

FINDLAY TOWNSHIP MUNICIPAL AUTHORITY

Short Form Specification

WATER LINE CONSTRUCTION

NIRA File No. 30-21-94

**THESE SHORT FORM SPECIFICATIONS ARE NOT INTENDED TO INCLUDE ALL
NECESSARY REQUIREMENTS FOR YOUR PROJECT**

**FINDLAY TOWNSHIP MUNICIPAL AUTHORITY
SPECIFICATIONS FOR
WATER MAIN CONSTRUCTION AND EXTENSION
(Revised September 2012)**

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FINDLAY TOWNSHIP MUNICIPAL AUTHORITY

SPECIFICATION FOR

WATER MAIN CONSTRUCTION AND EXTENSION

SECTION 1.0 – SCOPE

These Specifications have been developed as a guide to assist Developers, Designers and Contractors involved in planning, designing and constructing water distribution or transmission facilities under the jurisdiction of the Findlay Township Municipal Authority. It should be understood that these Specifications are general in nature and are not intended to address all conditions or needs of a particular project. Special circumstances which are peculiar to individual projects may require special design considerations. Developers and Designers of proposed water distribution or transmission facilities are encouraged to consult with the Authority and/or its Authorized Representatives regarding specific problems or unusual circumstances which may arise in the planning, design or construction of such facilities.

SECTION 2.0 – GENERAL

All materials utilized in the construction of water distribution or transmission facilities shall be of the type and quality of those specified herein. Where specific brand or trade names of a particular manufacturer or vendor are used and the term or equal is not used therewith, it shall be interpreted strictly that the specific item or article is required for reasons of compatibility and/or standardization. In such cases, no substitution of specified items shall be made without written approval of the Authority or the Authority's Authorized Representative. Where, in these Specifications, reference is made to other Standard Specifications, Standards, Manuals or Codes of any technical society, organization or association or to the code of any governmental authority, whether such reference be specific or by implication, shall mean the latest Standard Specification, Manual or Code in effect at the time. All materials and equipment shall be new and both workmanship and materials shall be of good quality. Any materials or equipment found to be defective for any reason, as may be determined by the Authority and/or the Authority's Authorized Representative, shall be removed and replaced with new materials or equipment in good condition and of the type specified.

SECTION 3.0 – QUALITY ASSURANCE (SUBMITTALS AND SHOP DRAWINGS)

To ensure that the specified products are furnished and installed, submittals, including manufacturer's certificates, shop drawings, brochures, product samples and catalog cuts for all products and materials to be used in connection with the project shall be submitted to the Authority or the Authority's Authorized Representative. Make all submittals in quadruplicate and sufficiently in advance of scheduled dates for purchase or installation of materials to secure the required approvals. Allow sufficient time for possible revisions and resubmittals. No substitution of the specified materials or equipment shall be permitted without written approval of the Authority or its Authorized Representative.

SECTION 4.0 – SIZING AND ROUTING WATER MAINS

Water mains shall be adequately sized to accommodate the proposed domestic, commercial or industrial system demands of the facility (ies) which it is intended to serve together with sufficient allowance for fire service needs. When sizing water mains, consideration shall also be given to any foreseeable extension(s) of the system and the additional capacity requirements of such extension(s). The Authority or its Authorized Representative shall reserve the right to judge the adequacy of water main sizing.

The route or path of water mains shall be such that the water pipe lines shall not be made unreasonably inaccessible for future maintenance or operational activities due to the relative proximity of other utilities or other physical features including buildings, site amenities, structures, limiting geographic conditions or any other existing or foreseeable condition which would limit or impede maintenance or operational activities.

Minimum horizontal and vertical separation between water mains and sewers shall be provided as outlined in the Pennsylvania Department of Environmental Resources (now the Pennsylvania Department of Environmental Protection) Public Water Supply Manual.

SECTION 5.0 – PLANS, ALIGNMENT AND EASEMENTS

Any person or firm who engages in the preparation of Design Plans for the construction or extension of the Authority's Water Facilities is encouraged to confer with the Authority or its Authorized Representative prior to commencing design activities. The preparation of preliminary or sketch stage Design Plans, for the purposes of obtaining review comments, guidance and recommendations is also encouraged as a means to anticipate problems and minimize the time and effort involved in producing acceptable Final Design Plans.

Final Design Plans shall be of sufficient scale and shall be neat, legible and contain adequate details and dimensions to clearly demonstrate the size and location of the water mains and appurtenances as well as the relative location of other utilities and/or pertinent physical features whether existing or proposed.

The horizontal location of proposed water mains, valves, fittings, fire hydrants, etc. along roadways shall, to the extent practical, maintain a uniform parallel alignment with the roadway. Abrupt changes in horizontal and vertical alignment or "snaking" is discouraged. The precise design location of water mains, valves, fittings, fire hydrants and other system components shall be identified by station and offset from the roadway centerline at sufficient intervals and at changes in direction. Other means of dimensioning or identifying the precise design location of the facilities including changes in alignment may be accepted. The position of all water system components shall be such that sufficient areas are available for maintenance and operational activities. Water facilities shall not be crowded over against one side of a public right of way or easement. The dedication of additional right of ways for utilities across the front of building lots to provide additional clearances is encouraged. Where water facilities are to be located within utility easements, the minimum width of the easement shall be twenty feet (20'). If such utility easement is intended to accommodate more than one (1) utility, the easement width shall be increased to suit the conditions and as may be directed by the Authority or its Authorized Representative. All utility easements provided to accommodate the Authority's facilities shall be defined by metes and bounds, centerline descriptions, or by other acceptable means to establish the precise mathematical location of the easement with respect to the overall property upon which the easement is located. Easements shall be properly recorded with the Recorder of Deeds and shall be provided in accordance with the terms and conditions of the Authority.

All Plans shall include the applicable Standard Construction Details attached to these Specifications. In addition, enlarged scale views and special details shall be provided for special design conditions which are unique to a particular project.

SECTION 6.0 – WATER MAINS

6.1 Ductile Iron

All water pipe lines where shown on the Drawings shall be constructed of ductile iron pipe. The pipe shall conform in all respects with American Water Works Association (AWWA) Standard C150 and C151. All pipe shall be double cement mortar lined and provided with an asphaltic seal coat. The cement lining and seal coat shall conform with AWWA Standard C104. All pipe shall be free of defects and shall be a minimum of special thickness Class 52 in accordance with AWWA Standard C150. Heavier thickness classes may be required in instances where high system

pressures, excessive loading due to depth of bury and external loading factors or other special circumstances may dictate. The Authority and/or its Authorized representative shall reserve the right to determine the minimum thickness class of pipe which shall be required for any particular installation.

Pipe joints shall be Bell and Spigot Type (Tyton Joint) and shall conform to AWWA Standard C111. Where owing to special conditions or project needs the Authority or its Authorized Representative may require or approve the use of other types of pipe joints as follows:

- Mechanical joints conforming to AWWA Standard C111.
- Flanged joints conforming to AWWA Standard C115.
- Special positive restrained joint piping systems.

All fittings shall be mechanical joint ductile iron and shall have a fusion bonded epoxy coating inside and out and shall comply with ANSI/AWWA C550 Standards. Mechanical joint fittings and valves shall be restrained using EBBA – Iron Megalug series 1100 designed for Ductile Iron pipe. All bolts shall be stainless steel.

Tyton joint and mechanical joint gaskets shall be made of nitrile rubber if chemical resistant applications are necessary.

Tyton joint and mechanical joint gaskets made of Viton rubber shall be required if coal is found to be prevalent in the water line excavation.

6.2 **PVC Pipe**

All water pipe lines where shown on the Drawings shall be constructed of Class 200 PVC with outside diameters compatible with cast iron and ductile iron pipe. All PVC water pipe are to be in accordance with ANSI/AWWA C900-97 and C905-97.

Pipe shall be made from virgin PVC resin that has been compounded to provide physical and chemical properties that equal or exceed cell class 12454-B as defined in ASTM-D1784 and shall qualify for a hydrostatic design basis of 4,000 psi at 73.4° F per the requirements of PPI TR-3.

PVC compounds or products shall be tested for chemical extractants and certified as suitable for potable-water transmission service by an accredited testing agency acceptable to the purchaser, in accordance with requirements that are no less restrictive than the applicable requirements specified in NSF 61.

All fittings shall be mechanical joint ductile iron and shall have a fusion bonded epoxy coating inside and out and shall comply with ANSI/AWWA C550 Standards. Mechanical joint fittings and valves shall be restrained using EBBA – Iron Megalug Series 2000 PV designed for PVC pipe. All bolts shall be stainless steel.

- PVC pipe and mechanical joint gaskets shall be made of nitrile rubber, if chemical resistant applications are necessary.
- PVC pipe and mechanical joint gaskets shall be made of Viton rubber, if coal is found to be prevalent in the water line excavation.

SECTION 7.0 – TRENCHING AND PIPE BEDDING

The side walls of the trench in the pipe zone area shall be kept as nearly vertical as possible and shall be properly shored and braced. Trenches shall be excavated true to line and grade so that a clear space of not less than four (4) inches and not more than eight (8) inches is provided on either side of the barrel of the pipe.

All pipe trench excavation shall be made to a minimum depth of four (4) inches beneath the designed pipe invert elevation. The pipe shall then be bedded in PADOT #57 Coarse Aggregate gravel bedding material in accordance with the requirements for class B, First Class Bedding material in accordance with ASTM Designation C-12 latest edition, and conforming with the applicable Standard Detail drawings. All water pipe lines shall have a minimum of four feet (4') depth of cover.

Where rock excavation is encountered, the rock shall be excavated a minimum overdepth of six inches (6") below the trench depths specified. The overdepth rock excavation and all excessive trench excavation beneath the pipe shall be bedded with PADOT #57 Coarse Aggregate.

Where quicksand, muck or other such conditions exist, which results in an unstable trench bottom, tongue and groove sheet piling, timber piles and/or over excavation and backfilling with selected borrow or trench bedding material may be required. The type and extent of methods employed to stabilize the trench bottom shall be approved by the Authority or the Authority's Authorized Representative.

All ground water which may be found in the trenches and any water which may get into the excavation from any cause whatsoever, shall be pumped or bailed out so that the trench shall be free of ponded water during pipe laying installations. No water shall be permitted to reach the joints or run through the pipe. All water pumped from the trenches shall be disposed of in a manner satisfactory to all regulating agencies.

SECTION 8.0 – THRUST RESTRAINT

The design and construction of water pipe lines shall include calculations for thrust restraint of pipe and fittings. Thrust restraint of pipe and fittings shall be accomplished with approved restraining devices and/or the use of approved special positive thrust restrained piping systems. Special positive thrust restrained piping systems may be required by the Authority or the Authority's Authorized representative due to special circumstances including, but not limited to, high pressure service applications, installations on steep gradients and/or poor soil conditions.

The minimum length of thrust restrained pipe and fittings shall be computer calculated in accordance with the Design Procedures of the Ductile Iron Pipe Research Association (DIPRA) Publication entitled "Thrust Restraint Design for Ductile Iron Pipe. Sixth Edition". A copy of the calculations shall be submitted for review. The calculations shall be based on soils information obtained from site investigations or conservative design parameters as may be approved by the Authority or its Authorized Representative. Thrust restraint devices and/or special positive thrust restrained piping systems shall be designed to provide adequate thrust restraint with a minimum safety factor of 2.0. The calculations shall also be performed based upon polyethylene encasement of the pipe, valves and fittings. Restraint of pipe and fittings shall be required for distances not less than the minimum calculated restrained lengths and in each direction, from all valves, fittings, dead ends, etc. The results of the thrust calculation shall be indicated on the construction plans by either illustration or in a tabular summary, identifying the type of fitting and the minimum length of restraint established by the computation. Restraining devices which may be utilized are as follows:

- EBAA Iron, Inc., Megalug Restraining Glands for Mechanical Joint Pipe and Fittings.
- U.S. Pipe Company, Gripper Gland for Mechanical Joint Pipe and Fittings.
- U.S. Pipe Company, Field-Lok Gaskets for Push-on Joint Pipe and Fittings.

- American Cast Iron Pipe Company, Fast-Grip Gaskets for Push-on Joint Pipe.

Acceptability of any of the listed devices, for a particular application shall be subject to the approval of the Authority or its Authorized Representative. Whenever possible, nuts and bolts to be used with restraining devices shall be stainless steel (unless prohibited by, or not available from manufacturer).

Other restraining devices may be utilized subject to review and approval of the Authority or its Authorized Representative. The need for special positive thrust restrained piping systems and the type of system to be utilized shall be determined by the Authority or its authorized Representative on a case by case basis.

The use of joint restraint devices and/or special positive restrained joint piping systems shall not preclude the requirement to install concrete reaction (thrust) blocks at the location of fittings, valves and dead ends.

SECTION 9.0 – POLYETHYLENE ENCASEMENT

All main piping, valves and fittings shall be encased in polyethylene film in accordance with AWWA Standard C105 "Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids."

SECTION 10.0 – UNDERGROUND EARLY WARNING DETECTION TAPE

Install underground early warning detection tape as indicated on the Detail Drawing. Tape shall be installed above all water lines and as shown on the applicable Standard Detail.

The tape shall be similar and equal to Terra-Tape Extra Stretch, as manufactured by the Tape Products Division, Reef Industries. Tape shall be blue, minimum 3" wide, and shall state, "Caution Water Line Buried Below."

SECTION 11.0 – CEMENT CONCRETE AND READY-MIXED CEMENT CONCRETE

Cement concrete and ready-mixed cement concrete shall be Class A conforming to Section 704 of the Pennsylvania Department of Transportation Specifications, Form 408. With a minimum compressive strength of 3,500 psi.

SECTION 12.0 – STREAM CROSSINGS AND CONCRETE ENCASEMENT

Stream crossings shall be constructed in accordance with the following specifications, and in accordance with all requirements of Pennsylvania DEP and Allegheny County Conservation District.

Provide concrete encased mechanical joint or Tyton joint with locking gaskets Ductile Iron Pipe, backfilled with minimum 3" size crushed limestone to the level of the stream bed, between the limits of the stream crossing. The minimum bury depth in the stream crossing shall be 42 inches.

Concrete encasement shall be constructed according to the Standard Detail.

SECTION 13.0 – BACKFILLING

Caution in all cases of backfilling shall be exercised, insuring that it is not done prematurely and that no pressure against which the pipe line has not been designed to withstand is exerted thereby. Any movement of the piping, appurtenances or blocking due to neglect or failure to exercise caution shall be promptly and fully corrected.

The trench area to be backfilled shall be dewatered, cleared of all trash, and debris prior to backfilling. Material for backfilling shall consist of approved, excavated soils, PADOT #2A limestone, or PADOT #2A sand and gravel material in accordance with the requirements for Class B, First Class Bedding material in accordance with ASTM

Designation C-12 latest edition. Backfill shall be placed in horizontal layers not in excess of six inches (6") in thickness, properly moistened to approximate optimum requirements and each layer compacted by vibrator tampers, machine tampers, or other suitable equipment to not less than 95 percent of the determined dry weight density.

Puddling will not be permitted.

SECTION 14.0 – FITTINGS

Fittings shall be ductile iron conforming to AWWA Standard C110 (full body) or C153 (compact fittings). All fittings shall be fusion bonded epoxy coated inside and out. Where owing to special conditions or project needs the Authority or its Authorized Representative may require or approve the use of the other types of fittings as follows:

- Ductile Iron Flanged Joint Fittings in accordance with AWWA C110.
- Ductile Iron Special Positive Restrained Joint fittings. (such as U.S. Pipe Co. TR-FLEX)
- U. S. Pipe Trim Tyton Ductile Iron Fittings.

SECTION 15.0 – TAPPING SLEEVES

Tapping sleeves are permitted only by special circumstance and only when authorized by the Authority's General Manager.

Where required or permitted by the Authority and to avoid water service interruption, tapping sleeves and valves may be utilized to facilitate connection to the existing distribution system.

Tapping sleeves for use in conjunction with existing asbestos cement (AC) pipe, 4" through 12" sizes, Class 150 or Class 200, shall be Mueller Company Catalog Number H-619. Observe precautions detailed under Section 16.0 when working with asbestos cement pipe. Tapping sleeves for use in conjunction with ductile iron pipe, 4" through 24" sizes, shall be Mueller Company Catalog No. H-304. The outlet flange and drilling for all sleeves shall conform with ANSI B-16.1, Class 125 and MSS SP-60.

Tapping sleeves shall be pressure tested with compressed air, in place on the pipe prior to being tapped, for not less than thirty (30) minutes. The test pressure shall be 1.5 times the static pressure of the water system, at the location of the tap. Test pressures may be increased or decreased due to local pressure conditions as may be directed by the Authority or the Authority's Authorized Representative. No actual tap of the existing water main will be permitted until the pressure test has been successfully completed.

Tapping valves shall be as specified under Section 16.0.

SECTION 16.0 – VALVES AND VALVE BOXES

Gate valves shall be required at tee fittings, on the branch and through runs of the pipe, and inline valves shall be required on both sides of fire hydrant lateral locations.

Gate valves for sizes 4" through 16" shall be Mueller Company A-2360 (Mechanical Joint), resilient wedge gate valves. The valves shall be manufactured and tested in accordance with the requirements of AWWA Standard C509 and C500 as applicable for a design working pressure of 250 psi and a test pressure of 500 psi. The pressure rating shall be cast on the outside of the valve. The valve bonnet and body shall be coated on all interior and exterior surfaces with a fusion bonded epoxy conforming to the requirements of AWWA Standard C550. The bonnet, body and gate shall be constructed of ductile iron. The gate shall be completely encapsulated in rubber over all interior and exterior ferrous surfaces. The bonnet bolts and nuts shall be stainless steel.

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Tapping valves shall be Mueller Company T-2360 resilient wedge tapping valve and shall be furnished with a raised face tapping flange designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS SP-60. Bonnet bolts and nuts shall be stainless steel.

The Authority reserves the right to require other types or brands of valves as may be required for a particular installation and may require such valves due to special conditions or circumstances pertaining to a particular project.

Valve boxes shall be set plumb and centered over the operating nut of the valve. Valve box tops shall be flush with the finished surface of the ground or pavement unless otherwise directed by the Authority or its authorized representative. Valve boxes located in unpaved areas shall be secured and maintained in a plumb position by installing a six inch (6") thick concrete support slab around the valve box top. The support slab shall be square and extend at least twelve inches (12") in all directions, as measured from the outside of the valve box top. Valve box lids shall be marked "WATER" and be painted blue.

Valve boxes and lids shall be cast iron, bituminous coated. Valve boxes for valve sizes four inch (4") through eight inch (8") shall be Tyler Pipe 6850 Series, two-piece screw type, 5-1/4" shaft or equal. Valve boxes for valve sizes ten inch (10") through sixteen inch (16") shall be Tyler Pipe 6860 Series, cast iron, three-piece screw type, 5-1/4" shaft or equal. All valve box lids shall be marked "WATER" with raised letters.

SECTION 17.0 – CONNECTION TO EXISTING WATER SYSTEM

The Authority must be notified at least seven (7) days in advance of planned connections to the Authority's Distribution System. The Authority or its authorized representative will provide the "shutdown" or isolation of the "in service" distribution system to allow the installation of a cut-in tee and valves. Tapping sleeves and valves are not permitted unless written permission is granted by the Authority's General Manager. The Authority or its authorized representative reserves the right to determine all aspects of the how and when the connection will be required for each installation.

EXTREME CAUTION MUST BE EXERCISED WHEN WORKING WITH EXISTING ASBESTOS CEMENT WATER LINE PIPE. ALL REQUIREMENTS OF THE EPA, OSHA, AND ALLEGHENY COUNTY DEPARTMENT OF HEALTH BUREAU OF AIR POLLUTION CONTROL ASBESTOS REGULATIONS, ARTICLE 20, CHAPTER 10, SECTION 1001, MUST BE STRICTLY OBSERVED.

17.1 Removal of Non-Friable Asbestos Containing Material

17.1.1 Personnel and Equipment - All work must be performed by a qualified asbestos abatement Contractor. Contractor's certified personnel must be trained as required by Asbestos Hazard Emergency Response Act (40 CFR 763) and receive physical examinations in accordance with Occupational Safety and Health Administration (OSHA) Standard (29 CFR 1926.58). All non-certified personnel must be excluded from the work area. All certified personnel must wear full-body disposable coveralls, footwear, and gloves while this work is being performed. Clothing, footwear, and gloves shall be disposed of as asbestos waste (2.11 B.1.c) as specified hereinafter.

17.1.2 Respiratory Protection - Minimum acceptable respiratory protection, in accordance with OSHA Standard 29 CFR 1910.134, shall consist of a fitted half-mask respirator, with Type H cartridges. Cartridges shall be new at the start of work and be replaced at the end of each workday, when they become wet, or when increased resistance to breathing is observed. Full shift (eight hours) personal air samples must be collected by qualified technicians in the breathing zone of workers during the workday. These samples must be analyzed by an American Industrial Hygiene Association accredited laboratory. If results indicate an eight hour time weighted average (TWA) airborne fiber levels in excess of 0.1

fibers per cubic centimeter (f/cc), workers must be provided with powered air purifying respirators. Copies of all air sample test results must be provided to the Owner upon completion of this work.

- 17.1.3 Work Practices - Asbestos-containing material must be kept wet during actual construction. Construction must proceed in a manner that will minimize airborne dust and debris. Water used for wetting asbestos-containing materials must contain a surfactant. At the completion of construction, any used respirator cartridges and earth contaminated with asbestos debris/cuttings shall be placed in six-mil thick disposal bags labeled "ASBESTOS". All asbestos waste shall be transported inside a fully enclosed lined truck to a Department of Environmental Protection approved landfill for disposal. Copies of all disposal manifests must be provided to the owner upon completion of this work.

17.2 Minor Repair and Tapping

- 17.2.1 Personnel and Equipment - All work must be performed by trained personnel of Findlay Township Municipal Authority. Equipment will consist of a respirator, personal monitor, and disposable gloves.
- 17.2.2 Respiratory Protection - Minimum acceptable respiratory protection shall consist of a fitted half-mask respirator with Type H cartridges and a personal monitor which shall be checked daily when performing this type of work.
- 17.2.3 Work Practices - Asbestos-cement water line must be kept wet during actual tapping. Tapping must proceed in a manner that will minimize airborne dust and debris. Water used for wetting asbestos-cement pipe must contain a surfactant (surface acting agent) i.e. Dawn dish soap. At the completion of the tapping, any earth contaminated with asbestos debris or cuttings and used respirator cartridges shall be placed in six-mil thick disposal bags labeled "ASBESTOS" and transported to a Department of Environmental Protection approved landfill for disposal.

SECTION 18.0 – FIRE HYDRANTS

Fire hydrants shall be provided and installed in accordance with the applicable Standard Detail. Fire hydrant location and spacing shall be such that no residence, building or structure normally requiring fire protection, shall be located more than approximately five hundred feet (500'), as measured along the roadway, parking area or accessway from a fire hydrant. Where fire hydrants are located near low points in the water main, the fire hydrant shall, where feasible, be set at the low point to facilitate low point flushing. Fire hydrants shall not be set in areas where accessibility of fire fighting apparatus may be limited. Fire hydrants shall not unreasonably encumber sidewalks, driveways, parking areas or accessways. Fire hydrants shall not encroach onto private property except where such hydrants are provided on private fire service lines.

Fire hydrants shall be Waterous Pacer (Model #WB-67-250) traffic model as manufactured by American Cast Iron Pipe Company. Fire hydrants shall have a 5-1/4" valve opening, 6" mechanical joint connection, 2- 2-1/2" hose connections, 1 X 4 1/2" Pumper Nozzle. Threads shall be National Standard Threads. Hydrants shall be 4'-0" bury with Pentagon operating nut, open "counterclockwise."

The fire hydrants shall be given one coat of primer and two coats of paint, safety yellow. The primer shall be PPG Primer 87-608 or approved equal and the paint shall be PPG 97-602 for safety yellow or approved equal. The Contractor shall also either stencil or paint a number designated by the owner on the fire hydrants. The numbers shall be two inches in height and placed under the bonnet directly above the pumper nozzle.

High pressure hydrants shall be furnished when required by the Authority.

SECTION 19.0 – REVIEW BY LOCAL FIRE OFFICIAL

The number and location of all fire hydrants shall be approved by the local fire official(s) having jurisdiction in the locality of the project. To ensure that the local fire official(s) have approved the number and location of fire hydrants, a copy of the construction plans shall be mailed to the designated fire official for review, sign off and return to the Authority.

SECTION 20.0 – SERVICE CONNECTIONS

Generally, the Authority will provide the materials and install the service lines from the water main to the curb stop and box (with the exception of service line casing pipes for long side water service lines), after application has been made and the tap fee is paid to the Authority. On occasion when approved by the Authority, the Developer/ Contractor may install individual water service lines. When connecting to ductile iron pipe, corporation stops shall be inserted directly into the main except where service saddles (Ford Catalog Number FS-101) shall be required for tapping corporation stops larger than 1" in 4" pipe, 1-1/4" in 6" pipe, and 1-1/2" in 8" pipe. The minimum size service line shall be 3/4". Corporation stops shall have AWWA taper thread inlet and pack joint (compression) outlet. Corporation stops for 3/4" through 1-1/4" size shall be Ford Meter Box Company Type F1000. Corporation stops for sizes 1-1/2" through 2" shall be Mueller Company Ori-Corp, Catalog No. H-15013.

Connections to existing asbestos cement (AC) pipe shall be made with service saddles, Ford Catalog Number FS-101 with stainless steel band and AWWA taper thread outlet. Service lines shall be constructed of ASTM B88, Type K copper tubing or polyethylene tubing. Curb stops for 3/4" through 2" sizes shall be Mueller Company Mark II Oriseal curb valves, Catalog Number H-15209 with compression connections (both ends). Curb boxes shall be cast iron, extension type and shall be Mueller Company Catalog Number H-10316 or equal. Couplings, when permitted for copper tubing sizes 3/4" through 2", shall be brass compression type couplings and shall be Ford Catalog Number C44 or Mueller Company Catalog No. H-15403.

Service lines shall be installed by "direct bury" method only. No service lines shall be laid in a conduit without written approval by the Authority or its Authorized Representative. No service lines shall be wrapped in polyethylene without written approval of the Authority or its Authorized Representative.

SECTION 21.0 – STEEL CASING PIPE

Where water mains are installed by boring or for other reasons installed in a casing, the casing pipe shall be welded steel pipe, manufactured and tested in accordance with ASTM A-53/A53M, Grade B, with a minimum yield strength of 35,000 psi. The pipe shall be new, visibly sound and round. Joining of casing pipes require butt welding around the entire circumference of the casing pipe. The casing shall be coated with bituminous material on the outside. Minimum casing wall thickness shall be as follows:

<u>NOMINAL DIAMETER OF CASING PIPE IN INCHES</u>	<u>WALL THICKNESS</u>
Up to 16	1/4 inch
18 to 24	3/8 inch
26 to 48	1/2 inch

21.1 PVC Casing Pipe

Where water mains are installed by boring or installed in a casing pipe in areas of aggressive soils, the casing pipe shall be Class 100 PVC and shall have a minimum wall thickness of 1.032 inches in accordance with ANSI/AWWA C905-97 Standards and Table below

Pipe shall be made from virgin PVC resin that has been compounded to provide physical and chemical properties that equal or exceed Cell Class 12454-B as defined in ASTM-D1784, and shall qualify for a hydrostatic design basis of 4,000 psi at 73.4° F per the requirements of PPI TR-3.

PVC compounds or products shall be tested for chemical extractants and certified as suitable for potable-water transmission service by an accredited testing agency acceptable to the purchaser, in accordance with requirements that are no less restrictive than the applicable requirements specified in NSF 61.

<u>NOMINAL DIAMETER OF CASING PIPE IN INCHES</u>	<u>MINIMUM WALL THICKNESS</u>
16 (DR25)	0.696
18 (DR25)	0.780
20 (DR25)	0.864
24 (DR25)	1.032
30 (DR25)	1.280
36 (DR25)	1.532

SECTION 22.0 – CASING SPACER

Where water lines are installed by boring or for other reasons installed in a casing, the water pipe shall be supported by casing spacers constructed of high molecular weight polymer runners secured to a stainless steel shell, as manufactured by Cascade Water Works Manufacturing Company of Yorkville, IL, or equal. Not less than three (3) spacers shall be used on each pipe length.

SECTION 23.0 – CASING END SEALS

Casing pipe end seals of the required size shall consist of a rubber seal and two (2) T-304 stainless steel bands, as manufactured by Cascade Water Works Manufacturing Company of Yorkville, IL, or equal.

SECTION 24.0 – COMBINATION AIR VALVES AND BLOW-OFFS

Combination air valves shall be provided and installed at high points in the system where air would naturally tend to collect. Combination air valves shall be housed in a precast concrete manhole over the water main and shall be connected to the water main by way of a corporation tap or a tapped tee on the main with the necessary length(s) of brass and/or copper pipe. Combination air valves shall be installed in accordance with the attached Standard Detail or by other methods approved by the Authority or the Authority's Authorized Representative. Combination air valves shall be sized based on the estimated maximum system flow rate and the gradient of the line on either side of the air valve. Utilize the APCO Series 140C Combination Air Valve with optional Outlet Cowl.

Blow-offs or fire hydrants shall be required to be installed at the terminal ends of water mains to facilitate line flushing and at definitive low points to facilitate sediment removal. Blow-offs shall be properly sized to ensure that flushing will produce a velocity, in the main being flushed, of at least 2.5 feet per second. No flushing device shall be directly connected to any sewer.

SECTION 25.0 – DEAD ENDS AND LINE LOOPING

Where practical, water mains shall be looped to eliminate dead ends. Installation of water mains in cul-de-sacs shall normally be accomplished by looping the water main around the outside perimeter of the pavement area to facilitate the future installation of service connections. A 4" diameter ductile iron water line will likely be required for residential cul-de-sacs. Where dead ends are necessary or unavoidable, an approved blow-off or fire hydrant shall be installed in accordance with Section 18.0 of these Specifications and the attached applicable Standard Detail or an by other methods as may be approved by the Authority or its Authorized Representative.

SECTION 26.0 – PRIVATE FIRE SERVICE LINES

Private fire service lines and/or combination private distribution/fire protection lines or systems may be permitted by the Authority. Private fire service lines shall generally be provided with detector check valves or approved fire service meters. The location and manner of housing any detector check valve or fire service meter shall be determined by the Authority. The Applicant or Developer shall be responsible for determining the capacity requirements for such installations.

SECTION 27.0 – TESTING AND DISINFECTION

27.1 General

After completion of satisfactory Hydrostatic Testing and prior to being placed into service, all new mains and repaired portions of, or extensions to existing mains shall be thoroughly disinfected in accordance with one of the following methods as set forth in AWWA Standard C651. Following chlorination, the main should be flushed as soon as possible (within 24 hours) because prolonged exposure to high concentrations of chlorine may damage the pipe interior coating and/or the cement lining. The disinfection method to be utilized shall be approved by the Authority or its Authorized Representative.

27.2 Methods of Chlorination

27.2.1 **Tablet Method** - The Tablet Method gives an average chlorine dose of approximately 25 mg/L.

27.2.1 **Continuous Feed Method** - The Continuous Feed Method gives a 24-hour chlorine residual of not less than 10 mg/L.

27.2.3 **Slug Method** - The Slug Method gives a three-hour exposure of not less than 50 mg/L free chlorine.

27.3 Forms of Chlorine for Disinfection

27.3.1 **Liquid Chlorine** conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers usually of 100-lb., 150-lb., or 1-ton net chlorine weight.

Liquid chlorine shall be used only (1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated; (2) under the direct supervision of a person who is familiar with the physiological, chemical, and physical properties of liquid chlorine, and who is trained and equipped to handle any emergency that may arise; and (3) when appropriate safety practices are observed to protect working personnel and the public.

27.3.2 **Sodium Hypochlorite** conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber lined, or plastic containers typically ranging in size from 1 qt. to 5 gal. Containers of 30 gal. or larger may be available in some areas. Sodium hypochlorite contains approximately five percent (5%) to fifteen percent (15%) available chlorine, and care must be taken to control conditions and length of storage to minimize its deterioration.

27.3.3 **Calcium Hypochlorite** conforming to ANSI/AWWA B300 is available in granular form or in 5-g tablets and contains approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry and dark environment to minimize its deterioration.

27.4 **Basic Disinfection Procedure**

The basic disinfection procedure consists of

27.4.1 Preventing contaminating materials from entering the water main during storage, construction, or repair.

27.4.2 Removing, by flushing or other means, those materials that may have entered the water main.

27.4.3 Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main, dechlorination of the chlorinated water prior to discharge to a storm system or water course.

27.4.4 Protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfection procedures.

27.4.5 Determining the bacteriological quality by laboratory test after disinfection.

27.4.6 Final connection of the approved new water main to the active distribution system.

27.5 **Preventive and Corrective Measures During Construction**

27.5.1 **Keeping Pipe Clean and Dry**

Precautions shall be taken to protect the interiors of pipes, fittings, and valves against contamination. Pipe delivered for construction shall be stored so as to minimize the entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when it is determined that watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.

Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.

27.5.2 Joints

Joints of all pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

27.5.3 Packing Materials

Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. If asbestos rope is used, it shall be handled in a manner that prevents asbestos from being introduced into the water-carrying portion of the pipe.

27.5.4 Sealing Materials

No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and NSF 61 approved. It shall be delivered to the job in closed containers and shall be kept clean.

27.5.5 Cleaning and Swabbing

If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a one percent (1%) hypochlorite disinfecting solution. If, in the opinion of the Authority or its Authorized Representative the dirt remaining in the pipe will not be removed by the flushing operation, then the interior of the pipe shall be cleaned by mechanical means such as a hydraulically propelled foam pig (or other suitable device acceptable to the Authority or its Authorized Representative) in conjunction with the application of a one percent (1%) hypochlorite disinfecting solution to the interior pipe surface. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the Authority or its Authorized Representative.

27.5.6 Wet-Trench Construction

If it is not practical to keep the pipe and fittings dry during installation, every effort shall be made to ensure that any of the water that may enter the pipe contains an available-chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench, or by treating the trench water with hypochlorite tablets. If the wet trench condition prevails for more than the installation of two pipe lengths or at any time when directed by the Authority or its authorized representative, temporary vertical perforated PVC casing pipe shall be installed adjacent to the work and at a minimum of one foot below the elevation of the new waterline. The perforated PVC pipe will be utilized as a conduit for a pump suction hose to be inserted and the ground water table to be pumped down below the elevation of the new waterline.

27.5.7 Flooding by Storm or Accident During Construction

If the main is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the continuous-feed or slug method.

27.5.8 Backflow Protection

As an optional procedure (if required by the Authority or its Authorized Representative), the new water main shall be kept isolated from the active distribution system by physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an appropriate cross-control device consistent with the degree of hazard, and shall be disconnected (physically separated) from the new main during the hydrostatic pressure test. It will be necessary to reestablish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

27.6 Methods of Chlorination

27.6.1 Three (3) methods of chlorination are explained in this section: tablet, continuous feed, and slug. The tablet method gives an average chlorine dose of approximately 25 mg/L; the continuous-feed method gives a 24-hour chlorine residual of not less than 10 mg/L; and the slug method gives a 3-hour exposure of not less than 50 mg/L free chlorine.

27.6.2 Tablet Method

27.6.2.1 The Tablet Method consists of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when installation is completed.

This method may be used only if the pipes and appurtenances are kept clean and dry during construction.

27.6.2.2 *Placing of Calcium Hypochlorite Granules* During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft. intervals. The quantity of granules shall be as shown in Table 1.

WARNING: This procedure must not be used on solvent-welded plastic or on screwed-joint steel pipe because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite.

27.6.2.3 *Placing of Calcium Hypochlorite Tablets* During construction, 5-g calcium hypochlorite tablets shall be placed in each section of pipe. Also, one such tablet shall be placed in each hydrant, hydrant branch, and other appurtenance. The number of 5-g tablets required for each pipe section

shall be $0.0012 d^2L$ rounded to the next higher integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table 2 shows the number of tablets required for commonly used sizes of pipe. The tablets shall be attached by a food-grade adhesive such as, Permatex Form-A-Gasket No. 2 and Permatex Clear RTV Silconce Adhesive Sealant as manufactured by Loctite Corporation. There shall be no adhesive on the tablet except on the broadside attached to the surface of the pipe.

Attach all the tablets inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section so it can be readily determined that the pipe is installed with the tablets at the top.

- 27.6.2.4 *Filling and Contact* When installation has been completed, the main shall be filled with water at a rate such that water within the main will flow at a velocity no greater than 1 ft/s (0.3 m/s). Precautions shall be taken to ensure that air pockets are eliminated. This water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41°F (5°C), the water shall remain in the pipe for at least 48 hours. As an optional procedure (if specified by the Authority or its Authorized Representative), water used to fill the new main shall be supplied through a temporary connection that shall include an appropriate cross-connection control device, consistent with the degree of hazard, for backflow protection of the active distribution system.

27.7 Continuous-Feed Method

- 27.7.1 The Continuous-Feed Method consists of placing calcium hypochlorite granules in the main during construction (optional), completely filling the main with potable water to remove all air pockets, flushing the completed main to remove particulates, and refilling the main with potable water. The potable water shall be chlorinated so that after a 24-hour holding period in the main there will be a free chlorine residual of not less than 10 mg/L. All necessary precaution shall be maintained in the dechlorination of the flushed waste water.
- 27.7.2 *Placing of Calcium Hypochlorite Granules* At the option of the Authority or its Authorized Representative, calcium hypochlorite granules shall be placed in pipe sections as specified in Sec. 26.6.6.2 The purpose of this procedure is to provide a strong chlorine concentration in the first flow of flushing water that flows down the main. In particular, this procedure is recommended when the type of pipe is such that this first flow of water will flow into annular spaces at pipe joints.
- 27.7.3 *Preliminary Flushing* Before being chlorinated, the main shall be filled with potable water to eliminate air pockets and shall be flushed to remove particulates. The flushing velocity in the main shall not be less than 2.5 ft/s (0.76 m/s) unless the Authority or its Authorized Representative determines that conditions do not permit the required flow to be discharged to waste. Table 3 shows the rates of flow required to produce a velocity of 2.5 ft/s (0.76 m/s) in commonly used sizes of pipe. Note that flushing is no substitute for preventive measures during construction. Certain contaminants, such as caked deposits, resist flushing at any feasible velocity.

For 24-in. (600-mm) or larger diameter mains, an acceptable alternative to flushing is to broom-sweep the main, carefully removing all sweepings prior to chlorinating the main.

27.7.4 Procedure for Chlorinating the Main

27.7.4.1 Water supplied from a temporary, backflow-protected connection to the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate into the newly installed water main. In the absence of a meter, the rate may be approximated by methods such as placing a Pitot gauge in the discharge, measuring the time to fill a container of a known volume.

27.7.4.2 At a point not more than 10 ft (3 m) downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 25 mg/L free chlorine. To ensure that this concentration is provided, measure the chlorine concentration at regular intervals in accordance with the procedures described in the current edition of *Standard Methods for the Examination of Water and Wastewater* or AWWA Manual M12, or using appropriate chlorine test kits.

Table 4 gives the amount of chlorine required for each 100 ft (30.5 m) of pipe of various diameters. Solutions of 1 percent chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires 1 lb (454 g) of calcium hypochlorite in 8 gal (30.3 L) of water.

27.7.4.3 As an optional procedure (if specified by the Authority or its Authorized Representative), water used to fill the new main during the application of chlorine shall be supplied through a temporary connection. This temporary connection shall be installed with an appropriate cross-connection control device, consistent with the degree of hazard, for backflow protection of the active distribution system. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine.

27.7.4.4 Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine. (The danger of using direct-feed chlorinators is that water pressure in the main can exceed gas pressure in the chlorine cylinder. This allows a backflow of water into the cylinder, resulting in severe cylinder corrosion and escape of chlorine gas.) The preferred equipment for applying liquid chlorine is a solution-feed, vacuum-operated chlorinator and a booster pump.

The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a gasoline or electrically powered chemical-feed pump designed for feeding

chlorine solutions. Feed lines shall be of such material and strength as to safely withstand the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the main.

27.8 Slug Method

27.8.1 The Slug Method consists of placing calcium hypochlorite granules in the main during construction, completely filling the main with potable water to eliminate all air pockets, flushing the main to remove particulates, and slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours.

27.8.2 *Placing Calcium Hypochlorite Granules* Same as Sec. 27.6.2.2.

27.8.3 *Preliminary Flushing* Same as Sec. 27.7.3.

27.8.4 *Chlorinating the Main*

27.8.4.1 Same as Sec. 27.7.4.1.

27.8.4.2 At a point not more than 10 ft (3 m) downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. To ensure that this concentration is achieved, the chlorine concentration should be measured at regular intervals. The chlorine shall be applied continuously and for a sufficient period to develop a solid column, or "slug," of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hours.

27.8.4.3 The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, the flow shall be stopped, chlorination equipment shall be relocated at the head of the slug, and, as flow is resumed, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.

27.8.4.4 As the chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

27.9 Final Flushing

27.9.1 Clearing the Main of Heavily Chlorinated Water

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe cement lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or is acceptable for domestic use.

27.9.2 Disposing of Heavily Chlorinated Water

The environment into which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. (See Table B.1 for neutralizing chemicals.) Where necessary, federal, state, provincial, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

27.10 Bacteriological Tests

27.10.1 Standard Conditions

After final flushing and before the new water main is connected to the distribution system, two (2) consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one (1) set of samples shall be collected from every 1200 ft (366 m) of the new water main, plus one (1) set from the end of the line and at least one (1) set from each branch. All samples shall be tested at a Pennsylvania DEP Certified Laboratory for bacteriological quality in accordance with *Standard Methods for the Examination of Water and Wastewater*, and shall show the absence of coliform organisms. A standard heterotrophic plate count shall also be required.

27.10.2 Special Conditions

If trench water has entered the new main during construction or, if in the opinion of the Authority or its Authorized Representative, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 ft (61 m) and shall be identified by location. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

27.10.3 Sampling Procedure

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate as required by *Standard Methods for the Examination of Water and Wastewater*. No hose or fire hydrant shall be used in the collection of samples.

27.11 Redisinfection

If the initial disinfection fails to produce satisfactory bacteriological results, the new main may be reflashed and shall be resampled. If the second attempt samples also fail to produce acceptable results, the main shall be rechlorinated by the continuous-feed or slug method of chlorination until satisfactory results are obtained.

NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When second attempt samples are taken, it is advisable to sample water entering the new main.

27.12 Final Connections to Existing Mains (OPTIONAL)

27.12.1 As an optional procedure if required by the Authority or its Authorized Representative, water mains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Sanitary construction practices must be followed during installation of the final connection, so that there is no contamination of the new or existing water main with foreign material or groundwater.

27.12.2 Connections Equal to or Less than One Pipe Length (≤ 18 ft. [5.5 m])

As an optional procedure, the new pipe, fittings, and valve(s) required for the connection may be spray-disinfected or swabbed with a minimum 1 percent solution of chlorine just prior to being installed, if the total length of connection from the end of a new main to the existing main is equal to or less than 18 ft (5.5 m).

27.12.3 Connections Greater Than One Pipe Length (> 18 ft [5.5 m])

As an optional procedure (if required by the Authority or its Authorized Representative), the pipe required for the connection must be set up aboveground, disinfected, and bacteriological samples taken, as described in Sec. 26.6, through Sec. 26.11, if the total length of connection from the end of a new main to the existing main is greater than 18 ft (5.5 m). After satisfactory bacteriological sample results have been received for this "pre-disinfected" pipe, the pipe can be used in connecting the new main to the active distribution system. Between the time that satisfactory bacteriological sample results are received and the time that the connection piping is installed, the ends of this piping must be sealed with plastic wraps or watertight plugs or caps.

27.13 Disinfection Procedures When Cutting into or Repairing Existing Mains

27.13.1 The following procedures apply primarily when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed, the existing main may be returned to service prior to completion of bacteriological testing in order to minimize the time customers are out of water. Leaks or breaks that are repaired with clamping devices while the mains remain full of pressurized water present little danger of contamination and require no disinfection.

27.13.2 Trench Treatment

When an existing main is opened, either by accident or by design, the excavation will likely be wet and may be contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

27.13.3 Swabbing With Hypochlorite Solution

The interior of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a one percent (1%) hypochlorite solution before they are installed.

27.13.4 Flushing

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions is recommended. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

27.13.5 Slug Chlorination

When practical, in addition to the procedures above, the section of main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated as described in Sec. 27.8 except that the dose may be increased to as much as 300 mg/L and the contact time reduced to as little as 15 min. After chlorination, flushing shall be resumed and continued until discolored water is eliminated, and the water is free of noticeable chlorine odor.

27.13.6 Sampling

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If positive bacteriological samples are recorded, then the situation shall be evaluated by the Authority or its Authorized Representative who can determine corrective action, and daily sampling shall be continued until two (2) consecutive negative samples are recorded.

27.14 Special Procedure for Caulked Tapping Sleeves

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned, and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main to be tapped. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is normally 1/2 in. (13 mm), more or less, so that as little as 100 mg/ft² of calcium hypochlorite powder will provide a chlorine concentration of over 50 mg/L.

TABLE 1

Ounces of calcium hypochlorite granules to be placed at beginning of main and at each 500-ft interval:

Pipe Diameter		Calcium Hypochlorite Granules	
in.	(mm)	oz.	(g)
4	(100)	0.5	(14)
6	(150)	1.0	(28)
8	(200)	2.0	(57)
12	(250)	4.0	(113)
16 and larger	(400 and larger)	8.0	(227)

TABLE 2

Number of 5-g calcium hypochlorite tablets required for dose of 25 mg/L*:

Pipe Diameter		Length of Pipe Section, ft (m)				
		13 (4.0) or less	18 (5.5)	20 (6.1)	30 (9.1)	40 (12.2)
in.	(mm)	Number of 5-g Calcium Hypochlorite Tablets				
4	(100)	1	1	1	1	1
6	(150)	1	1	1	2	2
8	(200)	1	2	2	3	4
10	(250)	2	3	3	4	5
12	(300)	3	4	4	6	7
16	(400)	4	6	7	10	13

* Based on 3.25-g available chlorine per tablet; any portion of tablet rounded to next higher integer.

TABLE 3

Required flow and openings to flush pipelines (40 psi [276 kPa] residual pressure in water main)*

Pipe Diameter		Flow Required To Produce 2.5 ft/s (approx.) Velocity in Main		Size of Tap, in. (mm)			Number of 2½ in. (64 mm) Hydrant Outlets
				1 (25)	1½ 38	2 (51 mm)	
in.	(mm)	gpm	(L/s)	Number of Taps on Pipe +			
4	(100)	100	(6.3)	1	---	---	1
6	(150)	200	(12.6)	---	1	---	1
8	(200)	400	(25.2)	---	2	1	1
10	(250)	600	(37.9)	---	3	2	1
12	(300)	900	(56.8)	---	---	2	2
16	(400)	1600	(100.9)	---	---	4	2

* With a 40-psi (276-kPa) pressure in the main and the hydrant flowing to atmosphere, a 2-1/2-in. (64-mm) hydrant outlet will discharge approximately 1000 gpm (63.1 L/s); and a 4-1/2-in. (114-mm) hydrant outlet will discharge approximately 2500 gpm (160 L/s).

+ Number of taps on pipe based on discharge through 5 ft. (1.5 m) of galvanized iron (GI) pipe with one 90° elbow.

TABLE 4

Chlorine required to produce 25-mg/L concentration in 100 ft (30.5 m) of pipe by diameter:

Pipe Diameter		100 Percent Chlorine		1 Percent Chlorine Solution	
in.	(mm)	lb.	(g)	gal.	(L)
4	(100)	.013	(5.9)	.16	(0.6)
6	(150)	.030	(13.6)	.36	(1.4)
8	(200)	.054	(24.5)	.65	(2.5)
10	(250)	.085	(38.6)	1.02	(3.9)
12	(300)	.120	(54.4)	1.44	(5.4)
16	(400)	.217	(98.4)	2.60	(9.8)

TABLE B.1

Amounts of chemicals required to neutralize various residual chlorine concentrations in 100,000 gal (378.5m³) of water:

Residual Chlorine Concentration Mg/L	Chemical Required							
	Sulfur Dioxide (SO ₂)		Sodium Bisulfite (NaHSO ₃)		Sodium Sulfite (Na ₂ SO ₃)		Sodium Thiosulfate (Na ₂ S ₂ O ₃ ·5H ₂ O)	
	lb.	(kg)	lb.	(kg)	lb.	(kg)	lb.	(kg)
1	0.8	(.36)	1.2	(.54)	1.4	(.64)	1.2	(.54)
2	1.7	(.77)	2.5	(1.13)	2.9	(1.32)	2.4	(1.09)
10	8.3	(3.76)	12.5	(5.67)	14.6	(6.62)	12.0	(5.44)
50	41.7	(18.91)	62.6	(28.39)	73.0	(33.11)	60.0	(27.22)

NOTES:

1. Check with the Authority or their authorized representative for conditions of disposal to sanitary sewer.
2. Chlorine residual of water being disposed will be neutralized by treating with one of the chemicals listed in Table B.1

SECTION 28.0 – HYDROSTATIC TESTING

28.1 Pressure and Leakage Test

28.1.1 Test Restrictions

Test pressure shall not be less than 180 p.s.i. or 1.25 times the working pressure at the highest point along the test section.

Test pressure shall not exceed pipe or thrust-restraint design pressures.

The hydrostatic test shall be of at least a 2-hour duration and not more than 2,000 feet in length unless permitted by the Authority or its authorized representative.

Test pressure shall not vary by more than ± 5 psi (34.5 kPa) for the duration of the test.

Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened if desired.

The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

28.1.2 Pressurization

After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) shall be applied by means of a pump connected to the pipe. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.

28.1.3 Air Removal

Before applying the specified test pressure, air shall be expelled completely from the section of piping under test. If permanent air vents or fire hydrants are not located at all high points, corporation cocks may be installed at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged with no-lead brass plugs or left in place as directed by FTMA.

28.1.4 Examination

All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, hydrants, or joints that are

discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until satisfactory results are obtained.

28.1.5 Leakage Defined

Leakage shall be defined as the quantity of water that must be added into the test segment of pipe or any valved section thereof to maintain the specified test pressure for the duration of the leakage test. Leakage shall not be measured by the drop in pressure in a test section over a period of time, but by establishing the quantity of leakage in gallons over the duration of the leakage test.

28.1.6 Allowable Leakage

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

In inch-pound units,

$$L = \frac{SD \sqrt{P}}{148,000}$$

Where:

- L = allowable leakage, in gallons per hour
- S = length of pipe tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the leakage test, in pounds per square inch (gauge)

This formula is based on an allowable leakage of 11.65 gpd/mi/in. (1.079 L/day/km/mm) of nominal diameter at a pressure of 150 psi (1034 kPa).

28.1.7 Allowable leakage at various pressures is shown in Table 6A.

28.1.8 When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/h/in. (1.2 mL/h/mm) of nominal valve size shall be allowed.

28.1.9 When hydrants are in the test section, the test shall be made against the main valve in the hydrant, not the lateral gate valve.

28.1.10 Acceptance of Installation

Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe indicates leakage greater than that specified in Section 28.1.6, repairs or replacements shall be accomplished in accordance with the specifications.

28.1.11 All visible leaks are to be repaired regardless of the amount of leakage.

TABLE 6-A

ALLOWABLE LEAKAGE PER 1,000 FT. OF PIPELINE* -gph†

Average Test Pressure psi	Nominal Pipe Diameter -- in.																	
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64
450	0.43	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.58	2.87	3.44	4.30	5.16	6.02	6.88	7.74	8.60	9.17
400	0.41	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	3.24	4.05	4.86	5.68	6.49	7.30	8.11	8.65
350	0.38	0.51	0.76	1.01	1.26	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07	6.83	7.58	8.09
300	0.35	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62	6.32	7.02	7.49
275	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38	6.05	6.72	7.17
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13	5.77	6.41	6.84
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86	5.47	6.08	6.49
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73	6.12
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29	4.83	5.36	5.72
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97	4.47	4.97	5.30
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63	4.08	4.53	4.83
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24	3.65	4.05	4.32

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

†Calculated on the basis of the equation on page 24

NIRA CONSULTING ENGINEERS, INC.
Water Line Integrity Test Report

Hydrostatic Test PASS / FAIL

Operating Pressure of Existing Water Main (at point of connection) _____ psi
Hydrostatic Test Pressure 1.5 x Operating Pressure (180 psi Minimum) _____ psi (initial)
Test Duration (2 Hour Minimum) _____ am/pm _____ to _____ am/pm
Pressure at Conclusion of Test _____ psi (final)

****If pressure drop occurs during Hydrostatic Test record drop and conduct leak test, the pressure shall not vary by more than 5% for the duration of the test.****

Notes: _____

Leak Test PASS / FAIL

Lineal footage of water line being tested _____ (2000' Maximum) Diameter of Pipe _____
Amount of water consumed to return to (initial) Test Pressure _____ gal.
over a two (2) hour period
Allowable leakage (see table in specifications) _____ gal.

****Allowable leakage values are per 1000' of pipe****

Notes: _____

Test Conducted By: _____ company / _____ individual
Test Inspected By: _____ company / _____ individual
Location of water line: _____
Date: _____ Contract No. _____

WATER LINE INTEGRITY TEST PASS / FAIL

SECTION 29.0 – PERMITS AND LICENSES

The Developer and/or Contractor shall be responsible for obtaining any and all Federal, State, County or Local Permits or licenses required for the execution of the proposed work. The Developer and/or the Contractor shall be responsible for all costs associated with securing such Permits and/or Licenses and any costs or fees for inspections which may be required as a condition of such Permits or Licenses. Some permits may be required to be in the name of the Authority, in which case the Authority will secure the permit and back charge the developer for any and all costs associated with obtaining the permit.

SECTION 30.0 – INSPECTION OF WORK

All materials and workmanship shall be subject to inspection, examination, or test by the Authority or the Authority's Authorized Representative at any and all times during manufacture or construction and at any and all places where such manufacture or construction is carried on. The Authority or the Authority's Authorized Representative shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the construction site and replaced with material of specified quality.

The Authority or the Authority's Authorized Representative and governmental agencies with jurisdictional interests will have access to the work at reasonable times for their observation, inspection and testing. The Contractor shall provide proper and safe conditions for such access.

The Contractor shall give ample notice to the Authority or the Authority's Authorized Representative before laying pipe so that an Inspector may make proper inspection. All pipe, before being lowered into the trench, shall be inspected and both ends shall be cleaned.

Before backfilling is begun, the Contractor shall make tests as directed by the Authority or the Authority's Authorized Representative in order to ascertain if joints are tight. Leaking, poor or misaligned joints shall be removed or repaired at once.

SECTION 31.0 – CONSTRUCTION-GENERAL REQUIREMENTS

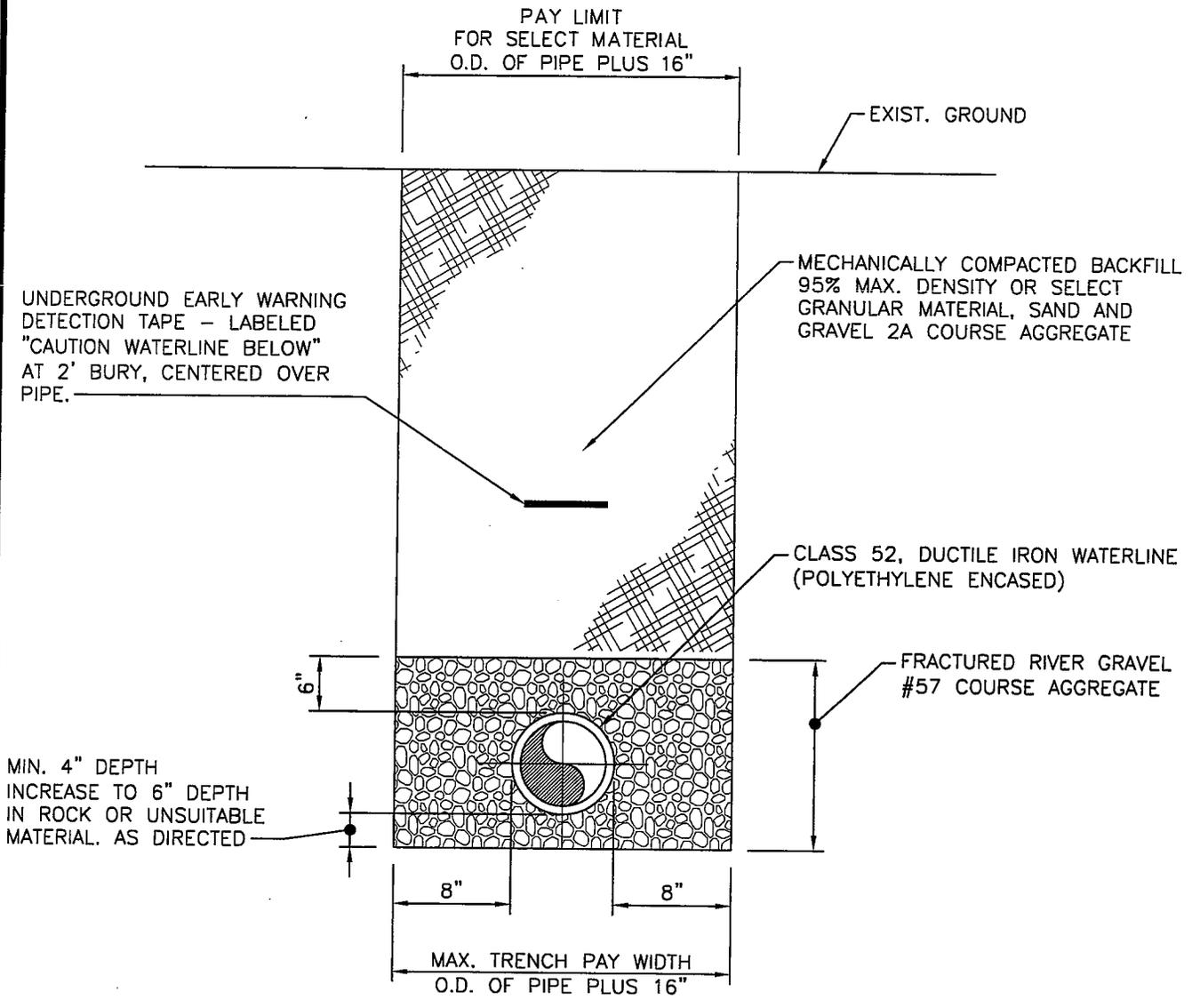
All construction shall proceed in a neat and organized manner. The construction of water distribution or transmission facilities shall be conducted systematically so as to avoid the need to sleeve together sections of water mains constructed separately.

No construction of any water main will be permitted until the proposed alignment has been satisfactorily staked-out by the Project Engineer or Surveyor. The Authority or the Authority's Authorized Representative shall be the sole judge of the adequacy of the stake-out. If during the course of the work, the Authority or its Authorized Representative determines that adequate stake-out or control points either do not exist or were removed, buried, damaged, mislocated or lost and that any further construction cannot be continued with reasonable assurance that the facilities are being installed in their proper design location, the work shall be discontinued until adequate construction stake-out or control points are established.

To ensure that all water facilities are installed to the proper depth, construction of water mains or appurtenances will not be permitted until all rough grading of the areas in which such facilities are to be located is completed. For the purposes of this Section, rough grading shall be considered to be the design finished grade plus or minus four inches (4"). The Authority reserves the right to require that roadway construction be completed prior to the installation of the water lines in development sites.

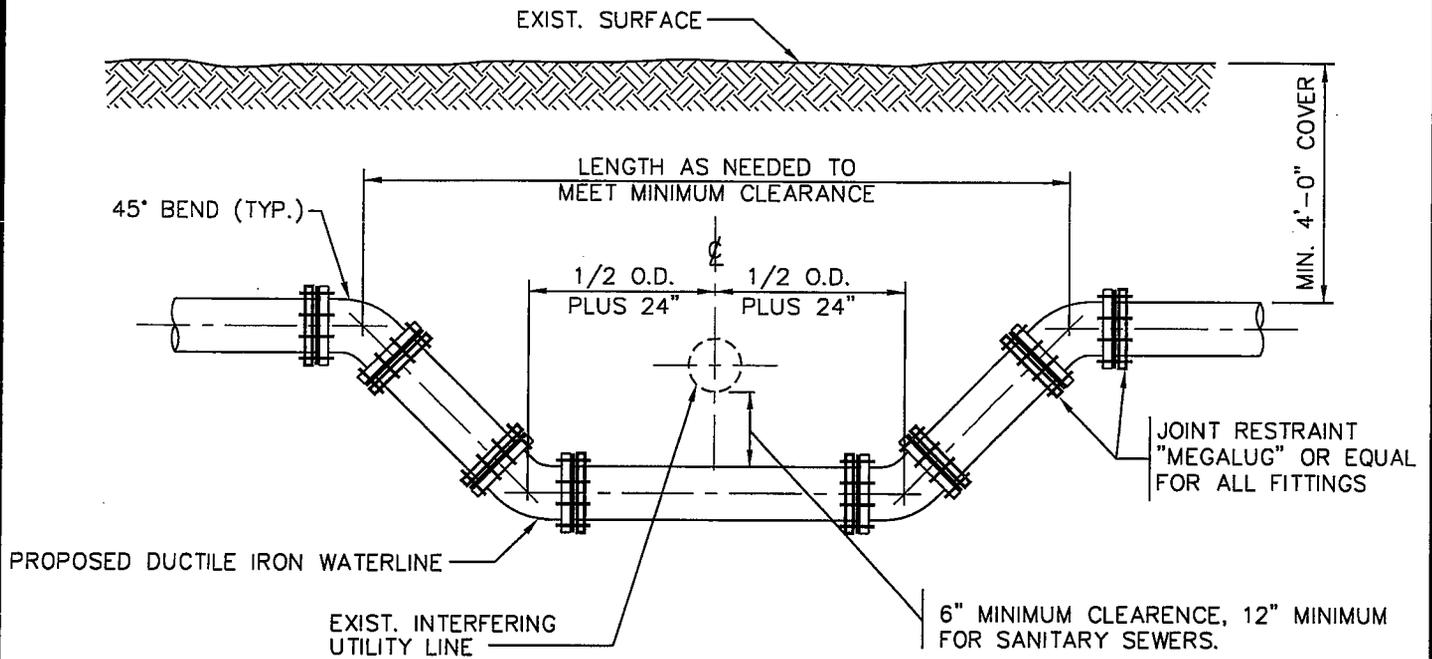
SECTION 32.0 – AS-BUILT DRAWINGS

At the completion of the project and prior to the final acceptance of any facilities by the Authority or the Authority's Authorized Representative, accurate As-built Drawings, shall be provided to the Authority or the Authority's Authorized Representative. As-built Drawings shall be reproducible mylars and shall include the field measurements, dimensions and/or stations and offsets depicting the final as-built location and size of all water mains, valves, fittings, fire hydrants, air/vacuum release valves, blow-offs, etc. The As-built Plans may illustrate the location of valves and fittings by way of accurate horizontal distance measurements (references) to other permanent physical features such as manholes, inlets, utility poles, buildings, etc. The use of supplemental drawings and/or enlarged scale views or details are encouraged as a means to include important information regarding the size, depth and/or location of the water mains or appurtenances. The relative location, depth and approximate clearance of other underground utilities and/or structures in close proximity to the water lines or appurtenances shall be included on the As-built Drawings. Following submission of the As-built Plans, any revisions or additional information requested by the Authority or its Authorized Representative shall subsequently be provided by the Developer and/or the Contractor. The Authority reserves the right to require that fittings, valves, and hydrants be located by GPS survey. Buried components of the water system may be required to have 4X4 pressure treated marker boards be placed at the fitting prior to backfilling.



NOTE:
TRENCH WIDTH SHALL BE SUFFICIENT
TO ACCOMMODATE SHORING EQUIPMENT
REGARDLESS OF MAX. PAY WIDTH

FINDLAY TOWNSHIP MUNICIPAL AUTHORITY	
TYPICAL WATER LINE TRENCH DETAIL	
NIRA Consulting Engineers, Inc.	
DATE: APRIL, 2012	FILE: FTMA SD-W-01



NOTE:

PROVIDE 2'-0" MINIMUM HORIZONTAL AND VERTICAL CLEARANCE BETWEEN WATERLINE AND ALL EXISTING AND PROPOSED UTILITIES AND PIPELINES.

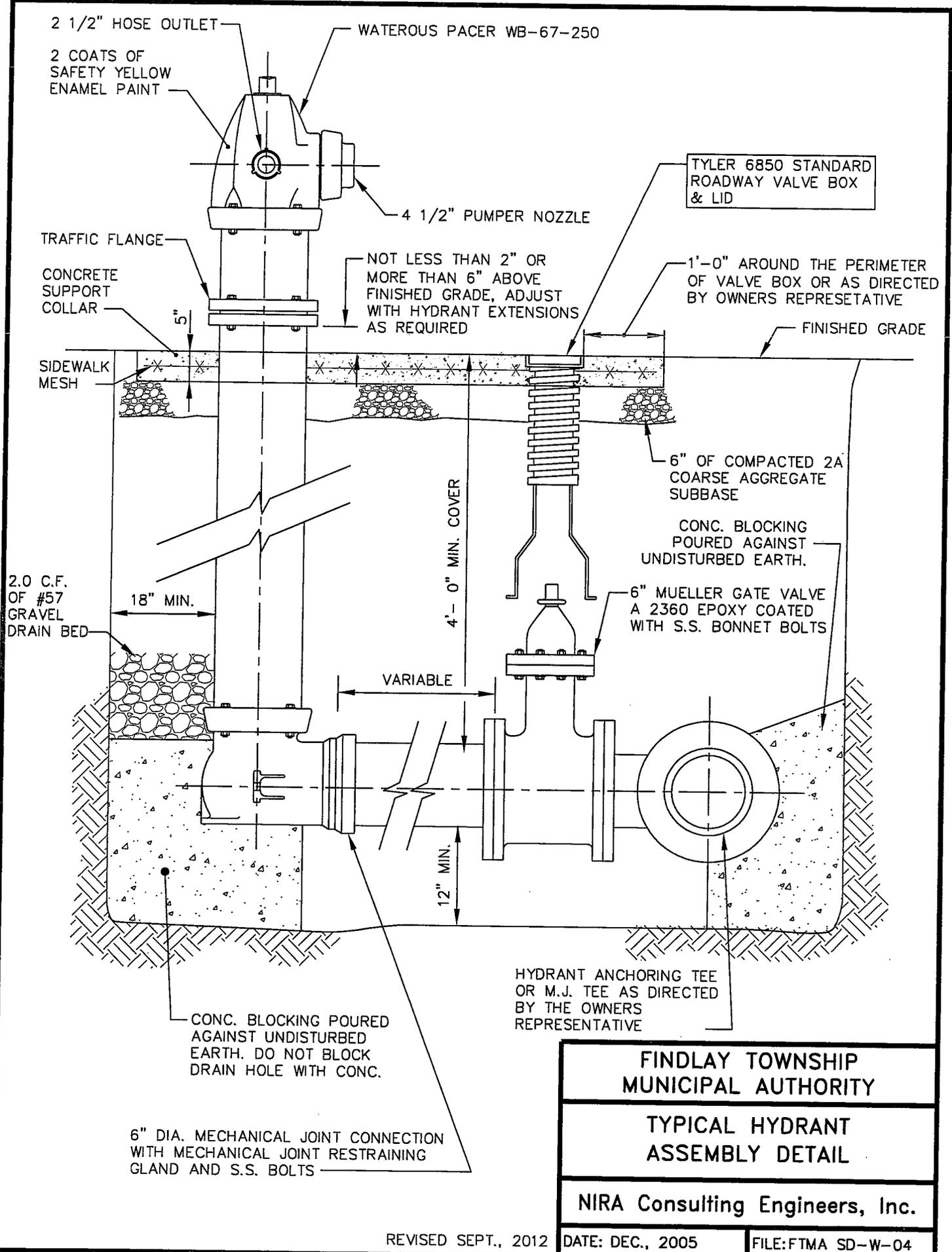
FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

SPECIAL CONDITION UTILITY
CROSSING DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003

FILE:FTMA SD-W-03



**FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY**

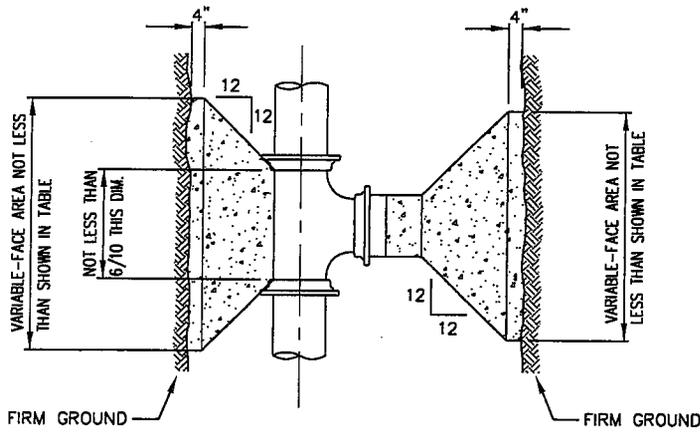
**TYPICAL HYDRANT
ASSEMBLY DETAIL**

NIRA Consulting Engineers, Inc.

REVISED SEPT., 2012

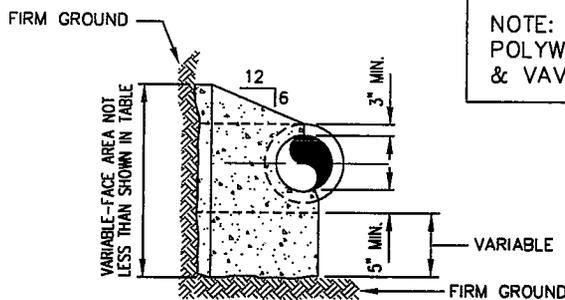
DATE: DEC., 2005

FILE: FTMA SD-W-04

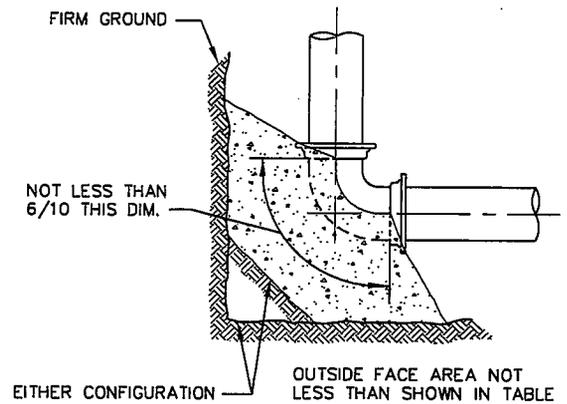


BLOCKING FOR TEES AND PLUGS

PLAN VIEW

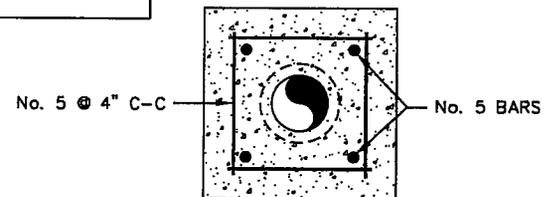


NOTE:
POLYWRAP ALL PIPE, FITTINGS
& VAVLES.



BLOCKING FOR BENDS

PLAN VIEW



APPLICABLE TO TEES, WYES, AND BENDS

ALL TEES, WYES, CROSSES & PLUGS, AND BENDS OF 10" OR MORE SHALL BE BLOCKED AGAINST FIRM EARTH WITH CONCRETE.

NOTE:
EARTH PRESSURE FIGURED AT 4000 lbs/sq. ft. IF EARTH ENCOUNTERED WILL NOT WITH STAND THIS PRESSURE.
THE AREA OF THE BLOCK MUST BE INCREASED PROPORTIONATELY.

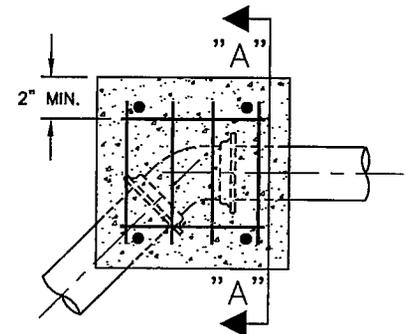
CALCULATIONS ARE BASED ON 225 lbs/sq. in. OR 150 lbs WORKING PRESSURE PLUS 50% WATER HAMMER FOR SIZES 4" TO 24" INCLUSIVE.

PIPE SIZE (in.)	AREA SQ."	TOTAL FORCE (kps)	AREA OF BLOCK IN SQUARE FEET				
			TEES & PLUGS	90° BENDS	45° BENDS	22 1/2" BENDS	11 1/4" BENDS
0-4	13	2.90	1.0	1.0	1.0	1.0	1.0
6	29	6.50	1.7	2.3	1.3	1.0	1.0
8	53	12.0	3.0	4.1	2.2	1.2	1.0
10	82	19.0	4.8	6.3	3.4	1.8	1.0
12	118	26.80	6.7	9.1	4.9	2.5	1.3
14	168	37.80	9.5	12.3	6.7	3.4	1.8
16	220	48.50	12.2	16.1	8.8	4.5	2.3
18	276	82.20	15.6	20.4	11.0	5.6	2.9
20	342	77.0	19.3	25.7	13.7	7.0	3.6
24	486	109.50	27.4	36.3	19.7	10.0	5.2
* 30	706	84.80	21.2	30.5	18.5	8.4	4.4
* 36	1017	122.0	30.5	43.7	23.7	12.1	6.2

* FOR SIZES 30" AND 36" THE TABLE IS BASED ON 120 lbs/sq. in. OR 75 lbs. WORKING PRESSURE PLUS 50% WATER HAMMER.

CONTRACTOR RETAINS RESPONSIBILITY FOR ADEQUATE BLOCKING. THE TABULATION IS PROVIDED AS A CONVENIENCE TO AID IN THE CALCULATIONS OF REQUIRED AREA OF BLOCKING UNDER ACTUAL CONDITIONS. VALUES MUST BE INCREASED PROPORTIONATELY FOR TEST PRESSURES OVER 200psi AND BEARING CAPACITY LESS THAN 4000psf.

SECTION "A-A"



REINFORCED CONCRETE GRAVITY ANCHORS FOR VERTICAL BENDS

(A) WHERE INLET OR OUTLET IS HORIZONTAL. WEIGHT OF ANCHOR CAN BE DETERMINED BY MULTIPLYING AREA IN THE TABLE BY 4000lbs.
(B) OTHER CONDITIONS REQUIRE SPECIAL DESIGN.

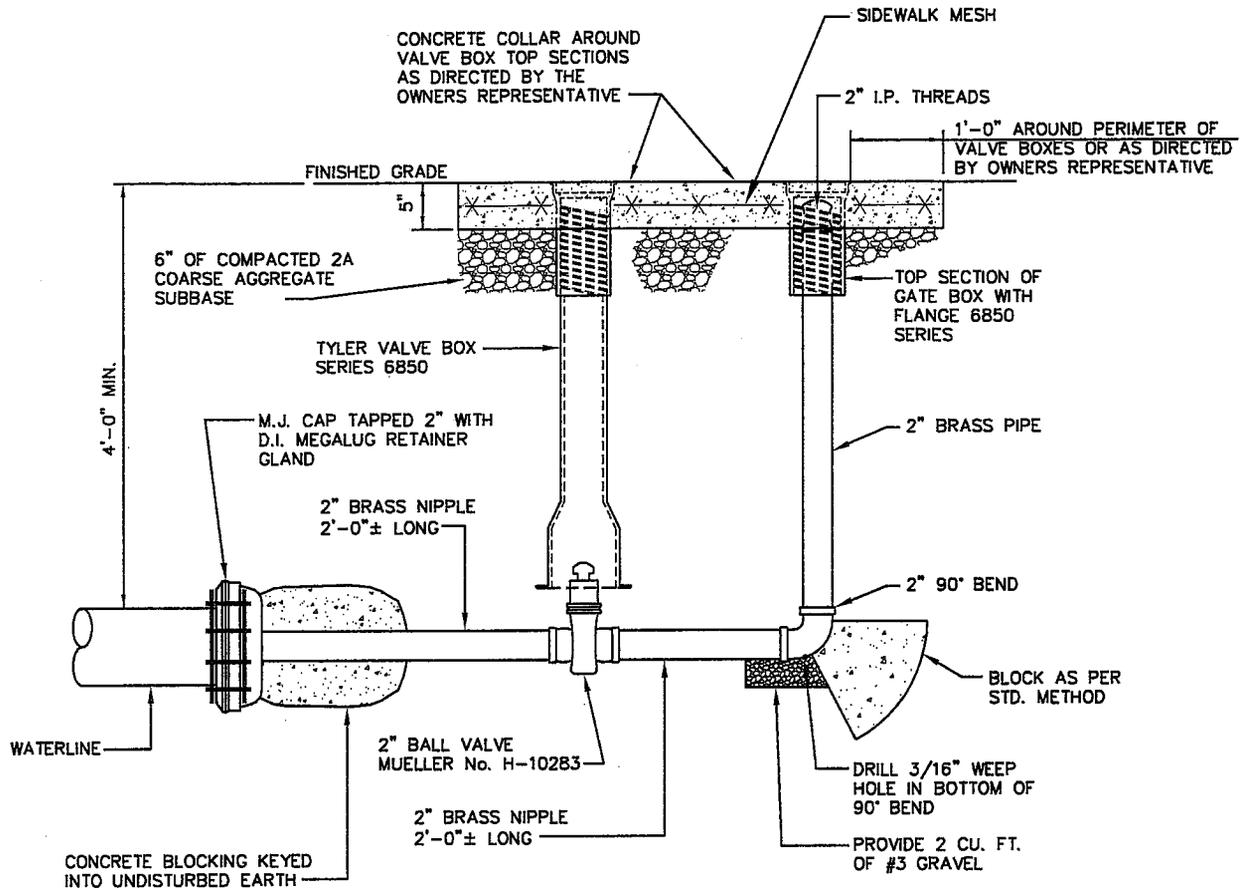
FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

DUCTILE IRON WATERLINE
THRUST BLOCKING DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003

FILE: FTMA SD-W-05



FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

TEMPORARY 2" BLOWOFF
TYPICAL ASSEMBLY

NIRA Consulting Engineers, Inc.

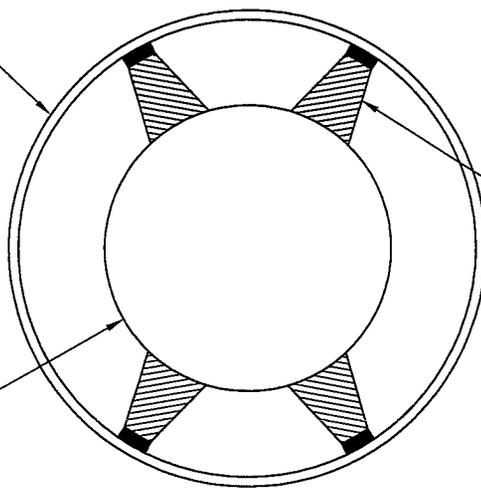
REVISED SEPTEMBER 2012

DATE: SEPT. 2003

FILE: FTMA SD-W-06

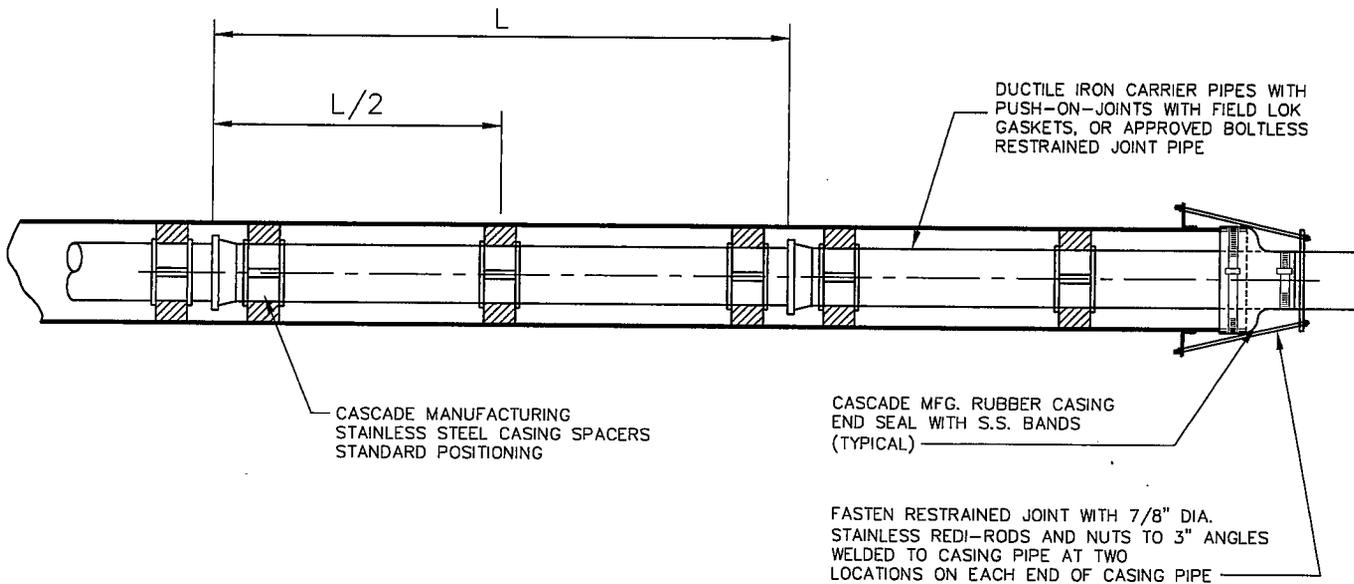
STEEL CASING

WATERLINE



CASING SPACERS
MODEL "CCS" AS
MANUFACTURED BY
CASCADE WATERWORKS
MFG. Co.

PIPE SIZE	6"	8"	10"	12"	14"	16"	18"	20"	24"
CASING SIZE	12"	16"	18"	24"	24"	30"	36"	36"	48"



CARRIER PIPE SUPPORT AND CASING DETAIL

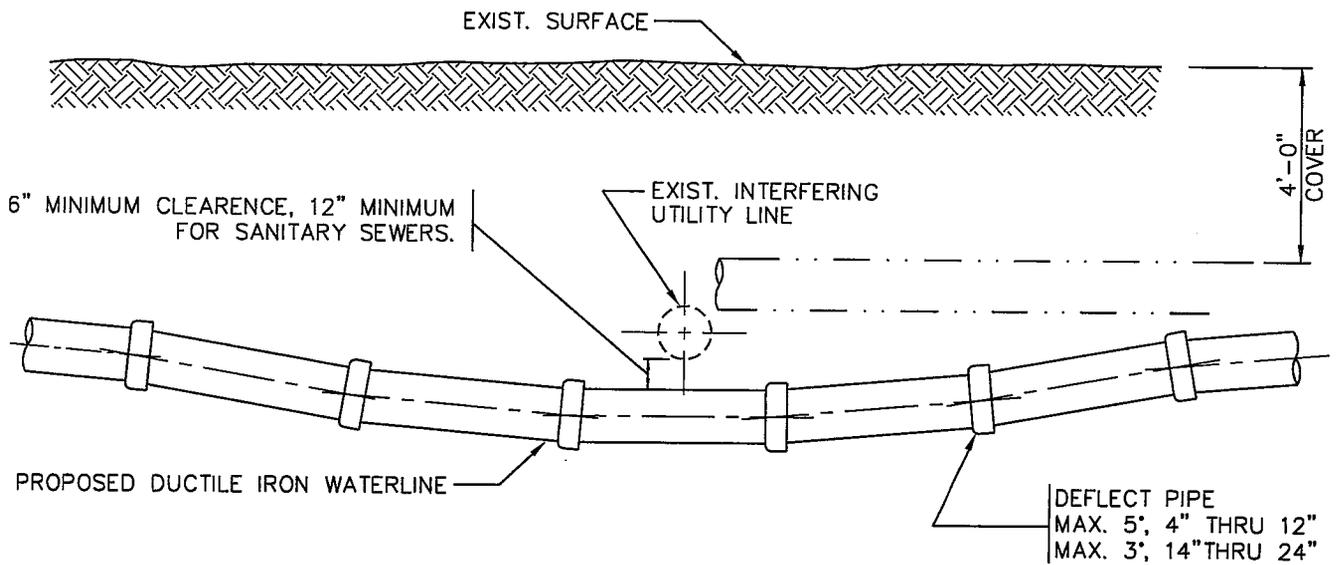
FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

CARRIER PIPE SUPPORT
AND CASING DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003

FILE: FTMA SD-W-07



NOTE:

PROVIDE 2'-0" MINIMUM HORIZONTAL AND VERTICAL CLEARANCE BETWEEN WATERLINE AND ALL EXISTING AND PROPOSED UTILITIES AND PIPELINES.

FINDLAY TOWNSHIP
 MUNICIPAL AUTHORITY

PIPE INTERFERENCE
 LAYING DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003

FILE: FTMA SD-W-08

1'-0" AROUND PERIMETER
OF VALVE BOX OR AS
DIRECTED BY THE OWNERS
REPRESENTATIVE

SIDEWALK MESH

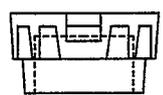
5"

CONC. SUPPORT SLAB
(NOT REQUIRED IN
PAVED AREAS)

6" OF COMPACTED 2A
COARSE AGGREGATE
SUBBASE

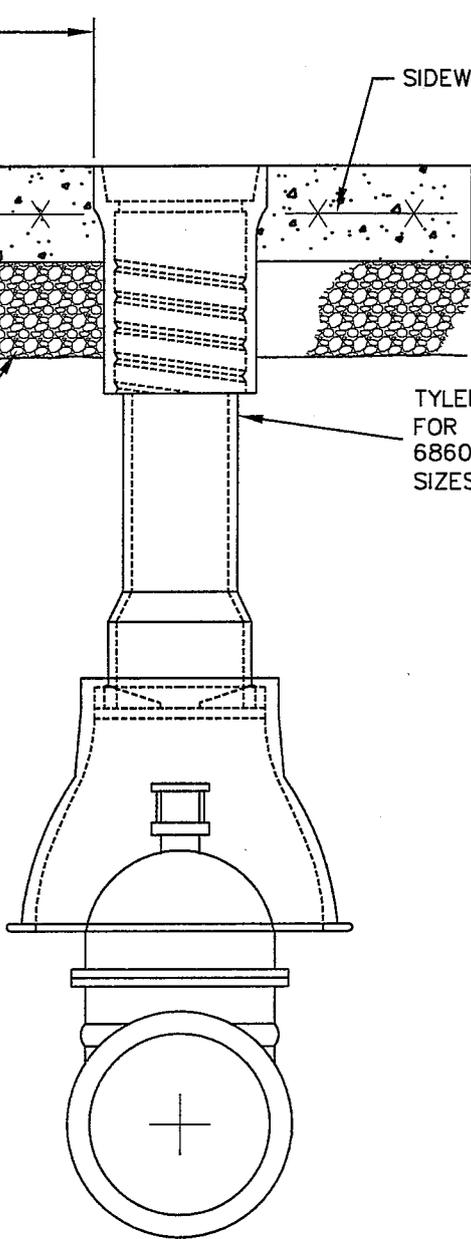
TYLER PIPE 6850 SERIES
FOR VALVE SIZES 4" - 8"
6860 SERIES FOR VALVE
SIZES 10" - 16"

TO BE STAMPED
"WATER"



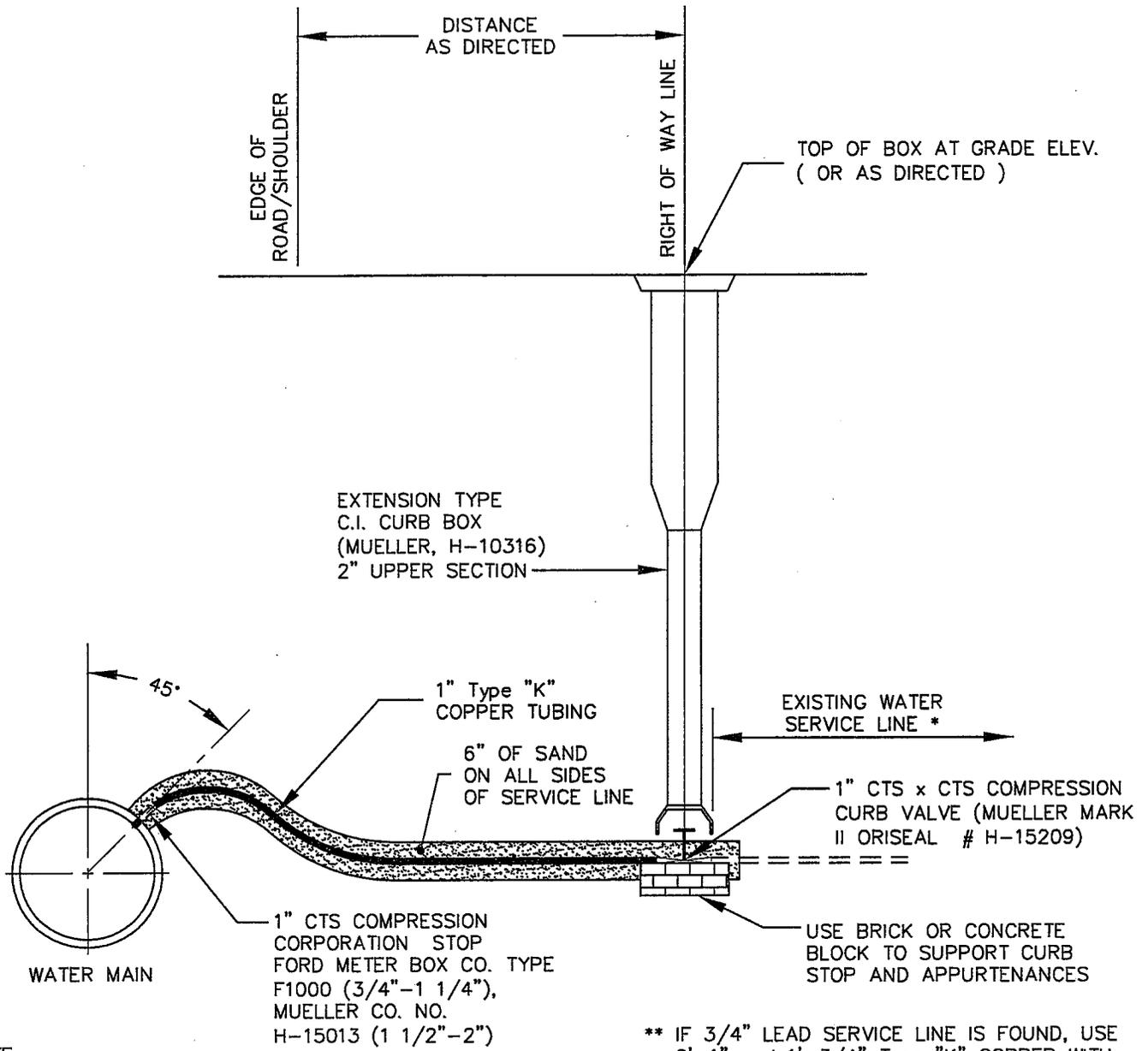
LID

C.I. VALVE BOXES SHALL BE BITUMINOUS
COATED.



* FOR 2 AND 3 WAY VALVE ARRANGEMENTS
CONSTRUCT ONE SUPPORT COLLAR THAT
ENCOMPASSES ALL VALVE BOX'S UNLESS
DIRECTED OTHERWISE BY THE OWNERS
REPRESENTATIVE.

FINDLAY TOWNSHIP MUNICIPAL AUTHORITY	
TYPICAL VALVE BOX AND CONC. SUPPORT COLLAR DETAIL	
NIRA Consulting Engineers, Inc.	
REVISED SEPTEMBER 2012	DATE: SEPT. 2003
FILE: FTMA SD-W-09	



NOTE:
 INSTALL CORPORATION STOP AT 45° ANGLE
 FROM VERTICAL AXIS OF WATER MAIN

* CONTRACTOR TO VERIFY TYPE AND SIZE OF EXISTING SERVICE LINE FOR HOOKUP. IF EXISTING SERVICE LINE IS 1" CTS, HOOK DIRECTLY TO NEW CURB VALVE. OTHERWISE USE THE FOLLOWING COUPLINGS WITH 2'-1" Type "K" COPPER (EXCEPT FOR EXISTING 3/4" LEAD SERVICES **)

SERVICE LINE COUPLINGS

FORD METER BOX COMPANY, INC.
 PACK JOINT COUPLINGS OR EQUAL

- 3/4" I.P. x 1" CTS (C-45-43)
- 1" I.P. x 1" CTS (C-45-44)
- 3/4" C.T.S. x 1" CTS (C-44-34)
- 5/8" E.S.L. x 1" CTS (Q24-24) (C-46-43)
- 5/8" D.E.S.L. x 1" CTS (Q34-24)
- 1" S.L. x 1" CTS (Q14-44)
- 1" E.S.L. x 1" CTS (Q24-44)
- 1" D.E.S.L. x 1" CTS (Q34-44)

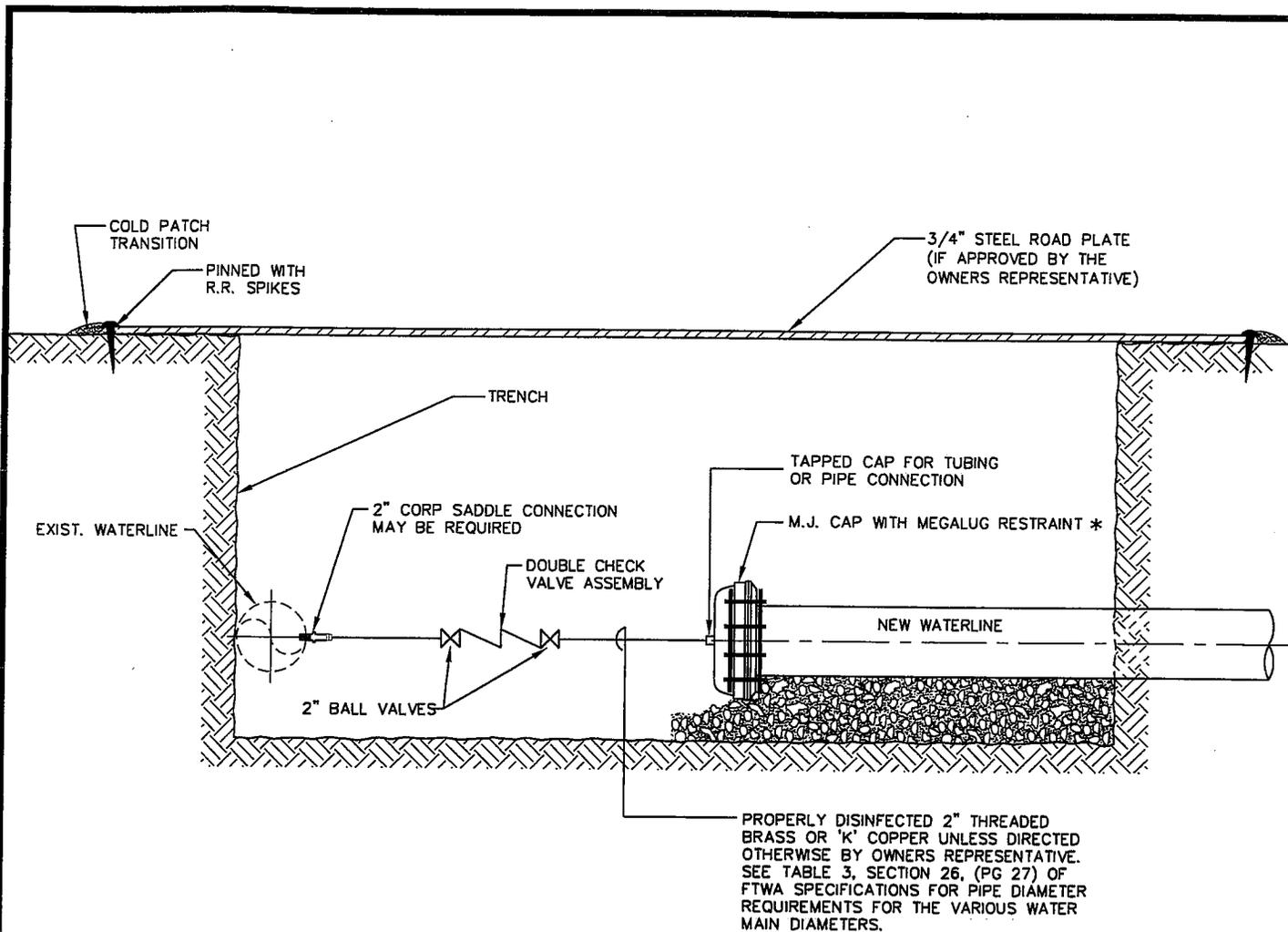
S.L.=STRONG LEAD
 E.S.L.=EXTRA STRONG LEAD
 D.E.S.L.=DOUBLE EXTRA STRONG LEAD

** IF 3/4" LEAD SERVICE LINE IS FOUND, USE 2'-1" and 1'-3/4" Type "K" COPPER WITH THE FOLLOWING COUPLINGS:

- 1" CTS. x 3/4" CTS. (C-44-34)
 then 3/4" CTS x 3/4" LEAD COUPLING
 as follows:
- 3/4" S.L. x 3/4" CTS (Q14-33-Q34-23)
- 3/4" E.S.L. x 3/4" CTS (Q24-33)
- 3/4" D.E.S.L. x 3/4" CTS (Q34-33) (C46-34)

FINDLAY TOWNSHIP MUNICIPAL AUTHORITY	
TYPICAL 1" WATER SERVICE CONNECTION DETAIL	
NIRA Consulting Engineers, Inc.	
DATE: SEPT. 2003	FILE: FTMA SD-W-10

REVISED: SEPTEMBER 2012



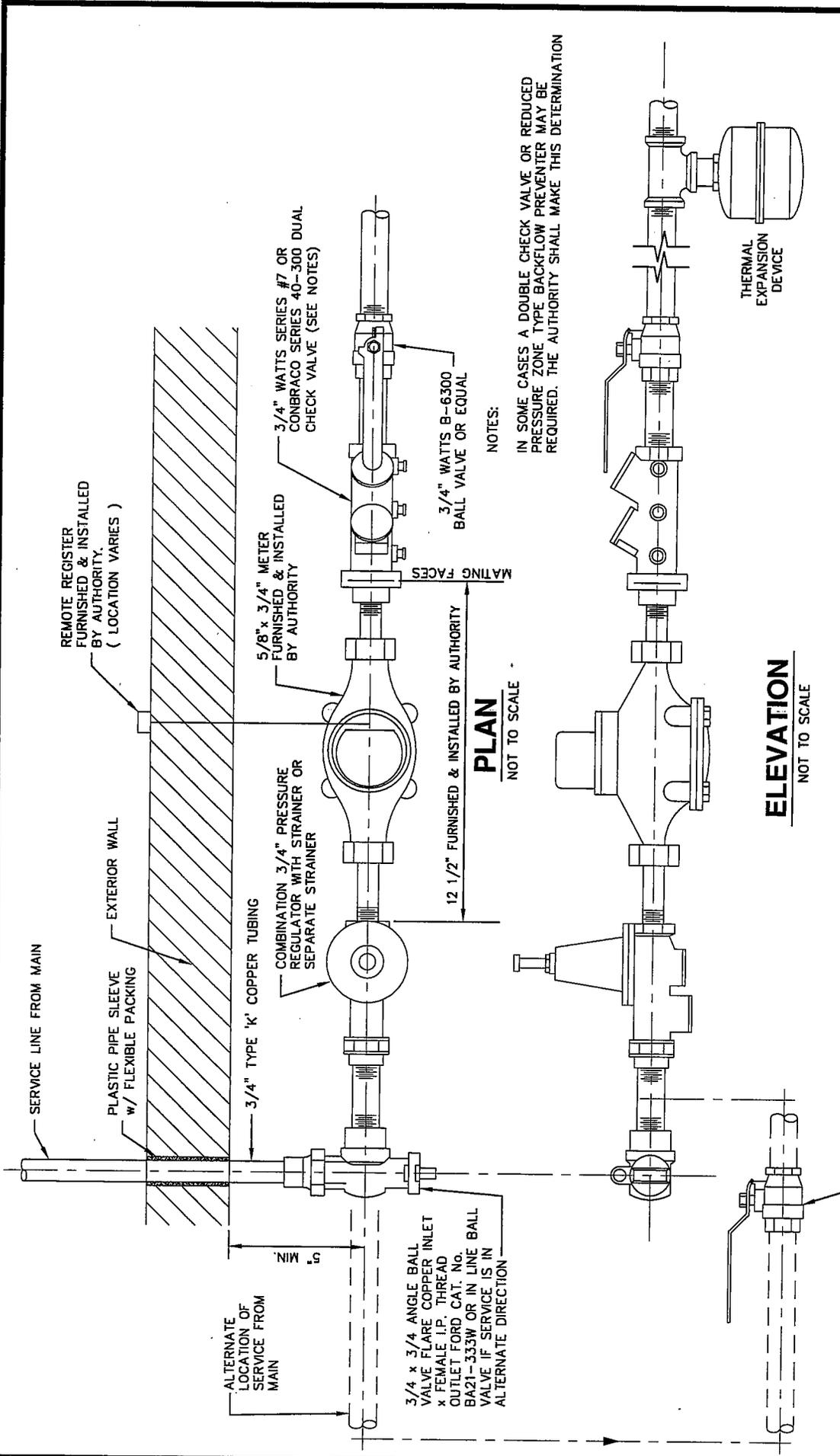
PROPERLY DISINFECTED 2" THREADED BRASS OR 'K' COPPER UNLESS DIRECTED OTHERWISE BY OWNERS REPRESENTATIVE. SEE TABLE 3, SECTION 26, (PG 27) OF FTWA SPECIFICATIONS FOR PIPE DIAMETER REQUIREMENTS FOR THE VARIOUS WATER MAIN DIAMETERS.

NOTES:

1. THE INITIAL FILLING OF THE NEW WATER LINE SHALL BE PERFORMED SUCH THAT THE VELOCITY IN THE NEW WATER LINE SHALL NOT EXCEED ONE (1) FOOT PER SECOND.
2. TO PREVENT DAMAGE TO THE PIPES INTERNAL CONCRETE LINING, THE NEW WATER LINE SHALL BE FLUSHED IMMEDIATELY FOLLOWING THE REQUIRED DISINFECTION SOLUTION CONTACT TIME BASED ON THE CHLORINATION METHOD UTILIZED. FLUSHING SHALL BE PERFORMED SUCH THAT A MINIMUM VELOCITY OF 2.5 FEET PER SECOND IS ACHIEVED IN THE NEW WATER LINE.
3. TEMPORARY CONNECTION TO THE IN-SERVICE EXISTING WATER LINE SHALL BE THROUGH AN APPROVED BACKFLOW PREVENTION DEVICE, PERMANENT CONNECTION TO THE EXISTING WATER LINE SHALL BE MADE AFTER ALL DISINFECTION, FLUSHING AND SAMPLING HAVE BEEN SUCCESSFULLY COMPLETED.

* BRACE CAP TO PREVENT BLOW-OFF

FINDLAY TOWNSHIP MUNICIPAL AUTHORITY	
TYPICAL PIPE LINE FILLING AND TESTING DETAIL	
NIRA Consulting Engineers, Inc.	
DATE: SEPT. 2003	FILE: FTMA SD-W-11



REMOTE REGISTER
FURNISHED & INSTALLED
BY AUTHORITY.
(LOCATION VARIES)

SERVICE LINE FROM MAIN
PLASTIC PIPE SLEEVE
w/ FLEXIBLE PACKING
EXTERIOR WALL

ALTERNATE
LOCATION OF
SERVICE FROM
MAIN

COMBINATION 3/4" PRESSURE
REGULATOR WITH STRAINER OR
SEPARATE STRAINER

3/4" TYPE 'K' COPPER TUBING

5/8" x 3/4" METER
FURNISHED & INSTALLED
BY AUTHORITY

3/4" WATTS SERIES #7 OR
CONBRACO SERIES 40-300 DUAL
CHECK VALVE (SEE NOTES)

3/4" x 3/4" ANGLE BALL
VALVE FLARE COPPER INLET
x FEMALE I.P. THREAD
OUTLET FORD CAT. NO.
BA21-333W OR IN LINE BALL
VALVE IF SERVICE IS IN
ALTERNATE DIRECTION

12 1/2" FURNISHED & INSTALLED BY AUTHORITY

MATING FACES

3/4" WATTS B-6300
BALL VALVE OR EQUAL

PLAN
NOT TO SCALE

NOTES:

IN SOME CASES A DOUBLE CHECK VALVE OR REDUCED
PRESSURE ZONE TYPE BACKFLOW PREVENTER MAY BE
REQUIRED. THE AUTHORITY SHALL MAKE THIS DETERMINATION

ELEVATION
NOT TO SCALE

THERMAL
EXPANSION
DEVICE

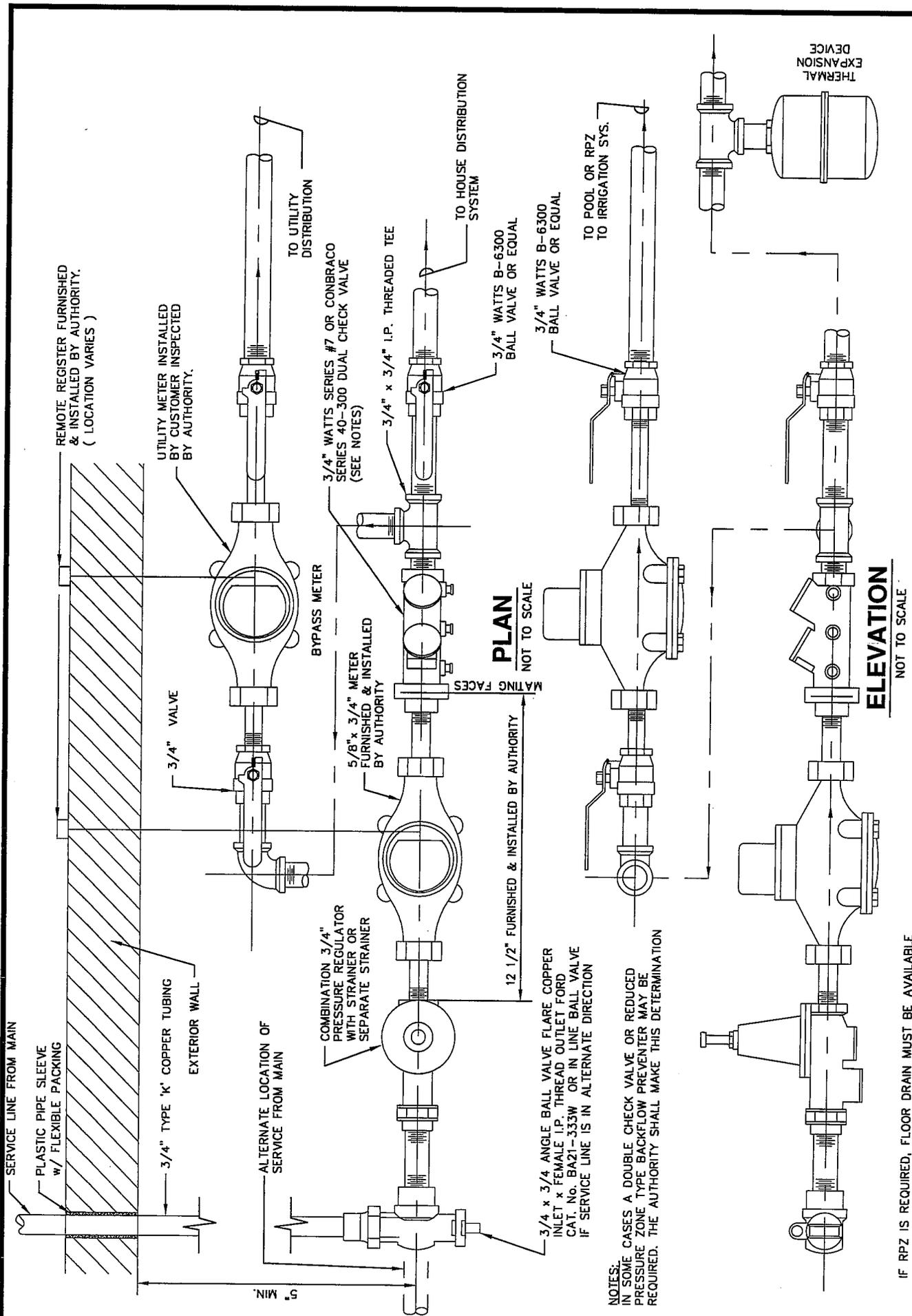
3/4" WATTS B-6300 BALL
VALVE OR EQUAL

FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

TYPICAL METER
INSTALLATION DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003 FILE: FTMA SD-W-12



REMOTE REGISTER FURNISHED & INSTALLED BY AUTHORITY. (LOCATION VARIES)

UTILITY METER INSTALLED BY CUSTOMER INSPECTED BY AUTHORITY.

3/4" WATTS SERIES #7 OR CONBRACO SERIES 40-300 DUAL CHECK VALVE (SEE NOTES)

BYPASS METER

5/8" x 3/4" METER FURNISHED & INSTALLED BY AUTHORITY

COMBINATION 3/4" PRESSURE REGULATOR WITH STRAINER OR SEPARATE STRAINER

PLAN
NOT TO SCALE

ELEVATION
NOT TO SCALE

NOTES:
IN SOME CASES A DOUBLE CHECK VALVE OR REDUCED PRESSURE ZONE TYPE BACKFLOW PREVENTER MAY BE REQUIRED. THE AUTHORITY SHALL MAKE THIS DETERMINATION

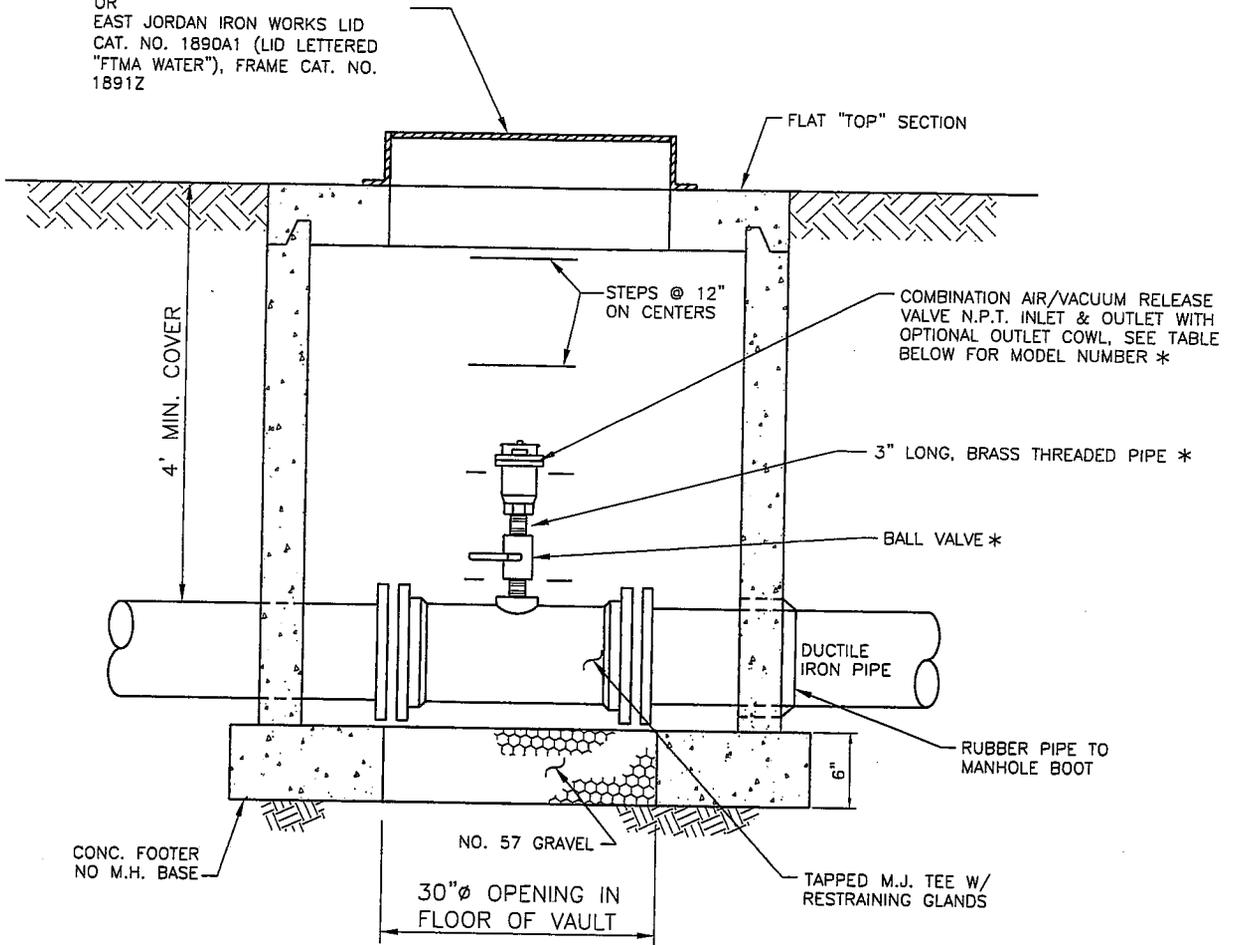
IF RPZ IS REQUIRED, FLOOR DRAIN MUST BE AVAILABLE

**FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY**

NIRA Consulting Engineers, Inc.

DATE: SEPT. 2003 FILE: FTMA SD-W-13

NEENAH FOUNDRY R-1753-A
 CASTING WITH 1-INCH DIAMETER
 CENTER VENT HOLE STAMPED
 "FTMA WATER"
 OR
 EAST JORDAN IRON WORKS LID
 CAT. NO. 1890A1 (LID LETTERED
 "FTMA WATER"), FRAME CAT. NO.
 1891Z



COMBINATION AIR VALVE CHAMBER DETAIL
 SCALE: N.T.S.

*SIZE SHALL BE AS NOTED ON PLAN.
 STOP, PIPE, & VALVE SHALL BE OF
 SAME SIZE

NOTE:
 ENTIRE ASSEMBLY SHALL BE INSTALLED
 IN 1 STD. 4' DIA. PRECAST MANHOLE

AIR / VACUUM RELEASE VALVE TABLE	
WATERLINE SIZE	MODEL
8"-10"	APCO 1" MODEL #143C
12"-16"	APCO 2" MODEL #145C

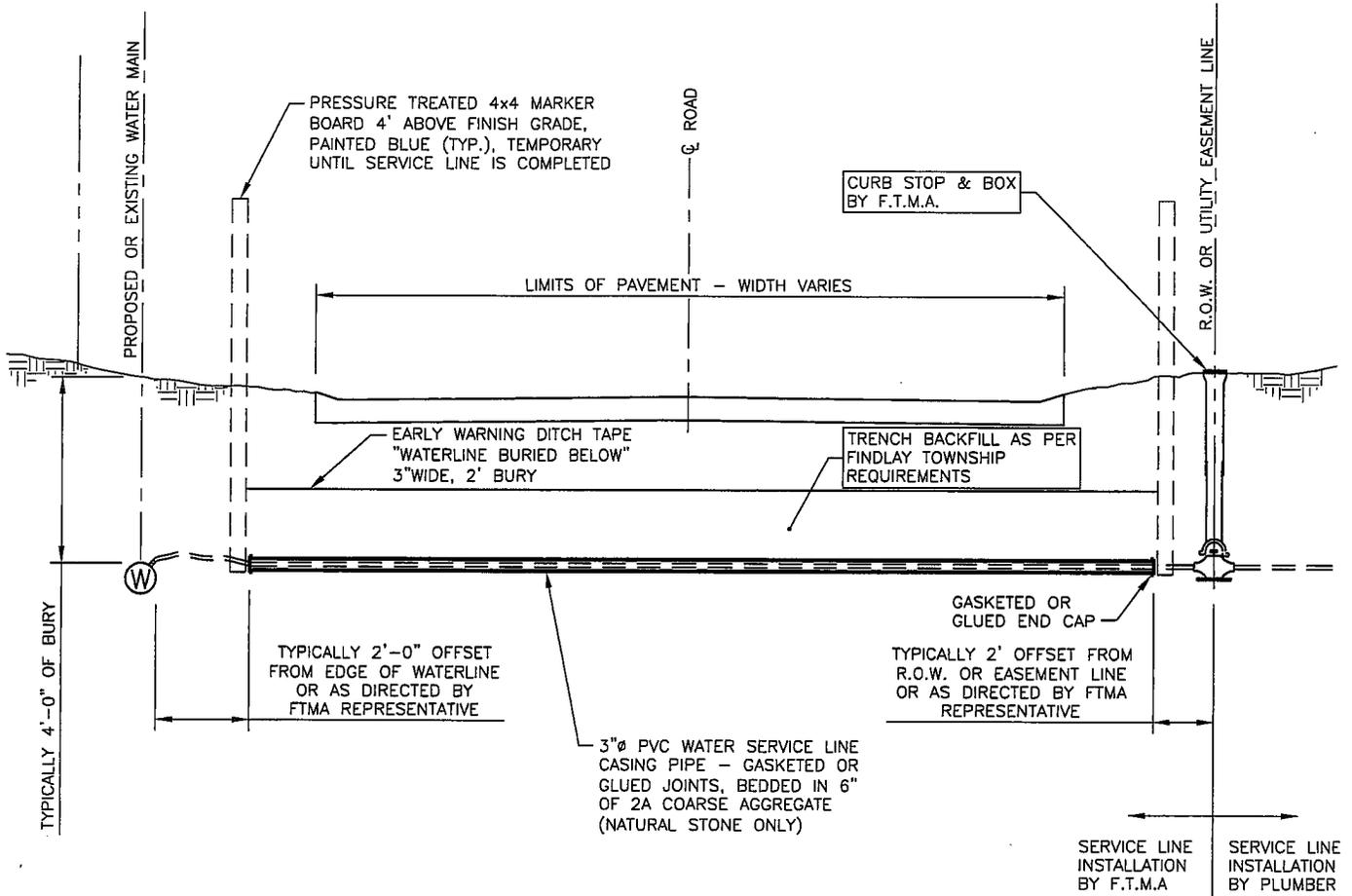
**FINDLAY TOWNSHIP
 MUNICIPAL AUTHORITY**

**COMBINATION AIR/VACUUM
 VALVE AND VAULT DETAIL**

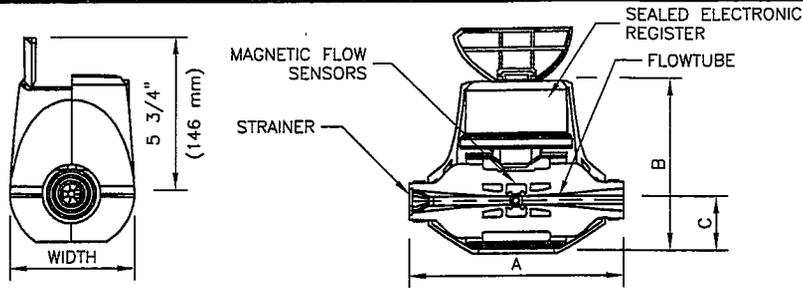
NIRA Consulting Engineers, Inc.

DATE: DEC., 2005 FILE: FTMA SD-W-14

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FINDLAY TOWNSHIP MUNICIPAL AUTHORITY	
DETAIL OF LONG SIDE WATER SERVICE LINE CASING PIPE	
NIRA Consulting Engineers, Inc.	
DATE: APRIL, 2010	FILE: FTMA SD-W-16



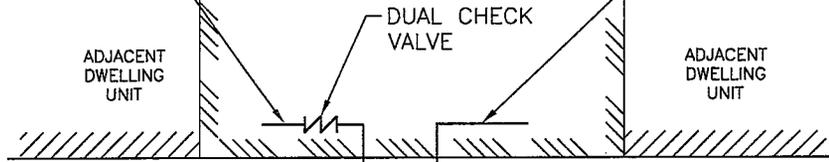
SIZE	A (LAY LENGTH)	B	C	SPUD ENDS	NPSM THREAD SIZE	WIDTH	NET WEIGHT
3/4"	7 1/2"	6 1/10"	1 3/4"	3/4"	1"	4 1/2"	3.1 LB
3/4"	9"	6 1/10"	1 3/4"	3/4"	1"	4 1/2"	3.2 LB
1"	10 3/4"	6 1/10"	1 3/4"	1"	1 1/4"	4 1/2"	3.3 LB

SENSUS IPERL WATER METER DIMENSIONS

FIRE SUPPRESSION SYSTEM SUPPLY (MUST MEET ALL REQUIREMENTS OF A.C.H.D. - PLUMBING DIVISION)

EXISTING OR PROPOSED RESIDENTIAL DWELLING

DOMESTIC SUPPLY (MUST MEET ALL REQUIREMENTS OF A.C.H.D. - PLUMBING DIVISION)

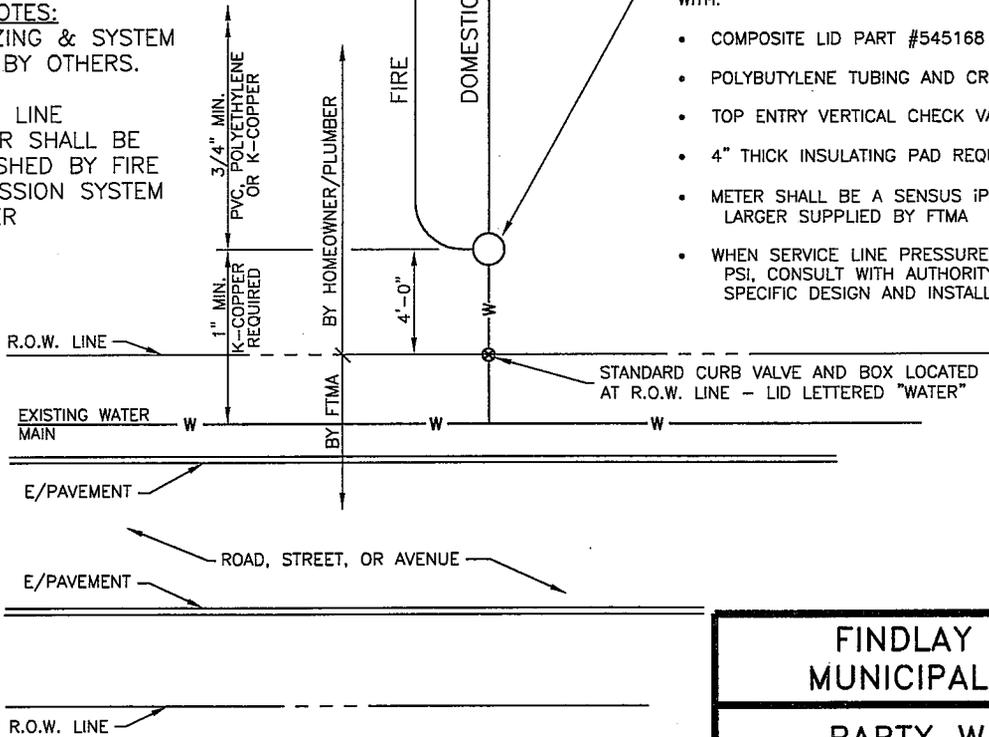


GENERAL NOTES:

1. FIRE SIZING & SYSTEM DESIGN BY OTHERS.
2. SERVICE LINE DIAMETER SHALL BE ESTABLISHED BY FIRE SUPPRESSION SYSTEM DESIGNER

MUELLER/HUNT THERMAL-COIL METER BOX, 18" DIAMETER x 48" DEPTH, PART #330CS1848FSBS000336 WITH:

- COMPOSITE LID PART #545168
- POLYBUTYLENE TUBING AND CRIMPED INTERNAL CONNECTION
- TOP ENTRY VERTICAL CHECK VALVE
- 4" THICK INSULATING PAD REQUIRED, PART #790153
- METER SHALL BE A SENSUS IPERL 3/4" OR LARGER SUPPLIED BY FTMA
- WHEN SERVICE LINE PRESSURES EXCEED 200 PSI, CONSULT WITH AUTHORITY MANAGER FOR SPECIFIC DESIGN AND INSTALLATION REQUIREMENTS.



**FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY**

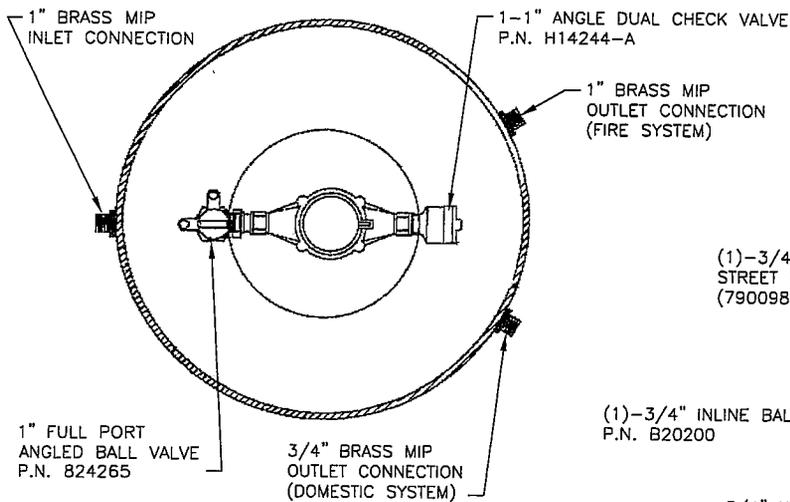
**PARTY WALL WATER
SERVICE LINE DETAIL**

NIRA Consulting Engineers, Inc.

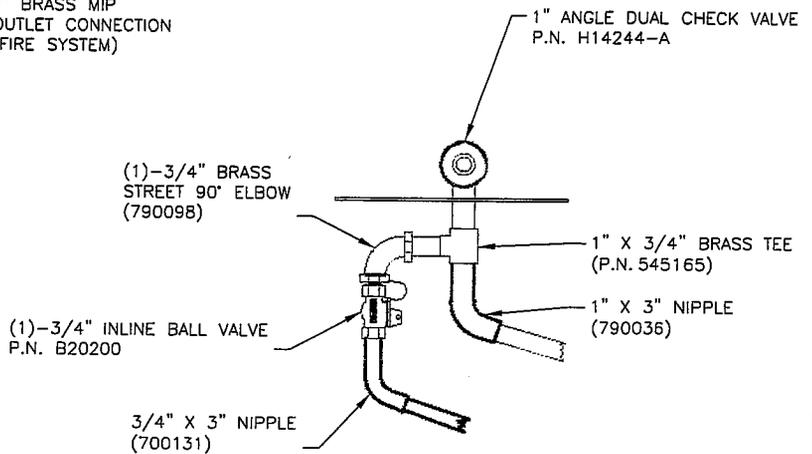
DATE: AUGUST, 2010 FILE: FTMA SD-W-17

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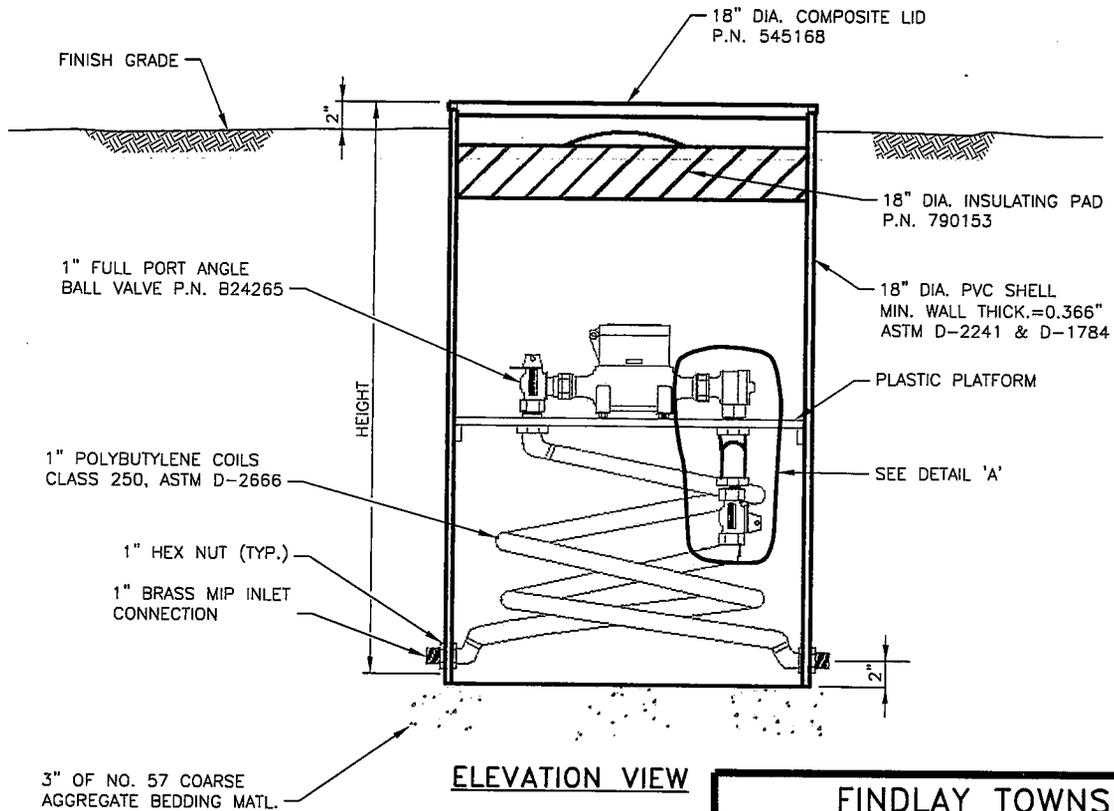
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PLAN VIEW



DETAIL A



ELEVATION VIEW

FINDLAY TOWNSHIP
MUNICIPAL AUTHORITY

PARTY WALL WATER
SERVICE LINE DETAIL

NIRA Consulting Engineers, Inc.

DATE: SEPTEMBER, 2010 FILE: FTMA SD-W-17