CITY OF BELVIDERE
GENERAL NOTES FOR WATER AND SANITARY SEWER CONSTRUCTION

The City of Belvidere has adopted the Standard Specifications for Water and Sewer Construction in Illinois (latest edition) as their standard specifications. The term "Standard Specifications" shall refer to this document from this point forward. The sanitary sewer (including all manholes, forcemains, lift stations, etc.) shall be constructed in accordance with the Illinois Recommended Standards for Sewage Works as issued by the Illinois Environmental Protection Agency. The following notes, as well as the City of Belvidere Sewer and Water Specifications, are in addition to the Standard Specifications and shall prevail in case of conflict.

Note: All materials installed on the City of Belvidere's Sewer and Water System shall be American Made.

GENERAL

1. PAVEMENT REMOVAL: Removal of existing pavement to accommodate the construction of sanitary sewer, sanitary services, water main or water services shall be approved by the City. A clean, vertical saw cut shall be made at all limits of pavement removal. The replacement pavement section shall be in accordance with City requirements. In no instance shall the replacement pavement section (hot-mix asphalt (HMA), concrete and aggregate subbase) have a depth less than the existing pavement being removed.

2. TRENCH BACKFILL: All excavations made for water and sewer work shall be backfilled in accordance with the City details and Standard Specifications.

   When under (or within 2 feet) of proposed/existing roadway, sidewalk, curb and gutter or other paved surfaces, backfill shall be completed with compacted aggregate. Excavated spoil material may be used as an aggregate backfill if it is composed of clean, uniformly graded sand. The City must approve the use of excavated spoil material as a trench backfill in a paved area.

3. EROSION CONTROL: All excavation, material placement or other soil-disturbing activities shall be completed in accordance with the Illinois Urban Manual. The Contractor shall implement and maintain Best Management Practices (BMPs) as necessary to prevent erosion/sedimentation of disturbed soil.

4. CITY SYSTEM: The City System consists of all water and sewer mains owned and operated by the City of Belvidere and all water and sewer services that connected to the main lines. Private water and sewer services shall be installed in accordance with Federal, State and local plumbing codes.

WATER

1. MECHANICAL JOINTS: Mechanical Joints (MJ) shall be required on water main valves, bends and other fittings. The MJ restraint shall be manufactured by Megalug or an approved equivalent.

2. WATER MAIN: Water main pipe shall be Class 52 ductile iron in accordance with AWWA C151 or plastic (PVC) in accordance with AWWA C900 or AWWA C905. Water main crossing a major arterial road shall be Class 56 ductile iron unless it is installed within a steel casing. All water main shall be installed with a minimum cover depth of 6 feet. If the minimum cover depth cannot be met, the water main pipe shall be properly insulated. All cover depths less than 6 feet shall be approved in writing by the City.

   Underground Locating
   All underground PVC water main pipes shall be completed with two separate devices for underground location.

1) An omni ball (or approved equivalent) shall be placed above the PVC water main at the intervals described below.
   - At no less than every 250 feet
   - At all fittings on the public water main

   The devices shall be placed directly above the water main pipe at an approximate depth of 3 feet (+/- 1 foot) below the final grade.

   The devices may be purchased directly from the manufacturer or the Water Department may make advanced purchases and distribute them to the Contractor as the project progresses. Prior to any advance purchase by the Water Department, the Contractor must provide the required pre-payment to the City. The devices shall be appropriate colored blue for placement above the water main. Omni balls designated for the underground location of sewer shall not be allowed.

2) Low voltage tracer wire shall be installed over all PVC or HDPE water mains and water services in the public right-of-way. Tracer wire shall not be required on Type K copper water services.

   The tracer wire shall be brought to the surface a minimum of once every 1000 feet, and at all valve boxes, fire hydrants and valve vaults. A tracer wire access box as manufactured by Valvco, Inc. (or approved equivalent) shall be installed adjacent to all water main gate valve boxes and at fire hydrants. The tracer wire shall be installed in the access box per the recommendations of the manufacturer. In the case where a valve vault is present rather than a valve box, the tracer wire may be installed within the pre-cast structure – a tracer wire access box shall not be required.

   The tracer wire shall be secured to the water main pipe with tape a minimum of once every 5 feet.

   Connections of trace wire at tees, crosses, and at locations where the trace wire will be brought to the surface shall be conducted using a direct bury lug.

3. METHOD OF INSTALLATION: All water main is to be installed via the standard open-cut method unless an alternative method is specified in the drawings and approved by the City.

   Water main laid on a curve shall be installed in accordance to the following table. Pipe joints are permitted to have a maximum angular deflection of 2 degrees. Fittings shall be required for an angular deflection above the maximum.

Nominal Size, in	4	6	8	10	12
Min. Radius, ft	100	144	189	231	273

   The auger-and-jack or jack-in-place method shall utilize when existing surface features (trees, pavements, signs, etc.) cannot be disturbed. All jack-in-place operations shall include steel casing, a flexible rubber seal at each casing end and spacers installed on the carrier pipe at the intervals recommended by the manufacturer. All spacers and casing seals shall be obtained from Cascade Waterworks Manufacturing or an approved equivalent.

   Directional drilling may be used for water main and water services, but shall not be acceptable for sanitary sewer unless specific permission is granted by the City.

4. VALVE BOX: Provide valve boxes with trench adaptors for all buried valves in paved areas.

   Valve boxes shall be one complete assembled unit composed of the valve box and extension stem. The assembly shall be adjustable to accommodate different trench depths. All moving parts shall be enclosed in the valve box unit. The valve box shall be set to position during backfilling operations so they will be in a vertical alignment to the gate valve operating stem.

   The valve box shall be cast iron and shall be installed on a valve box adapter. The casting shall not rest directly on the body of the gate valve or water main pipe. The Contractor shall install the casting in proper vertical alignment and the lid shall be set to match final grade.

   The valve box shall be American Flow Control's Trench Adaptor or Tyler/Union 6850 Series. The adaptor shall be a Valve Box Adaptor II as manufactured by Adaptor, Inc.

5. VALVE VAULTS: Provide pre-cast vault structures to house water valves located in lawn, agricultural, or other unpaved areas. Valve vaults shall also be provided when the valves is adjacent to vacant land where the water main may be extended.

   Valve vaults shall be pre-cast concrete according to the details shown on the drawings. Provide Neenah R1772B or East Jordan 1022 castings on all vaults. All joints (including the joints between the cast iron frame and adjusting rings) shall be in the same manner as the sanitary manholes described later in these specifications.

6. VALVES: All valves in the City system (including private water services) for 4 inch and larger shall be MJ Resilient seat valves rated at 250 psi. The gate valves shall conform (at a minimum) to the standards of AWWA C500 and AWWA C509. The words "DI" or "Ductile Iron" shall be cast on the valve or stamped on a permanently attached corrosion resistant metal tag.

   All internal and external ferrous surfaces shall be provided with an epoxy coating meeting the requirements of AWWA C550.

   Valves shall be equal to American Flow Control's Series 2500 Ductile Iron Resilient Wedge Gate Valve, or Mueller's 2360 Series Resilient Wedge Gate Valves (2361 Series for valves 14 inch or greater).

7. WATER MAIN FITTINGS: All fittings in the City System on pipes 4 inch diameter or greater shall be ductile iron in accordance with ANSI/AWWA C153/A21.53 with mechanical joint bells. Glands, bolts, nuts and gaskets shall be in accordance with requirements of ANSI/AWWA C153/A21.53. Fittings shall be listed by an approved certifying agency as conforming to the requirements of ANSI/NSF 61. The working pressure rating shall be 350psi.

8. PRESSURE CONNECTION: All pressure connections shall be completed in accordance with Section 46 of the Standard Specifications.

   The existing water main shall be carefully exposed and properly braced for the duration of the pressure tap. A tapping sleeve or saddle shall be installed over the existing main to allow for a pressure tight connection of the tapping fitting. The tapping valve meet the meet the same requirements as other valves in the City System, although it must able to the pilot drill/shell cutter assembly to pass through when opened. The assembly shall pass through the valve body without damaging the wedge, epoxy coating, etc. in any way.

   The pilot drill and shell cutter shall be operated to minimize fracturing of the existing water main pipe. After the portion of the existing pipe (coupon) is cut, it shall be cleanly removed with the tapping machine assembly. The coupon shall be retained by the Contractor and furnished to the City Representative immediately after the pressure tap is complete. If significant fractures are present in the coupon, the City shall require the Contractor to prove that there is no leak in the existing main or pressure tap. Any existing water main damaged by the pressure tap shall be replaced by the Contractor.

9. CUTTING-IN VALVES & SLEEVES: Cutting-in valves shall be manufactured to conform to AWWA C515 Standard for resilient seated gate valves. Bodies and bonnets to be cast iron. The wedge shall be constructed of ductile iron, fully encapsulated on the exterior by synthetic rubber. The wedge shall come in contact with seating surfaces arranged symmetrically about the centerline of the operating stem, so that the valve is equally effective regardless of direction of pressure. Rubber seal shall be bonded to the ductile wedge without the use of screws, rivets or similar fasteners. Valve shall have one end standard mechanical joint and the other end shall be able to accept oversized pit cast iron pipe. The oversized end shall be of a different color than rest of valve for identification. Valve shall be American Flow Control's Series 2500 Cutting-in Valve. Cutting-in Sleeve, stainless steel, shall be as manufactured by Cascade Waterworks, Yorkville, IL Style CST-EX.

10. RETAINER GLANDS: Mechanical joint restraint shall be incorporated in the design of the follower gland. The restraint mechanism shall consist of a plurality of individually activated gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA A21.53/C153 latest revision. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating restraining devices. The mechanical joint restraint shall be working pressure of at least 100 psi with a minimum safety factor of 2:1 and shall be EBAA iron incorporated Mega-Lug or equal.

11. POST-INSTALLATION PROCEDURES FOR WATER MAIN
   After the Contractor has completely installed the water main, fittings, valves, hydrants, etc., the following steps must be taken prior to City approval. The Contractor must sign and complete a City form for each step. Additionally, the Water Department must be notified 48 hours in advance of each procedure.

   Charging: The Contractor shall contact the Water Department prior to operating any existing valves on the potable water system. A City representative may open the existing valve or allow the Contractor to operate it directly. During the initial charging of the main, the first new valve section shall remain closed for a minimum of 5 minutes to provide proper time for chlorine mixing before the remainder of the test sections are filled. Operating an existing City valve without permission from the Water Department shall not be allowed.

   Chlorination: The Contractor shall utilize chlorination methods approved by the EPA and recognized by the City. The Contractor shall be wholly responsible for chlorinating the line as much and as often as necessary to completely disinfected the installed water main pipe.

   Flushing: In order to remove air from the installed pipe and de-chlorinate the water supply, the Contractor must thoroughly flush the water main. All de-chlorination methods must be approved by the IEPA and recognized by the City.

   Testing
   Upon completion, all water main shall undergo bacteriological and leakage testing. All tests shall be in accordance with AWWA and IEPA standards.

   The leakage tests shall be completed applying 150 psi to the water main for a period of one hour. No pressure drop is allowed during the testing period. A maximum of 3000 feet of water main may be tested in each test event. The Contractor shall isolate sections of the water main as necessary to meet this requirement. All system joints shall undergo a pressure test.

   Bacteriological testing shall be completed in strict accordance with IEPA requirements, including the testing and recording of residual chlorine for each water sample.

   All tests shall be witnessed by the City or designated representative. Results shall be recorded on City or laboratory forms and forwarded to the Water Department. The water system improvements will not be accepted by the City until all testing is complete (including submittal of the report forms) and all necessary permits have been received.

12. FIRE HYDRANTS: Fire hydrants shall meet or exceed AWWA C502, latest revision. Rated working pressure shall be 250 psi and shall be American Flow Control's Waterous Pacer (model WB-67-250 with vented caps) or Mueller's Super Centurion 250 (model A-423). Alternates shall not be allowed without written permission from the City.

   All ferrous metal parts of the hydrant shall be coated to meet the minimum requirements of Section 4.2 of AWWA C502.
   Primer: Primer shall be used on all surfaces and shall be cross-linked two-part liquid epoxy. Epoxy primer shall be applied using an electrostatic spray process.
   Topcoat: Surfaces shall be top coated with high-gloss two-part liquid urethane that uses an aliphatic isocyanate catalyst to produce a cross-linked cure. Topcoat shall be applied using and electrostatic spray process.

   The hydrant base shall be coated with fusion-bonded epoxy on interior and exterior surfaces using materials and coating application procedures that meet or exceed the requirements of AWWA C550-01 Standard for Protective Epoxy Interior Coatings for Valves and Hydrants.

   Valves may be directly connected to the hydrant if approved by the City. Fire hydrants used where space is limited shall use a hydrant Tee (Clow F1224 MJ Hydrant Tee with anchoring on the tee or its equivalent).

   Hydrants shall be backfilled with A-stone a minimum of 2 feet from the shoe base up the barrel, and a minimum of 2 feet on either side of the hydrant barrel itself. The A-stone backfill shall be encapsulated with a 2.5 millimeter (or greater) polyethylene filter fabric.

   Each fire hydrant shall be marked with a blue raised reflective pavement marker installed in the center of the nearest driving lane.

   The Contractor shall follow manufacturer's recommendations for protection of the hydrant paint during installation and backfilling. If paint is chipped or otherwise damaged, touch-ups shall be completed per the manufacturer's recommendations.

13. BACKFLOW PREVENTERS: Backflow preventers are required for all domestic and fire lines. Contact the Water Division for more details. All locations must be approved by the City, and all assemblies shall be purchased from the Water Department.

   Backflow preventers shall be placed inside of the meter location (see City Detail sheet). Reduced pressure zone devices shall have piped drain lines to a sump pit or floor drain (drain lines shall not be reduced).

   For all commercial outside installations, the contractor shall provide engineer's drawings showing location, type and size, and protections for City approval. All locations and installations must be approved by the Water Department. All underground sprinkler systems must be installed per CITY SPECIFICATIONS. Backflows shall be tested and tagged. Reports must be submitted before system is approved for use. Failure to comply with all requirements could result in termination of service.

   All single service commercial (including multi-family) and industrial water services shall have a redundant backflow preventer and bypass as shown in the detail drawings. The second (redundant) backflow preventer may be 1/2 the approved meter service size. These requirements are in addition to any State and local plumbing codes that may apply.

14. SERVICE PIPE
   A. All domestic water services shall have a minimum diameter of 1.5 inches. All water services 2 inches in diameter or less shall be Type K copper or high density polyethylene (HDPE) in accordance with ASTM D-3350. All HDPE water service pipe shall be SDR 9 with dimensions that meet Copper Tubing Size (CTS) standards. Water service pipe shall be back filled with natural sand as shown in the detail. If severely corrosive soils are present, the contractor shall install a polyethylene sleeve over the Type K copper water service. This sleeve shall be installed if required by the City Water Department.

   B. Water services greater than 2 inches in diameter shall meet the requirements of water main outlined elsewhere in these General Notes, City Specifications and Standard Specifications. All valves, fittings, hydrants, etc., on water services greater than 2 inches in diameter shall be equivalent to the same appurtenances used on City water main.

   C. All domestic water services to individual lots shall be a direct connection to the public water main and must be separate from any fire protection service to the property. The required horizontal separation between water service and fire protection lines is 10 feet.

   D. All existing services unused for a 12 month period will be deemed abandoned by the City and must be replaced. Disconnection of the existing service deemed abandoned will be the responsibility of the property owner. The service shall be turned off at the main, the service line shall be cut and removed, and the curb box (shut off valve and buffalo box) shall be removed. Services that meet correct City standards may be exempt from this rule, provided that approval is given by the Water Department. Removal and abandonment of existing services must be completed before construction on the new water service begins. All service removals must be inspected by the Water Department.

   E. The potable water service shall be marked by a 3 inch high "W" stamped in the curb face at the location where the service pipe crosses the concrete curb and gutter.

15. SERVICE FITTINGS: Brass fittings shall be compression-type manufactured by A.Y. McDonald, Ford or Mueller. No substitutes shall be allowed. For water services with a required capacity exceeding a 2 inch diameter line, all fittings shall meet the requirements of the WATER MAIN/DUCTILE IRON FITTINGS section of these specifications.

   In the event that the water services are HDPE or PVC, all corporation stops and curb valves shall be conductive to maintain continuity with the tracer wire. This shall be accomplished by utilizing service fitting with an electrical lines connection. This shall not be required if the service pipe is Type K copper.

16. CURB BOXES: Water curb boxes must be A.Y. McDonald, Ford or Mueller cast iron extension type with arch pattern base and plug cap. Curb boxes of the improved extension type as manufactured by Mueller are an approved alternative to the standard extension type.

   Curb box placement shall be at the approximate center of the lot, and a minimum of 15 feet from the driveway or sidewalk leading to the building. The box shall be installed within 6 inches of the property line or back-of-sidewalk unless an alternate location is specifically approved by the City. Placement of a curb box within a public or private sidewalk is not allowed. When a curb box is placed in concrete or hot-mix asphalt pavement, a VALVE BOX must be used. The location and size of the replacement water services shall be determined by the Water Department.

17. WATER METERS: Only Sensus meters shall be used in the City system and must be purchased from the City.

   There shall be a separate service connection with a separate curb stop and curb box located at the property line for each building served by the City water supply. Buildings requiring more than one metered service, but less than four metered services, may be served by a single service line with a master curb stop and curb box followed by a maximum of four additional separate service lines with curb stops and curb boxes on each service.

   Any building requiring more than four metered services shall be allowed only one master service connection with a separate curb stop and curb box located at the property line and one of the following options. 1) A single master meter for the entire building, or 2) Multiple meters for each unit within the building (with special door lock per City requirements).

   Before any installation begins, the Owner must inform the City on which option will be utilized. Prior to construction, the single meter or multiple meter option shall be approved by the City. All meters shall be placed no less than 12 inches above the floor and 12 inches away from any wall.

   In either case, the following criteria must be met to allow access and servicing of the meters.
   1) A common utility/meter room must be provided in which all meters are located (see City ordinance for specific requirements). The room must have lockable, permanent outside access.
   2) Contractors must supply a detailed drawing for the meter area to the City for approval.

   Fire Service: The fire service shall be completely separate from the standard water service. Fire service shall be hydrostatically tested per N.F.P.A. standards. Valve and box shall be located 6 inches behind the property line.

   Shop drawings showing the size, location, material type and configuration of all manifolds must be furnished and approved by the Department of Public Works prior to installation. Manifolds must be no less than 12 inches or more than 48 inches above the floor of the utility/meter room.

   All meters require a remote reader for reading outside the building. For meters not within 20 feet of an outside wall, a "-" conduit must be installed from the meter installation to the outside wall closest to a walk or drive located near the front of the building.

   All residential meters installed must have a backflow preventor. The type of backflow preventor is dependent on site conditions and shall be determined by the Water Department.

   All single service meters (including commercial, multi-family and industrial) must have a bypass at least of the size of the metered services. All single service lines must have two shut-off valves, one before and one after the meter and must be gate valves or ball valves with lockable handles.

   For all water connections ¾" and larger, where a meter cannot be placed in a building and a meter cannot be used for each service, the meter must be installed in a meter house with backflow protection above ground. See attached meter house example sheet.

   All service pipes on City side of the meter shall be below grade, including interior locations.

18. MISCELLANEOUS WATER SYSTEM ELEMENTS

   Flushing Stations: Provide blow-off hydrant or automatic flushing at all stubs for future extensions and dead ends. The station type, station equipment shall be specified or approved by the City.

   Sampling Station: For each subdivision development, the water system shall include a minimum of one Sample Station Hydrant as directed by the City.

   Air Release Valve: A valve designated for air release purposes shall be provided at all high points in water main with a diameter of 8 inch or greater. The minimum valve size shall be 1 inch diameter for 8 inch water mains and 2 inch diameter for water mains exceeding 8 inches in diameter. Air Release Valves shall be in accordance with AWWA C152 and shall include an isolation valve for maintenance purposes. All Air Release Valves shall be installed within a pre-cast vault structure.

SEWER

1. SEWER MAIN: Sanitary sewer lines may be PVC solid wall (SDR 35) meeting the requirements of ASTM D-3034. Joints shall meet the requirements of ASTM D-3212. As necessary to meet IEPA separation requirements, sanitary sewer shall be water main quality PVC SDR 26 meeting the requirements of ASTM D-2241 (joints shall meet the requirements of ASTM D-3139). Vylon Pipe (ASTM F-794, Uni-B-9) may be used as an alternate material if approval is granted by the City. The minimum cover depth of sanitary sewer is 6 feet. Cover depths of less than 6 feet may be allowed if specifically approved by the City. All sanitary sewer with a cover depth less than 5 feet shall be installed with proper insulation. Sanitary sewer main with a depth greater than 11 feet shall not be acceptable unless specific permission is granted by the City.

   Connections between sewer pipes of dissimilar materials shall be made using a flexible adapter (Fernco or equivalent) or a cast-in-place concrete collar. The connection method shall be approved by the City prior to construction.

   Testing: All installed sanitary sewer main shall undergo leakage testing via the low-pressure air method and deflection testing using a rigid ball or mandrel. In each instance, the test procedure shall be in accordance with The Illinois Recommended Standards for Sewage Works. All tests shall be witnessed by the City or designated representative. Results shall be recorded on the appropriate forms and delivered to the City.

   Televising: The Contractor shall televise all constructed sanitary sewer. The televising tapes shall be digitally recorded, and a DVD(s) shall be provided to the City for review. The televising shall include a footage counter that is re-set to 0.0 at each manhole. Any deficiency noted during the review of the sewer televising including but not limited to; silt/sediment build up in the sewer system, deflected or "out of round" segments of pipe, standing water in the sewer or manholes, shall be corrected by the Contractor.

   The following items shall be electronically recorded during the televising process:
   A. Report number
   B. Date of TV inspection
   C. Upstream and downstream MH numbers
   D. Current distance along sewer run (counter footage)
   E. Observation, location, "clock" position, etc.

   The televising shall also contain and audio description narrated by the camera operator. The audio narrative shall include, at a minimum:
   A. Date and time of inspection, operator name and description of inspection (street names, etc.)
   B. Verbal confirmation of upstream and downstream manhole numbers
   C. Televising direction in relationship to direction of sanitary flow
   D. Description of pipe diameter, type and condition
   E. Description and location of each service connection, including a statement on the status (active or inactive) of the service
   F. Description of the deficiencies noted in the sewer and/or manholes

   The sanitary sewer improvements will not be accepted by the City until all testing and televising is complete and the reports have been received.

2. METHOD OF INSTALLATION: All sanitary is to be installed via the standard open-cut method unless an alternative method is specified in the drawings and approved by the City.

   The auger-and-jack or jack-in-place method may be acceptable but must be reviewed and approved by the City. All jack-in-place operations shall include steel casing, a flexible rubber seal at each casing end and spacers installed on the carrier pipe at the intervals recommended by the manufacturer. All spacers and casing seals shall be obtained from Cascade Waterworks Manufacturing or an approved equivalent.

   Directional drilling for gravity sanitary sewer shall not be acceptable unless specific permission is given by the City.

3. SEWER LATERALS: Materials shall be water main quality PVC SDR 26 meeting the requirements of ASTM D-2241 (joints meeting the requirements of ASTM D-3139). Where possible, laterals shall be leakage tested under the same specification as Sewer Mains.

   All laterals shall extend to the property line, with a maximum depth of 9 feet and a minimum depth of 6 feet. A cleanout is required for each sanitary service, and shall be installed per City Standards. The cleanout shall have a diameter of 4 inches and be installed 6 inches within the property line. The cleanout cap shall be within 8 inches below the top of the ground and protected by a cast sleeve and lid flush with ground, marked "Sewer" (see City Spec.). If they are not connected to the buildings when installed, they must be marked at the end of the unconnected stub with a 2" x 4" treated post protruding a minimum of 14 inches above the ground.

   Any sewer service below the rim elevation of the nearest downstream manhole within 1,500 lineal feet of a sanitary pump station shall be lifted and discharged by automatic pumping equipment into the sewer collection system.

   All lateral sewer connections that are made to existing sanitary sewer mains shall be saddled and cuts in pipe shall be circular.

   Connections between sewer service pipes of dissimilar materials shall be made using a flexible adapter (Fernco or equivalent) or a cast-in-place concrete collar. The connection method shall be approved by the City prior to construction.

   The sanitary service shall be marked by a 3" high "S" stamped in the curb face at the location where the service pipe crosses the concrete curb and gutter.

4. MANHOLES:
   All manholes shall be precast concrete with a minimum 4 foot diameter. An approved external rubber seal (Cretex or approved equivalent) shall be installed at the adjusting rings and frame of the manhole barrel to form a watertight connection. Barrel joints shall be sealed with mastic and shall be wrapped with an external seal, "Mac Wrap" or an approved equivalent. All external barrel surfaces shall have a water proofing coating. Coatings shall be double applied (2 coats) and shall be either bituminous based or polymer based cement.

   All manhole inverts must be pre-poured with a concrete bench per the detail. The minimum slope of the manhole bench shall be 2 inches per foot.

   Pipe connections to new manholes shall be made by means of a watertight flexible pipe-to-manhole connector meeting the requirements of ASTM Standard C-923. Integrally cast and expandable gaskets are acceptable.

   All sewer manhole castings and lids shall be extra heavy and self-sealing with concealed pick-holes. Each lid shall be clearly stamped SANITARY.

   Connection to an existing sanitary manhole shall be made by a clean saw cut of the existing structure. The new sanitary sewer shall be installed within the existing manhole using an approved watertight connection. The interior and exterior of the existing structure shall be patched as needed with mortar masonry material.

   The sanitary manhole shall be complete with a pre-cast concrete eccentric cone section. Precast concrete flat tops shall not be allowed.

   Testing: All Sanitary Manholes shall be leakage tested by vacuum test in accordance with ASTM C-1244 and the Illinois Recommended Standards for Sewage Works. All tests shall be witnessed by the City or designated representative. Results shall be recorded on the appropriate forms and forwarded to the City. The sanitary sewer improvements will not be accepted by the City until all testing is complete and the reports have been received.

5. SEWER METERS: Monitoring for sewer only charges – see Meter Department equipment types.

6. REPAIR OF SANITARY SEWER LINES: The repair of damaged sanitary sewer lines shall be as follows:

   PVC Pipe – replace damaged section of sewer with City standard PVC pipe cut to fit with maximum one-fourth inch opening at coupled joints and install a Fernco coupling or repair coupling at each end as approved by the City.

   DIP – replace damaged section with a solid sleeve mechanical joint coupling at each end.

   Repairs to new lines, not yet accepted by the City, shall be tested in accordance with these standard specifications.

7. LINING OF EXISTING SANITARY SEWER:
   In the event that the existing sanitary service is to be lined or sleeved rather than removed and replaced the existing pipe shall be thoroughly cleaned. A mechanized root cutter shall be passed through the service pipe until all roots and debris are removed to the City's satisfaction. PVC service pipe shall be installed within the existing sewer service and connected to the sanitary sewer main using factory wye or tee fittings.

   The sewer lining shall be PVC SDR 35 meeting the requirements of ASTM D-3034. All joints shall be gasketed and meet the requirements of ASTM D-3212.

8. SANITARY SEWER FORCEMAIN:
   Sanitary forcemain pipe shall be PVC (C900 or C90x) or Ductile Iron (Class 52) meeting the specifications for City water main. The minimum cover depth above the top of the pipe shall be 5 feet. Yellow caution tape clearly marked "SEWER" shall be placed directly above the forcemain at an approximate depth of 3 feet below the final grade.

   Alternative material and installation methods, such as directional drilling of high-density polyethylene (HDPE), may also be utilized provided that a review and acceptance of the design is conducted by the City prior to installation.

   All sanitary sewer forcemain shall be installed with underground locating devices as described in Section 10 of the water main specifications.

   Testing
   Upon completion, all forcemain shall undergo hydrostatic leakage testing. The test shall be conducted in accordance with the water main leakage test described earlier in these specifications.

   The test pressure shall be provided by the Design Engineer, but shall not be less than 1.5 times the Total Dynamic Head (TDH) produced by the pumps. No pressure drop is allowed during the testing period.

   All tests shall be witnessed by the City or designated representative. Results shall be recorded on the appropriate forms and delivered to the City. Sanitary forcemain will not be accepted by the City until all testing is complete (including submittal of the report forms) and all necessary permits have been received.

   Underground Locating
   All underground PVC sanitary forcemain shall be completed with two separate devices for underground location.

1) An omni ball (or approved equivalent) shall be placed above the PVC pipe at the intervals described below.
   - At no less than every 250 feet
   - At all fittings on the public sanitary forcemain

   The devices shall be placed directly above the forcemain pipe at an approximate depth of 3 feet (+/- 1 foot) below the final grade.

   The devices may be purchased directly from the manufacturer or the Water Department may make advanced purchases and distribute them to the Contractor as the project progresses. Prior to any advance purchase by the Water Department, the Contractor must provide the required pre-payment to the City. The devices shall be appropriate colored blue for placement above the water main. Omni balls designated for the underground location of sewer shall not be allowed.

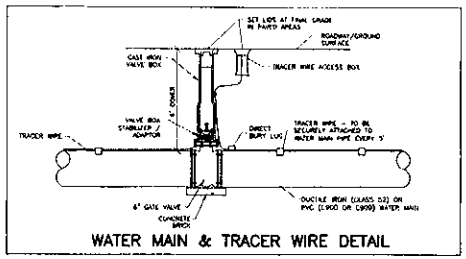
2.) Low voltage tracer wire shall be installed over all PVC or HDPE forcemain in the public right-of-way.

   The tracer wire shall be brought to the surface a minimum of once every 1000 feet, and at the lift station and sanitary manhole where the forcemain discharges. A tracer wire access box as manufactured by Valvco, Inc. (or approved equivalent) shall be installed adjacent to the lift station and receiving structure. The tracer wire shall be installed in the access box per the recommendations of the manufacturer.

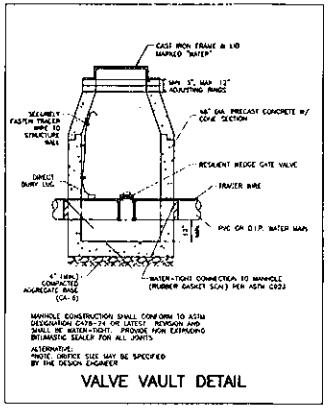
   The tracer wire shall be secured to the forcemain pipe with tape a minimum of once every 5 feet.

SANITARY SEWER AND WATER DETAILS

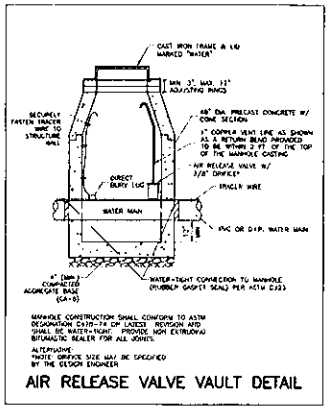
CITY OF BELVIDERE	
BY: J. GRIMES	DATE: 09/20/2002
NOT TO SCALE	SHT. NO. 1 OF 3
REV: 9/18/2013	



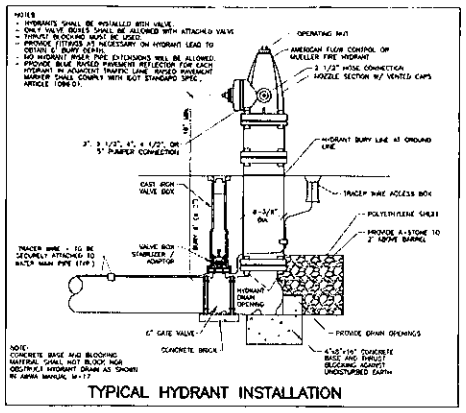
WATER MAIN & TRACER WIRE DETAIL



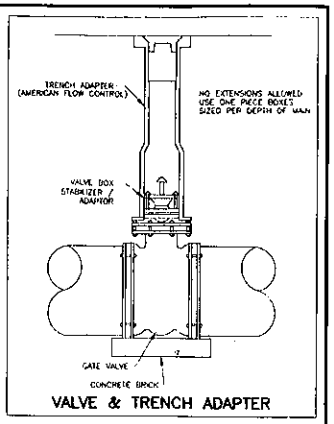
VALVE VAULT DETAIL



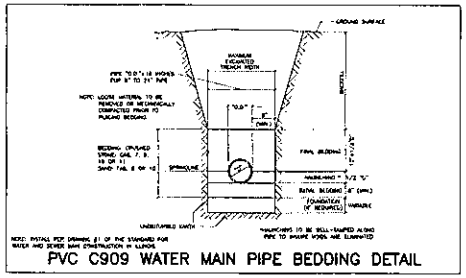
AIR RELEASE VALVE VAULT DETAIL



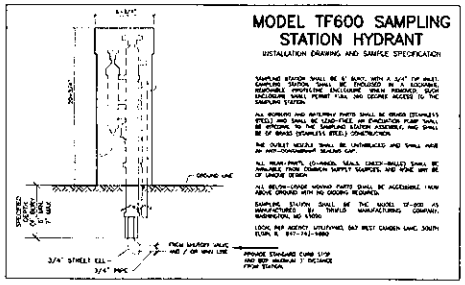
TYPICAL HYDRANT INSTALLATION



VALVE & TRENCH ADAPTER

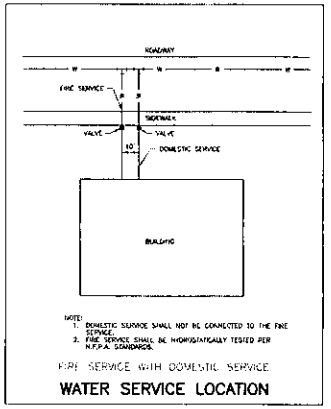


PVC C909 WATER MAIN PIPE BEDDING DETAIL

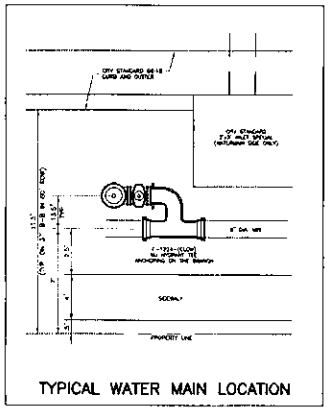


MODEL TF600 SAMPLING STATION HYDRANT

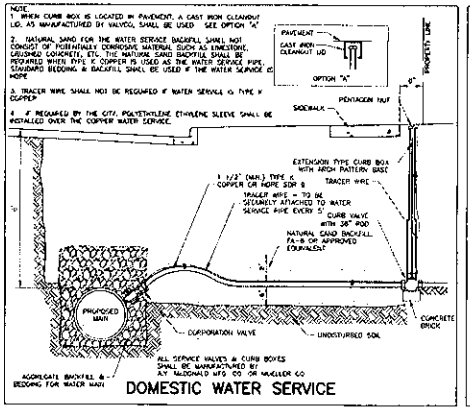
INSTALLATION DRAWING AND SAMPLE SPECIFICATION



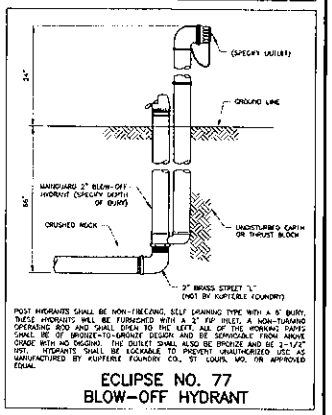
WATER SERVICE LOCATION



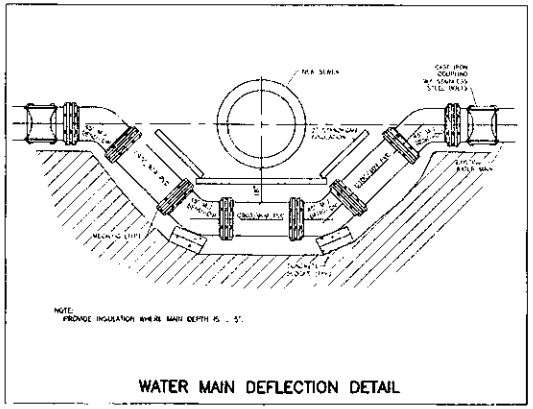
TYPICAL WATER MAIN LOCATION



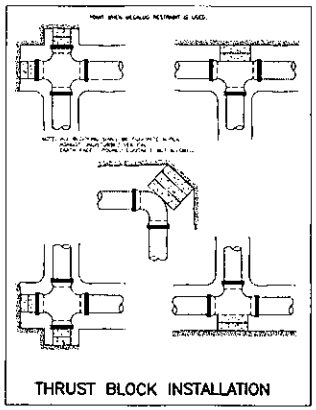
DOMESTIC WATER SERVICE



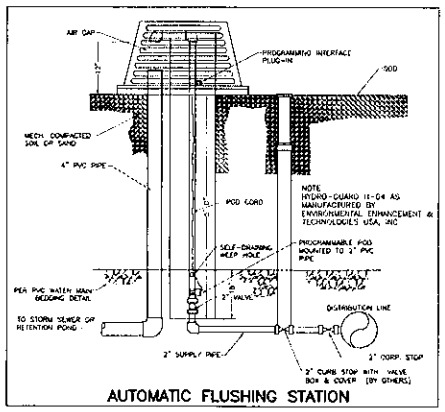
ECLIPSE NO. 77
BLOW-OFF HYDRANT



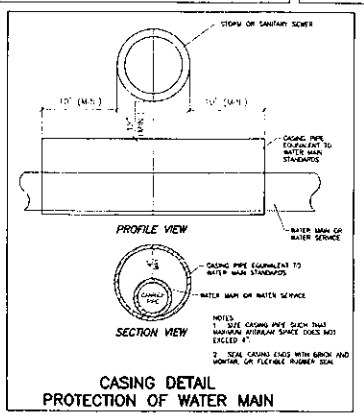
WATER MAIN DEFLECTION DETAIL



THRUST BLOCK INSTALLATION



AUTOMATIC FLUSHING STATION



CASING DETAIL
PROTECTION OF WATER MAIN

SANITARY SEWER AND WATER DETAILS

CITY OF BELVIDERE	
BY: J. GRIMES	DATE: 09/20/2002
NOT TO SCALE	SHT NO. 2 OF 5
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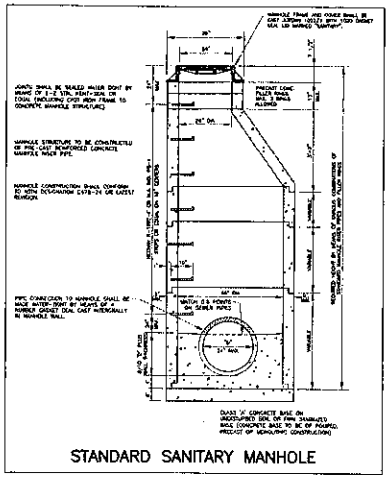
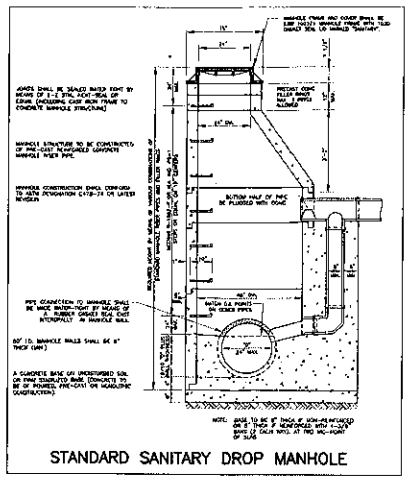
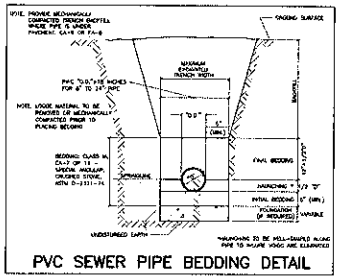


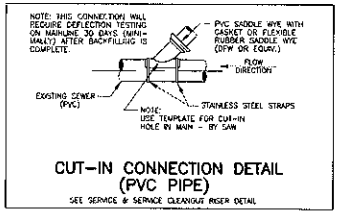
STANDARD SANITARY MANHOLE



STANDARD SANITARY DROP MANHOLE

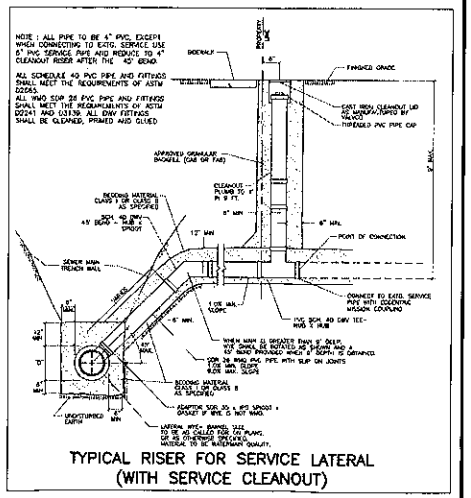


PVC SEWER PIPE BEDDING DETAIL



CUT-IN CONNECTION DETAIL
(PVC PIPE)

SEE SERVICE & SERVICE CLEANOUT RISER DETAIL



TYPICAL RISER FOR SERVICE LATERAL
(WITH SERVICE CLEANOUT)

SANITARY SEWER AND WATER DETAILS

CITY OF BELVIDERE	
BY: J. GRIMES	DATE: 09/20/2002
NOT TO SCALE	SHT. NO. 3 OF 3
REV: 9/18/2013	