

NEW CHANGES IN BLUE, revisions in red

408 WATER DISTRIBUTION SYSTEM

1. The plans for the installation of a **Public** water main supply system shall be provided by the petitioner and approved by the Greenfield Board of Public Works and Safety. Upon the completion of the water supply installation and one week prior to acceptance, the plans for such system's as-built drawings shall be filed with the Plan Commission staff and Water Utility.
2. The purpose of these Water Distribution System Construction Standard Specifications is to ensure quality workmanship, adequate pressure and fire protection, and last but not least, to guarantee the residential, commercial, and industrial customers of the Greenfield Water Utility clean and safe water.
3. Failure to abide by these Specifications **and or City of Greenfield Ordinance** will result in the immediate suspension of any waterline construction activities.
 - a. A full-time Water Utility Inspector may be required for work to resume.
 - b. See section 52.16 of the Water Utility Ordinances.

4. PUBLIC WATER SYSTEM SPECIFICATIONS

a. GENERAL

i. SCOPE

1. WATER DISTRIBUTION SYSTEM STANDARD SPECIFICATIONS - The City of Greenfield Water Utility (Public Water System Identification Number 5230004) has established the following Specifications for contractors to follow when installing water lines in the City of Greenfield.
2. The petitioner shall provide the subdivision with a complete public water distribution system, including fire hydrants at appropriate locations that shall be connected to the municipal water distribution system and approved by the Greenfield Board of Public Works and Safety.

b. DEFINITIONS

i. The following definitions/ abbreviations shall apply

1. ASTM- American Society for Testing and Materials, Latest Edition
2. City- City of Greenfield
3. Engineer- City of Greenfield Engineer
4. INDOT- Indiana Department of Transportation
5. IDEM- Indiana Department of Environmental Management
6. NOI- Notification of Intent to Construct a Water Main Extension
7. Utility- City of Greenfield Municipal Water Utility

8. Waterlines- Any pipe that carries potable water from the public water main to the meter.

5. SUMMARY OF STANDARDS SECTION

- A. Submittals
- B. Products for Potable Water distribution system
- C. Execution of the Installation of Potable Water System pipes
- D. Installation of all required and restraint couplings.
- E. Flushing, cleansing, and disinfecting of Piping System.
- F. Pressure Testing of Piping System.
- G. Bacteria Testing of Piping System
- H. Back-Flow Preventers Requirements
- I. Utility Regulations for Water Service Connections
- J. Requirements for Existing Water system testing
- K. Charges Established.

6. STANDARDS SECTION

A. SUBMITTALS

1. Along with the City of Greenfield Specifications, any contractor installing waterlines must submit a construction permit or NOI application to the Drinking Water Branch of the Indiana Department of Environmental Management.
 - a. No construction will be allowed without first obtaining a NOI, or permit (if required), approval from IDEM.
 - b. The City of Greenfield Water Utility must sign this application for approval before it will be accepted by IDEM.
 - c. The Water Systems capacity information will be provide to the applicant at technical review meeting. This information and subsequent calculations must be submitted to the Greenfield Water Utility prior to the project being approved to be constructed.
 - d. When submitting this application to the Water Utility, a set of Final Approved construction plans must be included.
 - e. These plans, along with the application, must be stamped and signed by a State of Indiana Registered Professional Engineer.
 - f. Applicants whom are submitting plot plans submitted for approval for the construction of a building on a lot within the City of Greenfield, shall be reviewed for compliance with the current City Water Main Standard Specifications.
 - i. The City of Greenfield and or the Greenfield Water Utility shall not be held liable for any infrastructure changes that may or may not be required to accommodate the construction on a lot within the Limits City of Greenfield.
~~Lot construction plans may, at the utility's discretion require a technical review prior to permit being issued.~~
 - ii. Product data sheets must be submitted on all Contractor supplied materials including pipe, valve boxes, valves, mechanical joints, fittings, tees, and all other miscellaneous products proposed for use.

- iii. All material used in the construction of waterlines and mains in the Greenfield Municipal Service Territory must be Domestic made and purchased unless otherwise approved.

2. PROJECT RECORD DOCUMENTS

- a. Record drawings shall be supplied to the City within 90 days of the completion, testing, and acceptance of installed water system.
- b. The record drawings shall be submitted as hard copy and digital copy, as well as ARCGIS drawing file or format approved by Greenfield GIS Coordinator.
- c. The ARCGIS drawing file and hard copy will identify all locations of installed piping, valves, fittings, hydrants, and service lines from known reference points.
- d. The final record documents will clearly state if the subdivision will have private infrastructure if applicable.

3. QUALITY ASSURANCE

a. CODES AND STANDARDS

- i. Comply with all Current City of Greenfield Water Ordinances.
- ii. Comply with these standards as addition to City of Greenfield Water Ordinances.
- iii. Comply with "American Water Works Association" (AWWA) standards to extent indicated by references herein. All references shall imply the latest revision.
- iv. Comply with "Recommended Standards for Water Works" (Ten States Standards) to extent indicated by references herein. All references shall imply the latest revision.
- v. Comply with requirements of the City of Greenfield Engineering Department for work along property lines, on public property, and utility easements.

b. Installer's Qualifications:

- i. Contractor shall have a minimum of three years of verifiable experience installing water distribution systems of type required.
 - 1. This three years of water installation projects must be submitted prior to the primary Technical Review Committee Meeting.
- ii. This experience, as expressed in previous projects, shall be submitted by the Contractor at least two weeks prior to the primary Technical Review Committee Meeting for the application being considered for approval for construction.

4. PROJECT CONDITIONS

- a. In the event that any unknown or unmarked active utilities be broken during excavation work, stop work immediately. Do not proceed further with work until decision has been reached regarding repair, disposition, or relocation of utilities. Notice must be made to the Greenfield Water Utility.
 - i. The City of Greenfield Engineer, Project Manager, and or the Water Utility Manager or their designee will make any determination of impact utilities.
 - ii. Storm water field tiles must be repaired, rerouted, or connected to a storm sewer system when encountered.
 - iii. Any drainage tiles, regardless of its apparent condition, that is damaged or severed during construction must be repaired.
 - iv. Examine areas and conditions under which water system's materials and products are to be installed.
 - 1. Do not proceed with work until satisfactory conditions are present.
 - 2. 48 hour notice and site inspection by the Water Utility must proceed any water line installation.

5. SEQUENCING AND SCHEDULING

- a. Construction Sequence:
 - i. 48 hour notice must be given to the Water Utility prior to the start of any construction.
 - 1. Based on the City of Greenfield business schedule
 - ii. Contractor shall submit proposed detailed construction sequence for:
 - 1. Connection to active water mains by hot tap. No contractor shall initiate shutting down of active water mains unless said shut down has been coordinated with and at the direction of the Greenfield Water Utility.
 - 2. Proposed method of disinfecting of new system or main.
 - 3. Coordination with Greenfield Water Utility is defined as scheduling construction, inspection, valve actions, or any other city involved activity; must be done with at least two City of Greenfield business day notice.

6. ISOLATION OF NEW IMPROVEMENTS

- a. The new construction water main isolation valves shall remain closed until all testing has been completed and accepted by the Water Utility.
 - i. At no time shall any contractor open or close any water valve.

B. PRODUCTS

- 1. All products used in any and all water line or main installation will be domestic material only.

- a. If any product to be used in the installation of water main is found to be non-domestically made or incorrectly installed, the developer will be required to remove the unapproved materials and re-install the correct approved materials.

2. WATER MAINS

- a. Pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/AWWA/WA C111/A21.1

- b. DUCTILE PIPE

- i. Class 52 and Class 350 pressure pipe.
 - ii. Pipe and fittings shall meet or exceed ANSI/AWWA C104/A21.4

- c. SDR 11 HDPE

- i. Pipe may be used for boring under highways, creeks, ditches, etc. as approved by the Water Manager or their representative on a stamped set of plans.
 - ii. Ductile iron fittings must be used with HDPE pipe
 - 1. Harvey adaptors are required to transition from HDPE to Ductile Iron pipe.
 - iii. Contractors are required to pull back a minimum of two sets of tracer wires with any bored in main or line.

- d. ACCEPTABLE MANUFACTURERS

- i. Will be determined when material submittals are reviewed prior to the start of site construction.

3. CORPORATION STOP (TAP) – 3/4” – 1”-1 1/2”-2”

- a. Tap is to be easy turning, ball valve having a round, full-open, unobstructed flow way with AWWA taper threads (CCI) and CTS compression outlet.

4. FITTINGS

- a. Ductile-iron, cement lined AWWA C 104; and rubber-gasket joints, AWWA C111.

- b. Fittings shall be ductile iron and in accordance with the requirements of either ANSI/AWWA C153/A21.53 or ANSVAWWA C110/A21.10.

- c. Mechanical joints shall conform to ANSI/AWWA C111/A21.11. TAPS MADE ON WATER MAIN

- i. New subdivision main installation shall be made by hot tap of existing city water mains.
 - ii. Single service taps shall be made by using a Stainless Steel Full Circle Clamp type tapping sleeve.

5. TAPPING VALVES

- a. AWWA C509 compatible with stainless steel tapping sleeve
 - i. 175 psi minimum working pressure.
 - ii. Iron body, resilient wedge, non-rising stem, O-ring type packing, and left hand open.
 - iii. 2" square operating nut, flanged inlet, and mechanical joint outlet connection.
 - iv. Acceptable manufacturer is Mueller or Kennedy.

6. GATE VALVES

- a. AWWA C509,
 - i. 175 psi minimum working pressure.
 - ii. Iron body, resilient wedge, non-rising stem, left hand open,
 - iii. 2" square operating nut, mechanical joint ends, O-ring packing.
 - iv. Acceptable manufacturer is Mueller or Kennedy.

7. VALVE BOXES

- a. Two-piece screw type shaft,
 - ii. 5" minimum inside diameter
 - iii. Cast iron of 1/4" minimum thickness, flared base.
 - iv. Centering disk
 - v. Appropriate water labeled valve box lid

7. GLANDS, GASKETS, BOLTS, AND NUTS

- i. AWWA C111 MEGA LUG restraints shall be used on all mechanical joints.

8. FIRE HYDRANT ASSEMBLIES (Includes anchor tee, valve, valve box, adapter pipe, and hydrant)

- a. Assembly must be approved by the City.
 - i. TEE:
 - 1. Mechanical joint with 6" branch line for anchoring and locking hydrant assembly in place
 - 2. Include split gland.

3. 6" Valve and Valve Box: See Items 6 and 7 of this section

ii. ADAPTER PIPE

1. 6" diameter by 2'-0" long minimum for locking valve to hydrant.
2. Use anchor couplings when distance permits

iii. HYDRANT

1. AWWA C502, 5-1/4" valve opening with 6" barrel.
 - a. Two 2-1/2" nozzles, one 5" Storz Connection
 - b. Ground line breakable flange
 - c. Self-draining
 - d. Left Hand open
 - e. Stainless steel bolts threads and operating nut sizes conforming to municipality standard.
 - f. Mueller Super Centurion, Kennedy K81 Guardian are accepted.

b. PIPE COUPLINGS

- i. Suitable for size and gap between pipes being coupled.

c. BACKFILL

- i. #8 stone is the only material to be placed around hydrant drain holes.
- ii. #8 stone must cover to a minimum of 18" above drain holes
- iii. #24 sand is the only backfill allowed for all pipe materials and sizes.

d. COLOR

- i. All hydrants will have the barrels painted safety yellow.
 1. Public Hydrants
 - a. The 2 1/2" hose caps will be painted the color of the size of the main the hydrant leg is attached.
 2. Private hydrants
 - a. The bonnets painted to match the 2 1/2" hose caps. These caps will be painted the color of the size of the main that the hydrant leg is attached.

- ii. Color reference by main size:
 - 1. 20" - Gold
 - 2. 16" – Orange
 - 3. 12" – Yellow
 - 4. 10" – Black
 - 5. 8" – Green
 - 6. 6" – Red

8. BUILDING WATER SERVICE LINES

a. PIPE MATERIAL

- i. Type K soft copper required from tap and tapping saddle to stub out.
- ii. Water service lines will be installed perpendicular from the water main to the location of the water service meter pit.
- iii. There will be one water service line for each lot sized appropriately for the building to be served by the Municipal Water System.
- iv. No other connection will be made inside the City meter pit.

b. CUSTOMER METER PITS

i. 5/8" Standard Meter Pit- Residential standard

- 1. 18"x 36" polyethylene pit body.
- 2. The meter pit cover shall be an 18" Ford ring and lid, pierced for a radio read antennae. Lids to have recessed centers.
- 3. Packed #24 sand shall serve as the pit base.

ii. 1" Standard Meter Pit- As Approved

- 1. 24"x36" to 48" polyethylene pit body
- 2. The meter pit cover shall be a 24"x18" expansion ring with a pierced 18" Ford ring and recessed center lid.
- 3. Packed #24 sand shall serve as the pit base.

iii. 1.5" or 2" services

- 1. Require a 2" tap with 2" gate valve and 5 ¼" valve box
- 2. 1.5" or 2" curb stops shall not be permitted.

c. INDOOR WATER METERS

- i. 1" or larger, along with the check valve assemblies, shall be placed indoors in the manner approved by Water Utility Distribution Foreman or appointed representative.
- ii. A meter set drawing is available at the Water Utility for 1" and larger interior meter setting.
- iii. Interior meter settings will be made in accordance with AWWA Standard M33 current edition.

b. RECORD DRAWINGS

- i. The Developer shall provide the City with record drawings for all water mains with services, in accordance with Section B(a)(iii)(5) of the current water standard specifications
- ii. The Contractor shall provide the City with all internal "As-Built" locations upon completion of the water main installation and prior to pressure testing of the main.
- iii. Submission to include shape file drawing for GIS update as per City GIS Coordinator.

c. SITE RESTORATION

- i. All areas disturbed by any construction on and off site, shall be restored to its original condition.
- ii. Excess construction material shall be removed from the project area as directed by the Developer at the Contractor's expense.
- iii. All disturbed area shall be seeded.
- iv. All City easements shall be seeded and straw covered.
- v. Netting may be required depending upon construction location.

C. EXECUTION OF THE INSTALLATION OF POTABLE WATER SYSTEM PIPES

1. BONDS, LOCATES, AND PERMITS

- a. The contractor shall furnish all bonds necessary to get permits from the City prior to starting construction.
- b. It shall be the responsibility of the Contractor to determine the location of existing utilities by calling IN811 48 hours prior to any excavating.
- c. The Contractor will be further responsible for maintaining operation of the active utilities.
 - i. The Contractor and or developer will be responsible for any modification of any installed Water infrastructure.
 - ii. The Contractor and or developer will be responsible for the due diligence to survey and plan any require infrastructure modifications or replacements.

- d. The Engineer will not be responsible for any damages caused by erroneous location shown or by the omission of a utility location on the plans. An IDEM approved application must be on file with the utility prior to the start of water main systems.
- e. The Developer shall be responsible for all approvals, permits, and easements.
- f. The Developer shall dedicate all water mains and easements containing public water mains to the City.

2. PRE-CONSTRUCTION CONFERENCE

- a. Prior to the beginning of any construction on the project site, a pre-construction conference will be scheduled with the City.

3. GENERAL REQUIREMENTS

- a. The current City Water Standard Specification shall prevail as to materials and methods of construction.
 - i. All future water main installation, either connected to or extended from this system shall be constructed in accordance with these specifications.
 - ii. All lots shall be served by a 3/4-inch water service line, as a minimum.
 - iii. Irrigation systems shall not be connected inside the City meter pit.
 - 1. Separate meter setting is required.
 - 2. Irrigation services shall be a separate water main tap and setting.

4. EROSION CONTROL

- a. The contractor shall be responsible for temporary erosion control measures during construction (i.e., straw bales around storm inlets and swales that exit the site). Where required, the Contractor shall be responsible for obtaining a Storm Water NPDES permit for the project. All erosion measure shall be made in accordance with current City Storm Water Standard Specifications.

5. SAFETY

- a. The Contractor is required to adhere to City of Greenfield Safety Policies, regulations, and requirements at all times.
- b. Failure to comply with any safety requirement will result in a stop of all work on the site until the safety deficiency is corrected.
- c. No animals, children, non-essential employees on city property. Only the individuals completing the task assigned.

- d. Contractors are to follow all OSHA State, Federal and Greenfield guidelines (always adhering to the more stringent regulation).
- e. Contractors are to check in with the department Manager or PM when starting a project.

6. TRENCH SAFETY AND CONFINED SPACE ENTRY

- a. The contractor is responsible for safety at the job site. Compliance with all City of Greenfield, State, and Federal safety regulation, including but not limited to construction trench safety and confined space entry regulations, shall be the responsibility of the Contractor.

7. SEPERATION DISTANCES

- a. Sewer (to include Storm Water sewer) and water mains shall be laid with at least a 10-foot horizontal separation. The distance shall be edge to edge. In cases where it is not practical to maintain a 10-foot separation, deviation may be allowed on a case-by-case basis. Such deviation may allow installations of sewers and water mains closer provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18-inches above the top of the sewer.
- b. For crossings of water main and sewers, a minimum 18-inch vertical separation between the two pipes shall be provided as measured from the outside of the sewer to the outside of the water main. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
- c. Where it is impossible to obtain proper horizontal or vertical separation, as indicated above, both the water main and sewer shall be constructed of ductile iron pipe with mechanical joints complying with the current City Water Main Standard Specification and be pressure tested to 150 PSI to assure water tightness before backfilling

D. INSTALLATION OF ALL REQUIRED MAIN, HYDRANTS, SERVICE LINES, AND RESTRAINT COUPLINGS.

1. EXCAVATION

- a. Perform excavating work through whatever materials are encountered (including rock), in obtaining indicated elevations.
- b. Perform removals of any obstructions to obtain this condition at no cost to Owner.
- c. Use shoring to support trench walls as required per OSHA Standards.
- d. Remove excess and unsatisfactory excavated materials from site and dispose of in a legal manner.
- e. Stockpile satisfactory excavated material at distance from banks of trenches sufficient to avoid overloading and cave-ins, but in no case closer than 1/2 depth of excavation.
- f. Provide adequate drainage around stockpiled material, shunting surface water away from open trenches.

2. PIPING INSTALLATION

- a. All water main to be installed in the City of Greenfield shall be designed and installed to create loops and prevent the addition of non-connected mains in any water main system.
 - i. If a non-connected section must be built due to limitations beyond the control of the petitioner a blow off hydrant and valve will be installed to allow future expansion without taking customers out of service. See subsection 5.
- b. Pipe for water mains shall be a minimum of 6-inch diameter or larger as indicated for the particular project for areas that require fire protection in accordance with Ten States Standards.
- c. Inspect pipe before installation for apparent defects. Mark individual defective materials with white paint and promptly remove from site.
- d. Pipe stored onsite will be stored in such a manner to prevent infiltration of dirt and untreated water from entering the pipe.
- e. The pipes will be covered with an impermeable cover that is securely attached to the pipe.
- f. Valves for Water Mains, "T"s", Hydrants, etc. shall be clustered as close as practical to facilitate ease of operation and locating in future required maintenance.
 - i. Valves must be placed at all points on tees and crosses.
 - ii. Distances must not exceed 600 feet between valves.
- g. Install system in accordance with AWWA C600 "Standard for Installation of Ductile-Iron Water Mains, C900, DR14 and HDPE Pipe Water Mains and Their Appurtenances."
 - i. All codes and standards shall meet or exceed state regulations 327 IAC 8-3.2 Technical Standards for Water Mains.
 - ii. A copy of this standard shall be maintained at project site for reference.
- h. HDPE water mains shall be installed with minimum of two #10 tracer wire.
 - i. Tracer wire shall be fastened to the main at intervals not to exceed 10 ft. and shall be positioned at the top or 12 o'clock position of the pipe.
 - ii. Tracer Wire may be spliced by using a [sealed DryConn connector](#).
 - iii. The wire's coating must be stripped at these connections to ensure electrical continuity to facilitate future utility locating requirements.
 - iv. Water main "T" junctions shall also be connected at these locations to facilitate the same.

- v. Tracer wires for hydrants shall be exposed, stripped and fastened to the upper most flange bolts above ground level.
- i. In placing pipe, jointing, bleeding, backfill and embankment construction, exercise care to see that the pipe is not damaged during unloading or placement on bed.
- j. During compacting of backfill, by movement of heavy equipment over fill, or by any other forces that may cause damage.
- k. Remove and replace any pipe which is not in true alignment and grade, or which shows undue settlement after laying or is otherwise damaged.
- l. Install piping only by laying sections of pipe up slope
 - i. Install spigot ends into previously laid bell ends.
 - ii. Install piping with uniform bearing along its length.
 - iii. Pipe deflection will not be accepted.
 - iv. Pipe ends must be protected by placing a protective cover over the pipe at the end of each work day.
- m. **Backfill** under pipe 6" with #24 sand. Extend up around and 24" over the pipe. Above this level use one of the following methods:
 - i. In lawn areas, use clean earth backfill and place 6" lifts and compact to 90% maximum density (at optimum moisture content) as determined by Modified Proctor Tests. ASTM D 1557.
 - ii. In paved areas backfill, compact, and fill with concrete per applicable standards
 - 1. City Street Principles and Standards of Design
 - 2. Current INDOT Standards and Specifications
 - 3. Full depth granular material and #24 sand must be used within 5 feet of all pavement areas and under sidewalks.
 - 4. Cut off sheeting at 2'-0" below finish grade when backfilling reaches that approximate level.
 - 5. Curbs shall be marked with "W" where the service line crosses onto lot from the water main.
 - 6. The water service line shall be installed perpendicular from the water main to the water meter pit.
- n. Water for testing, filling and flushing shall be from approved source available from the City without charge.
- o. Unless otherwise approved the Contractor will not permit the use of hydrants, or other water sources for construction activity without the expressed written permission of the Water Utility.

- p. Pipe shall be a minimum of 8" Ductile Iron Pipe (DIP) for the main public roads of a new subdivision.
- q. Pipe shall be a minimum of 6" DIP for a subdivision cul-de-sac following the curve of the road ending with a 5' bury height hydrant as per these standards.
- r. 54 inch minimum cover shall be maintained for new work except as required to transition to meet existing water line elevations.
 - i. Not more than 30 feet of trench shall be dug in advance of completed pipe laying excavation.
 - ii. Blocking as specified in AWWA C600 Section 8 shall not be provided except concrete blocks shall be used.
 - iii. Concrete shall not be poured on any water line.
 - iv. Mega-lug restraint collars shall be used.
 - v. Restraint collars 2 joints on each side of a 90 degree change in direction and one joint on each 45, 22.5, 11.25 degree change in direction.
- s. Stock pilings of granular materials must be surrounded by approved erosion control material such as coconut logs or approved equal.
- t. AWWA C600 Section 11.4 shall not apply, and Section 11.5 shall not apply unless indicated otherwise.
- u. Anchorage for hydrants shall be through anchorage fittings as specified. No other means are acceptable.
- v. Fire Hydrants will be used as the only means for dead end blow off.
 - i. Upon extension of the water main, the blow off fire hydrant will be returned to the Water Utility.
 - ii. Fire Hydrants shall be placed no more than 400 feet from one hydrant to the next.

3. SITE RESTORATION

- a. All areas disturbed by any construction on and off site, shall be restored to near its original condition
- b. Excess construction materials shall be removed from the project area as outlined in construction plans.
- c. All disturbed area shall be seeded in the best method required to prevent erosion.
- d. All City easements shall be seeded and covered.
- e. Lawn netting may be required depending upon construction location.

E. CLEANING AND DISINFECTION WATER DISTRIBUTION PIPING REQUIREMENTS

a. CLEANING OF WATER MAINS

- i. Notify the Utility representative at least 2 working days prior to the commencement of cleaning and disinfecting activities.
- ii. Water for testing, filling, and flushing shall be from approved source available from the City without charge.
- iii. Contractor shall not permit the use of hydrants or other water sources for construction activity without the expressed written permission of the Water Utility Manager or their designee.
- iv. Contractor shall purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired, prior to use.
- v. Use the purging and disinfecting procedure proscribed by the City jurisdiction or, in case a method is not proscribed by that authority, use the procedure described in AWWA C65 1, or as described below.
- vi. Comply with NFPA 24 for flushing of piping, flush the piping system with clean, potable water until discolored water does not appear at the points of outlet.
- vii. Fill the system or part thereof with a water/chorine solution or place granular chlorine as main is installed to achieve 50 parts per million chlorine residual.
 1. City of Greenfield Water Utility personnel will Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
 2. Drain the system or part thereof of the previous solution
 - a. When the main is to be drained containing high strength chlorine, the chlorinated water must be de-chlorinated prior to any discharge to storm or sanitary sewer system, or open ground.
 - b. Following the allowed standing time, flush the system with clean, potable water until chlorine levels above 1.5 ppm does not remain in the water coming from the system.
 - c. When the main is to be drained containing high strength chlorine, the chlorinated water must be de-chlorinated prior to any discharge to storm or sanitary sewer system, or open ground.

b. SHUTDOWN OF ACTIVE WATER MAINS

- i. "Hot Taps" are the preferred method of extending or adding a section of water main to an existing main.
- ii. Only in extreme cases will the utility permit the isolation of an existing water main.
- iii. If in these extreme and rare cases, portions of existing water distribution system is required to be isolated to make new connections, minimum two (2) week advance notice shall be given to Utility.
- iv. These shutdowns shall be shown on the construction schedule.
- v. Times for shutdown shall be coordinated with and shall be at discretion of the Utility

- vi. Existing valves shall be operated only by Utility personnel.
- vii. New connections shall be made in such a manner that the water service is shut off to existing users for a maximum of 4 hours.
- viii. 48- Hour advance notice shall be given to affected water users that their water will be shut off after authorization from the Utility has been obtained.
- ix. Contractors shall be responsible for the delivery of notices to those affected indicating date, time, and duration of shut down.
- x. Contractors must confirm with Utility those services that may be affected and then adhere to the times stated in notice.

F. PIPE TESTING

a. HYDROSTATIC TESTS

i. NOTIFICATION

1. The Contractor shall notify the Utility 2 working day prior to testing.

- a. A Utility representative shall be present for all testing.
- b. The Contractor shall provide all temporary bracing for testing operations.
- c. Refer to Water Utility Ordinances for charges involved with water main testing or when additional inspection services are required due to poor construction practices witnessed by Utility Employees.

d. TEST PROCEDURE

- i. Test at not less than 150 psi for 4 hours.
- ii. Maximum allowable loss 5 psi over 4 hours.
- iii. Remake leaking joints with new materials and repeat test until leakage is within above limits.
- iv. Prepare reports for all testing activities.

G. BACTERIA TESTING

- a. A Certified Greenfield Utility Water Operator shall be responsible to collect and submit the first three sets of water samples to the City of Greenfield's designated State approved Laboratory for testing. Sample collection will be scheduled at the discretion of the Water Utility.
 - i. A set of samples is defined as the collection of two specimens from each required location in the newly constructed water main.
 - ii. Should subsequent sets of samples be required, the contractor will be financially responsible for each additional set.

- iii. At least one set of samples shall be collected from every 1,200 ft (366 m) of the new water main, plus one set from the end of the line and at least one set from each branch.
- iv. Under no circumstance will any water line be accepted by the City until the Utility has received completed testing paperwork from the City of Greenfield's designated State Approved Laboratory stating the bacteriological testing is satisfactory.

H. CROSS CONNECTION AND BACKFLOW PREVENTION DEVICES

- a. Backflow preventers shall comply with AWWA standard C511.
- b. Double backflow assemblies shall comply with AWWA standard C510.
- c. In no case will any backflow preventer be housed in a vault or below ground.
- d. Backflow prevention devices shall be installed after the Public Water Utility Meter in all cases.
- e. No installation of public water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted or contaminated water, mixtures or substances to enter any portion of such piping from any tank, receptacle, equipment or plumbing fixture by reason of back siphonage or any other cause, either during normal use and operation thereof or when any such tank, receptacle, equipment or plumbing fixture is flooded or subject to pressure in excess of the pressure in the hot-or-cold-water piping;
- f. No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by any public or private water service system, and any pipes, conduits or fixtures containing or carrying water from any other source or containing or carrying water which has been used for any purpose whatsoever, or any piping carrying chemicals, liquids, gases, or any substance, unless there is provided an approved backflow prevention device.
 - i. IDEM's approval must be obtained before any connection is made between the domestic supply and any contaminated, polluted, or auxiliary water system; and,
- g. No plumbing fixture, device or construction shall be installed or maintained or shall be connected to any domestic water supply when such installation or connection may provide a possibility of polluting such water supply or may provide a cross connection between a distributing system of water for drinking and domestic purposes and water which may become contaminated by such plumbing fixture devices or construction unless there is provided an approved backflow prevention device.
- h. All connections from the public water supply to the temporary location will be made with:
 - i. No-lead connections wyes or valves
 - ii. Food grade water hose for the entire length from the first connection to the public water supply to the end consumer
 - 1. All food grade hoses will be set in such a manner to prevent any connection or portion of the hose to lay in standing water or come in contact with unsanitary conditions.
- i. **Consumer responsibility:**
 - i. The consumer has the primary responsibility of preventing pollutants and contaminants from entering their potable water system or the public potable water system. The consumer's responsibility starts at the point of delivery from the public

water supply and includes all water conditioning equipment and piping. When it is determined that a backflow prevention device is required for the protection of the public water system, the consumer shall be required to install an approved backflow prevention device at each service connection at their own expense, to properly repair and maintain the device or devices and to keep adequate records of each test and subsequent maintenance and repair.

j. **Unacceptable Backflow Preventer Devices**

i. *Single-Check Valve*

ii. *Changeover Devices*

k. **Acceptable Backflow Preventer Devices:**

i. *Air-Gap Separation*

1. Air-gap separation (AG) is probably the oldest method of preventing cross connections that result in backflow due to either back pressure or back siphonage. In many states, it is still the only method approved for preventing this type of backflow. Air-gap separation is the unobstructed vertical distance through free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood-level rim of the receptacle.

ii. *Atmospheric Vacuum Breaker*

1. The atmospheric vacuum breaker (AVB) assembly is one of the most simple and least expensive types of backflow preventers. The AVB contains an air inlet valve, check seat and an air inlet port. Water flowing through the AVB causes the air inlet valve to close against the air inlet port. When normal water flow is stopped, the air inlet valve falls to form a block for back siphonage. The AVB protects against non-health hazards or health hazards under back siphonage only. The atmospheric vacuum breaker is not designed to protect against back pressure. Based on the design and operation of AVB, the following criteria must be implemented:

- a. Absolutely no shut-off valves are allowed on the discharge side of the AVB;
- b. A minimum of six inches of clearance above all downstream piping of the AVB or any overflow rim is required; and,
- c. The AVB shall not be under continuous pressure for more than 12 hours.

2. *Pressure Vacuum Breaker*

- a. The pressure vacuum breaker (PVB) assembly evolved from the need to have a testable atmospheric vacuum breaker. The PVB contains an internally loaded check valve and an internally loaded air inlet valve. The valves independently act with the air inlet valve located downstream of the check valve. Shut-off valves and test cocks are located at each end of the assembly. The PVB, unlike the

atmospheric vacuum breaker, can be tested. The PVB protects against non-health hazards or health hazards under back siphonage only. The pressure vacuum breaker is not designed to protect against back pressure. Based on the design and operation of PVB, the following criteria must be implemented:

- i. Shut-off valves may be installed on the downstream of PVB; and,
- ii. A minimum clearance of 12 inches above all downstream piping must be established.

3. *Double-Check Valve*

- a. The double-check valve (DCV) consists of two independently acting, resilient seat check valves located between two tightly closing shut-off valves, together with suitable test cocks, and stop valves arranged so that the main check valves can be tested for water tightness.

4. *Reduced-Pressure Principle Backflow Preventer*

- a. An approved Reduced-Pressure Principle device (RP) is regarded as an assembly that meets the requirements of the AWWA Standard for Reduced-Pressure Principle Backflow Prevention Assembly (AWWA C511-07) or an assembly that has been approved by a laboratory sanctioned by USC or Plumbing Code. The reduced-pressure principle backflow preventer, introduced to the water supply industry about 1942, is safer than the double-check valve. The device consists of an automatic differential-pressure valve located between two or more independently acting, spring-loaded, resilient seat-check valves. These seat-check valves are, in turn, located between two tightly closing shut-off valves.
 - i. Suitable test cocks are provided for testing the tightness of the main check valves. Since this device discharges to the atmosphere, it can be used where codes call for an air gap. Backflow assemblies installed in a confined space are not recommended. For example, the RP cannot be installed in pits.
 - ii. The RP operates on the hydraulic principle that water will not flow from a zone of lower pressure to a zone of higher pressure. As a differential-pressure valve, the relief valve is held in a closed position when the pressure on the supply side is higher by a prescribed amount than that in the zone between the two main check valves.
 - iii. When the pressure on the supply side of the unit falls below a set value, the relief valve opens, and the intermediate zone discharges to atmosphere. If the pressure on the discharge side of the device becomes higher than the supply pressure and the second-check valve malfunctions, the intermediate zone also discharges to atmosphere. An outstanding advantage that the reduced-pressure principle backflow preventer has over the double-check valve is the visible

indication of malfunctioning long before a danger of backflow exists. Hence, repairs can be made while the device is still effectively acting as a backflow preventer.

iii. Examples of Cross connections and the Recommended Type of Backflow prevention

AG – Air Gap, AVB – Atmospheric Vacuum Breaker, DCV – Double Check Valve, PVB – Pressure Vacuum Breaker, RP – Reduced Pressure, SPVB – Spill Prevention Vacuum Breaker Fixture	Device
Automatic device for filling tanks, boilers and vats which have overflow connections to a sewer	AG/AVB
Automatic soap dispenser	AG/AVB
Any direct connection between water pipes and sewers, even though gate valves are used	RP
Any individual vat, tank, etc., which has an inverted water supply connection or a water supply connection below the top of the spill rim	RP
Coffee urn with direct water supply and sewer connections	AVB
Combination faucet with one safe and one unsafe supply	AVB
Commercial dishwashing machines	AVB
Dual water supplies, such as hot water supply from an unsafe source	AG/RP
Drinking fountain with submerged water inlet or with the water supply line passing through the drain	not allowed
Dual water supplies cross connected in factories, etc.	RP
Filter with waste connected direct to sewer	AG
Frost-proof hydrant, whether or not the valve drains to the sewer or to the ground surrounding the sewer	AVB

Fire hydrant with drain connection to sewer or weep hole to the sewer or to the ground surrounding the sewer	RP
Garbage can washers	AVB/PVBA
Gas-type chlorinator with dual feed to mixing basin and clear well	AG/RP
Grease trap with water supply connection for flushing	AG
Hose for sink, laundry tray, soap kettles, etc.	AVB
Hose outlets for washing down industrial, commercial or other equipment	AVB
Industrial processes requiring direct water connections	RP
Industrial water supplies process appliances with direct water supply connections not having adequate air gaps	RP
Kitchen fixtures with common waste and supply lines	not allowed
Kitchen sink garbage disposal or grinder	AG/AVB
Lawn sprinkling systems	SPVB/PVB/DCV
Lawn sprinkling systems with automatic chemical dispenser	SPVB/PVB/RP
Make-up water tank at swimming pool with below-water inlet	AG
Pump used for dual purposes, with one safe and one unsafe supply	AG/RP
Pump used for unsafe material having a direct water connection for priming	AG/RP
Pump pit with drain connection to sump or sewer line	AG
Rubber hose with hand control or self-closing faucets attached, as used in connection with baths, industrial vats, containers, etc.	AVB

Refrigeration equipment with water cooling	AG/RP
Rubber hose connection extending water line to below the overflow rim of sinks, lavatories, tanks, tubs, laboratory apparatus, etc.	AVB
Sealing ring on sewage pump with direct water connection	AG/RP
Sewage lift with direct water connection	AG/RP
Sinks with below-the-rim water inlets	Not allowed
Sludge line with direct water connection for flushing	AG/RP
Steam table with water supply connection entering the bottom of the table	AVB
Seat-action water closet with pressure tank having a flush valve in or attached to the bowl	AVB
Toilet equipped with flush-o-meter valve attached to the bowl	AVB
Tumbler washer in beverage sink having submerged inlet	AG/AVB
Tank with inverted supply or below-the-rim supply	AG
Water closet of the hopper type with pressure tank having a flush valve in or attached to the bowl	AVB
Yard hydrant having drip openings below ground surface that may allow polluted ground water to drain into the water supply pipes	RP

iv. Available Sources to reference the above standards

1. *Indiana State Department of Health:*

- a. 170 IAC 6-1-20 Water quality standards

2. **Rule 10. Cross Connections; Control; Operation (NOTE: IDEM Only Rules)**
- a. 327 IAC 8-10-2 Cross connection prohibited; bypass
 - i. Authority: IC 13-7-7-5; IC 13-7-14-5
 - ii. Affected: IC 13-7-7-5; IC 13-7-14-5
 - b. 327 IAC 8-10-3 Booster pump connection
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - c. 327 IAC 8-10-4 Cross connection hazards; notice; exemptions
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - d. 327 IAC 8-10-5 Secondary sources of supply; installation of air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - e. 327 IAC 8-10-6 Land irrigation facility buried below ground; installation of air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - f. 327 IAC 8-10-7 Construction and installation requirements for air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2; IC 22-13-2
 - g. 327 IAC 8-10-8 Inspection of devices; time limits
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - h. 327 IAC 8-10-9 Inspectors; reports of inspection or test
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-16-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - i. 327 IAC 8-10-10 Noncompliance; retention of reports; access
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2

- j. 327 IAC 8-10-12 Approval of an organization as a training provider of cross connection control device inspectors; record keeping
 - i. Authority: IC 13-13-5-1; IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18
 - ii. Affected: IC 4-21.5; IC 13-11-2; IC 13-18-11-8
- k. 327 IAC 8-10-13 Incorporation by reference
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2

I. UTILITY REGULATIONS FOR WATER SERVICE LINE CONNECTIONS

- a. **The Builder or Contractor** must obtain both the water and sewer permits at the same time, assuming that both types of permits are required.
- b. All permits issued must have the appropriate address and/or lot number. The Builder's name must also appear on the permit. If the builder has not been determined, then the Owner's name must appear on the permit.
 - i. If connecting to the Public Water System from a private well on an existing parcel the **home/land owner will be required to provide a letter from a licensed plumber certifying that well has been disconnected from the customer owned service line.**
- c. Type K soft copper to **installed** from main to water service pit.
 - i. Only Type K Copper tubing will be accepted in the meter pit.
 - ii. Copper tubing must start at the in-line stub out valve.
 - iii. **The tubing must then turn up in the pit and connect to the yoke with a ball angle valve, leave the opposite side of the yoke from a ball angle valve, exit the meter pit and end with a CTS coupling about 3' from the meter pit toward the structure.**
 - iv. **The water line, pit base and 50% of the barrel must be backfilled with #24 sand after the first inspection.**
 - v. **Meter pit standard drawing must be used for installation as approved in current Greenfield City Water standards.**
- d. **#10 Tracer wire is required to be installed from the meter pit to the house. Must have excess wire in the meter pit to reach 2' above meter pit.**
- e. **Under no conditions shall any water service lines be backfilled until a Representative of the Utility has inspected all work.**
- f. The water service lines and water main taps to all lots shall be located in such a manner that the water service line to the meter pit **is not located in the driveway pavement area.**
 - i. If the water service lines are found to be in conflict with a proposed driveway or private sidewalk pavement area, the Contractor shall be required to relocate the service line.

- ii. Water service line relocation shall be done so at the Builder's/Owner's/Developer's expense
- g. The meter pit should be located in such a manner to prevent vehicle traffic from causing damage to the installation.
- h. The Utility should be notified at least one week prior to the date the meter pit scheduled for completion.
- i. If water service lines are stubbed onto the property before construction of the building, it is the responsibility of the contractor to keep this line marked with a steel sign post during construction.
- j. The Water Utility will not install the meter unless the line meter pit has passed the final inspection. This is the responsibility of the builder.
- k. Business and/or commercial structure meters must be installed in a mechanical room or utility room approved by the Water Utility.
- l. The required backflow device must be installed after the meter.
- m. No water meter shall be installed by the Utility or Metering Department until a finish grade has been established.
- n. Once the meter pit has met the requirements of the Utility at the final inspection the new service would be approved for the meter installation.
- o. The 10-foot horizontal and 18-inch vertical separation rule must be maintained between water, storm, and sanitary sewer lines or mains.
- p. After the meter pit has been installed, it shall be the Builders/ Owners responsibility to maintain the integrity of said meter pit for a minimum of 3 years from the time of the meter installation.
- q. Any damages to the meter pit that requires the re-excavation by the Utility shall result in a service charge in the amount of \$2500.00
- r. No water service line construction shall be initiated until the Builder/Owner has the following in his/her possession:
 - i. A Valid Building Permit (if applicable)
 - ii. A Valid Water Service Permit
 - iii. A Valid Sewer Connection Permit (if applicable)
 - iv. A Street Cut Permit (if applicable)

J. REGULATION OF EXISTING WATER SYSTEM TESTING

- a. This section applies to all existing and future commercial, industrial, or municipal entities that have a fire suppression loops or systems that are connected and or served by the Public Water System.
- b. The Builder or contractor that performs fire suppression loop or system testing within the City of Greenfield Water Service Territory shall be required to do the following:

- i. Contact the Greenfield Water Utility via phone or email no less than 48 business hours prior to the planned system testing/maintenance event.
 1. The builder or contractor shall be required to provide:
 - a. The number of hydrants, fire pumps, booster pumps, valves, or any other water device or mechanism that will require water to be used for the testing or maintenance procedure; and
 - b. The duration of the test and or maintenance work
- c. Violation of this section will result in the assessment of a \$2,500 fee for each event