MEADOWMEER WATER SERVICE ASSOCIATION
Washington State System ID #532750
P.O. Box 10483
Bainbridge Island, WA. 98110

DESIGN & ENGINEERING SPECIFICATIONS

For NEW WORK, MODIFICATIONS, AND REPAIR

Revision Date: October 2010

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1. GENERAL SYSTEM REQUIREMENTS

Meadowmeer Water System Association (here in after "MWSA"), requires the use of this specification for any water system addition, modification, or repair within the confines of the MWSA water service area.

For developer designed additions to the system, other than single service connections, a proposed design with appropriate drawings and engineering calculations, must be submitted and approved by MWSA, based on the standards set forth in this specification, prior to beginning construction. Proposed design must be performed and submitted to MWSA from a registered professional engineer or firm, licensed in the State of Washington. MWSA will be inspecting system installation in accordance with the approved design drawings during construction.

In addition to water system design requirements, this specification covers site preparation, excavation, installation, testing, backfilling and site restoration for water system underground pipes, taps, valves and fittings.

Work performed under this specification shall be accomplished in accordance with the specific requirements herein and in all respects complies with the requirements of the Washington State Department of Health regarding public water systems. All work is to comply with the current WSDOT / APWA Standard Specifications.

All pipe and equipment, including materials coming into contact with potable water, shall be new, undamaged, clean, and shall comply with applicable APWA, AWWA and ANSI Standards. Contractor shall guarantee equipment, materials and workmanship covered herein. Defects discovered within one year following first service or completion of the project, whichever occurs later, shall be replaced or repaired by the Contractor at his own expense.

All building permits, road use permits, traffic control arrangements and testing shall be the responsibility of the Contractor.

All installations shall be located within the boundaries of recorded easements as marked by the Land Surveyor, licensed in the State of Washington, or as directed by MWSA. Construction activity and material stockpiles shall not exceed the easement boundaries without permission of the property owner. Utility easements shall be 20 feet or more in width wherever possible, but not less than 10' in width, and pipe shall not be installed closer than 5 feet from the easement boundary without the express approval of the project engineer.

2. MATERIAL SPECIFICATIONS

Ductile Iron Pipe (DIP) - Shall conform to AWWA Standard C151 (or better) and have cement mortar lining in accordance with AWWA Standard C104. Outer surfaces of pipe shall be protected from corrosion with either bituminous coatings, or a polyethylene cover per AWWA Standard C105, at the discretion of the MWSA.

Polyvinyl Chloride (PVC) pipe - Shall conform to AWWA Standard C900 Pressure Class 150 (or 200 when required by MWSA).

Polyethylene (PE) pressure pipe and tubing shall be iron pipe size SIDR-7, 200 psi and shall conform to AWWA Standard C901.

Fittings for mains greater than 4" diameter shall be Class D, cast Iron, short body type according to AWWA Standard C110. Fittings shall be either flange end or mechanical joint end.

Gate valves 2" diameter and larger in size shall conform to AWWA Standard C509 for ordinary water service. Such valves shall be iron body, bronze mounted, resilient seated, non-rising stem, 150 pound valves. Valves shall have O-ring stem seals rated for 200 psi without leaking and a 2" square operating nut.

Gate valves less than 2" diameter in size shall conform to AWWA Standard C500 for ordinary water service. Valves shall be iron body, bronze mounted, 150-pound valves with non-rising stem and solid wedge disc.

Fire Hydrants shall be dry-barrel and self-draining conforming to AWWA Standard C502. Hydrants shall have a 5-1/2 inch valve opening with two 2-1/2 inch hose ports and a single 4-1/2 inch pumper port with a 4" Stortz Adaptor.

Air release and vacuum valves shall be iron body, with bronze trim, in accordance with AWWA Standard C512.

All water meters shall have a meter setter in accordance with AWWA Standard C800. Water meters shall conform to AWWA Standard C700, and provide readings in cubic feet, and shall be approved by MWSA prior to installation.

3. CLEARING AND GRUBBING

The Contractor shall clear and grub all access lanes, parking areas, construction sites, drainage areas and water pipe and control cable routes. Clearing and grubbing shall extend beyond the excavation or route limits as specified on the as required for equipment access and stock piling excavated material. Tress, shrubs or other native material to be preserved or saved within the excavation or route limits will be marked MWSA.

Trees, shrubbery or other native materials designated to be preserved shall be left undisturbed. All other trees shall be felled within the area to be cleared. Trees, shrubs and native materials designated to be saved shall be removed and set aside as directed by MWSA. Cut or scarred surfaces of trees and shrubs designated for retention shall be painted with an appropriate tree wound dressing.

Grubbing shall include the removal of all stubs, roots, buried logs, vegetation or other debris and disposing of the refuse.

Refuse from clearing and grubbing operations shall be removed from the site within seven days after completing the project and disposed at a site obtained by the contractor.

4. ON SITE CONSTRUCTION

Contractor shall notify MWSA two weeks prior to beginning any construction work.

Contractor shall provide all materials and services required to construct, install and test the work covered by the contract.

Contractor is responsible for traffic control. The City of Bainbridge Island or MWSA may or may not require specific traffic control. In any case, the contractor is responsible for all traffic control arrangements and costs.

Excavated material shall be stockpiled in a manner to not unnecessarily obstruct traffic.

Where water service interruptions are necessary, contractor shall schedule the work such that interruptions do not occur at times of peak demand and are of minimum duration. All planned interruptions shall be under the direction and supervision of MWSA, with not less than 72 hours notice.

5. EXCAVATION, BACK-FILLING AND COMPACTION

See Detail #3.

For Ductile Iron Pipe (DIP) all excavation, bedding, back filling and compaction for water service piping shall be in accordance with AWWA Standard C600 using the design guidelines in AWWA Manual M27. All work must be in compliance with the WSDOT / ADWP Standard Specifications.

For PVC pipe all excavation, bedding, back filling and compaction for water service piping shall be in accordance with AWWA Standard C605 using the design guidelines in AWWA Manual M23.

Contractor shall provide all materials and services for excavating, back filling and compacting the water line trenches per the approved drawing.

Cover over all water mains shall be not less than 36" or more than 48" without the express approval of the project engineer and MWSA.

Existing facilities on the site shall be protected from damage caused by trench excavation, hand digging, back filling and compaction. The contractor is responsible for having all utilities located and marked prior to the start of work.

Existing trees, shrubbery and native materials located within the water utility easement shall be cleared so that root growth will not damage the buried water piping.

Existing trees, shrubbery and native materials located outside of the water utility easement shall be protected from damage. Where significant root damage to trees and shrubbery is unavoidable in the accomplishment of any work, MWSA and property owners shell be notified before construction proceeds. Trees and shrubs shall be staked and tied, or other measures shall be taken to minimize the consequences of any unavoidable damage.

Where the undisturbed condition of the native soil surrounding the trench is inadequate to support the planned pipeline installation, the Contractor shall over-excavate until adequate supporting soils are uncovered and refill the over-excavated space to the proper levels. Where removal of soft supporting soils or over-excavation is required, the excavated space shall be back-filled and compacted as necessary to ensure stable pipe support and minimize back-fill settlement.

Should the natural soils or fill soils be disturbed or loosened during trench excavation, such soils shall be re-compacted.

No open trenches or holes shall be left at the end of the day without adequate safety covers. Except as permitted by MWSA, no open trench excavated to final grade for more than five feet ahead of pipe laying shall be left at the end of the day without adequate trench supports.

During excavation, material suitable for back filling shall be stockpiled in an orderly manner at a distance form the trench to avoid cave-ins of the trench. Material unsuited for back-fill shall be promptly removed as construction refuse at the discretion of MWSA.

The minimum allowable trench width at the depth of the pipe shall be 12 inches plus the outside dimension of the pipe or fitting. Trench width shall be sufficient to accommodate pipe blocking and tie-downs where applicable.

Back-fill shall not be deposited in the trench in any manner that could damage or disturb the pipe, blocking, or bedding. Back-fill material shall be clean and free of foreign material and vegetation. Compaction in unimproved areas by two or more passes of hauling equipment is permissible where each pass completely spans the width of the back-fill. Under roadbeds and driveways, the back-fill shall be compacted by mechanical tamper in lifts not exceeding 8 inches to obtain 95% compaction.

Valve boxes shall be accurately aligned with the valve stem axis during back-fill.

Contractor shall repair roadway or driveway surfaces per Section 14 of this specification following back-fill and compaction.

6. WATER MAIN PIPING DESIGN AND INSTALLATION

A water main is considered by MWSA to be any water system pipe servicing more than a single water system user.

All additions or modifications to water mains must have an engineered design approved by MWSA. Water main design shall be in accordance with Washington States DOH WATER SYSTEM DESIGN MANUAL (DOH #331-123 August 2001), based on current peak demand hydraulic analysis and the MWSA fire flow requirements.

The minimum size water main servicing a fire hydrant is 6" diameter when looped, and 8" diameter when the main is a dead end of 50 lf or more.

New additions of water main piping 4" diameter and greater shall be constructed of Ductile Iron Pipe (DIP) with materials specified in Section 2, and installed in accordance with AWWA Standard C600.

New additions of water main piping less than 4" diameter shall be Polyvinyl Chloride (PVC) or Polyethylene (PE) pipe with materials specified in Section 2, and installed in accordance with AWWA Standard C605.

All repairs to the water system piping shall be in accordance with the applicable specification for the existing piping material.

Pipe joints shall use elastomeric gasket couplings and fittings in accordance with AWWA Standard CI11. Gaskets shall be by the same manufacturer as the pipe and intended for use with the exact pipe installed herein. Contractor shall assemble couplings by cleaning all debris from the bell end of the pipe, making sure that the gasket is completely and properly seated in the groove. The spigot end shall be lubricated immediately prior to assembly, using a lubricant intended for such service and rated for use in potable water systems.

Plugs, caps, tees, bends, and valve bodies installed with pipe 4" diameter and over in size, or when specified on the drawing, shall be restrained with concrete reaction blocking and/or tie-downs in accordance with the approved engineering drawing. The concrete blocking shall be cast in place and bear directly against undisturbed trench wall. Blocking shall not obstruct access to fittings or pipe joints.

Contractor shall practice the preventive and corrective measures during construction, specified in Section 4 of AWWA Standard C651, which covers requirements for protecting the pipe and fittings from contamination and describes disinfection procedures to be followed during pipe installation.

For all pipe installations, prior to back-filling the trench, a tracer wire shall be laid in the trench in close proximity to the pipe. See MWSA Standard Detail #3 and the Standard Notes.

After assembly, pipes and fittings shall be flushed through a wide-open discharge valve. Each valved section of newly laid pipe or repaired pipe shall be flushed independently.

After the pipe is laid, the joints completed and the trench partially back-filled (leaving the joints exposed for examination) the pipe installation shall be inspected and tested under the supervision of the project engineer and MWSA as described in Section 12.

Connection of new water facilities and pipe installations to existing water mains shall be subject to the explicit approval of the project engineer and MWSA. Notification of 72 hours shall be provided in advance of the work. All equipment and materials required for the connection shall be on site at the time of inspection and authorization of the work. Once started, such work shall not be interrupted and shall be accomplished with all reasonable haste. Prior to placing the new construction into service it shall be disinfected as described in Section 13 and pass the Washington State DOH prescribed bacteriological analysis.

7. GATE VALVES

Water system gate valves shall be of the type and style specified in Section 2, and installed in accordance with the applicable AWWA/ASTM specifications.

All valves shall be installed in a cast iron valve box of the slip extension type with cast iron cover marked "WATER". Valve boxes shall be aligned with and concentric to the valve stem axis and comply with MWSA Standard Details #7 and #8.

Contractor shall furnish and install a pre-cast concrete valve marker for valve or group of valves. The marker shall be visible from the valve at a location off the road near the valve. Markers shall be stenciled to show the distance to the valve.

8. FIRE HYDRANT INSTALLATION

Meadowmeer Water System Association has a fire flow plan approved by Bainbridge Island Fire Department (BIFD). Fire hydrant location and fire hydrant coverage for the existing system, and for any future development will be in accordance with this plan. Any deviations from MWSA Fireflow Plan will require both BIFD and MWSA approval before connection is made to the system.

MWSA fire flow plan is based on having one fire hydrant every 600 feet of water main and within 300 feet of property being served water. Fire hydrants must be served with a minimum of a 6" diameter pipe for looped distribution main, and 8” for dead end mains.

Fire hydrants shall be installed according to this specification and by the MWSA Standard Detail #5

The hydrant installation shall include a cast iron tee, a 6" gate valve, a cast iron valve box with lid, blocking and or tie-down, 4" Stortz Adapter, and associated equipment as shown in the standard drawing "Fire Hydrant Installation" which forms a part of this specification.

Hydrant installation shall provide a minimum of 36 inches of unobstructed clearance around the hydrant valve stem. The hydrant shall be oriented such that the pumper port faces the street. Reinforced concrete posts shall be installed on both sides of the hydrant according to the standard drawing.

Hydrants shall be painted with rust resistant yellow paint.

9. COMBINATION AIR VALVE INSTALLATION

When required by the approved engineering drawing, combination air valves shall be installed in accordance with this specification and the approved engineering drawing at high elevation points designated on the drawing to facilitate draining and filling water lines.

Combination air valves shall be installed in a suitable manhole enclosure with no part of the valve buried. The vault shall be insulated to protect the valve from freezing. The vent line to the manhole enclosure shall be no smaller in diameter than the combination air valve. The vent line riser shall be installed to preclude back siphonage into the system and shall be protected from damage by an adjacent pre-cast concrete post. See MWSA Standard Detail # 2.

10. SERVICE CONNECTIONS

Service connections must have a valid Water Availability Letter (WAL) and a New Service Authorization Form signed by the MWSA Water Manager prior to connecting to the system. All costs associated with installing a service connection (e.g. meter, meter box, backflow prevention device, service line, etc) are the responsibility of the Shareholder requesting the service connection.

Individual service connections shall be installed according to AWWA Standard C800 and this specification. Each connection shall consist of a meter setter including an angle meter valve with padlock wing, a domestic water meter conforming to AWWA Standard C700, a check valve and, if specified, a pressure regulator.

Each connection shall have a Washington State Dept. of Health approved backflow prevention device installed downstream of the meter and prior to any services. Backflow prevention device must be capable of annual testing and located in a plastic valve box.

The meter shall read in cubic feet and be installed in a meter box with reader lid.

Meter shall be installed properly to allow lifting meter lid and reading meter through the meter box reader lid. Plastic meter boxes and lids are acceptable except where located in a traffic area and then a pre-cast concrete box with steel lid shall be used, or as approved by MWSA.

11. BLOW-OFF ASSEMBLIES

When required by the approved engineering drawing, blow-off assemblies shall be installed in accordance with this standard and the approved engineering drawing.

Blow-off assemblies shall consist of a suitable reducing coupling from the water main. A 2" diameter gate valve, a cast iron valve box and cover, a galvanized steel riser pipe with 2x2-1/2" reducing elbow, a 2-1/2" fire cap adapter, fire hydrant cap and chain. The blow-off assembly shall be located at designated locations in accordance with the drawing, oriented to direct outflow in a direction to avoid property damage and positioned to preclude the possibility of backflow into the system.

12. INSPECTION AND TESTING

All water main installations, modifications, new connections, and repairs shall be inspected by MWSA and if applicable the project Engineer.

All repairs and minor modifications to the water system require a leak test as specified in this section. A hydrostatic test may also be required as directed by MWSA.

All new water system piping and components must pass both a hydrostatic and leak test as specified in this section before final acceptance by MWSA. This includes new water mains, service connections, and all buried shareholder service piping being connected to the system.

No new water main extensions shall be connected to the exiting water system without a Washington State Dept. of Health approved backflow preventer installed in the connecting line prior to testing.

No new water system extensions or major modifications to the existing system shall be placed in service without a proper Certificate of Completion executed by the project Engineer.

Hydrostatic Test

1. Hydrostatic and leak test shall be witnessed by MWSA and the project Engineer if applicable.
2. All water-piping joints must be exposed to view and back-fill material must be on-site at the time of the test.
3. All thrust blocking shall be in place and Type I Portland cement blocking shall cure at least seven days before testing.
4. The pressure gage used in the performance of such test shall have minimum divisions of five (5) psi.

5. The mains shall be filled slowly (less than 2 fps water velocity) and trapped air completely vented through air vents or corporation stops. Disinfection can be started at this time in which case all fill water shall be chlorinated as described in Section 13.
6. After completely filling the pipe with water it shall be subjected to a pressure of 150% of the maximum working pressure measured at the lowest elevation point of the section being tested but not less than 125% of the working pressure at the highest elevation point of the segment tested. The test pressure shall be applied by pumping and the pressure maintained for two hours with pumping as required to maintain the test pressure.
7. The pressure test shall consist of measuring the pressure decay following full pressurization; a pressure drop of 5 psi after 15 minutes shall be considered acceptable.

Leak Test

1. Leak tests shall be performed after successfully completing the hydrostatic test if one was required.
2. Leak test shall be witnessed by MWSA.
3. All water-piping joints must be exposed to view and back-fill material must be on-site at the time of the test.
4. All thrust blocking shall be in place.
5. The repaired or modified piping shall be slowly brought up to normal operating pressure and trapped air vented as directed by MWSA.
6. Repaired piping shall be inspected by MWSA prior to back-fill. Piping shall remain exposed until approval from MWSA.

13. DISINFECTION

Contractor shall provide all materials and services required to disinfect all installations. No new pipe or other facility shall be placed into potable water service until disinfected and satisfactorily tested for water quality.

Disinfection shall be accomplished in accordance with AWWA Standard C651 and Washington State Dept. of Health regulations.

After the completion of the retention period, the disinfectant shall be flushed from the system by opening blow-off valves or hydrants at the extremities of the system. Water shall be pumped through the system to remove the initial chlorine treatment. Flushing shall continue until no trace of chlorine can be detected. The contractor shall be responsible for the dechlorination and/or disposal of chlorine solution following disinfection of the system to the satisfaction of state and local authorities and in such a manner as to not contaminate surrounding lands or water, endanger wildlife or create a public nuisance.

After disinfection and flushing, water quality shall be tested for bacteriological contamination in accordance with Washington State Dept. of Health regulations. All test reports from a certified lab shall show satisfactory results prior to allowing final connection to the MWSA system.

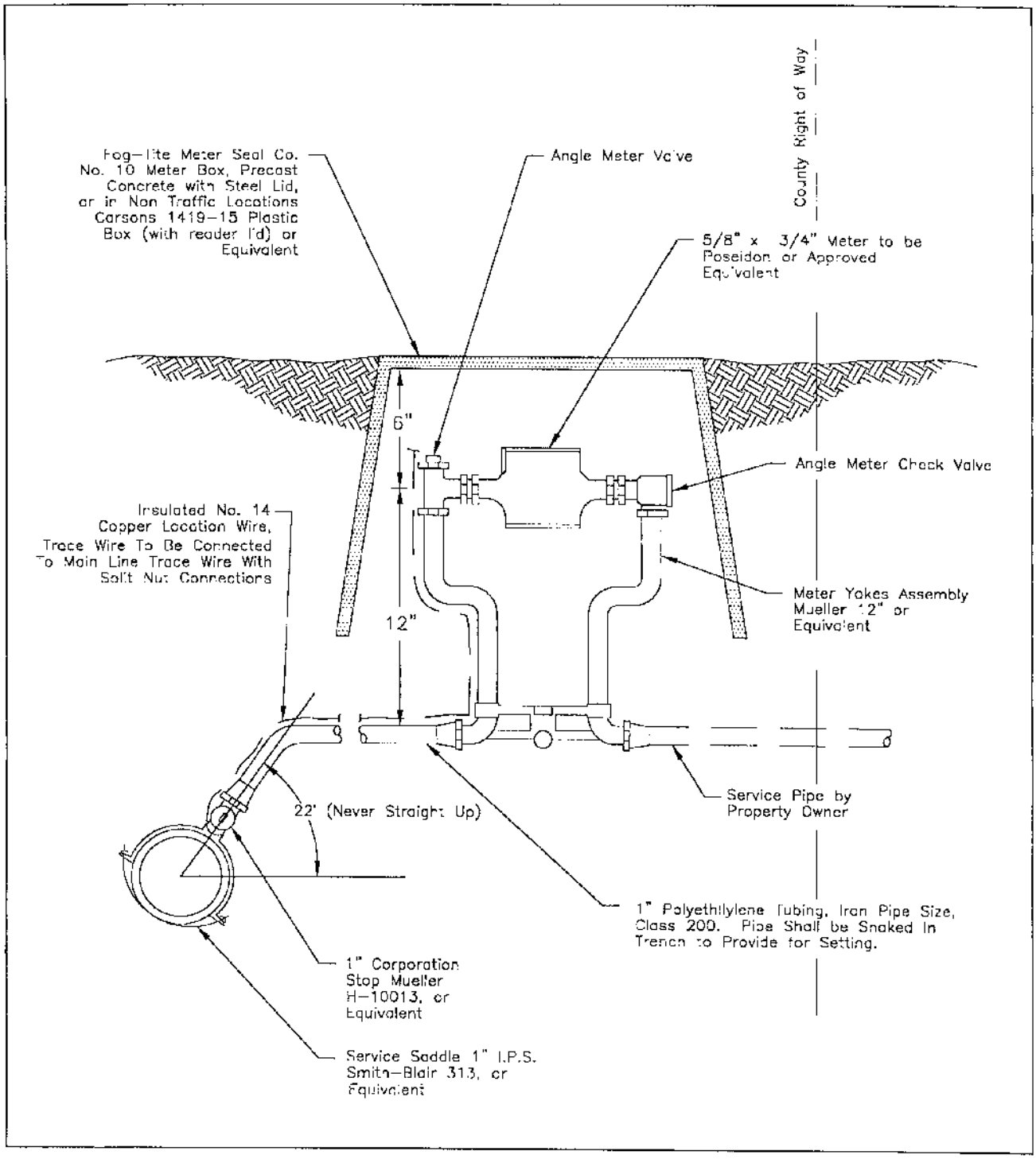
14. SITE RESTORATION

All roads and driveways in which the surface is removed, broken or damaged, or in which the ground has caved or settled due to this construction shall be promptly restored to the original condition.

All road shoulders and drainage ditches disturbed by this construction shall be restored to the original condition.

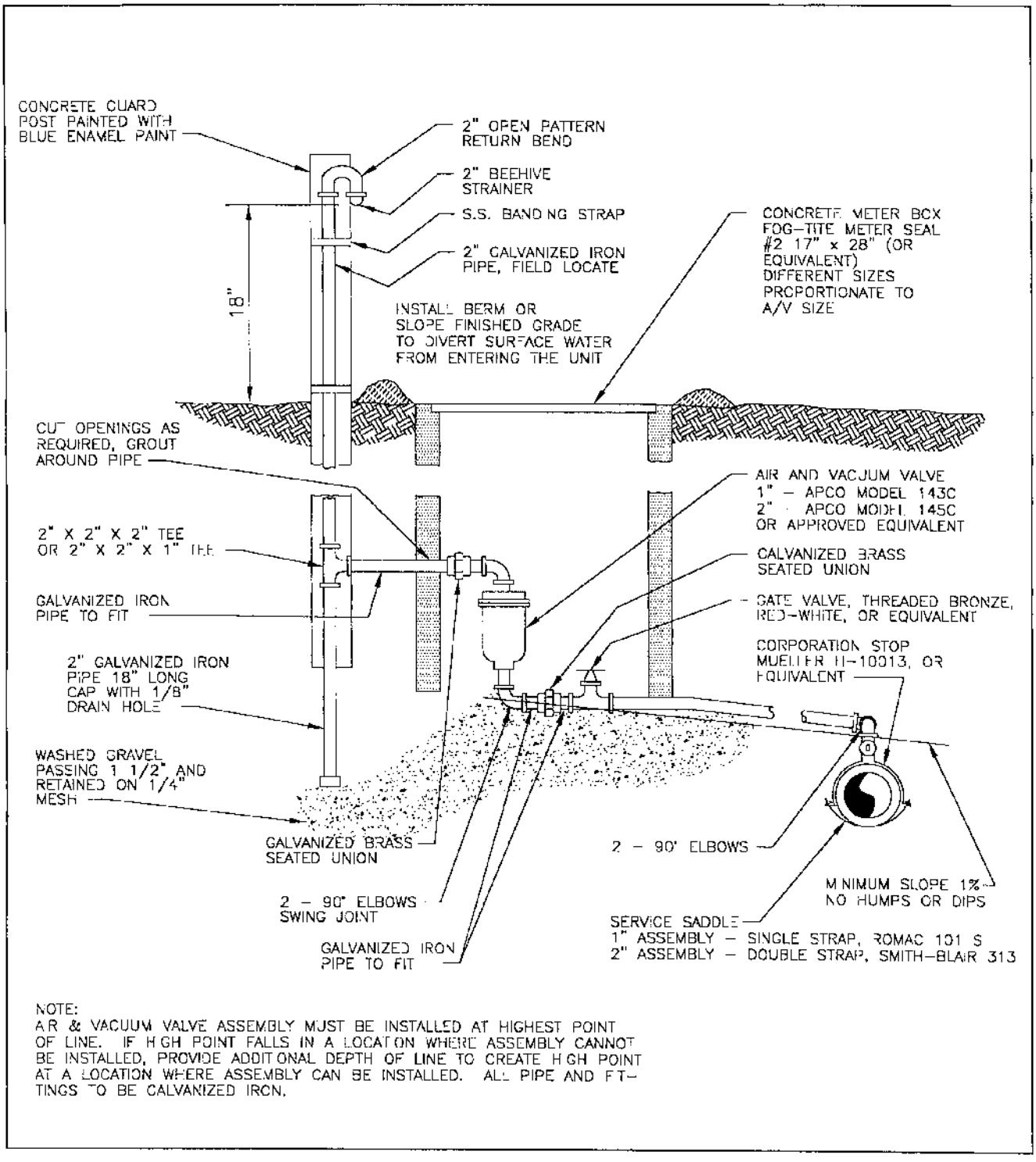
The Contractor shall remove all surplus construction material and refuse.

DETAIL #1 – Single Service Connection



MEADOWMEER WATER SERVICE ASSOCIATION	Standard Detail #1 Single Service Connection

DETAIL #2 – Air and Air Vacuum Relief Valve Assembly



NOTE:
AIR & VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF LINE. IF HIGH POINT FALLS IN A LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED. ALL PIPE AND FITTINGS TO BE GALVANIZED IRON.

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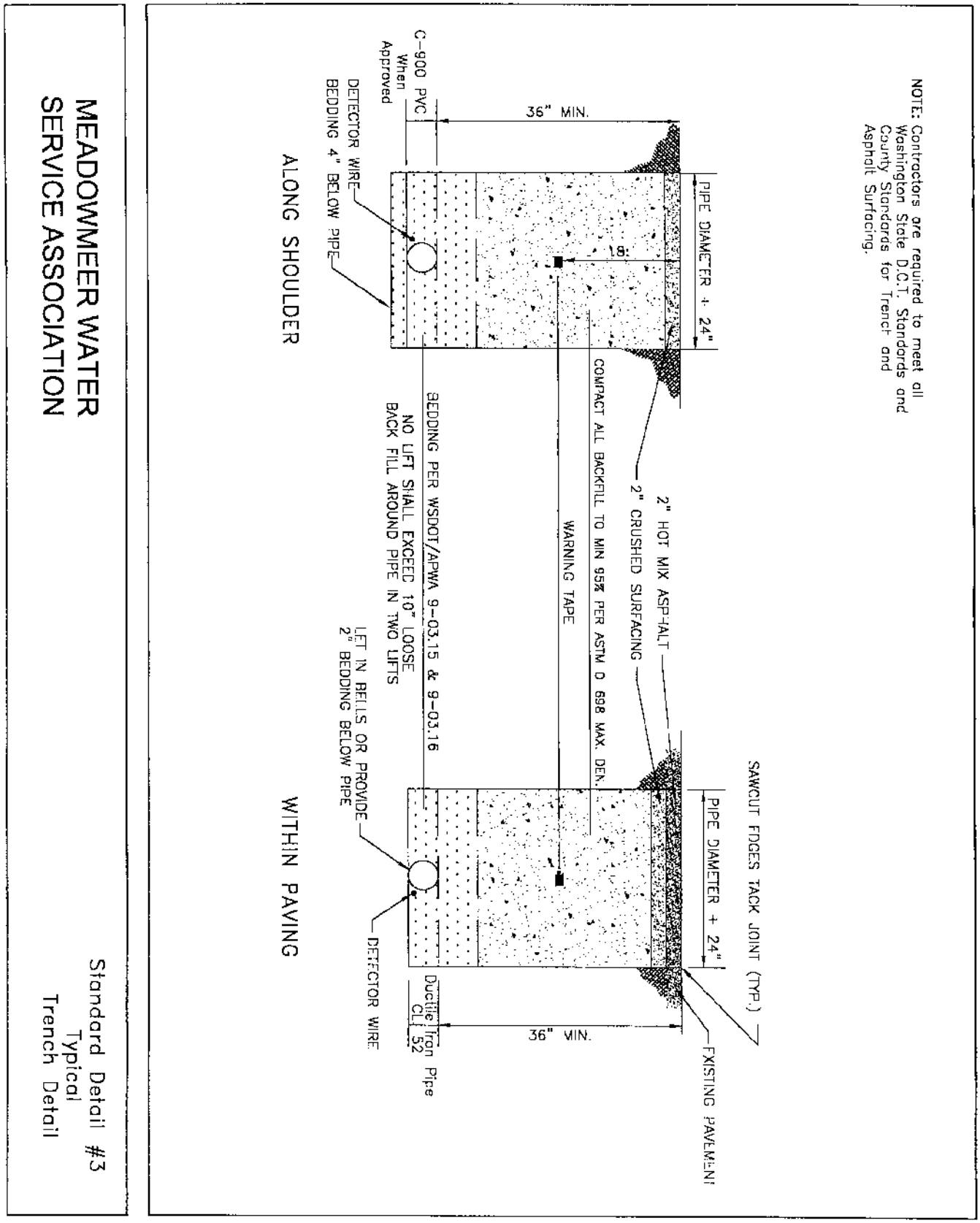
Standard Detail #2
Air and Air-Vacuum
Relief Valve Assembly

DETAIL #3 – Typical Trench Detail



DETAIL #4 – Concrete Thrust Blocking

Min. Bearing Area Against Undisturbed Soil
Square Feet

Pipe Size	A(ft.²)	B(ft.²)	C(ft.²)	D(ft.²)	E(ft.²)
4"	3	1	1	1	1
6"	4	4	2	1	1
8"	7	6	4	2	2
10"	11	10	6	3	2
12"	16	14	9	5	3

Notes:

1. Bearing area of concrete thrust-block based on 200 psi pressure and safe soil bearing load of 2,000 pounds per square foot.
2. Areas must be adjusted for other pipe sizes, pressures and soil conditions.
3. Concrete blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fitting.
4. Block shall bear against fittings only and shall be clear of joints to permit taking up or dismantling of joint.
5. Contractor shall install blocking adequate to withstand operating pressure under all conditions of service.

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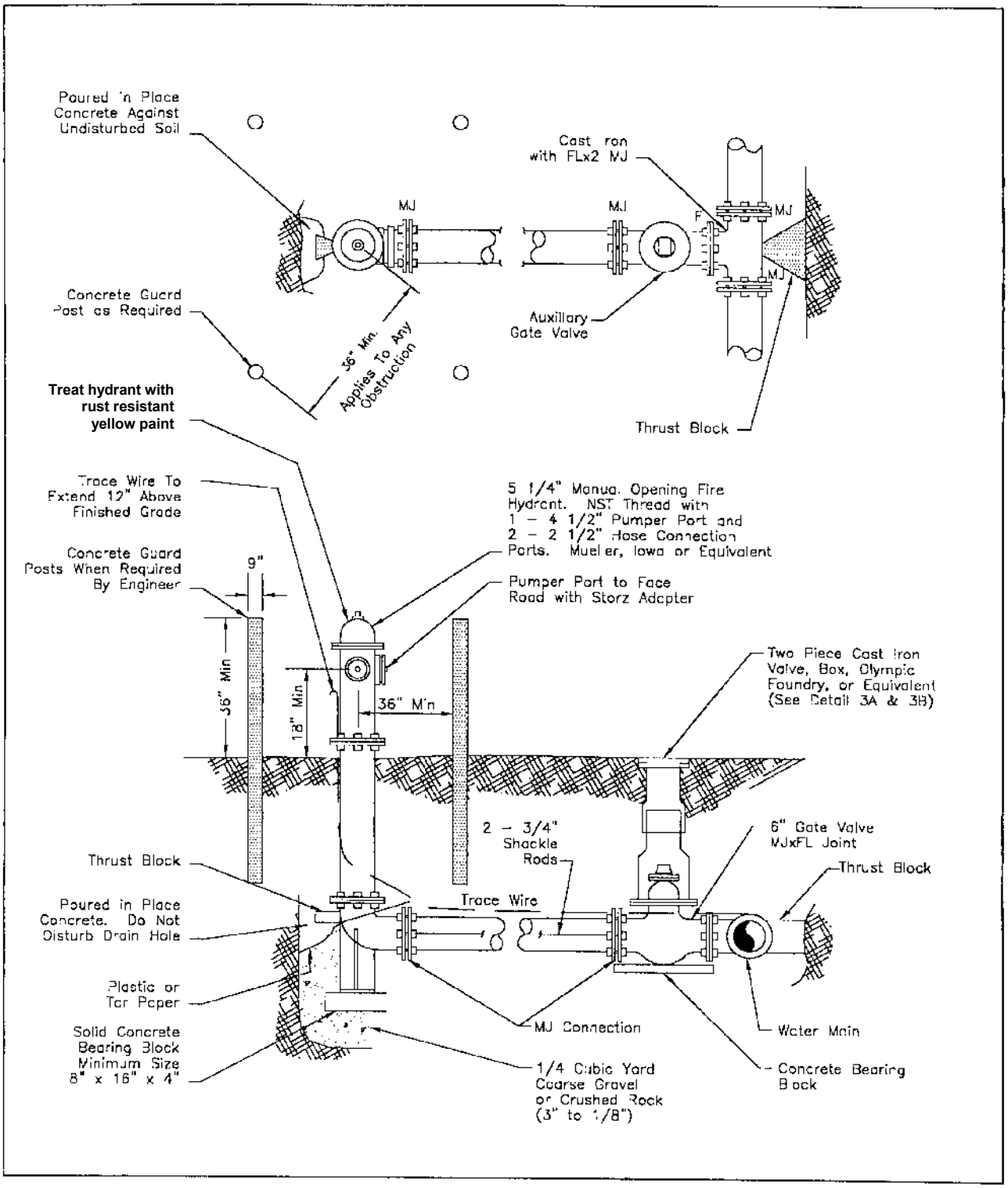
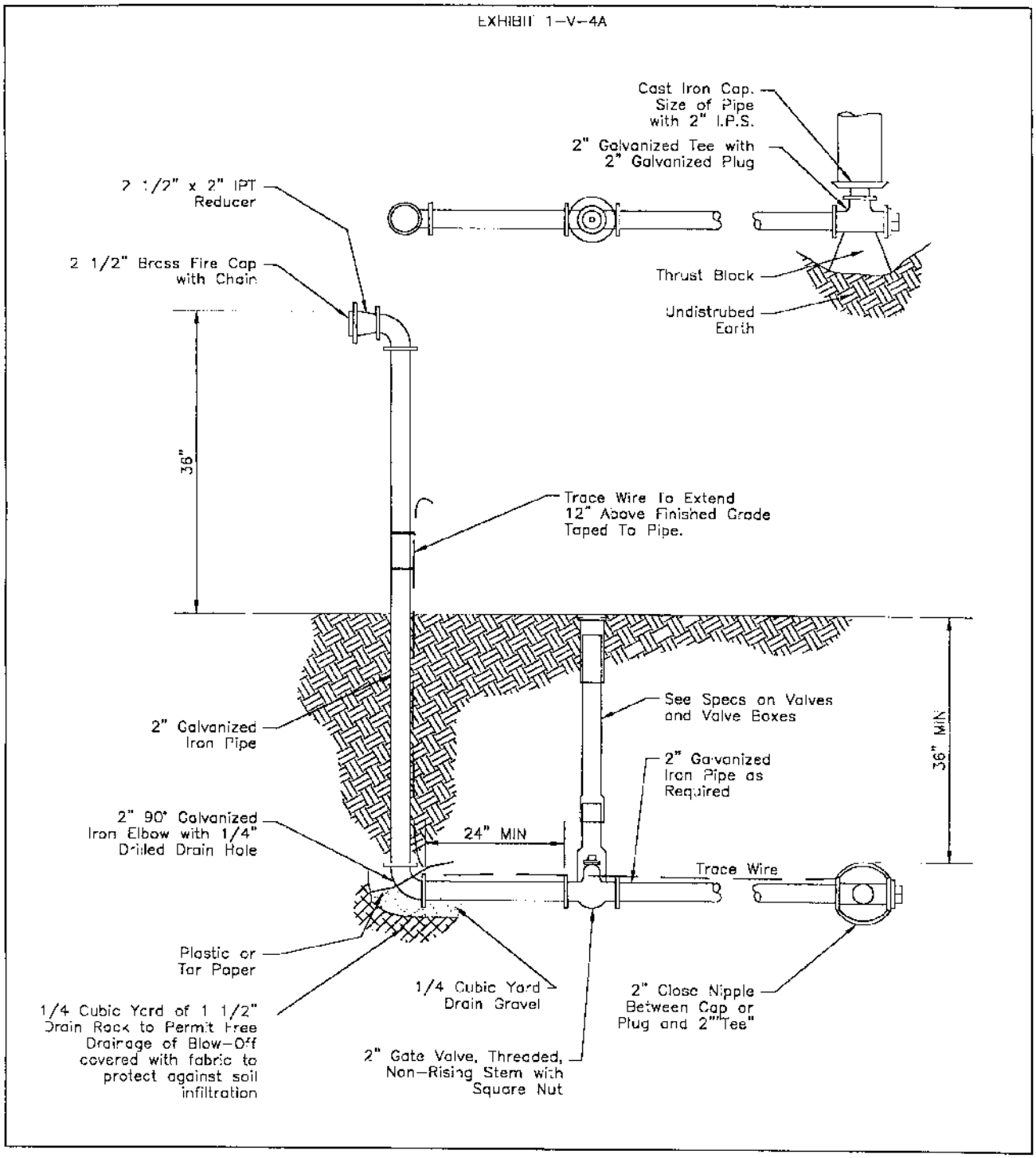
Standard Detail #4
Concrete Thrust Blocking

DETAIL #5 – Fire Hydrant Assembly



MEADOWMEER WATER SERVICE ASSOCIATION	Standard Detail #5 Fire Hydrant Assembly

DETAIL #6 – 2 inch Blow-Off Assembly



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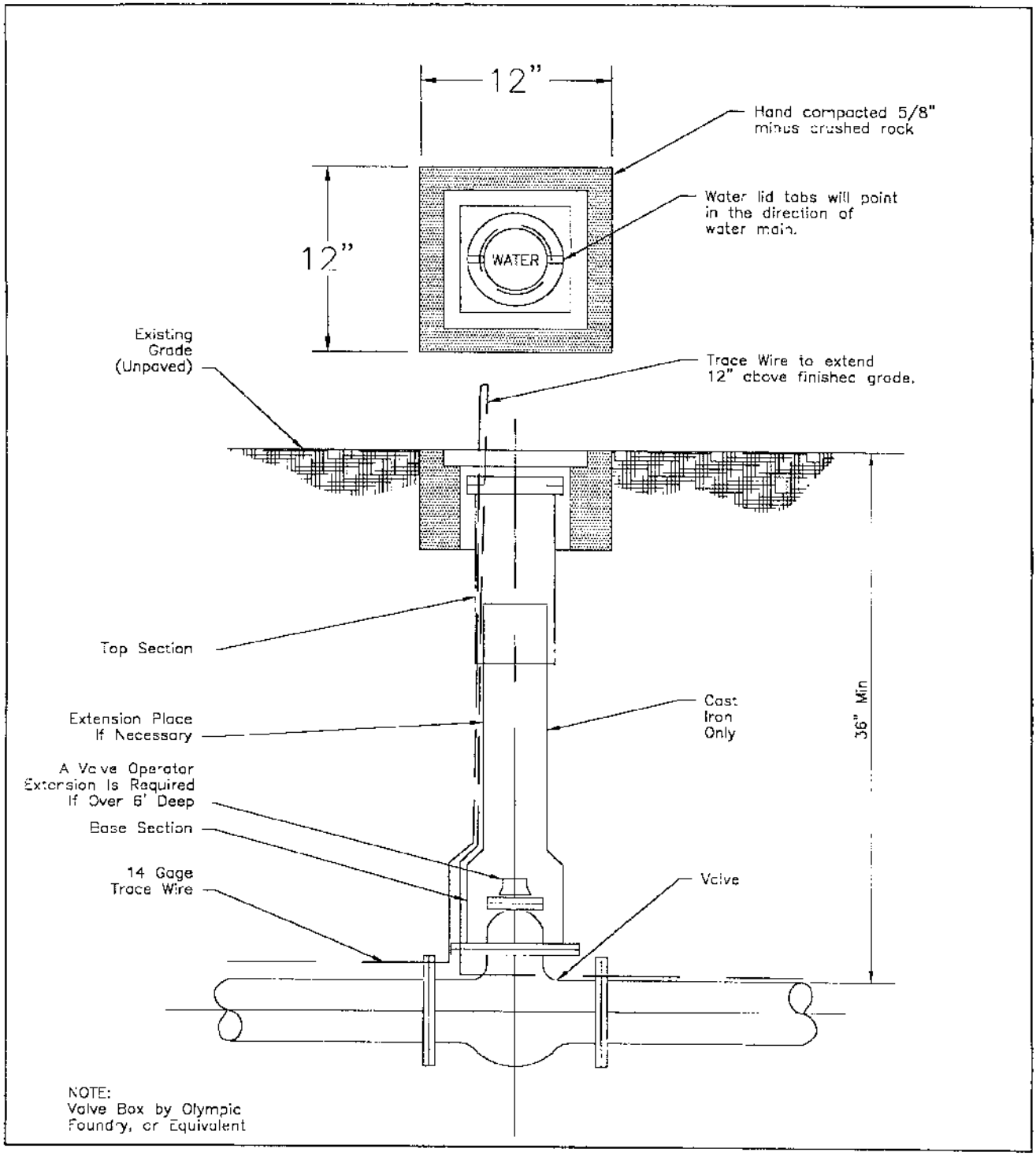
Standard Detail #6
2" Blow-Off Assembly

DETAIL #7 – Valve Box – Unpaved Roadway



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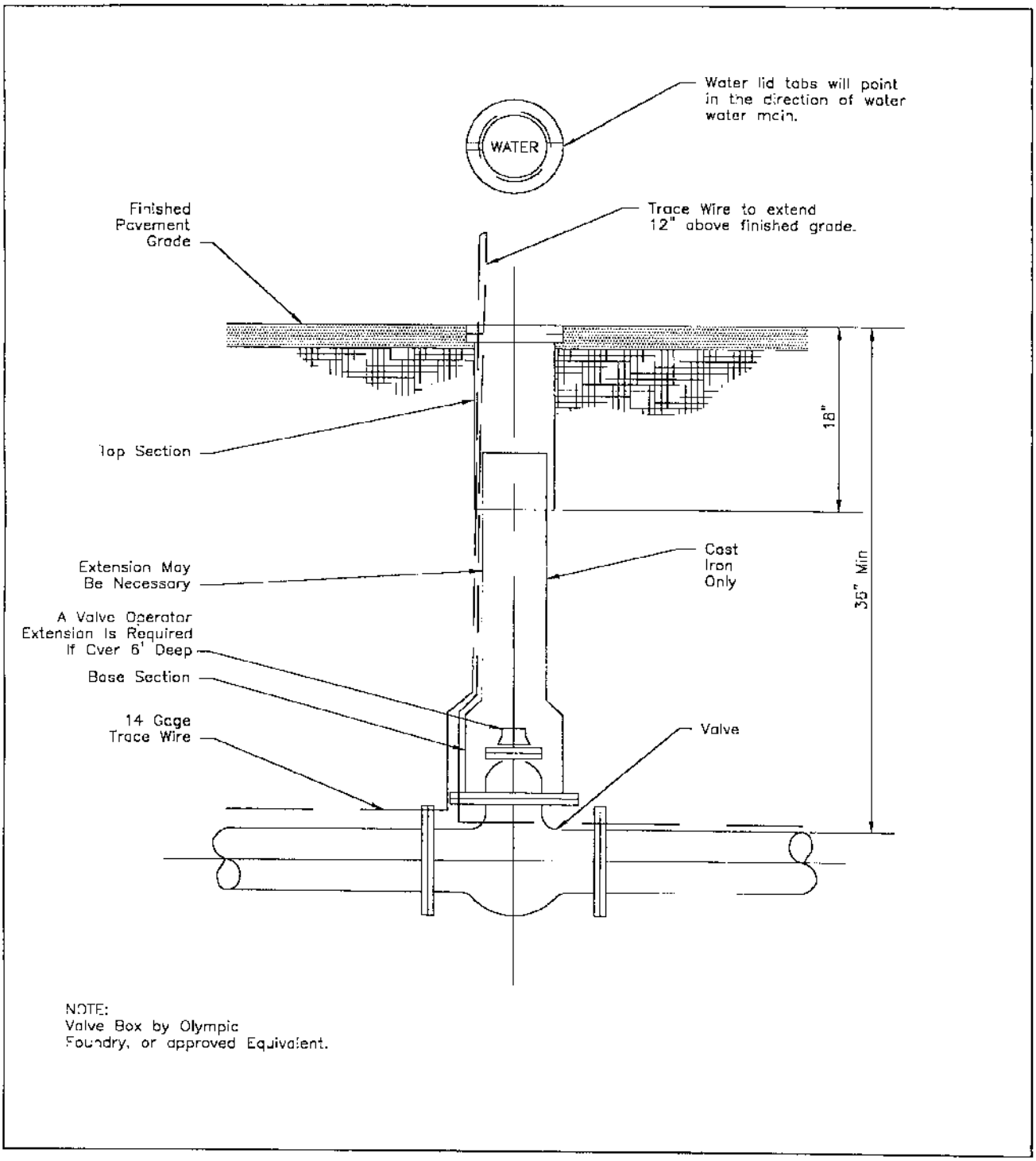
Standard Detail #7
Valve Box
Unpaved Roadway

DETAIL #8 – Valve Box – Paved Roadway



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Standard Detail #8
Valve Box
Paved Roadway

DETAIL #9 – Standard Notes

NOTES:

1. All materials and workmanship shall conform to the requirements of the APWA/WSDOT Standard Specifications (current Edition)

2. All 4" and larger water pipe shall be ductile iron pipe thickness class 52, cement lined. All pipe smaller than 4" and larger than 2" shall be PVC Schedule 40 or 80 PVC. Ali pipe 2" and smaller shall be Iron Pipe Size Polyethylene, PE, ASTM D2239, SIDR 7, 200 psi with compression fittings. (equal to Driscopipe 5100).

3. The minimum cover for water mains shall be 3 foot and shall be maintained at oil points.

4. Installation of water mains and service lines shall include locator wire buried along the entire length of the pipe. Locator wire is to be 14 gauge or larger and shall be stripped and connected to a bolt on each gate valve and the above ground hydrant flange. Locator wire to be run to 12" above ground hydrant flange. Locator wire to be run to 12" above ground at each meter, blow off, and air/vacuum valve. All splices in the locator wire shall be made using split bolt connectors or with a double nut connection at a fitting or with a "stake-on" butt connector equal to Campbell #SC1. Warning tape shall be placed 18" below finished grade per standard detail 12.

5. 2" To 12" gate valves shall be resilient-seated gate valves conforming to AWWA C-509. Concrete valve markers may be required by the engineer.

6. Services shall be iron pipe size polyethylene pipe meeting ASTM D2239, equal to Driscopipe 5100 and shall include a corporation stop at the main. All fittings shall be compression type equal to Mueller. Residential Services shall be 1". See detail 7a.

7. The contractor shall comply with all the requirements of the state and local health authorities.

8. The road and structure locations shown ore approximate and intended to show the relative location of the proposed water system only.

9. All locations of existing utilities are approximate and it shall be the responsibility of the contractor to verify the exact location to avoid damage or disturbance. 2 days prior to excavation, call the one call utility location © 1-800-424-5555.

10. The contractor is to maintain 10 feet horizontal separation between the water main and any septic tank, drainfield, or sewer main.

11. It shall be the responsibility of the contractor to secure all permits and post all bonds required from the city or county.

12. All Water Mains and facilities are to be pressure tested and disinfected per the requirements of WSDOT/APWA Section 7-11.

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Standard Detail #9
Standard Notes