the proposed development limits referring to the criteria set forth in Chapter 4.
(Re: 4.3.3.3)

B. Provide itemization of Average Daily Demand within the area served exterior to the proposed development referring to the criteria set forth in Chapter 4. (Re: 4.3.3.3)

C. Provide total of Water and Sewer Average Daily Demand to be used for design by considering both the demand from within and exterior to the proposed development. (A + B) (Re: 4.3.3.3)

ITEM 4 CALCULATION OF DESIGN FLOW RATES

A. Provide the applicable peaking factor and maximum hourly (peak hourly) domestic flowrate for water demand. (Re: 4.3.4.1)

B. Provide calculations for maximum daily demand and needed fire flow (Re: 4.3.4.1 and 4.3.4.3)

C. **Water Design Flow Rate;** larger of A or B.

D. **Sewer Design Flow Rate;** Provide the applicable peaking factor and peak design flowrate for sewer demand. (Re: 4.3.4.2)

ITEM 5 WATER SYSTEM HYDRAULIC DESIGN *AND WATER SERVICE CALCULATIONS* (RE: 4.3.5 *AND 4.3.5.5*)

WATER SYSTEM DESIGN COMPUATION

Location	Pipe Size (in)	Hazen-Williams Value	Location Elevation (feet)	Design Flowrate (gpm)	Static Pressure (psi)	Residual Pressure (psi)	Remarks

Basic Information -
To be provided by the Public Utilities Department

*Location of connection point
(Provide hydrant or City model node) ____________

*Static pressure at connection point ____________
(Provided by City)

*Residual pressure at connection point at design flowrate ______ psi at __________ gpm.
(Provided by City)

*System limitations at connection point (by City)
________ gpm at ________ psi

*Date of information (by City) ____________

Supplemental Information for Pipe Between Locations

Location	to	Location	Pipe Length	Fitting Equiv. Length	Total Length

Hydraulic Model Calculations may be substituted for this form. Calculations submitted must include all model input data.

ITEM 5A WATER SYSTEM HYDRAULIC DESIGN AND WATER SERVICE CALCULATIONS (RE: 4.3.5 AND 4.3.5.5)

WATER SERVICE CALCULATIONS

Lot	*Service Size (in) (Main to Meter)*	*Meter Size (in)*	*Service Size (in) (Meter to Bldg)*	*Elevation at Main (feet)*	*Elevation at Meter (feet)*	*Elevation at Fixture (feet)*	*Static Pressure at Main (psi)*	*Static Pressure at Meter (psi)*	*Static Pressure at Fixture (psi)*	*Design Flowrate (gpm)*	*Residual Pressure at Meter (psi)*	*Residual Pressure at Fixture (psi)*
Where specific building information is not known, Designer shall provided estimates service line length and fixture elevation estimates based on applicable zoning ordinances.												

ITEM 6 SANITARY SEWER HYDRAULIC DESIGN (RE: 4.3.6)

Project: ____________________

Designed By: ____________________

SANITARY SEWER DESIGN COMPUTATIONS

Location	Manhole Number		Flow Determination By Area (acres)		By Building		Flow Million Gallons Per Day				Pipe Run Manning's "n" Value = 0.014			Capacity of Pipe (Full)			Proportional Flow	Proportional Depth of Flow	Proportional Velocity	Elevation					Remarks
	From	To	Inc. Area	Flow per acre	No. of Units	Flow per Unit	Incr.	Total Avg.	Peak Flow Factor	Peak Flow	Length (ft)	Dia. (in)	Slope (%)	MGD	CFS	Velocity (fps)				Upper (out) Invert	Fall (pipe-run)	Lower (in) Invert	Drop in Struct.	Top of Struct.	

ITEM 7 EASEMENTS

Attach to this Report the preliminary plat, which identifies all proposed easement widths, types and locations. Identify placement of pipe within easement and width requirements based on pipe depth. If design requires changes to the preliminary plat, provide red-lined revisions, which will be made prior to recordation. (Re: 4.3.7)

ITEM 8 CONSTRUCTION COST ESTIMATE

Attach to this Report, or provide below, a construction cost estimate with itemization of unit prices, quantities and total estimated cost for Water and Sewer Utilities, (separate each type), to be installed by the Developer. If oversized mains have been required, provide the same itemization for the difference to be paid by the City. (Re: 4.3.8)

CITY OF HARRISONBURG
2155 BEERY ROAD
HARRISONBURG, VA 22801

DATE: _____

MEMORANDUM TO: Regional Director
Division of Water

FROM: City of Harrisonburg

SUBJECT: Waterline Project Report

REFERENCE: Memorandum of Understanding, Local Review Program

PROJECT NAME: _____

PROJECT LOCATION: _____
_____

PLANS PREPARED BY: _____

PROJECT CONSTRUCTION DATE: _____

Pipe: Size:_____ Length:_____ Material:_____

Water Source: _____

Average Production for Last Three Months: _____

Maximum Daily Demand: _____

Water Storage: Existing Capacity _____ MG
Tank to Serve this Area_____

Tank Overflow Elevation_____ FT
Tank Bottom Elevation_____ FT

Existing Service Area Evaluation After New Project Added:

Minimum Pressure _____ psi
Maximum Pressure _____ psi
Minimum Fire Flow Provided _____ psi

Hydraulic Capacity and Design: Pressures- Minimum _____ psi
Maximum_____
Using tank at_____

	Number of Connections		Fire Flow Provided Average Daily Usage
Domestic	_____	Usage	_____
Commercial	_____	Usage	_____
Industrial	_____	Usage	_____
Other	_____	Usage	_____
(Identify)	_____	Usage	_____
TOTAL	_____	Usage	_____

Supplemental Site Plan Checklist
For Water and Sewer Main Extensions
"Plan View" Requirements

Chapter 4 Reference	Design Requirement	OK ( )	Deficiencies Sht #	Deficiencies Notes
	Horizontal Location of Water or Sewer Main			
4.4.1.1	Within right-of-way where possible			
4.4.1.2	Proper placement in right-of-way			
4.4.1.2	Right-of-way provisions for other utilities			
4.4.2.1	Private property easement identified			
4.4.2.2	Private property pipe location within easement			
4.4.3.2	Proper separation of parallel water and sewer mains			
4.4.3.3	Water and sewer crossings identified with proper alignment			
4.4.3.5	Proper horizontal separation of other parallel utilities			
4.4.3.5	All utility crossings identified with proper alignment			
4.4.4	**Fire Hydrant Design**			
4.4.4.1	Public ownership			
4.4.4.2	One hydrant per 800 feet of pipe			
4.4.4.3	Pursuant to the Fire Chief's request			
4.4.4.4	Dead end mains			
4.4.4.5	Low point on main where feasible			
4.4.4.6	Street intersections			
4.4.4.7	Unobstructed placement			
4.4.4.8	50-100 feet from siamese connections			
4.4.4.9	Protected with a barrier			
4.4.5	**Valve Design**			
4.4.5.1.1	5 feet from main on hydrant pipe feed			
4.4.5.1.2	5 feet from hydrant if feed greater than 50 feet or services proposed			
4.4.5.2	Four valves at crosses on mains			
4.4.5.2	Three valves at tees on mains			

Chapter 4 Reference	Design Requirement	OK	Deficiencies	
		( )	Sht #	Notes
4.4.5.2	One valve on main at hydrant feed			
4.4.5.2	One valve per 800 feet of main			
4.4.5.2	Pursuant to Director's discretion			
4.4.6.1	1" air valve at high points on mains 16" and less (+6')			
4.4.6.1	2" air valve at high points on mains larger than 16" (+6')			
4.4.6.1	Air valve on terminal high points of mains			
4.4.6.2	Blow-offs shall be provided at low points on lines larger than eight inches			
	Appurtenances Design			
4.4.7.1	Concrete reaction blocks and/or restrained joints			
4.4.7.2	Pipe joint deflection tolerances			
4.4.8.1	Sanitary sewer bearing and distance table			
4.4.8.2.1	Manholes at differing pipe sizes			
4.4.8.2.2	Manholes at changes of pipe alignment			
4.4.8.2.3	Manholes at changes of pipe grade			
4.4.8.2.4	Manholes at point of industrial discharge			
4.4.8.2.5	Manholes at point of private laterals 6" and larger			
4.4.8.2.6	Manholes at terminal end of sanitary sewer			
4.4.8.2.7	Manholes at maximum 400 feet spacing			
4.4.8.3	Manhole proper size and pipe angles and separation			
4.4.8.4	Manhole lid elevation or inserts - 100 year flood designation			
	Service Connection Design			
4.4.9.1.1	Minimum water service information			
4.4.9.1.2	Separate meter for each building structure, townhouse and condominium			
4.4.9.1.3	Proper size and arrangement for water services			

Chapter 4 Reference	Design Requirement	OK	Deficiencies	
		( )	Sht #	Notes
4.4.9.1.4	Proper meter box settings			
4.4.9.2.1	Minimum sanitary sewer service information			
4.4.9.2.2	Separate pipe layout for sewer service to each structure			
4.4.9.2.3	Designated size and slope for sewer service			
4.4.9.2.4	Sewer service cleanouts designated			
4.4.9.2.5	Grease and sediment traps			
	Mains and appurtenances located to meet requirements of the Engineering Report			
	Hydrostatic Testing Schedule			
4.4.10.1	Leakage testing pursuant to Chapter 7			
4.4.10.2	Bacteriological testing pursuant to Chapter 7			
4.4.10.3	Representation on drawings			
	Special Conditions			
4.4.11.1	Underwater crossings identified			
4.4.11.1.2	Underwater crossings provided with isolation valves			
4.4.11.1.2	100-year flood elevation shown at underwater crossings			
4.4.11.1.3	Test meter assemblies provided at underwater crossings			
4.4.11.1.4	Minimum of three feet of cover beneath the stream channel bottom			
4.4.11.2	Highway crossings identified			
4.4.11.2.1	Highway crossings approved by governing authority			
4.4.11.2.2	Highway crossings provided with acceptable specifications			
4.4.11.3	Railroad crossings identified			
4.4.11.3.1	Railroad crossings approved by governing authority			
4.4.11.3.2	Railroad crossings provided with acceptable specifications			

Chapter 4 Reference	Design Requirement	OK	Deficiencies	
		( )	Sht #	Notes
	Construction Drawings - Plan View			
4.4.12.1	Minimum plan view information for water mains			
4.4.12.2	Minimum plan view information for sewer mains			
	Water Main Design			
4.5.1	Water main cover 3'-8'			
4.5.2.1	Utility conflicts shown - meets cover criteria			
4.5.2.2	Exception to water main cover			
4.5.2.3	Utility conflicts shown with standard clearance; casing at pipes >30"			
4.5.3	Water -sewer appropriate separations met			
4.5.3.1	Water and sewer vertical separation criteria met for normal conditions			
4.5.3.2	Water and sewer vertical separation criteria met for unusual conditions			
4.5.4	Water and sewer crossings shown in profile and criteria is met			
	Construction Drawing Profile View			
4.5.5.1.1	Water main design information			
4.5.5.1.2	Sewer main design information			
	Pumping Stations			
4.6	Water and sewage pumping station designs			