# CITY OF CASHMERE

## SANITARY SEWER DEVELOPMENT STANDARDS

## SECTION 1 - SANITARY SEWER EXTENSIONS

### A. INTRODUCTION

These standards shall apply to all improvements within the public right-of-way and/or public easements, to all improvements required within the proposed public right-of-way of new subdivisions, for all improvements intended for ownership, operations or maintenance by the City and for all other improvements for which the City Code requires approval from the City Public Works Director and/or City Planning Commission and/or the City Council. These standards are intended as guidelines for designers and developers in preparing their plans, studies and/or reports and for the City in reviewing same. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used where practical. The developer/proponent is however cautioned that higher standards and/or additional studies and/or environmental mitigation measures may, and will, in all likelihood, be imposed by the City when developing on, in, near, adjacent, or tributary to sensitive areas to include, but not be limited to, steep embankments, creeks, wetlands, certain wildlife habitat, unstable soils, high water tables, wet areas, etc.

Alternate design standards may be accepted when it can be shown, to the satisfaction of the City, that such alternate standards will provide a design equal to or superior to that specified. In evaluating the alternate design, the City shall consider appearance, durability, ease of maintenance, public safety and other appropriate factors, including the latest edition of the Standard Specification for Road, Bridge & Municipal Construction, State of Washington, and current amendments thereto.

Where improvements are not covered by these details nor by the Standard Specifications nor by the standard details, the City will be the sole judge in establishing appropriate standards. Where these "standards" conflict with any existing City ordinances or discrepancies exist within the body of this text, the higher "standards" shall be utilized as determined by the Public Works Director, or his representative.

Plans for major improvements in the public right-of-way or within public easements, or improvements to be "deeded" to the City, shall bear an approval signature from the City.

The designer shall submit calculations or other appropriate materials supporting the design of utilities, pavements and storm drainage facilities. The designer shall submit calculations for structures and other designs when requested by the City.

Definitions: As used herein:

(a) "Developer": The party having an agreement with the City to cause the installation of certain improvements, to become a part of the City's utility and/or roadway system upon

completion and acceptance. The term shall also include the Developer's contractor employed to do the work or the Contractor's employees.

(b) "Plans" mean drawings, including reproductions thereof, of the work to be done, prepared by an Engineer licensed in the State of Washington.

(c) "Specifications" means the directions, provisions, and requirements designated by an Engineer licensed in the State of Washington for the performance of the work and for the quantity and quality of materials, as contained or referenced herein.

(d) "Performance Bond" means a bond furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the work will be completed in accordance with the plans and specifications.

(e) "Maintenance Bond" means a bond furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the Developer will repair any defects found in the work within the time period as further identified herein.

(g) "Work": The labor or materials or both, superintendent, equipment, transportation, and other facilities necessary to complete the Contract.

(h) "City": City of Cashmere, Washington, Chelan County, a municipal corporation, existing under and by virtue of the laws of the State of Washington. Actions designated as taken by the City are the acts of the Council acting through the Mayor.

(i) "Mayor" means mayor of the City of Cashmere or his/her authorized representative.

(j) "Contractor" means the Developer's contractor or subcontractor.

(k) "Engineer" means the City's Engineer, whether a staff engineer or consultant.

(l) "City Public Works Director" means the City's duly appointed City Public Works Director.

(m) "Operations and Maintenance Supervisor" means the City's Utility/Public Works superintendent, and/or operations and maintenance supervisor, and/or the public works director.

Developer to be Informed: It is the Developer's responsibility to be fully informed regarding the nature, quality, and the extent of the work to be done, and, if in doubt, to secure specific instructions from the City.

Payment for City Services: The Developer shall be responsible for promptly reimbursing the City for all costs and expenses incurred by the City in the pursuit of project submittal, review, approval, and construction. These costs include, but are not limited to, the utilization of staff and consultants as may be necessitated to adequately review and inspect construction of the project(s). All legal, administrative, and engineering fees for project review, meetings, approvals, site visits, construction inspection, etc., shall be subject to prompt reimbursement. The Developer is

cautioned that project approval (City acceptance) and occupancy permits will be denied until all bills are paid in full.

# SANITARY SEWER DESIGN STANDARDS

## A. GENERAL

The standards established by this section are intended to represent the minimum standards for the design and construction of sanitary sewer facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. The following design and construction considerations shall apply:

It is the intent of the City of Cashmere to have all buildings connected to a gravity sewer collection system. Line extensions may be required to provide service to developments instead of septic systems. Longer routes may be required to avoid lift station and pressurized main lines. The City will support right-of-way acquisitions and cost recovery agreements to facilitate the intent.

## B. DESIGN STANDARDS

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems shall conform to the Department of Ecology "Criteria for Sewage Works Design" current edition and the following minimum City Standards set forth herein.

### 1. General

a) If future extensions of the system are deemed probable by the City, the proposed systems shall be designed and sized to service tributary areas and also be extended to "far" property line(s) so as to provide access to future development. Easements shall be provided to facilitate same. Sewer lines shall be extended to the boundaries of the property being served providing access for future service of adjacent properties.

b) Whenever sewer lines are located outside of public streets, the right-of-way or easement shall be of sufficient width to allow for future replacement of the facility without damage to permanent adjacent improvement. In general, if the sewer line is located in the center of the right-of-way or easement, its minimum width shall be 15 feet. Special circumstances may require additional widths such as for deep sewer lines.

c) Detailed plans shall be submitted for the City's review which provide the location, size, type and direction of flow of the proposed sewers and the connection with existing sewers. All elevation information shall be to the City datum.

d) Construction of new sewer systems or extension of existing systems will be allowed only if the existing and downstream receiving systems are capable of supporting the added hydraulic load. Sewer facilities shall be designed and installed to service tributary areas.

e) Collection and interceptor sewers shall be designed and construction for the ultimate development of the tributary areas and as may be further established in the City's Sewer Comprehensive Plan. The location and size of oversized sewer lines shall be designated by the City Public Works director.

f) Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow. Sewers installed below water table shall require special design and inspections.

g) Computations and other data used for design of the sewer system shall be submitted to the City for approval.

h) The sewage facilities shall be constructed in conformance with standards herein and current amendments thereto, and other applicable standards as allowed by the City.

i) Material and installation specification shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, WSDOT, WEF, and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints; impede cleaning operations and future tapping, nor create excessive side fill pressure or deformation of the pipe, nor seriously impair flow capacity.

j) All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, extra-strength pipe shall be used.

k) All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from City approval established line and grade shall not be greater than one-half inch (1/2"), provided that such variation does not result in a level or reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed one-sixty-fourth inch (1/64") per inch of pipe diameter, or one-half inch (1/2") maximum. Any corrections required in line and grade shall be reviewed with the City and/or the City Engineer and shall be made at the expense of the Developer and/or Contractor.

l) Deflection tests shall be performed on all PVC sewer mains and the deflection test limit shall be 5.0 percent of the base inside diameter of the pipe.

m) Prior to final inspection, all pipelines shall be tested, flushed and cleaned and all debris removed and disposed of at a location approved by the City. A pipeline "cleaning ball" of the proper diameter for each sized of pipe shall be flushed through all pipelines prior to final inspection. Hydrant meters shall be acquired from the City and utilized by the Contractor for all water withdrawn from the City's system for flushing purposes.

n) Before sewer lines are accepted, the Contractor/Developer shall perform a complete televised inspection of the sewer pipe and appurtenances and shall provide to the City an audio-visual tape recording of these inspections. All equipment and materials shall be

compatible with existing City equipment. It shall be the Contractor/Developer's responsibility to confirm equipment compatibility with the City prior to inspection.

o) At all times during the televised inspection process, the City's Inspector shall be present. The City's Operations and Maintenance Supervisor shall be notified forty-eight (48) hours prior to any televised inspection.

p) After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.

q) The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and the Developer shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the contractors, subcontractors and suppliers of material or equipment where such warranties are required, and shall deliver copies to the City upon completion of the work.

## 2. Design Elements

a) Sewer pipelines shall be laid only in dedicated streets, alleys, or easements which have been or will be prior to acceptance exclusively granted to the City.

b) The sewer pipelines shall be located in roadways when at all possible 6 feet southerly or westerly of street centerline. The sewer main shall maintain a minimum of 10 foot horizontal separation from proposed or existing water mains.

c) The maximum distance between manholes shall be 400 feet unless specifically approved otherwise by the City Engineer.

d) PVC pipe shall be a minimum Class S.D.R 35 and be manufactured in accordance with ASTM D3034. Ductile iron pipe shall be Class 50 and conform to AWWA C151 and C104. Class 52 Ductile Iron is required for force mains.

e) The allowable cover (finished grade) for the various types of pipe are:

- PVC Pipe: 4' to 25'
- D.I. Pipe (Class 50): 4' to 25'

The City reserves the right to require a minimum of four feet of cover unless topography, existing facilities or other future improvements prohibit this minimum cover for installation.

f) Sewer lines shall be designed such that the invert elevation of the side sewer stub at the property line is 4 feet below the lowest expected floor elevation of the structure to be served. The invert elevation of the side sewer stub shall be calculated based on the invert elevation of the lateral sewer at the side sewer connection plus the rise of the side sewer to the property line based on its length and a minimum slope of 0.02 feet/foot plus 1.0 feet. Where the service elevation is critical, the design elevation of the side sewer stub shall be shown on the construction plan.

g) Minimum slope on all sewer pipe shall comply with Department of Ecology standards except for the following:

- 6" side sewer laterals shall be 2.0%
- 8" gravity mains shall be 0.5%
- 10" gravity mains shall be 0.4%
- 12" gravity mains shall be 0.3%

Minimum slope shall be maintained unless specifically waived by the City Engineer. All mains shall be designed to have a minimum scouring velocity of two feet per second.

h) All side sewers shall be extended a minimum of 5 feet past the street right-of-way line (or property line).

i) Minimum size for all sewer pipe shall be 8-inches except where line is less than 150 feet and will not be extended.

j) All sewer pipe invert elevations at manholes shall be computed to the center of the manhole.

k) Where the combined slope of the sewer line entering or exiting a manhole is less than 0.05 feet per foot, a drop of 0.1 foot shall be provided between the invert of the entering and exiting sewer pipes.

l) All sewer manholes shall be located at street centerline or 6-foot left or right of street centerline.

m) Wherever possible sewer lines shall be terminated in a manhole. Should design considerations indicate a future manhole be located beyond the current sewer termination, a temporary lamp hole may be used to terminate the sewer provided the distance to the downstream manhole is 200 feet of less.

n) Side sewers shall be constructed at a $90^{o}$ to the lateral sewer.

o) Extended side sewers on easements shall be avoided wherever possible.

p) Connection of side sewers to manholes shall be avoided if possible. If side sewers must be connected to a terminating manhole such as in a cul-de-sac, no more than two (2) side sewer connections will be allowed.

# C. CONSTRUCTION DRAWING FORMAT

The City desires to maintain a consistent format to its construction drawings and, therefore, requires that all construction drawings conform the following format unless exceptions are approved in advance by the City Public Works Director and/or City's Engineer.

The following format and requirements are minimum for normal type system extensions. Unusual or special facilities or construction requirements may dictate additional drawings and drawing requirements.

1. **Sheet size:** 24" x 36"

**2. Plan**

A separate construction plan is required at an appropriate scale or a maximum of 1" = 50', shown all existing or proposed utilities, existing or proposed street surfacing and improvements, street centerline and stationing, street right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

a) Locations of streets, right-of-ways, existing utilities, driveways, and sewers.

b) All associated right-of-way, adjacent property lines, easements and/or proposed property lines. All utility easements, including County recording numbers.

c) Site topography at a minimum of five (5') foot intervals, to include a minimum of twenty (20') foot within adjacent areas.

d) Vicinity and site location map.

e) All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.

f) Station and offset to each manhole. Number each manhole consecutively in the new sewer system preceded by the initials of the development. Begin at the connection to existing system and proceed upstream. Branch lines shall use the subnumber of the manhole from which they branch. A line branching from manhole SR4 would have the first manhole on the line numbered SR4-1. All manholes shall be numbered on the plans and correspondingly numbered on the profile.

g) Show the size, material, and length of each sewer line between manholes.

h) Show the location of all side sewer stubs and the invert elevation at the end of the stub if critical to the service of the parcel. Where there is any question of the sewer being

sufficiently deep to serve any residence, the Developer shall indicate building and basement floor elevation in the profile.

i) Show details as necessary to direct the contractor in making connections to the existing system and to protect existing facilities during construction of the new sewers. Details to be to scale drawings which clearly show special sewer joints, connections, and cross-sections, and sewer appurtenances such as manholes and related items and all other items as required by the City to clearly identify construction items, materials, and/or methods.

**3. Profile**

A separate drawing showing the vertical profile of the proposed sewer is required. The scale of these drawings shall be at an appropriate scale or a maximum of 1" = 50' horizontal and 1" = 5' vertical with horizontal grid of 50' and vertical grid of 5'.

Show the following:

a) For each manhole, show the ground elevation, invert elevation of all sewers entering or leaving the manhole, the depth of the manhole, and the manhole number and location (street station and offset). Ground surface, pipe type, class and size, manhole stationing, invert and surface elevation at each manhole, and grade of sewer between adjacent manholes.

b) Show the sewer line in profile and the existing and proposed ground lines. Identify the size, slope and horizontal length of the sewer line on the profile.

c) Above the ground line indicate the profile location by street name or other right-of-way designation.

d) Show all crossing utility and designate special materials or construction procedures that may be required.

e) Provide a legend to clearly illustrate the composition of the profile.

## D. GENERAL CONSTRUCTION REQUIREMENTS

1. Prior to construction, the sewer plans shall be reviewed and approved by the City's Public Works Department

2. Prior to construction, the Contractor shall notify the City for a pre-construction meeting.

3. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public sewer systems of the type being proposed for construction. No contractor shall perform work prior to obtaining a City business license.

4. Prior to any work being performed, the Contractor shall contact the City Operations and Maintenance Supervisor or City Engineer to set forth his proposed schedule.

5. Contractor shall obtain approval of materials to be used from the City prior to ordering or delivery of materials.

6. Each side sewer lateral shall have an approved water-tight cap at the termination of the stub, it shall be adequately "blocked" to satisfactorily resist the air pressure testing.

7. All side sewer laterals shall be of the same material as the main line and shall be provided with a 6"x 6" tee with an approved water-tight cap located within the public right-of-way to be utilized as a clean out. A water-tight six-inch capped stub shall be installed which extends vertically from the 6"x 6" tee to within 18 inches of finished grade

8. Front lot corners shall be staked prior to construction for side sewer tee locations.

9. Each side sewer lateral shall have a treated 2"x 4" wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to 24" above finished grade. Above the ground surface, it shall be painted "white" with "S/S" and the depth, in feet, stenciled in black letters 2" high.

10. Side sewer connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.

11. Manholes, where sewer extension may occur, shall be provided with knock-outs and channeled accordingly.

12. Locking lids shall be provided for all manholes located outside pavement areas and all manhole lids shall have the work "sewer" cast integrally onto its surface.

13. Concrete collars shall be placed around all manhole frames.

14. Pipe connection to manholes shall be as follows:

    - PVC Pipe: Cast or grout a watertight manhole coupling into manhole wall.

    - D.I. Pipe: Bell and spigot joint or flexible coupling, either shall be 12 inch maximum distance from manhole wall.

    - PVC and D.I pipe, Optional: Core the manhole and connect sewer pipe with a water-tight flexible rubber boot in manhole wall, Kor-N-Seal boot or equal. Special approval by the Operations and Maintenance Supervisor required.

15. Provide the City's Engineer and Operations and Maintenance Supervisor a copy of the cut sheets prior to construction.

16. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City's Inspector.

17. Final air testing shall not be accepted until after the asphalt treated base or finished paving is accomplished, all other underground utilities have been installed, and the lines have been satisfactorily flushed, cleaned, deflection tested, and television inspected.

18. Manhole rim and invert elevations shall be field verified after construction by the Developer's engineer(s) and the "as constructed" drawings individually stamped by a Washington State licensed professional engineer which shall attest to the fact that the information is correct. As-builts shall be to City datum, and must be submitted in a format as outlined in the water standard, set forth herein, and approved by the City prior to project

# SANITARY SEWER TECHNICAL SPECIFICATIONS

## A. INTRODUCTION

These Technical Provisions cover the furnishing of materials, labor and equipment for the installation and construction of Developer Extensions for the City of Cashmere, and shall also cover materials, workmanship, and testing.

The following Technical Provisions shall be used in conjunction with the applicable sections of the latest edition of the "***Standard Specifications for Road, Bridge and Municipal Construction***", as prepared by the Washington State Department of Transportation and the Washington State Chapter of the American Public Works Association (hereinafter referred to as the "Standard Specifications") except as may be amended, modified, or revised herein. Division 1 of the "Standard Specifications" relating to the General Conditions are hereby deleted

The Standard Specifications, except as they may be modified or superseded by these specifications, shall govern all phases of work under this contract, and they are by reference made an integral part of these specifications and contract as if herein fully set forth.

The City of Cashmere Standard Details following these specifications are an integral part of these specifications and shall be complied with.

## B. REFERENCE SPECIFICATIONS

Certain referenced sections to the following publications are used in this specification and in the Standard Specifications and are from the latest edition of:

| | |
|---|---|
| AWWA | American Water Works Association |
| ANSI | American National Standards Institute |
| ASA | American Standards Association |
| ASTM | American Society for Testing and Materials |

## C. HEADINGS

Heading to parts, sections, forms, articles and sub-articles are inserted for convenience or reference only and shall not affect the interpretation of the contract documents.

## D. TECHNICAL PROVISION STRUCTURE

The specifications noted herein are in addition to, or as a replacement for, the Standard Specifications. Where sections are marked "Replacement Section" or "Partial Replacement

Section," the specifications herein are to replace, or partially replace, the Standard Specifications noted. Where sections are marked "Additional Section," the specifications herein will be an addition to the Standard Specifications noted. Where sections are marked "Supplemental Section," the specifications herein are to be a supplement to the Standard Specifications.

Where the word "Developer" is used, the term shall also include the Developer's agents, employees, and subcontractors.

# *Division 5*

# *SURFACE TREATMENT AND PAVEMENTS*

## 5-04 ASPHALT CONCRETE PAVEMENT

### 5-04.3(5)A Preparation of Existing Surfaces (Supplemental Section)

All edges of existing asphalt concrete pavement shall be saw cut or jackhammered full depth. The cut shall be a minimum of 12 inches beyond the edge of the trench.

### 5-04.3(22) Pavement Patching (Additional Section)

When constructing within existing paved areas the Developer shall patch the existing paved areas in accordance with the Construction Plans. Asphalt concrete paving, Class B as defined in Section 9-03.8 shall be placed in a maximum of 2-inch compacted lifts.

The asphalt concrete patch shall be rolled to a smooth riding surface, flush with the surface of the existing asphalt. Immediately thereafter, all joints between the new and original asphalt shall be painted with hot asphalt emulsion and be covered with dry paving sand before the asphalt solidifies.

At the end of each working day a temporary patch shall be placed over unfinished portions of work that affect traffic in any way. Material for these temporary patches shall be cold asphalt mix.

### 5-04.3(23) Pavement Overlay (Additional Section)

When constructing within existing paved areas, the Developer shall provide a full width 1-inch overlay of the traveled road and paved shoulders in accordance with the construction plans. Material shall be asphalt concrete, Class B as defined in Section 9-03.8, and shall be rolled to a smooth riding surface.

All utility and survey monument access covers shall be adjusted to the new grade. Storm catch basin grates shall be adjusted 0.1 foot below the new grade.

# *Division 7*

## *DRAINAGE STRUCTURES, STORM SEWERS, SANITARY SEWERS, WATER MAINS, AND CONDUITS*

**7-09 through 7-12** All references to water main(s) shall be construed as a reference to sanitary sewer force mains.

## 7-09 PIPE AND FITTINGS FOR SANITARY SEWER FORCE MAINS

### 7-09.2 Materials (Partial Replacement Section)

Replace Paragraph 1 with:

Materials shall meet the requirements of the following sections:

**Pipe**

Ductile iron pipe ..... 9-30.1

Except that Class 52 ductile iron pipe shall be used throughout the project.

- *Polyethylene (PE) Service Pipe*

  PE pipe shall be manufactured from high molecular weight polyethylene (average molecular weight of 1,750,000) defined by ASTM 1248 as Polyethylene Type III (3306) (PE). Pipe shall be made of all virgin material and conform to CS-255-63. PE pipe shall meet all requirements of ASTM D2241-67. The pipe shall be municipal service line size. The pipe shall have a working pressure of 160 psi at 73.4° F for 1,000 hours. The pipe must carry the NFS Seal of Approval.

- *PVC Pipe*

  Where PVC pipe is specified, the pipe shall be solvent weld PVC defined by ASTM D2241 SDR 21. The pipe shall have a working pressure of 160 psi at 73.4°F for 1,000 hours.

**Fittings**

Ductile iron pipe ..... 9-30.2

- *PVC Pipe Fittings*

  Fittings shall be solvent weld PVC defined by ASTM 2446 SDR 21, with a working pressure of 160 psi at 73.4° F for 1,000 hours.

## 7-09.2(1) Materials (Additional Section)

Restrained joint ductile iron pipe shall be Class 52 and meet the requirements of Section 9-30.1. Means of restraint shall be a retaining gland bearing against a metal ring welded to the pipe exterior. The pipe shall be Pacific States Lock Mechanical Joint, Pacific States Restrained Tyton Joint, or equal. Field cutting will not be accepted.

# 7-10 TRENCH EXCAVATION, BEDDING, AND BACKFILL FOR SANITARY SEWER FORCE MAINS

## 7-10.3(6)A Pipe Abandonment (Additional Section)

The pipes to be abandoned in place shall be drained, flushed, plugged, and completely filled with a light-weight concrete mixture which can be pumped into the existing line. This mixture shall be self-consolidating, free-flowing, which will result in a hardened, dense, non-settling fill.

## 7-10.3(10) Backfilling Trenches (Supplemental Section)

In backfilling the trench, the Developer shall take all necessary precautions to protect the pipe from damage, or shifting of the pipe. In general, backfilling shall be performed by pushing the material from the end of the trench into, along, and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling, which may damage the pipe.

## 7-10.3(11) Compaction of Backfill (Partial Replacement and Supplemental Section)

*Replace paragraph 1 with:*

Backfill shall be compacted to at least 90 percent maximum density in trenches in unpaved areas, and to at least 95 percent maximum density in trenches in paved areas as specified in Modified Proctor Test except where a higher standard is required by the agency which has jurisdiction.

*Supplement 7-10.3(11) with:*

After backfilling and placement of the base course, the Developer shall immediately place cold patch over all trenches in paved areas until such time that a permanent overlay or patch can be completed. The Developer shall grade all roads and shall maintain them during the period required by the general provisions of this contract in such a manner as to provide safe travel by the public, free of settlement, mud holes, ruts, and high centers. Streets shall be repainted upon completion of construction in conformance with current striping.

# 7-11 PIPE INSTALLATION FOR SANITARY SEWER FORCE MAIN

## 7-11.3(9)A Connections to Existing Mains (Supplemental Section)

Developer shall give City customers whose service may be disrupted, no less than twenty-four (24) hours notice prior to the interruption.

## 7-11.3(11) Hydrostatic Pressure Test (Replacement Section)

All sewer force mains and appurtenances shall be tested under a hydrostatic pressure equal to 150 psi in excess of that under which they will operate. In no case shall the test pressure be less than 200 psi. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the Developer. The pipeline trench shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and sufficiently cured to reach design strength before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking and remove it after testing.

The mains shall be filled with water and allowed to stand under pressure for a minimum of 24 hours to allow the escape of air and/or allow the lining of the pipe to absorb water. The City will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation.

Gauges used in the test may be required to be certified for accuracy at a laboratory by the City.

Any visible leakage detected shall be corrected by the Developer to the satisfaction of the City regardless of the allowable leakage specified. Should the test section fail to meet the pressure test successfully as specified, the Developer shall, at his own expense, locate and repair the defects and then retest the pipeline.

After the test has been completed, each gate valve shall be tested by closing each in turn and relieving the pressure beyond. This test of the gate valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Developer shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

Sections to be tested shall normally be limited to 1,500 feet. The City may require that the first section of pipe, not less than 1,000 feet in length, installed by each of the Developer's crews, be tested in order to qualify the crew and/or the material. Pipe laying shall not be continued more than an additional 1,000 feet until the first section shall have been tested successfully.

Prior to calling out the engineer to witness the pressure test, the Developer shall have all equipment set up completely ready for operation and shall have successfully performed the test to assure that the pipe is in a satisfactory condition.

Before applying the specified test pressure, air shall be expelled completely from the pipe and valves.

The test shall be accomplished by pumping the main up to the required pressure; stopping the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the engineer, and then pumping the main up to the test pressure again. During the test, the section being tested shall be observed to detect any visible leakage. A clean container shall be used for holding water for pumping pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l.

The quantity of water required to restore the initial hydrostatic pressure shall be accurately determined by either 1) pumping from an open container of suitable size such that accurate volume measurement can be made by the District's inspector or 2) by pumping through a positive displacement water meter with a sweep unit hand registering one gallon per evolution. The meter shall be approved by the District.

Acceptability of the test will be determined by two factors, as follows:

1) The quantity of water lost from the main shall not exceed the number of gallons per hour as listed in the following table.

2) The loss in pressure shall not exceed 1 psi per minute during the test period.

**Allowable Leakage Per 1,000 Ft. of Pipeline* - GPH**

| psi | Nominal Pipe Diameter* — Inches | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6 | 8 | 10 | 12 | 16 | 20 | 24 |
| 450 | 0.95 | 1.27 | 1.59 | 1.19 | 2.55 | 3.18 | 3.82 |
| 400 | 0.90 | 1.20 | 1.50 | 1.80 | 2.40 | 3.00 | 3.60 |
| 350 | 0.84 | 1.12 | 1.40 | 1.69 | 2.25 | 2.81 | 3.37 |
| 275 | 0.75 | 1.00 | 1.24 | 1.49 | 1.99 | 2.49 | 2.99 |
| 250 | 0.71 | 0.95 | 1.19 | 1.42 | 1.90 | 2.37 | 2.85 |
| 225 | 0.68 | 0.90 | 1.13 | 1.35 | 1.80 | 2.25 | 2.70 |
| 200 | 0.64 | 0.85 | 1.06 | 1.28 | 1.70 | 2.12 | 2.55 |

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size, or for those diameters of pressures not listed, by the formula stated in Section 7-11.3(11) of the Standard Specifications.

### 7-11.3(12) Disinfection of Water Mains (Supplemental Section)

Disinfection shall not apply to sanitary sewer force mains.

### 7-11.3(13) Concrete Thrust Blocking (Replacement Section)

Provide concrete blocking at all fittings, and horizontal or vertical angle points. Conform to the City standard details for general blocking and vertical blocks. All fittings to be blocked shall be wrapped with 4-mil polyethylene plastic. Concrete blocking shall be properly formed with plywood or other acceptable forming materials and shall not be poured around joints. The forms can be stripped prior to backfilling. All shackle rods and nuts shall be stainless steel and coated with two coats of asphalt varnish.

## 7-12 VALVES FOR SANITARY SEWER FORCE MAIN

### 7-12.2 Materials (Supplemental Section)

*Sewer Valves – 4-12"*

Eight-inch eccentric valves shall be non-lubricated, resilient-seated, underground operator (with 2-inch AWWA operating nut), and provided with ends as required. Valves shall have

a minimum nominal port area of 80 percent of the pipe opening. The valve bodies shall be cast iron (ASTM A-126 Grade B) providing full circle seat area. The disc shall be ductile iron (ASTM A-536) with integral upper and lower shafts. Flanged ends shall comply with ANSI B16.1, Class 125. The valves shall provide bi-directional opening and closing torque that is not dependent upon field adjusted stops. Valves shall be Dresser Series, Style 800, or approved equal.

## 7-17 SANITARY SEWERS

### 7-17.2 Materials (Replacement Section)

Gravity sewer pipe shall be PVC sewer pipe or ductile iron pipe as specified herein. Sewers within easements or deeper than 20 feet shall be ductile iron. The Developer shall provide two copies of the pipe manufacturer's technical literature and tables of dimensional tolerances to the engineer. Any pipe found to have dimensional tolerances in excess of those prescribed or having defects which prevent adequate joint seal or any other damage shall be rejected. If requested by the engineer, not less than three nor more than five lengths of pipe for each size, selected from stock by the engineer, shall be tested as specified for maximum dimensional tolerance of the respective pipe.

**PVC Pipe and Fittings – Gravity**

All PVC pipe and fittings shall meet ASTM D3034, SDR35 4" to 15" and ASTM F679 18" to 27", and Section 9-05.12 of the Standard Specifications.

**Ductile Iron Pipe – Gravity**

Ductile iron pipe shall conform to ANSI specification A21.51 (AWWA C151). Cement lining and sealing shall be 1/16-inch and shall conform to ANSI specification A21.4 (AWWA C104). Pipe joints shall be a rubber gasketed mechanical joint type, and shall conform to ANSI specification A21.11 (AWWA C111). The pipe class shall be standard thickness Class 50.

**Pipe Plugs and Caps**

All plugs shall be of the same material as the pipe being plugged. The plug shall be capable of withstanding all test pressures without leakage.

**Manhole Joints**

Concrete to PVC manhole adapters shall be “Kor-N-Seal” boots, or GPK manhole adapters.

**Joints and Gaskets**

Rubber or elastomeric gaskets for gravity sewer pipe shall conform to ASTM D1869.

**Quarry Spalls**

Quarry spalls shall be 4" - 6" quarry spalls.

**Foundation Gravel Material**

Foundation gravel shall be 1 1/2" washed rock.

**Bedding Gravel Material**

Flexible Pipe: Bedding gravel shall be pea gravel.
Rigid Pipe: Bedding gravel may be either pea gravel, granulific, or sand.

**Bank Run Gravel Material**

Bank run gravel for trench backfill shall conform to the requirements of Section 9-03.19 of the Standard Specifications.

**Concrete Blocking Material**

Concrete used for bedding or blocking shall be Class C (1-1/2) Portland Cement Concrete and shall conform to the requirements of section 9-01 and 6-02.3(1) of the Standard Specifications.

## 7-17.3(1) Excavation and Preparation of Trench

## 7-17.3(1)A Sewer Trench (Supplemental Section)

Prior to excavation through asphalt concrete, or portland cement concrete surfaces, the pavement shall be removed to a minimum of 24-inches greater than the top width of the trench. The pavement shall be sawcut in a neat, straight line paralleling the trench centerline prior to removal. The Portland Cement concrete pavement shall be cut to half the depth of the pavement.

Prior to trenching through areas improved with lawn or through fences, rockeries, shrubs, plants, or other improvements, these improvements shall be removed, stored and protected unless otherwise noted. After the sewer installation is complete, the improved area shall be

returned to a condition equal or better than the area before the sewer installation. If any stored improvements are not suitable for reuse after construction, they shall be replaced with an improvement of equal or better quality.

The Developer shall provide all materials, labor and equipment necessary to adequately shore trenches to protect the work, existing property, utilities, pavement and any other improvements and to provide safe working conditions in the trench. The Developer may use any method of shoring, provided that the method complies with all local, state and federal safety codes. The Developer alone shall be responsible for worker safety, and the City and its agents assume no responsibility. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Developer.

Shoring below the pipe will not be removed if, in the opinion of the engineer, such removal will disturb the pipe bed.

The Developer shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during construction.

Drainage and culvert replacement: where disturbed, drainage ditches and culverts shall be restored to their original alignment and grade, backfilled with select backfill as shown on the plans, and left in a condition to provide drainage equal to or better than now existing as determined by the engineer. Existing vegetated channels shall be revegetated using hydroseed or other methods of stabilization if approved by the engineer if disturbed by construction.

## 7-17.3(1)C Pipe Foundation (Additional Section)

### Pipe Foundation in Poor Soil

When soft or unstable material is encountered at the subgrade which, in the opinion of the engineer, will not uniformly support the pipe, such material shall be excavated to an additional depth as required by the engineer and backfilled with 1 1/2" washed rock to a depth of 12" and 4" to 6" quarry spalls to the excavated depth. The foundation material shall be placed in 12-inch lifts and compacted to provide an unyielding foundation. All washed rock will be considered incidental to the project.

### Correcting Faulty Grade

Excess excavation below the required grade shall be backfilled with foundation material and thoroughly compacted to the required grade line. Such excavation below the required grade and the required backfill shall not entitle the Developer to extra compensation.

## 7-17.3(2) Laying Sewer Pipe

## 7-17.3(2)B Pipe Laying (Partial Replacement Section)

Delete Paragraph 3 and insert the following:

Variance from established line and grade shall not be greater than 1/32-inch per inch of pipe diameter and not to exceed 1/2-inch, provided that such variation does not result in a level or reverse sloping invert; provided also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum.

## 7-17.3(2)G Sewer Line Connections (Supplemental Section)

Sewer line connections to trunks, mains, laterals, or side sewers shall be left uncovered until after an acceptance inspection has been made. After approval of the connection, the trench shall be backfilled as specified in section 7-17.3(3) of the Standard Specifications, after first covering the bare pipe with select material compacted to a depth of 6-inches above the crown of the pipe.

## 7-17.3(2)J Sewer Abandonment (Additional Section)

Pipe and manholes to be abandoned in place shall be abandoned as follows:

- *Pipe:* Plug ends as noted with brick and mortar.
- *Manholes:* Remove the top three feet of the manhole and fill the remaining structure with control density fill or pea gravel.

## 7-17.3(3) Backfilling Sewer Trenches (Partial Replacement and Supplemental Section)

*Remove the second paragraph and replace with:*

Backfill above the pipe zone shall be accomplished in such a manner that the pipe will not be shifted out of position nor damaged by impact or overloading. Backfill shall be compacted to at least 90 percent maximum density in trenches in unpaved areas, and to at least 95 percent maximum density in trenches in paved areas as specified in the Proctor Test except where a higher standard is required by the agency which has jurisdiction.

*Supplement 7-17.3(3) with:*

After backfilling and placement of the base course, the Developer shall immediately place cold patch over all trenches in paved areas until such time that a permanent overlay or patch can be completed. The Developer shall grade all roads and shall maintain them during the period required by the general provisions of this contract in such a manner as to provide safe travel by the public, free of settlement, mud holes, ruts, and high centers. Streets shall be repainted upon completion of construction in conformance with current striping.

## 7-17.3(4) Cleaning and Testing

## 7-17.3(4)A General (Supplemental Section)

Testing of all pipe materials may be required prior to installation at option of the engineer. Such tests, if required, shall be conducted in accordance with the reference material specification for the material being used. Tests on the completed installation shall be made as specified below.

### Cleaning and Flushing

All gravity sewer pipe shall be cleaned and flushed after side sewer installation and after backfilling and compaction. The pipe shall be cleaned and flushed by passing an inflatable rubber ball through the completed section or using a flush truck. Any obstruction such as cemented grout or debris found in the completed section, shall be removed.

### Alignment and Grade

Alignment and grade will be inspected with an approved video monitoring system (TV inspection). Any section or portion which exceeds the allowance for variance in line or grade shall be re-excavated and relaid at no additional cost to the District.

### Deflection Test of PVC Pipe

All PVC gravity sewer pipe shall be tested for deflection at least 30 days after completion of trench backfill and compaction in accordance with the requirements of section 7-17.3(4)H of the Standard Specifications.

### Leakage Tests

All gravity sewers, including all connected side sewers, shall be tested for water tightness in accordance with the provisions of section 7-17.3(4)B of the Standard Specifications. No other test procedures will be allowed except by written approval of the engineer. Whenever ground water is encountered in the sewer construction, an approved water level monitoring device shall be installed at each manhole. The device shall be used in the conduct of the sewer testing to determine the water pressure above the sewer being tested.

### Infiltration Tests

When the natural ground water table is above the crown of the higher end of the test section, the maximum allowable limit for infiltration shall be four tenths (0.4) Gallons per hour per

inch of internal diameter per 100 feet of length, with no allowance for external hydrostatic head.

## 7-17.3(4)I Television Inspection

Prior to the television inspection, the new sewer pipe shall be flushed to remove all debris and water allowed to fill all pipe "bellies." The deviation from pipe grade (depth of pipe "bellies") shall be determined by towing a 1" ball ahead of the video camera while the water is stagnant in the pipe "bellies." Video inspection while water is flowing will not be acceptable. The ball shall be fully visible during the video.

Once the television inspection has been completed the Developer shall submit to the engineer the written reports for the inspection plus the video tapes. Said video tapes are to be in color or black & white and compatible with the District's viewing and recording systems.

# *CONTENTS – TECHNICAL PROVISIONS*

## *CONTENTS – STANDARD DETAILS*