

SECTION 500

WASTEWATER

INTRODUCTION

This section is subject to periodic revision to meet changing requirements for materials, and environmental regulations, etc. At the beginning of a project, users should verify that they have the latest edition.

The latest published edition of the following documents shall be the accepted standard for materials and/or procedures for the construction, modification, alteration, or expansion of the City of Fairfield's public wastewater system.

1. *City of Fairfield Design, Construction, and Materials Specification Handbook.*
2. *City of Fairfield Codified Ordinances. Sewers Chapter 925.*
3. *Ohio EPA Laws and Regulations (OEPA).*
4. *Ohio EPA Backflow Prevention and Cross Connection Control.*
5. *Recommended Standards for Sewage Works, "The Great Lakes Upper Mississippi River Board" (G.L.U.M.R.B.) also known as "The Ten Sate Standards".*
6. *The Clean Water Act (CWA).*
7. *40 Code of Federal Regulations Part 403. General Pretreatment Regulations.*
8. *National Pollutant Discharge Elimination System (NPDES).*
9. *Ohio Revised Code (ORC) 6111.032- Ohio Pretreatment Program.*
10. *Solid Waste Disposal Act (SWDA).*

If a conflict exists between reference sources, the more restrictive requirement shall prevail. The Public Utilities Director shall provide interpretation, as requested.

Section 500 is intended to convey the general design and construction requirements for a typical project. It also lists specific City of Fairfield Wastewater Department requirements relating to plan review, inspection, testing, and acceptance of facilities. It is not intended as a substitute for site-specific engineering. Individual project conditions may require variances from the provisions in this document in which case the variances should be noted in the plans and other data submitted by the project design professional for the City of Fairfield's approval.

The standard details in the appendix are supplemental to the general construction materials and specifications. If the developer or designer notes any discrepancies or desires an interpretation of a specification, they shall submit their question to the City of Fairfield in writing for a decision.

“Wastewater or sewage” means the spent water of a community, and may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any ground water, surface water, and storm water that may be present.

Any single family, or multi-family dwelling, commercial or industrial establishment shall be connected to a public sewer if the sanitary lines are available for connection. Service shall be considered available if the property can be connected by gravity flow within 100 feet of a main sanitary line in any public right-of-way or easement. Service may also be considered available if the property can be connected by force main within 500 feet of a main sanitary line in any public right-of-way or easement. The connection shall be at the cost of the property owner.

In all buildings in which any building drain is too low to permit gravity flow to the sewer main, sanitary sewage carried by such drain shall be lifted by artificial means as approved by the Public Utilities Director, and discharged into the sewer service.

Sewer availability will be determined by the City of Fairfield, or representative of the municipal authority in the area of the proposed development. The City of Fairfield will review the preliminary plans to determine if the wastewater treatment facilities, lift stations, and sanitary lines in the area of the proposed development have sufficient capacity to serve the proposed development.

Septic tanks, leech fields and mound systems are under the authority and review of the Butler County Board of Health. Butler County sanitary sewers are under the authority and review of Butler County Water and Sewer.

If the Director of Public Utilities, or his/her designee, requires that a subdivision sewer or sewers must be larger than the size required to handle the sewage flow from the subdivision, due to expansion of the sewer system beyond the subdivision in the future, the City shall pay the developer the difference in cost for the larger piping materials. Additional installation cost for the larger piping is the responsibility of the developer.

ABBREVIATIONS

The following abbreviations used in this manual shall have the designated meanings:

- **AASHTO** - *American Association of State Highway Transportation Officials*
- **ABS** - *Acrylonitrile-Butadiene-Styrene*
- **ANSI** - *American National Standards Institute*

- **ASTM** - *American Standard Test Methods*
- **BCWS** - *Butler County Water and Sewer*
- **BOD** - *Biochemical Oxygen Demand*
- **CCTV** - *Closed Circuit Television*
- **CFR** - *Code of Federal Regulations*
- **COD** - *Chemical Oxygen Demand*
- **CWA** - *Clean Water Act*
- **DI** - *Ductile Iron*
- **FOG** - *Fats, Oils, Grease*
- **GI** - *Grease Interceptor*
- **GLUMRB** - *Great Lakes Upper Mississippi River Board*
- **Gpd** - *Gallons per Day*
- **Mg/l** - *Milligrams per Liter*
- **NACE** - *National Association of Corrosion Engineers*
- **NSF** - *National Sanitary Foundation*
- **NPDES** - *National Pollutant Discharge Elimination System*
- **ODOT** - *Ohio Department of Transportation*
- **OEPA** - *Ohio Environmental Protection Agency*
- **ORC** - *Ohio Revised Code*
- **PDI** - *Plumbing and Drainage Institute*
- **POTW** - *Publicly Owned Treatment Works*
- **PVC** - *Polyvinyl-Chloride*
- **RCRA** - *Resource Conservation and Recovery Act*
- **SAE** - *Society of Automotive Engineers*
- **SDR** - *Standard Dimension Ratio*
- **SIC** - *Standard Industrial Classification*
- **SSPWC** - *Standard Specification Public Works Construction*
- **SWDA** - *Solid Waste Disposal Act*
- **TDH** - *Total Dynamic Head*
- **TOMP** - *Toxic Organics Management Plan*
- **TSS** - *Total Suspended Solids*
- **UPC** - *Uniform Plumbing Code*
- **USEPA** - *U.S. Environmental Protection Agency*

501.00 DISCHARGES TO WASTEWATER COLLECTION SYSTEM

501.01 Prohibited Discharges

No person shall discharge or cause to be discharged any storm water, surface water, ground, roof runoff, subsurface drainage, cooling water, or unpolluted industrial process water into any sanitary sewer of the City of Fairfield, or permit

or allow to be discharged or conveyed to a public sewer any wastewater containing pollutants of such character or quantity that will:

- a) Not be susceptible to treatment or interfere with the process or efficiency of the treatment system.
- b) Constitute a hazard to human or animal life, or to the stream or water course receiving the treatment plant effluent.
- c) Violate pretreatment standards.
- d) Cause the treatment plant to violate its NPDES permit, or applicable receiving water standards.

No person shall discharge or cause to be discharged without prior written approval of the Director of Public Utilities, or his/her designee, any hazard waste into the sanitary sewer of the City of Fairfield. A hazardous waste shall be defined by OAC 3745-51-21 to 3745-51-24 inclusive, or is a waste listed in OAC 3745-51-31, 3745-51-32, 3745-51-33(E), or 3745-51-33(F).

501.02 Special Discharges

Special discharges to the wastewater collection system are prohibited unless approved in writing by the Public Utilities Director. An application for special discharges can be made through email at public_utilities@fairfielddoh.gov or regular mail at 5021 Groh Lane, Fairfield, Ohio 45014. There is no application fee for a special discharge. If the discharge is approved, the discharger will be billed for the amount of wastewater discharged to the City system in accordance with the effective wastewater treatment rates. Any analytical data obtained during the process of discharging to the wastewater collection system shall be submitted to the Public Utilities Department within 7 calendar days along with the total volume of water discharged to the system.

502.00 APPROVAL

502.01 Wastewater Approval

Plan approval by the City of Fairfield does not imply, nor assure approval from the Ohio EPA. Approval of the plans does not constitute an assurance that the proposed project will operate in compliance with all Ohio laws and regulations. Plans are approved subject to the conditions of compliance with applicable laws, rules, regulations, and standards. The proposed project may be constructed only in accordance with the approved plans. There may be no deviation from the approved plans without the written approval by the Director of Public Utilities, or his/her designee. Plans should contain a note stating “All work within the

right-of-way within City limits will require a permit from Public Works”. Permits can be found at <https://www.fairfield-city.org/448/Permits-Specifications>.

As required by the Director of Public Utilities or his/her designee, plans shall be submitted to the Ohio EPA for approval. The cost of submitting plans to the Ohio EPA, and review by the Ohio EPA shall be paid by the developer. Construction shall not begin until such plans are approved by the Ohio EPA, or unless the Director of Public Utilities, or his/her designee, issues a conditional release.

All sewers connecting to the City of Fairfield’s public sewer system shall comply with all City of Fairfield standards, as well as federal, state, and City ordinances. The Public Utilities Director and other authorized employees of the City bearing proper credentials and identification shall be permitted to enter into or upon all properties for the purpose of inspection, observation, measurement, sampling, and testing, in accordance with the provisions of this section. No tie-in shall be made except in the presence of the City of Fairfield Inspector.

Inspection of Construction – See Section 102.00.

502.02 Determination of the Amount of Sewage and Average Flows

The average flow of sanitary sewage shall be computed on the basis of 100 gallons per capita. The estimated flows listed are to be used only for the design of sewers and lift stations, and should not be used in the design of treatment plants.

<u>WASTEWATER SOURCE</u>	<u>ESTIMATED SEWAGE FLOW</u> (gallons - per -day)
<u>Airports</u>	
Per Employee	20
Per Passenger	5
<u>Apartments</u>	
One bedroom	250
Two bedroom	300
Three bedroom	350
<u>Assembly Halls</u>	
Per seat	2
<u>Bowling Alleys (no food service)</u>	
Per Lane	75

<u>WASTEWATER SOURCE</u>	<u>ESTIMATED SEWAGE FLOW</u> (gallons - per -day)
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Camps

With individual bath units-per person	50
With central bath house per person	35

Churches

Small- per sanctuary seat	3-5
Large with kitchen-per sanctuary seat	5-7

Dance Halls

Per person at maximum capacity	2
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Factories

No showers per employee	25
With showers per employee	35

Family Dwelling

Per person	100
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Food Service Operations

Restaurant per seat	35
Banquet rooms-per seat	5
Tavern (very limited food service) per seat	35

Hospitals

No resident personnel per bed	300
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Institutions

Residents per bed	100
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Laundries

Coin operated-per machine (standard size)	400
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Motels

Per Unit	100
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Nursing and Rest Homes

Per patient	150
Per resident employees	100

Office Buildings (exclusive of cafeteria)

Per employee per shift	20
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<u>WASTEWATER SOURCE</u>	<u>ESTIMATED SEWAGE FLOW</u> (gallons - per -day)
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Playgrounds and Daytime Parks

With toilet facility-per person	5
With showers, bathhouse toilets-per person	10

Schools

Elementary (not including showers or cafeteria-per pupil)	10
High and Junior High (not including showers or cafeteria per pupil)	15
Add for cafeteria – per pupil	5
Add for showers – per pupil	5

Service Gas Station

1000

Shopping Centers (without food service or laundries)

Per area of floor space	0.2/sq.ft
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Swimming Pool (average with hot shower)

Per swimmer	3-5
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Theaters

Movie – per seat	5
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Trailer Parks (mobile home parks)

Per trailer space	300
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Travel Trailer and Recreational Vehicle (parks and camps)

Per trailer or tent space	125
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Vacation Cottages

Per person	50
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502.03 Peak Flows

Sanitary sewers shall be designed on a peak flow basis using a peak factor of 4 times the total calculated average daily wastewater flow for collector sewers, and a peak factor of 2.5 for sub-mains and truck sewers. Pumps and force mains should be designed to carry the peak flow of all the sewers that discharge into the lift station. The peak flow for areas which do not have a 24-hour run-off period shall be calculated as follows:

$$\text{Peak Factor} \times \frac{(\text{Calculated Wastewater Flow(gallons)} \times 24 \text{ hours})}{\text{Run-off period (in hours)}} = \text{gpd}$$

Peak Factor = 4.0 for collector sewer mains.
 Peak Factor = 2.5 for trunk main sewers.

ENTITY

RUN-OFF PERIOD

Municipality	24 hours
Factories	Length of shift
Subdivisions (over 250 homes)	24 hours
Subdivisions (under 250 homes)	16 hours
Hospitals	12-24 hours
Camps	16 hours
Schools	8 hours
Restaurants	4 hours
Boarding Schools	16 hours
Mobile Home Parks	12 hours
Apartments	12 hours
Motels	4 hours

**Use of other run-off periods must be documented.*

503.00 DESIGN OF SEWERS

503.01 Approval of Sewers

In general, the City of Fairfield will approve plans for new systems, extensions to new areas, or replacement sanitary sewers only when designed upon the separate basis, in which rain water from roofs, streets, and other areas, and groundwater from foundation drains are excluded.

503.02 Design Capacity and Design Flow

In general, sewer capacities should be designed for the estimated ultimate tributary population, except in considering parts of the systems that can be given to the maximum anticipated capacity of institutions, industrial parks etc. Where future relief sewers are planned, economic analysis of alternatives should accompany initial permit applications.

503.03 Minimum Size

All public sanitary sewers conveying raw sewage shall be a minimum of 8 inches in diameter. Sanitary sewer laterals shall be a minimum of 6 inches of diameter,

and run to within 5 feet of the building, and tied directly into the building sanitary sewer.

503.04 Depth

In general, sewers should be sufficiently deep to receive wastewater from basements, and to prevent freezing. Insulation shall be provided for sewers that cannot be placed at a depth sufficient to prevent freezing. A minimum depth for sewer laterals shall be 36 inches from the crown of the lateral to afford protection from frost. Sewer installation requiring less cover shall require the approval of the Director of Public Utilities, or his/her designee.

503.05 Buoyancy

Buoyancy of sewers shall be considered and shall be prevented with appropriate construction. The flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated.

503.06 Location

Public sewer mains shall be installed in public right-of-way, or upon approval, in a public utility easement. The width of a permanent sewer maintenance easement shall be governed by the following depth chart:

<u>Depth</u>	<u>Width of Maintenance Easement</u>
10-15 feet	20 feet
16-20 feet	30 feet
21-30 feet	2.0 x depth of sewer, plus 10 feet

**Sewers greater than 25 feet of depth shall require the approval of the Director of Public Utilities.*

The sewer maintenance easement shall be no less than 20 feet wide, and shall be totally within the public right-of-way, or public utility easement. The easement shall be evenly divided on both sides of the sewer line.

503.07 Flow Velocities

All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula using an "n" value of 0.013. When velocities greater than 12 feet per second are

expected, provisions should be made to protect against displacement by erosion and impact.

503.08 Minimum Allowable Slope

The following minimum slopes, should be provided for sewers 18 inches or less. However, slopes greater than these may be desirable for construction, to control sewer gases, or to maintain self-cleansing velocities at all rates of flow within the design limits.

The minimum allowable slope shall be that which results in a velocity of at least 2 feet per second when the sewer pipe flows at ¼ of full depth. Sewers of 18 inches or less shall be laid with uniform slope and straight alignment between manholes. The line and grade alignment shall be checked with laser instruments.

Sewer size	Min. Slope 2.0 FPS Velocity (ft./100ft.) n-0.013	Approx. Capacity Minimum Slope (GPD)	Approx. Capacity Minimum Slope (CFS)
8 inch	0.50	520,000	0.80
10 inch	0.28	750,000	1.16
12 inch	0.22	1,100,000	1.70
15 inch	0.15	1,680,000	2.60
18 inch	0.12	2,330,000	3.60

503.09 Minimum Flow Depths

No slopes less than the recommended minimum will be permitted unless approved by the Director of Public Utilities or his/her designee.

503.10 Minimum Solids Deposition

The pipe diameter and slope shall be selected to obtain the greater practical velocities to minimize settling problems. Oversize sewers will not be approved to justify using flatter slopes. If the proposed slope is less than the minimum slope of the smallest pipe, which can accommodate the design peak hourly flow; the actual depths and velocities (minimum, average and maximum) shall be calculated by the design engineer, and shall be included in the plans.

503.11 Steep Slope Protection

Sewers of a 15% slope or greater shall be anchored with concrete anchors spaced as follows:

- a) Grades from 15% to 35% shall be anchored on 36 feet center to center.
- b) Grades from 36% to 50% shall be anchored on 24 feet center to center and must be approved by the Public Utilities Director.
- c) Grades from 51% and over shall be anchored on 16 feet center to center and must be approved by the Public Utilities Director.

503.12 Alignment

In general, sewers shall be laid with straight alignment between manholes. Straight alignment shall be checked by using a laser beam. A laser beam system shall conform to OSHA requirements, and have an early warning system. See Section 507.04 Laser System.

503.13 Changes in Pipe Size

A manhole or approved structure shall be placed at all changes in pipe diameter. At no time shall a pipe of a larger diameter flow into a pipe of a smaller diameter without the approval of the Public Utilities Director. The invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient.

503.14 Connections

No buildings shall be connected to a lateral unless the building is completely under roof. In the case of building demolitions, the existing connection shall be abandoned at the right of way or as determined by the Public Utilities Director or his/her designee. Any utility abandonment during redevelopment or demolition requires an inspection by the Public Works Department.

503.15 Protection of Water Supplies

There shall be no physical connection between a public or private potable water system and a sewer, or its appurtenance that would permit the passage of any sewage into the potable water supply.

503.16 Parallel Installation

Sanitary sewers and manholes shall be laid a minimum of 10 feet horizontally from any existing or proposed water main. When local conditions prevent a

separation of 10 feet, a sewer line may be laid closer than 10 feet to water main if it is laid in a separate trench. The sewer shall be laid lower than the water line, with a minimum of 18 inches below the invert of the water main. When it is impossible to obtain proper separation, the sewer pipe material shall be pressure rated at 150 psi and shall be pressure tested to assure water tightness.

503.17 Crossings

Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation, or reconstructed with ductile iron pipe, that will withstand a 150 psi pressure test, for a distance of ten feet on each side of the sewer. One full length of water main pipe shall be centered over the sewer so that both joints will be as far from the sewer as possible.

504.00 LATERALS

504.01 Lateral Size

No gravity lateral sewer conveying wastewater shall be less than 6 inches. Laterals for low-pressure force main systems shall be sized according to the hydraulic design criteria.

504.02 Lateral Slope

The slope of the 6-inch pipe shall be not less than 1/4 inch per foot (2%), while maintaining a minimum vertical separation of 36 inches. A minimum vertical separation of 36 inches shall be required as measured from the crown of the public sanitary main and the lowest floor elevation served by gravity sewers. In any structure in which the plumbing is too low to permit gravity flow to the utility system, or private sewer, the sewage shall be lifted by artificial means and discharged into the utility system. When only the lower floor of a structure is too low for gravity flow, the remaining floors must flow by gravity. **See the Service Line Details drawing on Page 24 of the Standard Construction Drawings.**

504.03 Location

No sewer lateral shall be laid parallel to within 5 feet of any bearing wall, which might thereby be structurally weakened. A 2-inch-tall "S" shall be stamped on the curb face at all sewer lateral locations. **See the Utility Service Location Designation drawing on Page 11 of the Standard Construction Drawings.**

504.04 Depth

The minimum sewer lateral cover depth shall be 36 inches from the crown of the lateral to afford protection from frost. The sewer lateral shall be installed on the low point of the property being served and shall be sufficiently deep to receive wastewater from basements. A minimum vertical separation of 36 inches shall be required as measured from the crown of the public sanitary main and the lowest floor elevation served by gravity sewers.

504.05 Alignment

The sewer lateral shall be laid at a positive uniform grade and in straight alignment. Changes in direction shall be made only with properly made curved pipe-fittings with no deflections greater than 45° permitted. The maximum connection angle shall be no greater than 60° degrees into the public main.

504.06 Tap Connections

The connection of a building lateral to an existing sanitary sewer shall be air and water tight in an acceptable manner. The standard connection shall utilize standard pipe-fittings or manufacturer's recommended adapter designed to join the type of pipes together. The connection from a 4-inch pipe to a 6-inch lateral shall be made by use of a commercial fitting only and within 5 feet of the building. Cement grout shall not be permitted. Building connections are not to be completed until the structure is under roof in order to prevent unnecessary inflow and infiltration. Connections to gutters, sump pumps, or pool drains will not be allowed.

The tap for truss pipe shall be accomplished by installing a manufactured wye fitting to prohibit any degradation of the interior truss lining void structure. Coring a hole for the tap may be completed at the discretion of the Public Utilities Director. For truss pipe tapping connections, a solid sleeve type coupling shall be used to add integrity and stiffness to the pipe at each connection.

A manufactured tap saddle of a high durometer PVC shall be used on sanitary pipe materials other than truss pipe. The tap saddle apron shall be installed by a solvent weld system, in addition to stainless steel slip-lock clamps around the saddle on the sanitary main pipe.

All connections within the sanitary sewer system shall be inspected and approved by the City of Fairfield before being covered. No sewer pipe laid underground shall be covered, or the trenches filled, until after the sewer has

been inspected for workmanship and proper material. If the City of Fairfield refuses to approve the work, the plumber or owner must proceed immediately to correct the work.

504.07 Clean Outs

Clean outs to grade shall use a 4-inch minimum diameter riser capped with a 4- or 6-inch cleanout plug. Clean outs are required at every 100 feet or fraction thereof along all straight lines of pipe and at the discretion of the Public Utilities Director or his/her designee, at changes of direction of 45 degrees or more. Clean out installation should be avoided in traffic areas, however if such installation is required, materials shall be capable of bearing traffic weight. Clean outs caps constructed of plastic material in traffic areas shall be un-acceptable. In all cases, a 2-way cleanout is preferred, however, in some cases the Engineer and his/her designee may approve a directional cleanout or wye. **See the Two Way Cleanout drawing on Page 27 of the Standard Construction Drawings.**

504.08 Bedding

All sanitary sewer laterals shall be bedded in #8's, #9's or #57's gravel. The granular bedding shall extend to 12 inches above the top of the lateral. Any over-dig area shall utilize #57 gravel. Bedding shall have bell holes for joint shape and locations.

504.09 Backfilling Under Pavement

Flowable controlled density fill (Low Strength Mortar –LSM 50) shall be per ODOT 613 under the roadway and curb. Granular backfill item 304 may be used under private driveways. **See the Trench Detail drawing on Page 3 of the Standard Construction Drawings.**

504.10 Sewer Stubs

All sewer lateral stubs shall be capped with a watertight plug. Plug location shall be marked with a 2 x 4 stake, 12 feet long, with one end buried at depth of the plug invert and extending at least 3 feet vertically out of ground. The portion of the stake above the ground shall be painted green, marked with the word "SEWER" and indicate the depth from the pipe invert to the ground surface. Any new street curb, or curb replacement over the sanitary lateral shall be stamped with an "S" symbol to identify the approximate location of the sewer. **See the Utility Service Location Designation drawing on Page 11 of the Standard Construction Drawings.**

504.11 Cured-In-Place Pipe (CIPP) Service Lateral Lining

The intent of this CIPP lateral lining specification is to provide reconstruction of service laterals without excavating the entire existing pipeline. The existing pipe reconstruction will be accomplished using a scrim reinforced liner tube measured to exact length and inside diameter utilizing a thermosetting resin that meets required physical and chemical resistance properties. The scrim reinforced liner will be impregnated with resin then loaded into an approved air pressure launching system. The liner will be aligned to the open end of the existing lateral pipe. Once the liner is aligned, the launching system will invert the resin-impregnated liner with air pressure. The inversion process is completed once the liner has fully inverted to the sewer main collection pipe, stopping at the connection. The inversion process must conform with ASTM F 1216. The liner will be open to allow the calibration tube to invert beyond the liner end at the sewer main connection. A calibration tube is then inverted into the liner holding the liner in place during the curing process. At no time will the calibration tube lose air pressure and be re-pressurized during the inversion process. The calibration tube will be sealed at the sewer main, holding air pressure to secure the liner against the existing host pipe until the liner is fully cured. After the resin-impregnated liner is fully cured, the calibration tube is removed. The sewer lateral collection pipe will be immediately televised for the inspector's approval. A copy of the televised inspection must be recorded digitally and provided to the City for future reference.

The liner tube will consist of scrim reinforcement and needled felt. The liner tube will be fabricated together using a butt-stitched seam sealing process with a heat welded sealing tape to ensure airtight seal. The liner tube will be capable of carrying resin and withstanding installation pressures and curing temperatures. The liner tube will be lined on one side with a translucent impermeable chemically resistant polyvinylchloride (PVC) water proof coating. This coating will be on the inner lateral collection lined pipe after curing is completed. The coating will provide a smooth and seamless inner wall.

The resin will be a two-part, 100% solids epoxy containing no styrene. The epoxy resin shall be formulated to have a gel (pot) life of approximately 30 minutes with a set cure time of three hours. The epoxy shall ambient cure by internal exothermic chemical reaction.

The scrim reinforced / seam stitched / heat welded seam tape / felt liner tube and resin will upon installation meet and/or exceed minimum testing standards as

required by ASTM, IAPMO and ANSI/NSF International. All materials must have 3rd party testing provided by independent laboratory. The materials must be ANSI/NSF Standard-14 and IAPMO Certified for small diameter pipe lining in Sewer Pipes and Vents. The scrim reinforced / seam stitched / heat welded seam tape / felt liner tube and resin must have NSF Standard 14 denoted on the tube.

- a) The Contractor must have a valid City of Fairfield Sewer Tapper License in addition to being a certified CIPP installer with proof of certification.
- b) The Contractor shall supply plans to the Director of Public Utilities or designee five days prior to construction. The Contractor will arrange for work to be inspected by the City Inspector prior to construction.
- c) The owner shall be notified 24 hours in advance of project start time. No building utilities, such as toilets, sinks, dishwasher, laundry washer, bath tubs, or sump pumps will be used during the installation and curing process.
- d) Lateral sewer collection pipe must be cleaned thoroughly prior to installation of liner. All sand, rocks, gravel, grease, mud, sludge, and other debris must be removed from the invert to permit proper installation. Roots must be removed to the extent necessary to effectively line the entire pipe to the main.
- e) The existing service lateral will be inspected using a mini-television color camera system capable of viewing the interior condition of the host pipe. The TV inspection must be performed within 5 hours prior to installation of liner tube and be provided to the homeowner and City.
- f) The resin-impregnated liner tube will be kept clean and loaded directly into the air pressured launching system. The launching system will be aligned to the existing host pipe for proper installation.
- g) The resin shall not be contaminated and/or diluted prior to installation.
- h) The liner tube shall be inverted using air pressure, inverting the liner inside-out until the liner tube reaches the sewer main collection pipeline. The liner tube will be open and not sealed off. The liner tube will be designed to fit tightly against the host pipe annular space and gaps. A calibration tube will be inverted inside the liner tube to ensure the liner is tight against the host pipe until fully cured. The resin-impregnated liner tube will cure within 4 hours without external heat sources.

- i) Once the curing process is finished, the calibration tube shall be removed and the lateral sewer collection pipe immediately inspected for final acceptance. The new lined pipe shall be free of any foreign objects providing a smooth, seamless and continuous lined pipe from entry point to main sewer connection pipe.
- j) Any liner tube protruding from the lateral sewer collection pipe into the main sewer pipeline must be removed by remote robotic cutting equipment.
- k) If the liner/repair contacts or affects the city sewer main in any manner, the contractor is solely responsible and must repair the main to meet city standards.
- l) A final TV Inspection of the lined pipes will be recorded and provided to the owner and City for final approval.

Required Cured-In-Place Lateral Lining Standards

Flexural Strength	ASTM D-790	4,500 PSI (min.)
Flexural Modulus	ASTM D-790	250,000 PSI (min.)
Tensile Strength	ASTM D-638	3,000 PSI (min.)
Compressive Strength	ASTM D-695	4,000 PSI (min.)
Tensile Elongation	ASTM D-638	5 PSI (min.)
Chemical Resistance	ASTM D-543	>20% loss
Leakage Test*	NSF Standard 14	0/gal/in/day

*Leakage test performed by ANSI/NSF International

Manufacturer must have United States based manufacturing headquarters. The manufacturer must have at least five years of manufacturing / supplying CIPP Air Inversion Liner Tube and Materials. The manufacturing plant has a Quality Assurance / Quality Control program in place and overseen by NSF International and IAPMO R&T Laboratories.

505.00 SEWER MAIN PIPE MATERIALS

505.01 Force Main and Gravity Sewers

All materials for sewer pipe shall be new and furnished by the Contractor. The Manufacturer and Contractor shall use equipment and methods adequate to protect pipe, joint elements, and coatings from damage during hauling, storage and handling. When there is reasonable doubt as to the structural strength or water tightness of damaged sections, those sections shall be rejected and replaced

at the Contractor's expense. Any proposed deviations from these listed, or specified materials must first be approved by the City of Fairfield, Director of Public Utilities, or his/her designee. The force mains and sewers shall be constructed to the alignment and inverts shown on the construction plans, and of the size and type shown or specified.

A manufacturer's certificate that the material was manufactured and tested in accordance with the appropriate ASTM specification shall be furnished to the City of Fairfield prior to the installation of pipe.

PVC or HDPE pipe shall not be used in industrial areas where the effluent is detrimental to the integrity of the pipe. The Director of Public Utilities, or his/her designee, may request analytical data on the proposed industrial discharge. Any cost for the analysis will be encumbered by the contractor. The Director of Public Utilities, or his/her designee, shall make a determination on what type of pipe should be used based upon industrial sampling.

No sewer shall exceed 25 feet in depth without the approval of the City of Fairfield, Director of Public Utilities, or his/her designee.

All materials not specifically referenced shall comply with applicable sections ASTM, AWWA, APWA, GLUMRB, or ODOT standard specifications.

505.02 High Density Polyethylene Pipe (HDPE)

HDPE pipe material may be considered for force mains and service laterals only. All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D 3350 with a minimum cell classification of 445474C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacture of the HDPE resin shall certify the cell classification indicated. Pipe sizes 3 inches and larger shall have a manufacturing standard of ASTM F 714, while pipe smaller than 3 inches shall be manufactured to the dimensional requirements listed in ASTM D 3035. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans. Pipe shall meet AWWA C901 (1/2" to 3") or AWWA C906 (4" to 63"), and shall be listed as meeting

NSF-61. HDPE pipe shall be either black in color or black with green stripes. Butt fusion shall be performed per manufacturer’s recommendations. The Inspector shall have the right to test butt-fused joints at least once per day when butt fusion is being performed. Electro-fusion may be performed only when approved by the Public Utilities Director of his/her designee. A minimum 12 ga. tracer wire shall be installed with all HDPE pipe with the ends terminating in a test box or structure to allow easy access for locating equipment connections.

505.03 PVC Pipe

PVC pipe shall conform to ASTM D 3034-08 or current standard. PVC gravity sewer pipe may be installed according to manufacturer’s recommendations except for the conditions noted on the following table:

<u>PVC Gravity Pipe</u>	<u>Depth (feet)</u>
SDR 35	3-14 feet
SDR 26	15-19 feet
SDR 21	20-25 feet

505.04 Ductile Iron Sewer Pipe

All ductile iron shall conform to ANSI/AWWA C150 /A21.50-08 or current standard. In no case shall the pipe be less than Class 53 (Ductile Iron Wall Thickness). The lining and coating for ductile iron pipe and fittings shall be cement mortar lined with bituminous seal coat conforming to ANSI/AWWA/C104 A/21 or current standard.

The fittings for ductile iron pipe shall be mechanical and shall conform to ANSI/AWWA/C111 A/21 or current standard. All ductile iron pipe shall bear the manufacturer’s name or trademark, the year produced, and the letter’s “DI” or word “Ductile”. The Ductile Iron lining/coating system shall be impervious to sewer gases and waste (Protecto 401, or approved equal.). A Polyethylene Encasement conforming to AWWA C105 shall be utilized when ductile iron pipe is installed.

505.05 Deflection of Pipe

The deflection of pipe diameter shall not exceed 5 percent. Installed pipe shall be tested 30 days or more after trench has been back-filled to the finished grade.

Test is to be scheduled and performed by the Developer or Contractor, under supervision by the City of Fairfield.

505.06 Joints

PVC pipe joints can be solvent-welded and conform to ASTM D2680-01 or current standard or elastomeric gasket joints which shall conform to ASTM D 3212-07 or current standard. Joints recommended for circular sewers where infiltration or exfiltration is a factor in design shall use flexible watertight joints using compression type rubber gaskets for sealing the joint, and shall conform to ASTM C443 or current standard. Sewer joints shall be premium joints, and shall be designed to minimize infiltration and to prevent entrance of roots. In all jointing operations, the trench shall be dry before making pipe joints. All surfaces to be joined and all parts of the joint shall be clean.

505.07 Concrete Encasement

In areas requiring concrete encasement, Ductile Iron Class 53 with poly wrap (refer to 505.04) shall be used unless waived by the Director of Public Utilities, or his/her designee. Concrete encasement is required where sanitary sewers cross under streams, drainage swales, points of heavy loading, or at other locations as directed by the City of Fairfield. Concrete encasement shall completely surround the pipe and shall have a minimum thickness at any point of 1/4 of the outside diameter of the pipe, or a minimum of 6 inches, whichever is greater. In addition, 4 reinforcing bars of a size selected by the inspector shall be evenly spaced around the pipe, and have a length equal to that of the encasement. The concrete encasement shall be designed to provide the necessary addition strength. **See the Gravity Sewer Creek Crossing drawing on Page 28 of the Standard Construction Drawings.**

505.08 Casing Spacers and Insulators

Field adjustable casing spacers shall be ISO-9001 certified and used to center, or adjust the position and elevation of the gravity sewer pipe to on-grade requirements within the casing. An appropriate end-seal shall be used on the encasement as recommended by the manufacturer or approved by the inspector.

506.00 MANHOLES

506.01 Manholes

Manholes shall be installed in accordance with the City of Fairfield Sanitary Sewer Standard Construction Drawings and shall not be spaced further apart than 400 feet. Manholes shall conform to ASTM C478-12a or current standard for precast reinforced concrete manhole sections. In traffic load bearing conditions, manholes shall conform to AASHTO M199 or current standard. Pre-cast reinforced concrete manholes shall be constructed with use of Xypex C-1000, or approved equal, at the discretion of the Public Utilities Director. In addition, all pre-cast reinforced concrete manholes shall include the sidewall rings and base. The cone shall be of the eccentric type. Manhole joints shall be sealed with flexible watertight rubber gaskets conforming to ASTM C900, C443 or current standard. Prior to backfilling, 12-inch-wide rubber external seal wraps or approved equal shall be applied to each manhole section joint in accordance with ASTM C877 (Type III – Chemically-Bonded Adhesive Butyl Bands) or current standard. At points of pipe inlet, the pre-cast base manhole shall contain a wedge lock, or flexible O-ring joint conforming to ASTM C-923-08 or current standard. “Resilient Connections” to ensure the prevention of shearing the pipe due to differential settling. Grouted joints between sections and cast-in-place bases are not acceptable.

Pipe material changes between manholes shall not be permitted.

506.02 Manhole Castings

Manhole castings shall be made of cast iron, and conform to AASHTO M199 or current standard or Low-Density Traffic H-20 Loading to support traffic, or current standard. The manhole frame shall be East Jordan 00160014 with a 00160062 (Solid)/0016026 (Vented) cover or Neenah 1767-2001 Frame with 1767-5027 (Solid)/1767-5023 (Vented) cover and have “SANITARY SEWER” factory cast into the lid. Water-tight manhole covers are to be used wherever the manhole covers may be flooded by street run-off, or predicted high water conditions. Water-tight covers shall be East Jordan 00104509 or Neenah R 1916-F. Vented Manhole covers shall be permitted only if the manhole, and sanitary system has high-pressure fluctuations and requires pipe venting. Vented lids shall have a maximum of (4), 1-inch ventilation holes and be utilized only in unpaved areas or when the elevation of the vented cover is above the surrounding ground elevation. Steps inside the manhole shall be polypropylene encapsulated steel spaced a minimum of 12 and a maximum of 16 inches apart. The standard base shall be precast by the manufacturer.

506.03 Manhole Installation

Manholes shall be installed plumb. Whenever possible, the height of the manhole sections shall be selected in order to allow the manhole casting to be set directly on the top cone at the required elevation, rather than using pre-cast grade rings. In areas where the manholes are located in streets, the casting and cover shall be installed at the same grade as the street with use of pre-cast grade rings. Pre-cast grade rings may be utilized to adjust grade levels to a maximum of 16 inches. No more than 3 pre-cast grade rings may be utilized for grade adjustment.

The minimum diameter of the manhole shall be 48 inches and shall conform to the requirements of ASTM C478-12a or current standard. A minimum access opening of 22 inches shall be provided. Manholes shall be installed at the end of each sewer line, or service lateral having a length greater than 150 feet, at all changes in grade, size, alignment, and at all pipe intersections. Manholes shall also be installed at a spacing distance not greater than 400 feet for main sewers. The locating of a manhole in a sidewalk shall be avoided whenever possible. Private sewer systems must be separated from the City sewer systems by a manhole located at the right-of-way line.

Manholes installed in flood plains shall extend 2 feet above the 100-year flood elevation, and shall have an internal rubber seal installed to seal the frame-chimney joint area. Seals must be provided with the initial sleeve and extensions on the installation of manholes with multiple adjusting rings. The full chimney section, between the frame and cone section shall be open. Expansion bands are required at such intervals to ensure a complete rubber seal. A sleeve or boot shall have a vertical height of 12 inches and be capable of expanding 2 inches.

All resilient connectors, boots and sleeves between the reinforced concrete manhole structure its pipes and laterals shall conform to ASTM C-923-08 or current standard.

506.04 Drop Inlets

Drop inlets shall be avoided whenever possible. When approved, a drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Drop manholes shall be constructed with an outside drop connection. Inside drops shall only be used when tying into any existing sewer main, and requires approval by the Director of Public Utilities, or his/her designee. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the manhole bench or flow channel

shall be modified to prevent solids deposition. **See the Drop Manhole drawing on Page 33 of the Standard Construction Drawings.**

506.05 Flow Channel

The flow channel shall be straight through the manhole, and shall be made to conform in shape, slope and smoothness to that of the sewers. Flow direction changes in excess of 90 degrees will not be permitted. The channel walls should be formed or shaped to the full height of the crown of the outlet sewer in such a manner to not obstruct maintenance, inspection or flow in the sewers. A bench shall be provided on each side of the flow channel when pipe size is less than manhole diameter. No lateral sewer or drop manhole pipe shall discharge onto the surface of the bench. The bench shall slope one inch per foot.

506.06 Control and Inspection Manholes

All industrial dischargers shall provide for an on-site monitoring manhole. All discharge from the property must pass through one control manhole before entering the City of Fairfield sewer system. Control manholes are manholes through which all flow from a single user passes. Inspection manholes are manholes with additional monitoring features to allow for routine sampling of a user's wastewater discharge.

The City of Fairfield requires that a control manhole be installed for any new or changed industrial unit. The Public Utilities Director may require the user to install monitoring and/or flow measuring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the user at its own expense. The Director or his designated agent(s) shall have the right to enter the premises of any user to determine whether the user is complying with the requirements of the wastewater discharge permit, or order issued hereunder.

Users shall allow the Director ready access to all parts of the premises for purposes of inspection, sampling, records examination and copying, and the performance of any additional duties. Information and data on a user obtained from reports, surveys, wastewater discharge permit applications, and monitoring programs from the Director's inspection and sampling activities shall be available to the public without restriction, unless the user specifically requests, and is able to demonstrate to the satisfaction of the Director, that the release of such information would divulge information, processes, or methods of production entitled to protection as trade secrets under applicable State law.

506.07 Manhole Inspections

Sanitary Sewer manholes will be inspected in the field for visual damage and water tightness. All manholes shall be vacuum tested by the contractor prior to acceptance using testing procedures described in 508.02. The vacuum test method shall demonstrate the integrity of the installed materials.

507.00 TRENCHING AND EXCAVATION

507.01 Protection of Underground Utilities

The accuracy of location of existing underground utilities as shown on plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation, and to protect same from damage after uncovering. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. The Contractor shall contact the Ohio Utilities Protection Service (1-800-362-2764 or 811), (ohio811.org) at least 48 hours in advance of digging. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor. **For Separation of Water Mains and Sewers, see Section 406.01.**

507.02 Installation

No trenching or laying of pipe, and fittings shall be done until grade stakes have been set. The Contractor shall use digging equipment that produces an even bedding and foundation on which the pipe and fittings shall be installed. The bottom of the trench shall be level and free from lumps, holes, excessive loose dirt and large stones. The bottom of the trench base shall be undercut 6 inches, and then back filled with #8's, #9's or #57's gravel. The bottom of the trench shall be accurately graded to provide uniform bearing and support for each section of pipe. Support of pipe shall be given at every point along its entire length, except to excavate for bell holes and joints. Allowing the pipe to be bridged by the bell or joint end is unacceptable. The trench shall be excavated to the depth required to provide a uniform and continuous bearing support for the pipe on solid and undisturbed ground at every point between joint ends.

All sanitary sewers shall have minimum cover of 36 inches. The open trench ahead of pipe-laying shall be kept to a minimum, and shall not be in excess of 25 feet at the end of the working day, or the ceasing of work.

Open cut trenches and excavations shall be sheeted and braced as required by OSHA standards and municipal ordinances, and as may be necessary to protect life, property, the project, or as ordered by the project engineer or inspector. To

protect the persons from injury, and to avoid property damage, adequate barricades, construction signs, torches, red lanterns, and guards shall be placed and maintained as required during the progress of the construction until it is safe.

All grading in the vicinity of a trench excavation shall be controlled to prevent surface water from flowing into the trench. Any water accumulating in the trench shall be removed by pumping or other approved method. Material excavated from the trench shall be stacked in an orderly manner and a safe distance away from the trench edge. The project inspector will have the contractor remove materials unsuitable for backfilling.

The Contractor shall notify the City 24 hours in advance of the location and time that the Contractor intends to work. Any unauthorized excavation below the grade shall be backfilled at the Contractors expense with controlled fill. For public and private work within the City's Right-of-Way, the contractor performing the work is required to restore any disturbed areas in the Right-of-Way within 48 hours after the completion of the work.

All trenching, grade and cover work shall conform to the lines and grades given by the engineer. Work shall be done according to the drawings and specifications; subject to such modifications as the City of Fairfield may determine necessary during the project period.

Allowable Removal of Pavement, see Section 408.02

Trenchless Methods, see Section 408.03

Protection of the Public, see Section 408.04

507.03 Pipe Installation

Proper facilities shall be provided for stringing and lowering sections of pipe into the trench. The pipe shall be installed in accordance to the active standard ASTM D2321-05 for underground installation of buried thermoplastic pipe for sewers and other gravity-flow applications.

Existing sanitary sewer lines and flow shall remain in operation at all times. Any rerouting or blockage of sewer lines during construction by the Contractor shall require prior approval by the Director of Public Utilities, or his/her designee.

Pipe laying shall begin at existing sewer locations and shall proceed upgrade with the bell or groove end of the pipe placed upstream. The interior of the pipe shall be kept free from dirt, excess mortar and other foreign material as the

laying progresses. Pipe shall not be laid when the condition of the trench or the weather is unsuitable, or when water or mud may interfere with proper joining. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued. Any pipe, which shows undue settlement or is damaged shall be taken up and replaced at the Contractor's expense.

507.04 Laser System

The Contractor shall furnish and use, for grade and alignment control, a laser beam system, which complies with OSHA requirements. The laser system is to be provided by the Contractor, and shall have a minimum accuracy of 0.01 foot per 100 feet on line; and a minimum visible range of one thousand 1000 feet.

The battery for the laser device should be located far enough from the manhole or sewer pipe to ensure that it will not act as an ignition source for explosive hazards originating in the excavation or in existing sewer lines. When laser alignment is impractical, such as short pipe runs, the Contractor shall have a professional surveyor on site to set grade verify the installation of each pipe joint.

508.00 TESTING

508.01 Testing Requirements of Gravity Sewers

All completed piping shall be tested as specified herein by low-pressure air test, exfiltration, or infiltration test prior to backfilling to test for leaks. The maximum leakage allowance for all sanitary sewers shall be 50 gallons per inch diameter per mile of pipe per 24 hours. If the level of the current prevailing groundwater is two feet or more above the top of the sewer pipe, an infiltration test will be required. At the request of the Inspector, a low-pressure air test or exfiltration test will be performed instead of or in addition to an infiltration test if the ground water level is uncertain. Labor, equipment and supplies required for all tests shall be furnished by the Contractor. The Contractor shall flush and clean the sewer line to the satisfaction of the Inspector prior to testing. The Inspector shall witness and approve all leakage tests. In the event the Contractor performs any test without witness by the Inspector, the Contractor will be required to test the section again at no cost to the City. The Contractor and Inspector shall sign all test reports. Note that only four sections (approximately 1,200 – 1,600 feet) of sewer will be permitted to remain untested at any time.

a) Low-Pressure Air Test:

The air test shall be conducted between two consecutive manholes. Low pressure air tests shall be in accordance with ASTM C 924-02, or current standard, for concrete pipe or ASTM F 1417-11a, or current standard, for plastic pipe, except as specified by the Director of Public Utilities or his/her designee, herein. All pipe outlets must be plugged in the section being tested with suitable test plugs. One of the plugs used at a manhole must be tapped and equipped for an air inlet connection for filling the line from the air compressor.

Air shall be supplied slowly to test section until the internal pressure reaches approximately 4 pounds per square inch (psi). At least 2 minutes shall be allowed for the air pressure to stabilize. When the pressure has stabilized and is at or above 3.5 psi, the air supply shall be disconnected and timing shall begin. Timing shall continue until the pressure has dropped 1.0 psi. If the time elapsed before the pressure drops 1.0 psi is greater than the specified minimum holding time, the section shall be considered to have passed the test. If the time is less than the specified minimum holding time, the section shall be considered to have failed and must be repaired or replaced.

Minimum holding time shall be calculated from the following equation:

$$\text{Holding Time (minutes)} = 0.00037 \times D^2 \times L / Q$$

where D = Pipe Diameter (inches)
 L = Length of Pipe Tested (feet)
 Q = Allowable Air Loss (ft³/min) from Table: Minimum Holding Time for Low Pressure Air Test

An air pressure correction is necessary when the current prevailing groundwater is above the invert of the sewer line being tested. Under this condition, the air test pressure shall be increased 0.433 psi for each foot the groundwater level is above the invert of the pipe. All gauge pressures shall be increased by this amount. If the current prevailing groundwater is more than 24 inches above the invert of the pipe, the infiltration or exfiltration test should be used as required above. Thus, internal air pressures should never exceed 5.0 psi.

Minimum Holding Time for Low Pressure Air Test

Nominal Pipe Size, (Inches)	Time per 100 feet
6	42 seconds
8	1 minute – 12 seconds
10	1 minute – 30 seconds
12	1 minute – 48 seconds

15	2 minutes – 6 seconds
18	2 minutes – 24 seconds
21	3 minutes
24	3 minutes – 36 seconds
27	4 minutes – 12 seconds
30	4 minutes – 48 seconds
33	5 minutes – 24 seconds
36	6 minutes

Allowable Air Loss for Low Pressure Air Test

Nominal Pipe Size (Inches)	Air Loss (Q), ft ³ /min
6 and 8	2
10	2.5
15	3
15	4
18	5
21	5.5
24	6
27	6.5
30	7
33	7.5
36	8
42	9
48	10
54	11
60	12
66	13
72	14

b) Infiltration Test:

The Contractor may elect to use an infiltration test when the level of the current prevailing groundwater is 2 feet or more above the top of the sewer pipe, including all service laterals, at the highest point of the section being tested. The inlet end(s) of the upstream manhole shall be securely sealed. The downstream sewer shall be completed and open to allow the sewer to drain. The Inspector shall approve the length of sewer to be tested at one time. The Inspector may require that each manhole span be tested separately. The amount of infiltration shall be measured by means of a weir located in the downstream manhole. The test head shall be maintained for a period of at least 24 hours before the weir measurement is made. Infiltration shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours. This infiltration test may not be performed until the sewer line and manholes are completed and all known leaks are repaired. The Contractor will be required to correct all conditions that permit visible

infiltration and may be required to relay sections with such conditions that cannot be corrected, even though infiltration is within allowable limits.

c) Exfiltration Test:

When the exfiltration test is selected, the inlet ends of the upstream and downstream manholes shall be sealed with watertight plugs or bulkheads, and the sewer along with the upstream manhole shall be filled with water until the elevation of the water in the upstream manhole is: 1) two feet higher than the top of the sewer pipe, including all service laterals, at the highest point of the section being tested, or 2) two feet above the level of the current prevailing groundwater, whichever is the higher elevation. The test level shall be clearly marked in the upstream manhole. The entire length of section to be tested shall be filled and maintained full of water for a period of at least 24 hours prior to the start of the test. If the water level in the upper manhole drops during this 24-hour period, the level shall be raised to the test level mark prior to start of the test. Exfiltration will be determined by measuring the amount of water required to maintain the marked water level for a period of 1 hour from the start of the test. The allowable leakage of 50 gallons per inch diameter per mile of pipe per 24 hours based on a maximum difference in elevation of 8 feet between the water level in the upstream manhole and the invert of the pipe being tested in the lower manhole or the current prevailing groundwater level, whichever is higher. If this difference in elevation exceeds 8 feet, the allowable leakage shall be increased 5 percent for each 1 foot in excess of 8 feet. All observed leaks shall be corrected even if exfiltration is within the allowable limits.

508.02 Vacuum Testing of Manholes

This specification shall govern the vacuum testing of sanitary sewer manholes and structures and shall be used as a method of determining acceptability by the Director of Public Utilities, or his/her designee, in accepting maintenance of a sanitary sewer manhole or structure on behalf of the public. Vacuum testing shall be according to ASTM C1244-11, or current standard, except as specified otherwise herein. Other forms of testing of some manholes may be required, as deemed necessary by the Director of Public Utilities.

All manholes related to a project are subject to vacuum testing. Manholes to be tested shall be selected by the Inspector at the time of testing. No advance notice will be provided to the Contractor as to which manholes will be tested.

Manholes shall be tested after installation with all connections in place.

- a) Drop connections shall be installed prior to testing.
- b) The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings.
- c) If a coating or lining is to be applied to the interior of the manhole the vacuum test must not be performed until the coating or lining has been cured according to the manufacture’s recommendations.
- d) If existing manholes are to be vacuum tested (e.g. in the case of a sewer rehabilitation project), the Inspector and Contractor must deem the manhole structurally sound prior to vacuum testing.

Procedure for testing shall be as follows:

- a) Temporarily plug all pipes entering the manhole. Each plug must be installed at a location beyond the manhole/pipe gasket (i.e. outside the manhole wall), and shall be braced to prevent the plug or pipe from being drawn into the manhole.
- b) The test head shall be placed on the rim of the cast iron frame at the top of the manhole, in accordance with the manufacturer’s recommendations.
- c) A vacuum of at least 10 inches of mercury (10” Hg) shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and shut off the pump or disconnect the vacuum line from the pump.
- d) The pressure gauge shall be liquid filled, having a 3.5-inch diameter face with a reading from zero to thirty inches of mercury.
- e) The manhole shall be considered to pass the vacuum test if the vacuum reading does not drop more than 1” Hg (i.e. from 10” to 9” Hg) during the following minimum test times.

MH Depth(feet)	4’ Diameter MH	5’ Diameter MH	6’ Diameter MH
15 Feet or less	50 sec.	1 min. 5 sec.	1 min. 20 sec.
15.01 to 30 Feet	1 min. 20 sec.	1 min. 45 sec.	2 min. 10 sec.

- f) If any manhole fails the vacuum test, the manhole shall be repaired with a non-shrinkable grout or other material or method approved by the Director of Public Utilities or his/her designee. The manhole surfaces shall be properly prepared prior to any repairs. Once the repair material

has cured according to the manufacture's recommendations the vacuum test shall be repeated. This process shall continue until a satisfactory test is obtained.

g) All temporary plugs and braces shall be removed after each test.

508.03 Deflection of Pipe

The deflection of pipe diameter shall not exceed 5 percent. Installed pipe shall be tested 30 days or more after trench has been back-filled to the finished grade. Test is to be scheduled and performed by the Developer or Contractor, under supervision by the City of Fairfield.

508.04 Closed Circuit Television (CCTV)

All new sanitary sewer extensions shall be inspected with the City of Fairfield Wastewater Division's CCTV equipment prior to acceptance. The sanitary laterals may also require additional CCTV camera inspection as a condition of acceptance. All construction must be completed and approved by the inspector prior to the CCTV inspection. The sewer lines and manholes shall be cleaned before the inspection process. A camera inspection will be performed after the Air test of the sanitary system(s). Additional CCTV inspections shall be performed when warranted.

The contractor shall bear all costs for correction of deficiencies found during the CCTV inspection, including the cost for additional CCTV camera inspection(s) to verify the correction of deficiencies.

No performance bond shall be released until a CCTV inspection has been performed, and the sanitary work has been approved for quality assurance by the City of Fairfield. The City of Fairfield may also CCTV inspect the sewer lines prior the expiration of any warranty, or again before final acceptance of a subdivision or other project as necessary.

If an unsatisfactory condition is found, that condition shall be presumed to have been caused by defective workmanship, or materials. The Contractor shall be directed to correct the work in a manner as approved by the City of Fairfield Wastewater Division.

508.05 Testing Requirements for Force Mains

A hydrostatic pressure test at 150 psi for at least 2 hours shall be performed. All tests will be conducted in accordance with the hydrostatic testing requirements of AWWA C600, or current standard, on all force mains and service laterals. Pressure shall be measured at low point on section of pipelines. The contractor shall furnish all gauges, meters, pumps and other equipment required and shall maintain said equipment for accurate testing.

If the pressure drops more than 5 psi or the leakage is greater than allowable as determined by the formula in AWWA C600, or current standard, the test shall be considered failed. Common force mains shall be tested after all air release valves, flushing installations, and other appurtenances have been installed and with all service laterals installed at least to the curb stop. Private force mains and service laterals (on the pump side of the curb-stop) shall be tested after the entire system is completely installed (except for the connection to the gravity sewer, when applicable).

An Occupancy Permit shall not be issued until the sanitary sewers are tested and accepted by the City of Fairfield. See section 511.00 for building permits and occupancy.

509.00 FAT, OIL, AND GREASE PREVENTION

509.01 Fat, Oil, and Grease (FOG), Waste Food, and Sand Interceptors

FOG, waste food, and sand interceptors shall be installed when in the opinion of the City of Fairfield they are necessary for the proper handling of liquid wastes containing fats, oils and grease, ground food waste, sand, soils, or other harmful ingredients in excessive amounts, which impact the wastewater collection system. All interceptors shall be of a type and capacity as approved by the City of Fairfield, or the Butler County Department Water and Sewer (BCWS) as the governing jurisdiction requires. In general, the interceptor shall be designed to meet the Plumbing and Drainage Institute (PDI) standards.

New construction and renovation of food service establishments shall be required to install adequately sized grease interceptors necessary to maintain FOG compliance. All car washes, truck washes, garages, service stations, laundries, airport facilities, and other sources of sand, soil and oil shall have effective sand, soil and oil interceptors installed.

Oil and grease interceptors shall be constructed of impervious materials capable of withstanding abrupt and extreme changes in temperature. They shall be of substantial construction, watertight, and be equipped with easily removed covers, which when bolted in place shall be gas tight and waterproof. The interceptor shall be installed at a location where it can be easily accessed for inspection, cleaning, and removal of accumulated grease and installed as close as possible to the source of the FOG laden hot water. Access manholes, with a minimum diameter of 22 inches shall be provided over each grease interceptor chamber. The access manhole shall extend to finished grade and be designed and maintained to prevent water inflow or infiltration. Grease interceptor sizing shall be a minimum of 1000 gallons, and meet the PDI design guidelines.

Where installed, all oil, grease and sand interceptors shall be maintained by the owner at his expense while providing continuous operation at all times. The owner shall maintain a yearly maintenance logbook subject to the review by the Director of Public Utilities, or their agent(s). The owner shall provide for the proper removal and disposal of the captured material. Grease interceptors shall be fully pumped out and cleaned at a frequency such that the combined FOG and solids accumulation does not exceed 25% percent of the total design hydraulic depth of the grease interceptor.

All food service establishments shall pump out and fully clean the grease interceptor every 90 days or less. Permits for the hauling and disposal of this material must be secured from the Butler County Health Department.

510.00 GRINDER PUMPS AND LOW-PRESSURE FORCE MAINS

510.01 Grinder Pumps and Low-Pressure Force Main Systems

In developments where first-floor gravity service can be provided, but basements cannot be served by gravity, individual grinder pumps will be permitted to provide basement sewer service. In this event, gravity sewers shall be installed throughout the development such that each building can be provided with first-floor-only gravity sewer service.

The lowest level serviced by a gravity sewer shall be a minimum of 3 feet above the top of the receiving sewer at the point of connection. If the minimum separation cannot be achieved, then an on-site individual sanitary grinder pump system is required. No public or shared force mains will be permitted where first-floor gravity service can be provided.

The installation of grinder pump systems creates an ongoing operation and maintenance expense for the property owners and transfers the burden of extending off-site trunk sewers to the City of Fairfield and its sewer customers (existing and future).

It is the goal of the City of Fairfield Public Utilities Department to provide for the conveyance of wastewater by natural gravity flow wherever, and whenever possible.

510.02 Complete System Design Requirements for Low-Pressure Mains

Plans shall be consistent with a complete system design submittal which shall be approved by the pump manufacturer and submitted to the City of Fairfield's Department of Public Utilities for approval.

The complete system design shall include:

- a) Numbers of properties served by each force main and force main branch.
- b) Type of occupancy and anticipated flow rate for each property.
- c) Development sequence and timetable.
- d) Design flows (average, daily peak, instantaneous peak etc.).
- e) Grinder pump system manufacturer and model number(s). Include catalog cut sheets, pump curve(s), and a description of system features.
- f) Small scale sketch of entire pump system, including pump locations and elevations; location and direction of flow for each individual force main/service lateral, and each common force main or branch; location and elevation of discharge point(s); locations and elevations of any high points in the system. Each branch or zone shall be identified on the sketch with a unique branch number. Branches/zones shall be divided as described below.
- g) Table indicating the following information for each branch-zone to include:
 - 1) Branch number.
 - 2) Number of pumps connected directly to the branch.
 - 3) Accumulated total number of pumps connected directly or indirectly.
 - 4) Maximum daily flow in branch.

- 5) Pipe size.
- 6) Maximum daily velocity in branch.
- 7) Length of branch.
- 8) Friction loss in branch per Hazen Williams with C 120.
- 9) Accumulated friction loss.
- 10) Maximum force main elevation (between branch and discharge).
- 11) Maximum pump elevation (connected directly to branch).
- 12) Maximum elevation difference.
- 13) Maximum total dynamic head (for pump connected directly to branch).

510.03 Maximum Daily Design

The force main design maximum daily velocity (i.e. minimum velocity anticipated to occur at least once each day) shall not be less than 1.90 feet per second (fps) and not greater than 4.0 fps. This requirement shall apply to each force main branch or zone. Zones shall be divided based on the number of grinder pumps connected as shown in the following table. A new zone shall also be defined on each side of any common force main junction. The following table shall be used to determine the maximum number of grinder pumps operating simultaneously daily in each zone.

Maximum Number of Grinder Pumps Operating Simultaneously Daily

Number of Grinder Pumps Connected (Each range represents a separate zone.)	Maximum Number of Grinder Pumps Operating Simultaneously Daily
1	1
2-3	2
4-9	3
10-18	4
19-30	5
31-50	6
51-80	7

510.04 Basic Design and Construction Requirements for Low-Pressure Systems

All grinder pump systems shall be designed and constructed in accordance, but limited to, the following:

- a) The maximum number of contiguous (or nearly contiguous) homes allowed with private grinder pumps shall be 80 homes. Public wastewater lift stations may be considered for larger developments.
- b) All properties to be served by a particular common force main shall be included in the same section of the development and developed at the same time. Any future section requiring a common force main shall have a separate force main independent of any other common force main. Each individual grinder pump installation connected to a common force main shall be consistent with the overall system design approved by the manufacturer and Public Utilities Director.
- c) No public force main branches shorter than 300' will be permitted. Homes or other buildings on short cul-de-sac streets or panhandle/ flag lots shall be served via parallel individual service laterals.
- d) Where grinder pumps are required, each building or property that is (or could potentially be) owned by a different owner shall have a separate wet well tank, grinder pump, and force main/service lateral.
- e) No individual/private force main discharging directly to a gravity sewer will be permitted longer than will allow for a complete turnover of the sewage in the force main at least four times per day at 150 gallons/day per residential home.
- f) Single-family pipe requirements: All individual force mains and service laterals shall be 1-1/4" or 1-1/2" nominal diameter SDR 21 PVC, Schedule 40 PVC (200 psi) or HDPE pipe with a SDR rating of 11 or heavier and conform to iron pipe sizing (IPS) or copper tube sizing (CTS) Diameter (1-1/4" or 1-1/2") shall be determined during the design of each project/installation and shall be approved by the Public Utilities Director. Joints shall be rated for at least 200 psi. HDPE piping with a standard inside dimension ratio (SiDR) will not be approved.
- g) Commercial and Multi-family Residential pipe requirements: All individual force mains and service laterals shall be sized according to the estimated average flows anticipated from each building or parcel, with a minimum size of 1-1/4" nominal diameter. Pipe diameter shall be approved by the Public Utilities Director. Piping smaller than 3" nominal shall be SDR 21 PVC, Schedule 40 PVC (200) psi or HDPE pipe with a

SDR rating of 11 or heavier and conform to iron pipe sizing (IPS) or copper tube sizing (CTS). Piping 3" nominal diameter and larger shall be Ductile Iron Class 53 with ceramic epoxy Protecto 401 lining or approved equal. Joints shall be rated for at least 200 psi. HDPE piping with a standard inside dimension ratio (SiDR) will not be approved.

- h) Detectable magnetic marking tape shall be installed in the ditch line one-foot (1') below the final surface grade for non-metallic pipe installed within the public right-of-way and easements. If horizontal direction drilling is the installation method for the force main piping, the contractor shall affix minimum 12 ga. tracer wire to the product pipe prior to the pipe being pulled in to the drilling path.
- i) Private force mains that connect to a public gravity sewer shall connect via a wye fitting. Private force main connections to public manholes must be approved by the Public Utilities Director or his/her designee.
- j) Private service laterals that connect to a common/public force main shall connect at a manufactured fitting. No direct taps or tapping saddles will be permitted on public force mains. No new service connections to existing force mains will be permitted-only those connections included in the original design. A stainless-steel curb stop and cast-iron stop box shall be installed inside the public right-of-way or easement on each service lateral and shall be located approximately 5 feet from the public force main. Curb stops shall be least 2 inches lower than the connection of the service lateral to the public force main. All curb stops shall be made of stainless steel, and all curb-stop-boxes shall be made of cast iron or ABS with a cast iron lid. The top of each curb stop box shall be set in a concrete slab 18"x18"x6" thick (or 18" circular x 6" thick) with the top of the slab and box flush with the top of the ground.
- k) Each individual/private force main or service lateral shall have at least one check valve located at the pump, and an additional redundant check valve located at the curb-stop. Check valves and all other portions of the private force main or service lateral shall meet the pump manufacturers requirements and recommendations.
- l) All public force mains shall be at least 2" nominal diameter.

- m) Private force mains shall be installed with a minimum of 4 feet ground cover. Common/public force mains shall be installed with a minimum of 4 feet and a maximum of 12 feet ground cover. A minimum of 10 feet horizontal clearance (for parallel installations) and 18 inches vertical clearance (at crossings) shall be maintained between all force mains/services laterals and water mains/services.
- n) Whenever possible, common/public force mains should be installed with a continuous positive grade to the discharge into the gravity sewer. Approved air/vacuum release valves shall be installed anywhere where this is not possible and where localized high points exist or on long runs (greater than 2500 feet) with no clearly defined high point occur. Air/vacuum release valves shall be installed on upward-turned tees. Taps or tapping saddles are not allowed. The Engineer and contractor should also evaluate the need for air release valve(s) at high points on private force mains and service laterals.
- o) Flushing connections shall be installed at the end of each common force main (farthest from the discharge point), at each junction of two common force main branches, and at intermediate points such that the maximum distance between flushing installations (or discharge point) is 1000 feet. The Engineer and contractor should also evaluate the need for flushing attachments on private force mains and laterals.
- p) Public force mains shall discharge into a gravity sewer through a separate manhole with no up-stream gravity sewer connections. The force main shall be extended along the bottom of the manhole and approximately 10 feet into the gravity sewer at the sewer's invert. A flow channel and bench shall be formed in the manhole to allow any water or sewage to drain into the gravity sewer, but still allow access into the sewer for maintenance. No laterals may be connected into the gravity sewer within 12 feet of this manhole.
- q) A hydrostatic pressure test at 150 psi for at least 2 hours shall be performed in accordance with the hydrostatic testing requirements of AWWA C600 on all force mains and service laterals. If the pressure drops more than 5 psi in 2 hours, or the leakage is greater than allowable as determined by the formula in AWWA C600, the test shall be considered failed. Common force mains shall be tested after all air release valves, flushing installations, and other appurtenances have been installed,

including all service laterals installed to the curb stop. Private force mains and service laterals (on the pump side of the curb stop) shall be tested after the entire system is completely installed (except for the connection to the gravity sewer, when applicable).

- r) The following requirements apply to installations connected to common force mains: All pumps shall be progressive cavity non-clogging, non-jamming grinder pumps capable of pumping 15 g.p.m. at 0 feet TDH, 9 g.p.m. at 138 feet TDH, and capable of operating at negative TDH without overloading the motor. The maximum design total dynamic head (TDH) for any pump shall be 138 feet (60 psi) with the maximum number of grinder pumps operating simultaneously daily (see article five). Grinder pump motors shall have built-in automatic reset overload protection. Grinder pumps shall be designed for the specific purpose of grinding and pumping domestic wastewater. Grinder pumps shall be suitable for operation under varying conditions in a system with multiple other grinder pumps. An anti-siphon valve and check valve shall be integral with the grinder pump. Level sensing control for grinder systems shall be non-fouling type with no moving parts in contact with the sewage. Each grinder pump system shall have a high-level audible and visual warning alarm to warn the building's occupants of a high wet well level. A battery backup system is recommended. Future replacement pumps must be the same type and meet the same operating conditions as the original pump.
- s) Detectable marking tape shall meet the following requirements:
- 1) Minimum thickness of 5 mil, with a solid aluminum foil core. Construction is 2 mil clear film, reverse print laminated to aluminum foil to 2 mil clear film, making the film permanently printed.
 - 2) Minimum width of 3 inches
 - 3) Color coded green to signify Sewer or associated line.
 - 4) Tensile strength of 35 lbs./in. (15,000 psi).
 - 5) Elongation of 80 percent.
 - 6) Adhesives with value of Morton 548 or higher.
 - 7) Bottom layer with the value of virgin PE.
 - 8) Top layer with the value of virgin PET.
 - 9) Printability value of 45 dynes.

- t) Where future gravity service is reasonably possible (as determined by the Director of Public Utilities, or his/her designee) and there is unsewered up-stream property, a dry gravity sewer shall be installed from the most reasonable point at the downstream property line of the proposed development (for connection to the future trunk sewer) to the upstream boundary/boundaries of the development. This dry sewer shall be installed prior to acceptance of the grinder pump system by the City of Fairfield.
- u) Whenever there is potential for installation of a future gravity sewer to serve the involved properties, each building utilizing a grinder pump system shall have a gravity sewer drain through the building's foundation to facilitate connection to the future sewer, whether the grinder pump is located inside or outside the foundation.
- v) Where future gravity sewer service is reasonably possible, adequate platted right-of-way and/or easements shall be provided for future local gravity sewers. Each building's gravity sewer drain shall leave the foundation at a location that will facilitate connection to the future gravity sewer.

510.05 Operation and Maintenance

All individual grinder pump facilities and force mains serving only one home or property shall be privately owned and maintained by the property owner. All common force mains serving multiple properties will be publicly owned and maintained by the City of Fairfield.

The City of Fairfield will maintain the service lateral from the public force main to (and including) the curb-stop. The property owner will be responsible for the private service lateral or force main from the curb-stop the pump. The property owner shall maintain all check valves on the private service lateral and/or force main.

The property owner shall be responsible for operation, maintenance, and future replacement of the private grinder pump system. Maintenance of each grinder pump system shall be performed by a licensed contractor, which is certified and approved by the equipment manufacturer. Documentation of all maintenance shall be provided to the City of Fairfield's Public Utility Department upon request. Failure to adequately maintain the private pump system or provide the required documentation will cause for disconnection of sewer service by the City of Fairfield.

510.06 Construction Plan Requirements

The following language shall be included on all construction drawings for developments that include any lots to be served by private grinder pump systems. Such plats shall clearly indicate which lots require grinder pumps, and appropriate utility easements.

- a) Where grinder pumps are required, each building or property that is (or could potentially be) owned by a different owner shall have a separate wet well tank, grinder pump, and force main/service lateral.
- b) Each individual grinder pump installation connected to a common force main shall be consistent with the overall system design approved by the pump manufacturer and the City of Fairfield's Director of Public Utilities Department, or his/her designee.
- c) Each building utilizing a grinder pump system shall have a gravity sewer drain through the building's foundation at a location that will facilitate connection to a future gravity sewer, unless future gravity sewer service is not possible.
- d) All individual grinder pumps facilities and force mains serving only one home or building shall be privately owned and maintained by the property owner. All common force mains serving multiple properties will be publicly owned and maintained by the City of Fairfield.
- e) All individual force mains and service laterals shall be 1-1/4" or 1-1/2" nominal diameter SDR 21 PVC, Schedule 40 PVC (200 psi) or other approved material.
- f) Detectable magnetic marking tape shall be installed in the ditch line one foot (1') below the final surface grade for non-magnetic pipe installed the public right-of-way and easements.
- g) Private force mains that connect to a public gravity sewer shall connect via a "Wye" fitting. No private force main connections to public manholes will be allowed.
- h) Private Service laterals that connect to a common/public force main shall connect at the original laterals installed with the public force mains. No new

service connections to existing force mains will be permitted-only those connections included in the original system design. All curb-stops shall be made of brass, and all curb-stop-boxes shall be made of cast iron. The curb-stop and curb-stop-box shall remain when the connection is made, and the elevation of the curb-stop shall not be changed. The top of each curb-stop-box shall be set in a concrete slab 18" x 18" x 6" thick (or circular x 6" thick) with the top of the slab and box flush with the top of the ground. The City of Fairfield will maintain the service lateral from the common force main to (and including) the curb-stop. The property will be responsible for the private service lateral from the curb-stop to the pump.

- i) Each individual/private force main or service lateral shall have one check valve located at the pump, and an additional redundant check valve located at the curb-stop. The property owner shall maintain all check valves. Check valves and all other portions of the private force main or service lateral shall meet the pump manufacturer's requirements and recommendations.
- j) No individual/private force main discharging directly to a gravity sewer will be permitted longer than will allow for the complete turnover of the sewage in the force main at least four times per day per day at 150 gallons/day per residential home.
- k) The property owner shall be responsible for operation, maintenance, and future replacement of the private grinder pump system.
- l) The annual maintenance of each grinder pump system shall be performed by a licensed and bonded plumber/contractor, which is certified and approved by the equipment manufacturer. Documentation of all maintenance of all pumping shall be provided by request to the City of Fairfield Director of Public Utilities, or his/her designee. Failure to adequately maintain the on-site pump system, or provide the required documentation will cause for disconnection of sewer by the Public Utilities Department.
- m) The Engineer and plumber should evaluate the need for air release valve(s) and/or flushing attachments on private force mains and service laterals.
- n) A hydrostatic pressure test of each private force main/service lateral shall be performed in accordance with the City of Fairfield requirements.

- o) The following requirements apply to installations connected to a common force main:
- 1) All pumps shall be progressive cavity non-clogging, non-jamming grinder pumps capable of pumping 15 g.p.m. at 0 feet TDH, 9 g.p.m. at 138 feet TDH, and capable of operating at negative TDH without overloading the motor.
 - 2) The grinder pump motor shall be designated for the specific purpose of grinding and pumping domestic wastewater. Grinder pumps shall be suitable for operation under varying conditions in a system with multiple other grinder pumps.
 - 3) An anti-siphon valve and check valve shall be integral with the grinder pump.
 - 4) Level sensing control for the grinder pump systems shall be of a non-fouling type with no moving parts in contact with sewage.
 - 5) Each grinder pump system shall have a high-level audible and visual warning alarm to warn the building's occupants of a high wet well level. A battery back-up system(s) is strongly recommended.
 - 6) Grinder pump systems shall be an *Extreme Series* grinder pump system as manufactured by Environment One Corporation, or approved equal. Future replacement pumps must be the same type, and meet the same operating conditions as the original pump. **See the Force Main Grinder Pump Station Installation drawings on Page 37 of the Standard Construction Drawings.**

510.07 Deed Restrictions

The following language shall appear on the recorded deed and record plat for each property to be served by a private grinder pump system. The language shall be included on any subsequent deeds, certificates of transfer etc. until such time as the grinder pump system is eliminated and replaced by a different means of providing sanitary sewer to the property.

- a) The individual force main(s) serving the building(s) on this property, both check valves and all other appurtenances that are a part of the force main, or are connected to it, are private and shall be owned and maintained by the property owner. The curb-stop, curb-stop-box, and force main between the curb-stop and public force main shall be owned and maintained by the City of Fairfield.

- b) The property owner shall be responsible for operation, maintenance, and future replacement of the grinder pump system. Maintenance of each grinder pump system shall be performed by a licensed and bonded plumber/contractor, which is certified and approved by the equipment manufacturer. Documentation of all maintenance shall be provided to the City of Fairfield's Public Utilities Department, 5350 Pleasant Avenue, Fairfield, Ohio 45014. Failure to adequately maintain the on-site pump system, or provide the required documentation will cause for disconnection of sewer service by the Public Utilities Department.

- c) For installations connected to a common force main:
 - 1) All pumps shall be progressive cavity non-clogging, non-jamming grinder pumps capable of pumping 15 g.p.m. at 0 feet Total Dynamic Head (TDH), 9 g.p.m. at 138 TDH and capable of operating at negative TDH without overloading the motor. Grinder pump motor shall have built-in, automatic reset overload protection. Grinder pumps shall be designated for the specific purpose of grinding and pumping domestic wastewater. Grinder pumps shall be suitable for operation under varying conditions in a system with multiple other grinder pumps. An anti-siphon valve and check valve shall be integral with the grinder pumps. Level sensing control for grinder pump systems shall be non-fouling type with no moving parts in contact with sewage. Each grinder pump system shall have a high-level audible and visual warning alarm to warn the building's occupants of a high wet well level. A battery back-up system is recommended. Future replacement pumps must be the same type and meet the same operating conditions as the original pump.

 - 2) These conditions are to run with the land, and shall be binding upon the Owner(s) as well as the heirs, successors, administrators, and assigns of the Owner(s), until such time as the grinder pump system is eliminated and replaced by a different approved means of providing sanitary service to the property.

 - 3) Invalidation of any condition herein by a judgment or court order shall in no way affect any of the other provisions, which shall remain in full force and effect.

511.00 BUILDING PERMITS AND OCCUPANCY

Building permits in a new development (both major and minor Subdivisions) shall not be issued until the sewers serving the structure have been tested and approved. This prevents the unauthorized connection of a structure to a sewer thus preventing a test. A model home for sales display only, and not for immediate occupancy, may be built prior to construction of the sanitary sewers. The house shall not receive an occupancy permit issued until the sanitary sewers are tested and accepted by the City of Fairfield.

512.00 AS-BUILTS

Within thirty days after completion of construction work on any part of the wastewater system, the contractor shall provide a complete set of certified, reproducible as-built drawings to the Public Utilities Director or his/her designee, for all sewers constructed, including those constructed in subdivisions. These plans must be clearly marked “As-built” on every sheet with all sewer service lateral locations, manholes, inverts, and the distances verified by a post-construction survey made at the developer’s expense.

As-built plans shall be provided on reproducible sheets measuring 24 inches by 36 inches and sealed and signed by the engineer to certify that the “As-builts are per field conditions. Additionally, an AutoCAD (.dwg or .dxf) shall be submitted electronically.