

WCWID DEVELOPMENT STANDARDS
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1 INTRODUCTION

This manual, in conjunction with the latest edition of the APWA Manual of Standard Specifications and Manual of Standard Plans, establishes requirements for the preparation, processing and approval of improvement plans for water system projects. Preparation of improvement plans and specifications that conform fully with the requirements outlined in this manual will expedite the processing, reviewing, and approval of the submitted improvement plans by WCWID Water Improvement District (WCWID).

All local, Municipal and State laws and rules and regulations governing or relating to any portion of this work are to be incorporated into and made a part of all plans and specifications and their provisions shall be carried out by the Developer and Contractors. Anything contained in these specifications shall not be construed to conflict with any of the ordinances and regulations of the District; however, these specifications take precedence over the requirement of said rules and regulations when they describe materials, workmanship or construction of a higher standard or larger size.

It is the intent of WCWID to continually improve this manual. On a periodic basis, proposed supplements, revisions and amendments will be reviewed and adopted.

Copies of this manual are available for purchase from WCWID, 999 E Galena Dr., Sandy, Utah 84094, during normal working hours.

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2 GENERAL APPROVAL PROCEDURE

This section provides general guidance for the District's approval procedure. The actual process depends on the unique situation of each development or project. Steps may be combined, added, replaced or eliminated as deemed necessary by the District. Additional information may also be required.

2.1 Plan Review Flow Chart

The following flow chart show the important steps involved in the plan review of the Developments. All land developments in WCWID shall follow the appropriate procedure detailed below.

2.1.1 Approval Procedure

The steps listed herein may require multiple reviews or revisions. Multiple meetings may also be required.

2.2.1 Initial Plans Received by WCWID. Developer to submit proposed development in initial design phase. Initial drawings shall show the proposed layout of lots, proposed street system, and proposed land uses, and proposed water plans.

2.2.2 Development Review Committee. The WCWID Operations Manager and Engineer will meet with the developer(s) to discuss needed improvements and answer any questions regarding WCWID approval procedure. In order to be placed on the development review committee's agenda, an application must be submitted one week prior to the upcoming scheduled meeting.

2.2.6 Engineering Plan Review. To understand the function of the proposed development, engineering conceptual design review is recommended. All plans to be reviewed by Engineer must be submitted for Engineering review. The purpose of engineering plan submittal is to ensure that the proposed development will follow all development procedures and standards adopted by WCWID. All improvement plan submittal requirements must be submitted before plan review will begin. The plan review process will take fifteen working days from the day that all required improvement plan submittal(s) have been received. Redlines will be provided and must be addressed before proceeding to engineering final plan submittal. Plan review will remain in this stage until WCWID completely accepts the proposed improvements within the plan set. If plans anticipate access to UDOT road, written UDOT approval will be required.

2.2.11 Water Department Review. The Water Department shall review the plans to determine culinary water compliance with WCWID Standards. This review shall occur simultaneously with the Engineering Review, and shall have the same requirements.

2.2.12 Engineering Final Plan Approval. Upon completion of the engineering plan submittal, the final plans shall be submitted and if all corrections have been made and the District is satisfied with the proposed improvements, final approval will be granted. With final approval, applicable bonds and fees will be calculated and the totals will be provided to the Developer. The Developer shall provide four (4) 11x17 plan sets and all electronic files to the District upon engineering final plan approval.

- A. Expiration of Plan Approval. Approval on construction drawings will only be valid for two years from the date of approval. After two years from the time of approval, drawings must be resubmitted prior to construction for a staff review to ensure

adequate, current construction standards are reflected in said plans. A revised fee of 30% of the original fee will be charged for a re-review of plans.

2.2.16 Pre-Construction Meeting. A Pre-Construction Meeting with the Developer, Contractor, and WCWID Water Improvement District and Engineering is required prior to start of construction. This shall be scheduled through WCWID.

2.2.17 Construction and Inspection. Throughout the construction of the proposed improvements, the Contractor shall make every effort to ensure that construction is being performed in a professional manner and in strict accordance with the approved plans and WCWID's Development Standards. A WCWID inspector will perform periodic inspections throughout the progress of the development to ensure that the improvements are being constructed in accordance with the Development Standards and the approved plan set. The WCWID inspector will notify the developer of any deficiencies in the work and may issue a letter of non-compliance if necessary. All improvements shall be constructed correctly and any deficiencies shall be fixed in a timely manner. It is the developer's responsibility to coordinate inspections with White City Water Improvement District. All improvements shall be constructed using the highest quality of workmanship and materials.

SECTION 3: GENERAL IMPROVEMENT REQUIREMENTS

3 GENERAL IMPROVEMENT REQUIREMENTS

This section is an outline of WCWID development requirements. Requirements listed herein must be completed for each project/development. Compliance with these requirements must be maintained throughout the project.

3.1 Improvement Plan Submittal Requirements

This section outlines the improvement plan submittal requirements for a development.

3.1.1 Subdivision, Master Planned Subdivision, and PUD.

Subdivision means any land that is divided, re-subdivided or proposed to be divided into two or more lots, parcels, sites, units, plots, or other division of land for the purpose, whether immediate or future, for offer, sale, lease, or development either on an installment plan or upon any and all other plans, terms, and conditions. Subdivision includes: The division or development of land whether by deed, metes and bounds description, devise and testacy, lease, map plat, or other recorded instrument; and divisions of land for all residential and non- residential uses, including land used or to be used for commercial, agricultural, and industrial. The requirements for both subdivision and master planned subdivision are listed below.

- A. Submit a title report for the subdivided land.
- B. Submit four complete sets of the improvement plans and dedicated plat(s), including:
 - 1. Title sheet.
 - 2. Dedicated plat.
 - 3. Mylar plat.
 - 4. Utility overview sheet.
 - 5. Grading and drainage plans and profiles.
 - 6. Erosion control plans.
 - 7. Street improvement plans and profiles.
 - 8. Traffic signing, striping, and control plans.
 - 9. Street Light plans.
 - 10. Storm drain plans and profiles.
 - 11. Culinary water plans and profiles.
 - 12. Secondary water plans and profiles.
 - 13. Details and typical sections.
 - 14. Landscaping plans.
 - 15. Irrigation plans.
 - 16. Other special plans, as required.
- C. Submit engineer's estimates of construction costs.
- D. Submit survey notes.
- E. Submit all easements and agreements.
- F. Submit a geotechnical report.
- G. Submit all other associated studies (geological, environmental site assessment or other hazard studies), if required.

- H. Submit other information or documents as necessary.
- I. Submit a master plan layout showing the development in phases.
- J. Submit all necessary permits.
- K. Submit electronic files at the following stages for review: concept, final approval, as-built.

3.2 Contractor/Developer

For the purpose of this document, the developer and the contractor are considered one and the same.

3.3 Engineer's Seal Required

Any final plan, map sketch, survey, drawing, document, plat, specification, or report shall bear the seal of a professional engineer and/or surveyor licensed in the State of Utah when filed with White City Water Improvement District. This is a State requirement and applies to all documents filed with WCWID including, but not limited to, filings related to site plans, plats, improvement plans, specifications or report of a building or structure. Additionally, the signature of the individual named on the seal and the date shall appear across the face of each original set of documents in compliance with State law.

3.4 Electronic File Requirements

Concept, final approved and as-built surveys in electronic format shall be submitted and accepted by the WCWID Engineering Department. The electronic drawings shall be in Computer Aided Drafting (CAD) file format. The acceptable formats are AutoCAD 2018 or District's latest version. The deliverables for CAD submittals are AutoCAD drawing files and Microsoft Excel files. All CAD files shall be registered to the North American Datum 83 (NAD83) State Plane Coordinates US Survey foot, Utah Central Zone coordinate system (grid) with ties to two public monuments. Information on monuments is available through Sandy City or Salt Lake County Surveyor.

3.4.1 File Content and Layering.

To ensure that all electronic files will be able to be incorporated into WCWID's Geographic Information System correctly, all electronic files submitted shall be drawn and labeled on individual layers. These layers shall include:

- Water line sizes on individual layers
- Water service layer
- Water meter layer
- Fire hydrant
- Hydrant service layer
- Hydrant valve layer
- Storm drain line sizes on individual layer
- Storm drain manhole layer
- Storm drain catch basin layer
- Detention pond layer
- Sewer line layer

- Sewer manhole layer
- EOP (edge of pavement) layer
- Lot layer
- Lot number layer
- Sidewalk layer
- Back of curb layer
- Road centerline layer.
- Dimension layer.
- Contour layer.
- Sprinkler head layer.
- Sprinkler line sizes on individual layers.
- Sprinkler valves layer.
- Sprinkler timers layer.
- Street light wire sizes on individual layer.
- Street light location.
- Street Light Junction boxes.

3.4.2 Geometry.

All files shall be constructed in a format that is geometrically correct; meaning that all lines that intersect are snapped together at a common point (no overlapping lines or short shots). Street centerlines shall be segmented to be a continuous polyline. Structures (bridges, box culverts, and arch culverts) shall be surveyed at the four corners of the structure and shall be drawn to form an enclosed polygon for each structure. Bridges shall be surveyed at the top of the bridge abutments on the four corners. Storm drain and sanitary sewer pipes shall be drawn in the direction of flow and shall be a continuous polyline from structure to structure and snapped together at the centerline of the structure. Water lines shall be segmented to be a continuous polyline from pipe intersection or at changes in pipe size. Water line shall be drawn without curves. A series of lines shall be used to represent smooth curves. The edge of pavement, curb and gutter, sidewalks, street centerlines, culinary waterlines, and storm drain lines shall be 3D polylines representing their actual horizontal and vertical location. Where text is being placed for a polygon feature, the text justification point shall be placed within the boundary of the polygon. It is acceptable to have the text overwrite one another.

3.5 Bonding Information

A bond posted with WCWID assures the Districts required improvements will be completed according to District specifications. The District allows for the following bond choices:

3.5.1 Escrow.

A special account with a local bank in which the bank agrees to hold the funds until the District directs them to release it.

3.5.2 Cashier's Check.

Only a cashier's check will be accepted (no company checks or personal checks). The District will deposit the check into a special account and hold it until the project is complete. If no request has been made within three years, all proceeds become property of WCWID.

Please note, only WCWID forms will be accepted. Copies of the bond agreements are located in *Appendix A*. The Bond Coordinator must be informed of which form of agreement will be used. All bond release inspection requests must be in writing; telephone requests will not be accepted. Inspection requests will be scheduled through the District. Release of the bond will NOT be initiated until this step is taken. Should your project fail the initial bond release inspection, you will be required to pay a re-inspection fee, along with your re-inspection request. Please note that in the event that the District is requested to hold the plat for final signature and approval until all fees and bonds have been received, the requesting party will be responsible to pay all costs and fees associated with this request.

If you have any questions please contact:

White City Water Improvement District
999 E Galena Dr
Sandy, UT 84094
801-571-3991

3.6 Pre-Construction Conference

After final approval, the Contractor may be released for construction of the development. A pre-construction conference shall be held before any excavation or other work is begun in the development.

3.7 Inspection

All construction work involving the installation or repair of improvements in developments shall be subject to inspection by WCWID Water Improvement District. It shall be the responsibility of the developer to ensure that inspections take place where and when required as indicated in the specifications, on the permit and as discussed in the preconstruction conference, where applicable. All projects will be assigned an inspector in which the inspector will be responsible for the project and all information shall be directed through the inspector in charge of the project. It is WCWID's objective to be proactive with the inspection of each project and in order to facilitate this objective it is the developer's responsibility that all inspections shall be completed.

3.7.1 Continuous and Periodic Inspection.

Certain types of construction may require continuous inspection, while others will only require periodic inspections. The type and amount of inspection performed by the District shall be at the sole discretion of the District Engineer. On construction requiring continuous or periodic inspection, no work shall start until an inspection request has been made to the District by the Developer and the required submittals received and approved by the District. Throughout the inspection process the contractor shall ensure that the infrastructure installed in the project is inspected and surveyed. The District may require the contractor to leave some infrastructure open to review and inspect. Continuous inspection may be required on the following types of work:

Installation of, water pipe, valves, and hydrants.
Testing and backfilling as per approved specifications.
Any connections to the District utilities.

3.7.2 System Improvements.

All projects have multiple systems in order to better manage the flow of each project the District shall calculate the bond according to the system it is related to. The inspection process shall follow the systems also to define stages of each project. The system that WCWID shall evaluate with each project is listed below:

1. Culinary Water System Improvements. All pipe, fittings, valves, services, hydrants, blow off assemblies, air vacuum release valves, sampling stations, pressure reducing valves, and other structures required in the project that convey drinking water.

3.7.3 System Material Inspection.

As each project begins each phase of construction and the material is on the project, the contractor shall request a system material inspection. This inspection shall ensure all proper materials for each system is verified prior to install.

3.7.4 System Start Up Inspection.

As each project begins each phase of construction, the contractor shall request an inspection. This inspection is crucial to ensure proper installation is observed before system wide construction is allowed to reduce possible defects or deviancies.

3.7.5 System Partial Release Inspection.

During the construction of each system, the developer may request one partial release from the above system improvements. This inspection shall occur at any time, but is only allowed one time per system. No other partial releases will be granted until system substantial completion has been reached. This inspection only requires one inspector. The system partial release inspection does not in any way guarantee or warrant any work installed but is only a quantity measure that construction has installed the portion of the improvements being requested for system partial bond release. See *Section 2.09* for bond release information.

3.7.6 System Substantial Completion Inspection.

As each system is completed an inspection shall occur that reviews the entire system and ensures that the system is installed and functional according to all WCWID standards. This inspection requires two WCWID representatives and shall be completed by the project inspector and a representative for the system.

Culinary Water System Improvements substantial completion shall be completed after curb and gutter installation and base placement, but before asphalt installation.

Submit electronic as-builts per *Section 2.10*. Submittal must be examined and approved by the WCWID Water Improvement District to ensure compliance with the standards.

Fire flow test shall be performed as required by the UFA Fire Department. Copies of the test shall be submitted to the UFA Fire Department and the District Water and Engineering Departments. The Developer/Contractor is responsible to pay for this test and for BAC-T tests.

3.7.7 Final Completion.

Final Completion shall occur after the system has been completed and inspected, electronic as-builts are submitted and accepted, and the fire flow test is completed. The last system to be completed and approved shall cause Final Completion to be granted. Final Completion is not an inspection; however it begins the warranty period for all systems

3.7.8 End of Warranty Inspection (12 Month Inspection).

End of Warranty Inspection shall occur twelve months from the Final Completion. This inspection is an audit to ensure system construction is still free of defects and deficiencies. This inspection shall require two WCWID representatives and shall be completed by the project inspector and a representative for the system.

Requests for inspection on work requiring continuous inspection shall be made at least two (2) working days prior to the commencing of the work. Notice shall also be given 24 hours in advance of the starting of work requiring periodic inspection, unless specific written approval is given otherwise. For inspection requiring two or more WCWID representatives notice shall be given one (1) week and will only be scheduled on a Tuesday or Thursday. It is critical that all inspection requests are complete and ready for inspection. Work done by the Contractor which requires periodic or continuous inspection beyond the normal working hours of the District (8 am to 5 pm Monday thru Friday), on weekends or District holidays shall require prior payment of current District overtime rates by the contractor.

3.8 Partial Bond Release

During the construction of each system the developer may request one partial bond release per system. This inspection shall occur at any time, but is only allowed one time per system. As outlined in *Section 2.08.05 System Partial Release Inspection*, once partial release has occurred for each system no releases will be granted until System Substantial Completion Bond Release. The system partial release inspection does not in any way guarantee or warrant any work installed but is only a quantity measure that contractor has installed the portion of the improvements being requested for partial bond release. Partial releases are not required but may be granted once per system.

3.9 System Substantial Completion Bond Release

System Substantial completion inspection shall be made by the District Engineer or a representative after ALL system construction work is completed. Upon substantial construction completion, contractor shall submit a substantial completion inspection application to the District prior to the improvement inspection. These inspections shall be completed as discussed in *Section 2.08.06*. Any faulty or defective work shall be corrected by the persons responsible for the work within a period of fifteen (15) days from

the date of the inspection report defining the faulty or defective work. Should the Contractor fail to complete the required work, the District Engineer, at his discretion, may complete the defective work and bill the Contractor, using the monies in escrow, or otherwise held by the District to complete the defective work. If the District Engineer or a representative determines damages or defects are present and is concerned that replacement may cause more damage than desired, the District Engineer or a representative may elect to take monies from the bond for the cost of replacement of damaged and defective work rather than removing the defective work. In addition, the District may withhold future permits from the affected Contractor, Subcontractor or Developer. After this inspection occurs and ALL system improvements constructed are approved, an As-built record of plans shall be made. These As-built plans shall show location of all infrastructures installed for all culinary water, storm drain, secondary water, street system, irrigation and landscaping, street lights and any other system improvements installed by the developer and shall be submitted electronically and reviewed prior to release. See *Section 2.04* for the electronic file format. All plans shall be surveyed and stamped by a Professional Engineer licensed in the State of Utah. In addition, the developer will be required to provide final survey on all detention facilities to ensure design capacity is achieved. All surveys shall be stamped and certified by a licensed land surveyor. This As-built shall be drawn in accordance with WCWID file format and must be completed and approved before any release of bond will occur. In addition, the UFA Fire Department requires a fire flow test before granting their approval. Upon receipt of the above stipulated conditions a release of the bond may be granted in the amount of 75% of the bond for that system.

3.10 Final Completion

Final Completion shall occur after all systems have been completed and inspected, electronic as-builts are submitted and accepted, and the fire flow test is completed. See *Section 2.08.07* for inspection information regarding Final Completion. The last system to be completed and approved shall cause Final Completion to be granted. Final Completion begins the warranty period for all systems. Upon final completion all systems shall have been released to 75% of the bond amount. Final Completion begins the warranty period.

3.11 Guarantee of Work

The developer shall warrant and guarantee (a retainage of an escrow or other security in the amount as dictated by the District) that the improvements and every part thereof will remain in good and serviceable condition for a period of twelve months from the final date of all substantial completion inspections report by the District's Engineer or his authorized representative. Additionally, the developer shall ensure that the improvements are in good condition during that warranty period at no cost to the District. Any repairs required by the District shall be made at no cost to the District. It is further agreed and understood that the determination for necessity of repairs and maintenance of the work rest with the District Engineer. The Engineer's decision upon the matter shall be final and binding upon the Developer, and the guarantee hereby stipulated shall extend to and include, but shall not be limited to, the entire street base, and all pipes, fittings, joints, valves, backfill, and compaction, as well as the working surface, curbs, gutters, sidewalks, and other accessories that are or may be affected by the construction operations. Also, whenever, in the judgment of the District Engineer, said work shall be in need of repairs, maintenance, or rebuilding, the Engineer shall cause a written notice to be served upon the Developer or permittee, or both, and the responsible party(s) shall undertake and complete such repairs, maintenance, or rebuilding. If the responsible party(s) fails to do so within thirty (30) days from the date of the service of such notice, the District Engineer shall have such repairs made. The cost of such repairs shall be paid by the responsible

party(s), together with 25 percent in addition thereto as damages for failure on the part of the responsible party(s) to make the repairs. If the District Engineer or a representative determines the presence of damaged or defective work and is concerned that replacement may cause more damage than desired, the District may elect to take monies from the bond for the cost of replacement of damaged and defective work rather than removing the defective work. Additionally the District Engineer may withhold future permits from the affected contractor, subcontractor or developer for failure to comply with District requirements. An End of Warranty Inspection as outlined in Section 2.08.08 shall occur prior to the completion of the warranty period to verify compliance with the above stipulated conditions. After this inspection occurs ALL constructed improvements shall be accepted by WCWID, and the remaining twenty-five percent (25%) of the bond shall be released.

3.12 Development Safety

It shall be the responsibility of the developer to maintain and enforce all Federal, State, and Local safety codes involved with the development. All excavations shall be conducted in a manner resulting in a minimum amount of interference or interruption of street or pedestrian traffic. Inconvenience to residents and businesses fronting on the Public Way shall be minimized. Suitable, adequate and sufficient barricades and/or other structures will be available and used where necessary to prevent accidents involving property or person. Barricades must be in place until all of the permittee's equipment is removed from the site and the excavation has been backfilled and proper temporary gravel surface is in place, except where backfilling and resurfacing is to be done by the District. In this case, the barricades together with any necessary lights, flares, or torches, must remain in place until the backfill work is commenced by the District. From sunset to sunrise, all barricades and excavations must be clearly identified by adequate signal lights, torches, etc. Street closure and traffic detours require permission from the District Engineer based on a traffic control/detour plan submitted by the contractor. The Police Department and Fire Department shall be notified at least 24 hours in advance of any planned excavation requiring street closure or traffic detour by the permittee.

SECTION 4: PLAN SET FORMAT
REQUIREMENTS

4 PLAN SET FORMAT REQUIREMENTS

Improvement plans submitted to WCWID for review and approval shall follow the formatting requirements set forth in this *Section 3*. The following formatting procedure helps ensure proper plan review and maintenance of consistent standards by WCWID.

4.1 General

All improvement plans submitted for review and approval by WCWID shall be designed in accordance with current Engineering practices. All plan sets shall meet the requirements listed below.

1. A location map shall be included with the plans.
2. An index sheet shall be included with the plans.
3. All drawings shall be drawn on, 24" x 36" paper with a maximum scale of 1" =
4. 100' on plans and 1" = 10' on profile sheets.
5. Show a North arrow on all pages of the plan set.
6. Show the scale on all pages of the plan set and on each detail.
7. Show a title block on the lower right hand corner of all pages within the plan set.
8. Completely dimension and describe all proposed improvements.
9. All plans shall be stamped, signed, and dated by a Registered Engineer, Architect, Landscape Architect, or Surveyor.
10. Elevations shall be referenced to the North America Datum 83, (NAD 83), State Plane Coordinates, Utah Central Zone. No assumed elevations will be acceptable.
11. Show stationing and elevations for all profiles.
12. Provide general and construction notes throughout the plan set. This shall include any mitigation for contaminated soils.
13. Show details for all proposed structures.
14. Plan sets shall include an emergency contact phone number and name of the developer's responsible person who will be available 24 hours a day, should an emergency situation arise.
15. Plan sets shall include a detailed Storm Water Pollution Prevention Plan (SWPPP), which is to be posted on the project site at all times during construction.

4.2 Title Sheet

A title sheet is required for all plans submitted to WCWID. The title sheet shall be arranged in a visually appealing manner. The title sheet is required to include the following items listed below.

1. Show the name of District on the title sheet.
2. Show the project title of the proposed development.
3. Specify the type and location of work to be constructed within the development.
4. Show the name, address, phone, etc. of the engineer or firm preparing drawings.

4.3 Project Overview Map

The purpose of the project overview map is to show the entire project as each phase is submitted for a planned unit development. The project overview map is required to show how each phase will complete the overall theme of the planned unit development and to ensure that all improvements will tie in with each future phase of the development. The project overview map shall show:

1. A north arrow and scale.
2. Any existing street within 200 feet of the development.
3. Street Improvements.
4. All street names.
5. All lots.
6. All lot numbers.
7. A title Block.
8. Each phase number and boundaries.
9. All detention ponds.
10. Any other pertinent information.
11. The zoning on and surrounding the project.
12. All building setbacks.
13. The public utility and drainage easements throughout the project.

4.4 Utility Overview Sheet

This subsection outlines the required items and minimum standards for the utility overview sheet.

1. All existing and proposed public improvements must be shown on the final drawings. Show public improvements such as storm drains, water, sewer, gas, electric or other major improvements existing or planned for construction on or near the project.

4.5 Culinary Water Plans

All culinary water plans shall meet the requirements listed below. Other requirements may be required to ensure proper design of the culinary water within the development.

1. All plans shall be drawn on 22" x 34" paper, at a maximum scale of 1" = 100', scalable to 11" x 17" half size plan sets.
2. Show the location and size of water mains, valves, drains, etc.
3. Show the type of pipe.
4. Provide details at 1"=10' or other appropriate scale to adequately provide required information.
5. Show all benchmark locations and elevations (use State Plane Coordinates, Utah Central Zone, NAD 83).
6. When development occurs across pressure zones include PRV station in improvement designs. Show all inlet and outlet pressures.
7. Show all existing utilities within and adjacent to the area proposed for construction must include actual existing elevations obtained from field survey. Pot holing at locations of potential conflicts, overlaps, or gaps shall be completed in the field survey
8. Show all backflow prevention devices.
9. Show all general and construction notes. All plans of public and private improvements will need to be reviewed by the District or County Fire Marshall to verify compliance with fire flow requirements. A letter regarding the required fire flow for the District or County Fire Marshall indicating the required flow will need to be submitted.

4.6 Details and Typical Sections

Detail sheets or references to the current APWA Manual of Standard Plans are required for all details. Typical Sections should be drawn in accordance with WCWID Standard Plans as shown in *Section 7* of this standard document.

SECTION 5: DESIGN REQUIREMENTS

5 DESIGN REQUIREMENTS

Section 4 outlines design criteria that will be required by developments and developers engineer. All submitted plans shall meet at a minimum the criteria provided and use the highest engineering practices. Developer's engineer will be required to use design criteria unless otherwise specified by District's Engineer.

5.1 Easements and Agreements.

All required easements and agreements shall follow the requirements listed below.

1. Easements for culinary water, shall be provided by the Developer and designated on the improvement plans and final plat or separate document as require to accommodate the utility systems in the development.
2. Easements and area descriptions shall be of sufficient width to completely identify and provide for access and maintenance of the utility or identified restricted area.
3. Easements to be dedicated to White City Water Improvement District which are not shown and described on the dedication plat shall be submitted to the District's Engineer on forms provided by the District. Said easements shall include, by attachment, a drawing of the easement being dedicated and a complete legal description of the easement.
4. Under no circumstance shall permits be issued or construction allowed without the proper easements in place to accomplish the work.
5. Should easements become necessary to cross abutting private property to permit drainage or utility access of the development, it shall be the responsibility of the developer to acquire such easements at no cost to the District.
6. Both legal and physical accesses are required to all manholes, meters, vaults, valves, or other structures requiring periodic maintenance. Physical access shall consist of all weather surfaces sufficient to allow of all routine maintenance and repair equipment.

5.2 Culinary Water System Design

Culinary water systems shall be designed according to the following requirements listed below, and as shown on *Standard Plan No.'s WCS-01 to WCS-11*. Construction shall be in accordance with *Section 6 Construction Standards*. All WCWID culinary water components shall comply with AWWA requirements and Utah Division of Drinking Water Requirements.

5.2.1 Alignment.

Standard centerline alignment within the public right-of-way shall be 5 foot north or 5 foot east of the centerline.

5.2.2 Crossings.

Perpendicular or skewed crossings between other utilities and water mains shall have clearance of at least 18 inches. Closer tolerances require a steel casing in combinations with no mechanical joints of either utility within 10 feet horizontally of the crossing or additional separation. Reinforcement shall be as per the current specifications.

5.2.3 Easements.

Should the installation of a water system require easements to WCWID, the developer of such system shall convey such easements by deed to WCWID. Easements shall be a minimum of 20 feet in width with the water line centered within the easement. No buildings, utilities, or structures shall be erected or constructed within such easements as to interfere with the activities necessary to properly access and maintain or replace such lines or water structures.

5.2.4 Pipe Materials NSF/ANSI 61

All Pipe materials shall meet NSF/ANSI 61 certification for drinking water system components.

5.2.5 Minimum Size

Minimum mainline diameter shall be 8 inches. System demand requirements will dictate actual size requirements.

5.2.6 Pipe Material.

Ductile iron pipe PC- 350 or CL-52 shall be used for all pipes. All fittings and valves 4 inches and larger shall be ductile iron and must meet the requirements of NSF 61 and ANSI/AWWA C-153.

5.2.7 Pipe Fittings.

All tees, crosses, bends, etc. shall be Tyler Union USA (made in the USA) or approved equal.

5.2.8 Identification Tape.

Tape shall be Permanent, brightly colored, continuously printed magnetic plastic tape intended for direct burial service; not less than 6-inches wide by 4 mils thick. The tape shall read "CAUTION: BURIED INSTALLATION BELOW". Color of tape shall be Blue for Potable water. See *Standard Plan No. WCS-03*.

5.2.9 Tracer Wire.

Tracer wire shall be required on all water lines, and shall be installed in the pipe zone directly above the pipe centerline and in contact with the pipe for all installations of potable water lines. Tracer wire shall be attached to the pipeline to minimize movement during backfill process. Attachments shall be by means of zip ties or tape at 10 foot increments. Tracer wire shall be extended to and rise to the surface with valve box installation. An additional 12-inch loop shall be added at each end of the tracer wire to allow slack for adjustments in road elevation. S-curves in the tracer wire, equal to the diameter of the pipe, shall be installed at each bell to allow the wire to be moved during tapping or other maintenance or repair work on the water line. When the pipe consists of a continuous material lacking joints or bells, provide S-curves at 10-foot increments.

5.2.10 Valve Location.

Valves shall be located in all intersections and shall equal the number of legs of the fitting. Maximum interval of one block or 800' between isolation valves.

5.2.11 Valves.

All Valves 8 inches and smaller shall be gate valves, valves 10 inches and larger shall be butterfly valves. All valves 3 inches and larger shall be cast iron and must meet the requirements of NSF 61 and ANSI/AWWA C-153. See *Standard Plan No. WCS-05*.

Valves shall be spaced no further than 800' or each block.

All control valves shall be CLA-VAL brand valves, epoxy coated inside and outside.

All butterfly valves shall be rated for 250 psi.

5.2.12 Air Vacuum Valves.

Air vacuum valves shall be epoxy coated inside and outside and shall be GA Industries Valmatic or approved equal.

Combination Air Valves. Upon approval of the District Engineer, combination air valves may be used. Combination air valves shall be ARI D-040 or approved equal.

5.2.13 Fire Hydrants.

Fire Hydrant spacing shall not exceed 300 feet in areas of multi-family dwellings, and in commercial and industrial use areas. In widely spaced single family dwelling use areas, hydrant spacing shall not exceed 500 feet. See *Standard Plan No. WCS-02*.

All valves for fire hydrants shall be located in the street flanged off of the tee.

5.2.14 Service Laterals.

Service lines shall be constructed of Type K Copper pipe. Minimum size shall be ¾" inch diameter for residential connections. Location of water service shall be located in the center of the lot or as approved by the District's Engineer. No meter box shall be allowed in any driveway, driveway flare, or sidewalk. Services shall be installed as shown on *Standard Plan No. WCS-01*.

Minimum pressure allowed to each individual service shall not drop below 40 PSI under peak day demands.

Each single family dwellings shall be serviced by a separate meter. No single family dwelling, either attached or detached, shall be serviced by a master meter.

Multi-family dwellings may be serviced by a master meter. A multi- family dwelling is defined as five units or more.

5.2.15 Minimum Cover.

Minimum cover required shall be 48 inches. Minimum cover on transmission lines shall be 60 inches. Cover over utilities and between railroad tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. Should cover be insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility. All casing shall be twice the size of the pipe with thinsulators installed per manufactures guidelines.

5.2.16 Backflow Prevention.

Appropriate backflow prevention devices shall be installed on service laterals to protect the municipal water system from low level (non-health) and/or high level (health) contamination through cross connections. Specifically, the laws, regulations and conditions set forth in Federal Public Law 99-339, Utah Code Section 19-4-112, Utah Public Drinking Water Rules Section R309-102-5, Occupation Safety and Health Rules and Regulations Part 1910-Subpart J Section 1910.41 and the current International Plumbing Code shall be adhered to for the cross connection control program of each consumer of the municipal water system. All backflow prevention assemblies shall be in-line serviceable, in-line testable and have

certification through third party certifying agencies. Backflow prevention devices shall be installed as shown on *Standard Plans*.

5.2.17 Pressure Reducing Stations.

All pressure reducing stations shall be underground packaged stations factory built, factory delivered, with all necessary internal piping, valves and other necessary appurtenances as shown in the WCWID pressure reducing stations detail. The underground pressure reducing station shall be complete when delivered and will not require internal contractor construction except to install the power service through the service conduit provided for that purpose. The underground pressure reducing station shall be manufactured by Engineered Fluid, Inc. (EFI), or approved equal. The size of the pressure reducing station shall be determined by the size of the water lines connecting to the station and flow demands of those lines, which will be determined by WCWID. All pipe and valves need to be epoxy painted inside and outside within the PRV vault.

1. All PRV's shall be epoxy coated inside and outside.

5.2.18 Sampling Stations.

All developers are required to install a sampling station as determined by the District. Sampling Stations shall be installed as shown on Standard Plan *WCS-13*.

5.2.19 Dead Ends.

Dead ends shall be minimized by looping and making appropriate tie-ins. Where dead end mains occur, they shall be provided with a fire hydrant if flow and pressure are sufficient or with an approved flushing hydrant or blow-off for flushing purposes. Flushing devices shall be sized to provide flows of which will give a velocity of at least 2.5 feet-per-second in the water main being flushed. No flushing device shall be directly connected to any sewer. All blow offs and flushing hydrants shall be pre-manufactured. See *Standard Plan No. WCS-15*

5.2.20 Tapping Sleeves.

All Tapping sleeves shall be stainless steel Smith-Blair 664 or JCM432 tapping sleeves.

5.2.21 MJ Fittings

All MJ Fittings shall be EBBA Iron MEGALUG or approved equal.

5.2.22 Concrete Vaults.

All concrete vaults shall be constructed as per APWA Plan No. 505 with the following additions.

1. Dismantling joints shall be used on all piping between isolation gate valves for case of maintenance; placement shall be approved by the District Engineer.
2. All vaults that required mechanical or electrical components shall be equipped with two 120 vac/ GFCKI commercial grade receptacles with water tight covers, a 100 watt incandescent vapor tight light fixture with protective cage, a fractional HP hermetically sealed exhaust fan sized to remove total air volume 30 times per hour, and all conduit shall be rigid galvanized steel. The fan and light switches shall be located within arm's reach of the entrance. A 100 Amp service panel shall be provided.
3. All vaults shall be equipped with intake and exhaust vents. The vents shall be located at opposite ends of the vault with the intake terminating 12 inches from the floor and the exhaust terminating a minimum of 4 feet from the floor.

4. All isolation valves located inside vaults shall be hand operated with a wheel. Valve box shall not be poured in the lid as shown on APWA Plan 523, 525, 527, and 529.
5. All water meter vaults shall be equipped with an additional 15" removable water meter lid with a 2" knockout. The 15" lid shall be poured in the vault lid and set at the finished grade. The 15" lid will be used with the radio read meters.
6. All 1½" and 2" meter vaults shall be 5' x 5' x 5'-6" and shall have a 30" ring and lid, 15" ring and lid and stairs. See *Standard Plan No. CW-11*.

5.2.23 Location of Isolation Valves.

1. Placed at intervals not to exceed 800 feet in residential areas or split the difference.
2. Placed at intersections on all branches of the system.
3. Placed within 100 feet of the upstream and downstream ends of an augured or trenched casing.
4. If valves are located in an undeveloped area, a vertical valve marker will be required.
5. Valves shall be placed in clusters where possible, and at property lines and point of curves.
6. Valve shall be flanged to connecting fittings whenever possible.
7. MJ Fittings to be EBBA Iron MEGALUG or approved equal.

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SECTION 6: CONSTRUCTION
STANDARDS

6 CONSTRUCTION STANDARDS

Section 5 outlines construction standards that will be required by developers and contractors. All construction procedures shall be as specified in APWA Standard Plans

Specifications Edition 2017, as specified herein or in Section 6 Standard Specifications. Where any discrepancy is found between the specifications, whichever specification is stricter shall apply.

6.1 Culinary Water System Construction

Culinary water systems shall be constructed according to the following requirements and as shown on *Standard Plan No.'s WCS-01 to WCS-11*. Please refer to *Section 5.0 Design Requirements* for materials standards.

6.1.1 Pipe

Pipe shall be as specified in *Section 5.2.F*.

6.1.2 Ductile Iron Pipe.

All new Ductile Iron pipe shall be wrapped with an 8 mil Poly Wrap to minimize corrosion. Ductile Iron fittings shall be wrapped with an 8 mil Poly Wrap to minimize corrosion using 8 mil poly tape. All bolts shall be greased. Installation shall be per AWWA C600-10. All pipe shall be sealed at the end of the day's construction.

6.1.3 Services.

Service line shall be located at center of lot served unless directed otherwise by the District Engineer. No meter box shall be allowed in any driveway, driveway flare, or sidewalk. Location of extended service lateral towards building shall be located via a 2 x 4 with a blue colored end visibly extended above adjacent surface. Locator wire shall be run with each service. Services shall be installed as shown on *Standard Plan No. WCS-01*.

6.1.4 Minimum Cover.

Minimum cover required shall be 48 inches. Minimum cover on transmission lines shall be 60 inches. Cover over utilities and between railroad tracks or roadways shall be sufficient to adequately protect such utilities from potential loading of track or roadway either during construction or final finished surface. Should cover be insufficient to adequately protect utility, encasement or casings shall be provided to protect affected utility. All casing shall be twice the size of the pipe with thinsulators installed per manufactures guidelines.

6.1.5 Trenching.

Trenching shall be performed as shown on Standard Plan No. WCS-02.

6.1.6 Pipe Zone.

Fill material in the pipe zone shall be sand conforming to APWA Section 31 05 13. Tracer wire shall be installed with the pipe directly above the pipe zone as specified in *Section 5.2.I*. Identification tape shall

be installed directly over buried lines 12-inches above the top of pipe. Refer to *Section 5.2.H* for Identification Tape specification. See *Standard Plan No. WCS-03*.

6.1.7 Crossings.

Perpendicular or skewed crossings between other utilities and water mains shall have clearance of at least 24 inches. Closer tolerances require a steel casing in combinations with no mechanical joints of either utility within 10 feet horizontally of the crossing or additional separation. Reinforcement shall be as per the current specifications.

6.1.8 Backflow Prevention Devices.

All backflow prevention assemblies shall be in-line serviceable, in-line testable and have certification through third party certifying agencies. See the WCWID cross connection control ordinance for additional details. Backflow Prevention Devices shall be in accordance with *Standard Plan No.'s WCS-12*.

6.1.9 Concrete Vaults.

All concrete vaults shall be constructed as per APWA Plan No. 505.

6.1.10 Locks.

Any water facility that has walk-in doors shall be equipped with Primas locks with approval from WCWID Improvement District.

6.1.11 Water Pipe Installation.

1. Handling and Approval or Rejection of Materials - All materials delivered to and used at the job site are subject to approval of the Engineer or the Owner. Care shall be taken during handling of pipe, to avoid any impact which might cause damage. Dropping pipe during unloading will not be permitted. Pipe will be carefully inspected in the field before and after laying. If any cause for rejection is discovered in a pipe before or after laying, it shall be removed and replaced by the Contractor, at no additional cost to the Owner. Any pipe found to be unfit or rejected due to cracks, broken bells or spigots, irreparable chipped lining, etc., shall be removed from the job site.
2. DEWATERING - Prior to pipe laying and jointing, sufficient dewatering effort shall be provided to maintain the ground water level at or below the surface of the trench bottom or base of the bedding course. The dewatering operation; however accomplished, shall be carried out in such a manner as to not permanently disturb natural underground water conditions.
3. CONNECTION TO EXISTING FACILITIES - When connections are to be made to any existing pipe or appurtenances, for which the actual elevation or position cannot be determined without excavation, the Contractor shall excavate for, and expose the existing pipe or appurtenances before laying any new pipe. The Engineer shall be allowed to inspect the existing pipe or appurtenances before any connection is made. The Contractor shall make any adjustments in line or grade which may be necessary to accomplish the intent shown on the Drawings. Where new fittings, valves, meters, restraints etc., are required to be installed in, or attached to, existing piping, or where connections are to be made to existing piping, the Contractor shall
4. furnish and install the necessary components needed to accomplish the work, whether or not specifically indicated on the Drawings.
5. CAPPING PIPE END - At the close of each workday, or whenever the work ceases for any reason, the end of the pipe shall be securely closed.
6. JOINING – Joining of pipe shall be as follows: When making connections, pipe shall be cut and beveled in a neat and workmanlike manner, so as to provide a smooth, beveled end at right angles to the axis of the pipe. Pipe and fittings shall be assembled so there will be no distortion or springing of the pipelines. Flanges, unions, flexible couplings and other connections shall come together at the proper orientation. The fit shall not be made by springing any piping, nor shall

orientation or alignment be corrected by taking up on any flange bolts. Flange bolts, union halves, flexible connectors, etc., shall slip freely into place. If the proper fit is not obtained, the piping shall be altered to fit.

7. LAYING - All pipe laid shall be retained in position, using mechanical means if necessary, so as to maintain alignment and joint closure until sufficient pipe bedding and backfill have been completed to adequately hold the pipe in place. All pipe shall be laid to conform to the prescribed line and grade shown on the plans, within specified limits. No blocking of any kind shall be used to adjust the pipe to grade, except when used with concrete embedment. Bedding materials shall be placed so the bottom surface of the pipe will have full bearing for the entire barrel length. The pipe shall rest on not less than 1/4 of its outside perimeter. Bell holes shall be dug as required to assure uniform support along the barrel but shall be no larger than necessary. Unless otherwise approved by the Engineer, pipe shall be laid upgrade from the point of connection on the existing pipeline or from a designated starting point. Pipe shall be installed with the bell end forward or upgrade, unless approved otherwise. When pipe laying is not in progress, the forward end of the pipe shall be kept closed with an approved temporary plug. At no time shall pipe be dropped into a trench during installation.
8. PIPE RESTRAINT – Pipe restraint work shall be as follows:
9. The Contractor shall provide and install either concrete thrust blocks or mechanical pipe restraints on all pressure piping not connected with bolted flanges or welded joints.
10. For projects involving pipeline construction covered under this section of the Specifications, a pipe restraint schedule is included in the Drawings. Pipe restraints (thrust blocks and/or mechanical restraints) shall be furnished and/or constructed and installed as shown on the Drawings and described in the schedule.
11. Pressure pipe shall be properly blocked or restrained at all fittings, wherever the pipeline makes a change in direction of 11.25 degrees or more, wherever it changes sizes, or wherever it ends.
12. Placement of concrete thrust blocking shall provide bearing against undisturbed vertical earth banks or approved compacted backfill, sufficient to absorb thrust from line pressure, and in a configuration so that pipe joints and fittings will be accessible.
13. All restraints shall be in place before any hydrostatic testing and flushing are performed on the system.
14. The Contractor shall allow visual inspection of every thrust block or mechanical restraint before it is buried.
15. FINISH BEDDING - After the pipe is laid, additional bedding material shall be placed in 6-inch lifts to a level even with the spring line of the pipe and compacted. The portion of the trench from the spring line to 12 inches above the top of the pipe shall then be filled and compacted in the same way.
16. EXPOSED PIPING - No exposed piping shall be installed until all equipment to which the pipe is to be attached has been installed and it can be determined where piping and fittings shall be located to make a neat, efficient arrangement. Piping shall be aligned with equipment connections such that no external load or stress will be transferred to any equipment from the piping. Piping shall be installed with a sufficient number of unions, flexible couplings, or flanged joints, in addition to those shown on the Drawings, to allow for convenient inspection and maintenance.
 - i. Exposed pipe work shall be suspended or supported, to prevent sagging or over-stressing of the pipe and connections. Assembly of pipe and fittings shall be accomplished so there will be no distortion or springing of the pipe. The fit shall not be made nor the alignment corrected by taking up on any flange bolts. Joints shall come together in proper orientation, and Flange bolts, union halves, flexible couplings, and etc. shall slip freely into place. If the proper fit is not obtained, the piping shall be altered to make the fit meeting the above requirements
 - ii. Exposed pipe shall be installed in straight runs parallel to the axis of the structures. Pipe runs shall be horizontal and vertical; except that gravity drain lines shall be pitched down in the direction of flow at a slope not less than 1/8 inch per foot. All exposed pipe shall be painted. Factory finished items are not

required to be field painted except touch-up. The color and type of paint used shall be submitted to the Engineer for his approval.

6.1.12 Field Quality Control.

Refer to WCWID's Development Standards Section 33 08 00 Commissioning of Water Utilities. Flushing, disinfection, and microbiological testing shall be per AWWA C651-05. Pressure and leak testing shall be per AWWA C600-10 at a minimum pressure of 200 psi.

- a. DISINFECTION - All pipelines to be used for culinary water service shall be disinfected in accordance with the requirements of state and local public drinking water regulations.
- b. METHODS - The Contractor may use any method which complies with the above referenced standards.
- c. FLUSHING - After disinfection, the lines shall be flushed until free chlorine is reduced to the levels safe for consumption. Samples for bacteriological testing can then be taken. Samples will be taken by WCWID and the cost of samples will be charged to the Developer. The Contractor shall safely and legally dispose of contaminated water used for disinfection after consultation with the local authorities. Under no circumstances shall heavily chlorinated water be allowed to mix with "live" waters, meaning waters in lakes, rivers, streams or wetlands.
- d. LEAKAGE TESTING – The leakage test shall be conducted concurrent with the pressure test and in accordance with AWWA C600-10 Sec. 5.2 Hydrostatic Testing. That section is included as follows:

WARNING: The testing methods described in this section are specific for water-pressure testing only. These procedures should not be applied for air-pressure testing because of the serious safety hazards involved with compressed air. Also, pipelines intended for buried service should generally be tested with the backfill in place.

5.2.1 Hydrostatic pressure test.

5.2.1.1 Test restrictions.

5.2.1.1.1 The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section.

5.2.1.1.2 The test pressure shall not exceed the thrust restraint design pressures or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).

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

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

5.2.1.2 Test setup and pressurization. Following the installation of any new pipeline, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure test. Each valved section of pipeline shall be slowly filled with water. When venting air from pipelines it is important to limit the pipeline fill rate to avoid excessive surge pressures when the water reaches the air venting opening(s). The specified test pressure shall be applied using a suitable pump connected to the pipeline. (NOTE: The specified test pressure shall be based on the elevation of the lowest point of the pipeline or section under test and corrected to the elevation of the test gauge—see Sec. 5.2.1.1 Test restrictions.) Before applying the specified test pressure, air shall be expelled completely from the pipeline section under test. If permanent air vents are not located at all high points, corporation stops shall be installed at these points to expel any air as the line is filled with water. Corporation stops should be rated for the design pressure of the pipeline. Exceeding design pressure is not recommended and should be checked with the product manufacturer prior to proceeding. Following removal of any air, the corporation stops shall be closed and the test pressure applied (at the conclusion of the pressure test, the corporation stops shall be removed and the pipe plugged, or left in place as required by the purchaser's documents). After filling the pipeline and before application of the test pressure, the test section shall be maintained at the working pressure for a sufficient period of time for it to stabilize with respect to line movement under pressure, water absorption by the lining, etc. This may require several cycles of pressurizing and bleeding trapped air prior to beginning the test. The hydrostatic test shall be of at least a 2-hr duration. The test pressure shall not vary by more than ± 5 psi (34.5 kPa) for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline. The amount of makeup water added shall be accurately measured (in gallons or liters per hour) by suitable methods and shall not exceed the applicable testing allowance as specified in Tables 4A or 4B (see Sec. 5.2.1.4).

5.2.1.3 Examination. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the pressure test. Any damaged or defective pipe, fittings, valves, hydrants, or joints that are discovered during or following the pressure test shall be repaired or replaced with reliable material, and the test shall be repeated until satisfactory results are obtained.

5.2.1.4 Testing allowance. Testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within ± 5 psi (34.5 kPa) of the specified test pressure (after the pipeline has been filled with water and the air has been expelled*). No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

In inch pound units,

$$L = \frac{SD\sqrt{P}}{148,000} \quad (\text{Eq 1})$$

Where:

L = testing allowance (makeup water), 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 hydrostatic test, in pounds per square inch (gauge)

**The testing allowance may not be reasonable if the pressure boundary of the test section includes appurtenances subjected to pressures above their rated working pressures because of possible leakage by those appurtenances.*

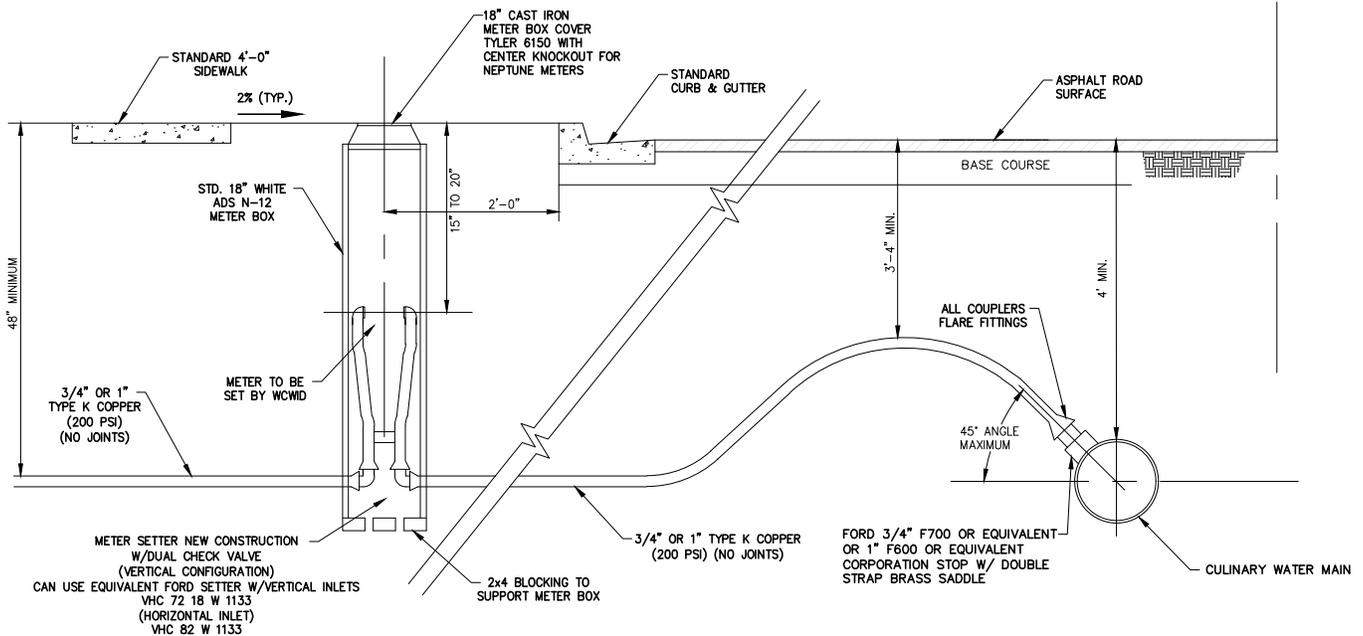
See Table 4.A in AWWA C600-10 for Hydrostatic testing allowance per 1,000 ft of pipeline (gph)

5.2.1.4.1 These formulas are based on a testing allowance of 10.49 gpd/mi/in. (0.971 L/d/km/mm) of nominal diameter at a pressure of 150 psi (1,034 kPa). Values of testing allowance at various pressures are shown in Tables 4A and 4B. When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/hr/in. (1.2 mL/hr/mm) of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the main valve in the hydrant.

5.2.1.5 Acceptance of installation. Acceptance shall be determined on the basis of testing allowance only. If any test of a new pipeline discloses testing allowance greater than that specified in Sec. 5.2.1.4, repairs or replacements shall be accomplished in accordance with the purchaser's documents. All visible leaks are to be repaired regardless of the allowance used for testing.

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7 STANDARD DRAWINGS



NOTES FOR
1" MINIMUM SERVICE TAPS

- 1) **INSPECTION:** PRIOR TO BACKFILLING AROUND THE METER BOX, SECURE INSPECTION OF INSTALLATION BY DISTRICT.
- 3) **TAPPING:** PLACE TAPS A MINIMUM 24 INCHES APART. USE A TAPPING TOOL WHICH IS SIZED CORRESPONDING TO THE SIZE OF THE SERVICE LINE TO BE INSTALLED. NO TAPS WITHIN 24 INCHES OF THE END OF PIPE.
- 4) **PIPE & FITTINGS:** A SERVICE SADDLE CLAMP IS REQUIRED ON ALL PVC PIPE UNLESS SPECIFIED OTHERWISE.
- 5) **TAPE:** TEFLON TAPE AND PIPE DOPE IS REQUIRED ON ALL TAPS.

NOTES FOR
3/4" METER WITH 1" SERVICE LINE

- 2) **BACKFILLING:** INSTALL ALL BACKFILL MATERIAL PER APWA SECTION 02320 IN LIFTS NOT EXCEEDING 6 INCHES AFTER COMPACTION. COMPACT EACH LIFT TO A MINIMUM RELATIVE DENSITY OF 95 PERCENT.
- 6) **METER IN TRAFFIC AREAS:** NOT ALLOWED.
- 8) **METER:** WHITE CITY WATER IMPROVEMENT DISTRICT WILL PROVIDE AND INSTALL METER AFTER APPROPRIATE CONNECT FEE PAID.
- 7) **PLACEMENT:**
 - A. DO NOT INSTALL METERS BOX UNDER DRIVEWAY APPROACHES, SIDEWALKS, OR CURB AND GUTTER.
 - B. IN NEW CONSTRUCTION, INSTALL METER NEAR PROPERTY LINE OF LOT IN PARKSTRIP. CONSULT WITH HOMEOWNER FOR DRIVEWAY ORIENTATION.

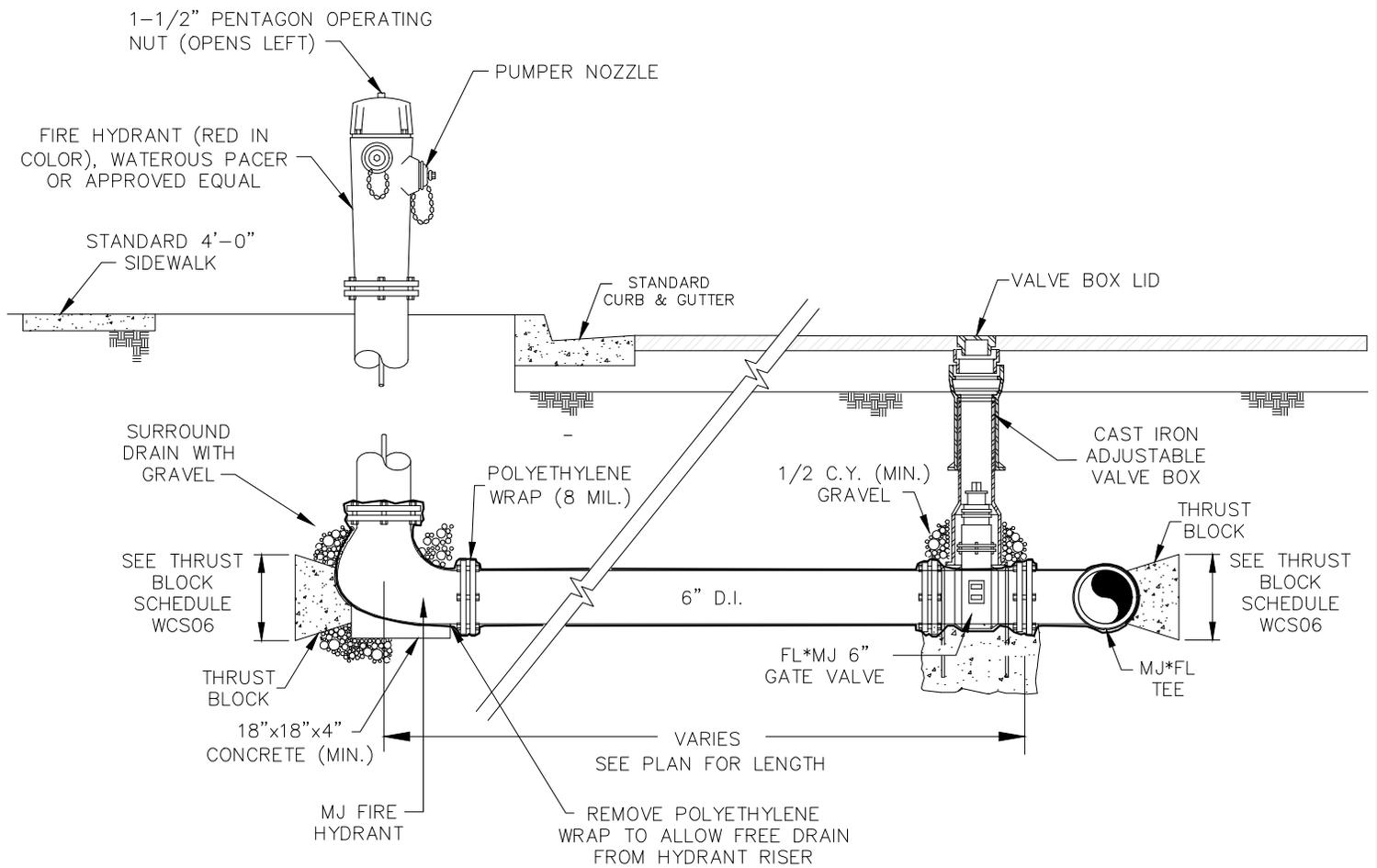
WHITE CITY WATER IMPROVEMENT DISTRICT

999 EAST GALENA DRIVE SANDY, UTAH 84094
OFFICE: (801) 571-3991 MOBILE: (801) 232-9559 FAX: (801) 571-2688

**3/4" & 1" WATER
SERVICE CONNECTION**

WCS-01

DATE: 07-10-19



NOTE:
 FIRE HYDRANT ASSEMBLY INCLUDES
 PIPE, GATE VALVE, FITTINGS, &
 HYDRANT.

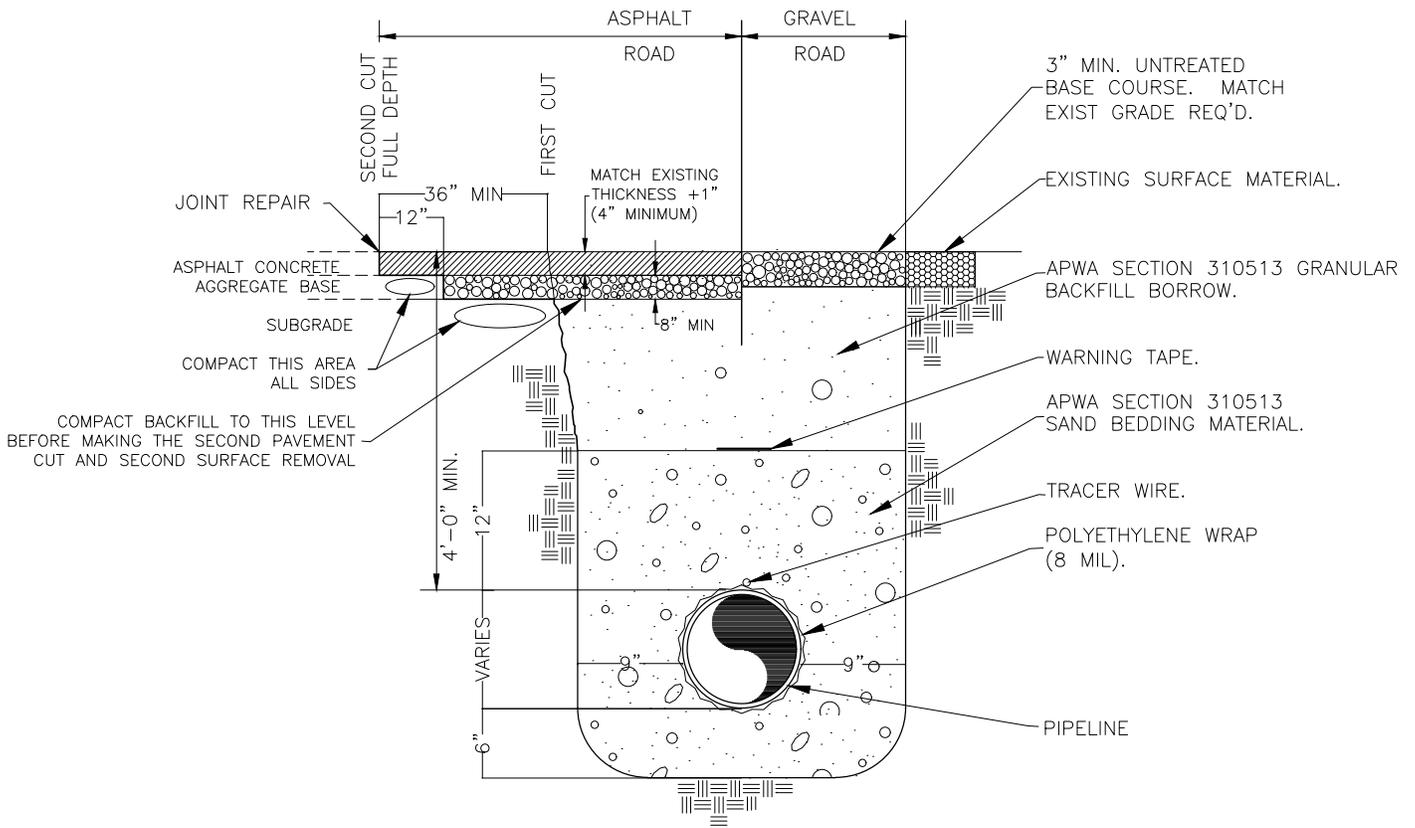
WHITE CITY WATER IMPROVEMENT DISTRICT

999 EAST GALENA DRIVE SANDY, UTAH 84094
 OFFICE: (801) 571-3991 MOBILE: (801) 232-9559 FAX: (801) 571-2688

**FIRE HYDRANT
 CONNECTION DETAIL**

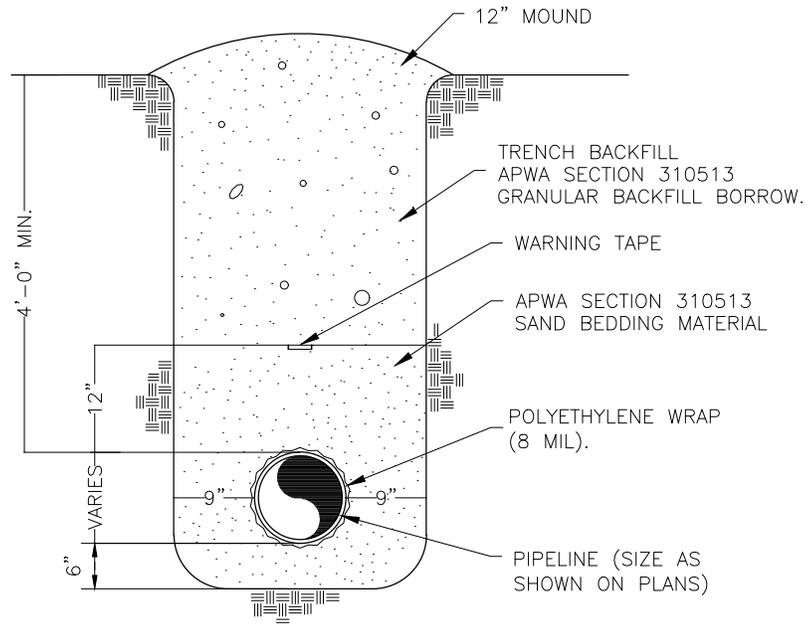
WCS-02

DATE: 07-10-19



ROADWAYS TRENCH

NOTE:
 ASPHALT RESTORATION WITHIN SANDY CITY OR SALT LAKE COUNTY
 RIGHT-OF-WAY SHALL MEET CITY/COUNTY REQUIREMENTS.



UNDEVELOPED/UNTRAVELLED AREAS TRENCH

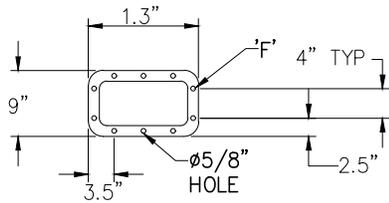
WHITE CITY WATER IMPROVEMENT DISTRICT

999 EAST GALENA DRIVE SANDY, UTAH 84094
 OFFICE: (801) 571-3991 MOBILE: (801) 232-9559 FAX: (801) 571-2688

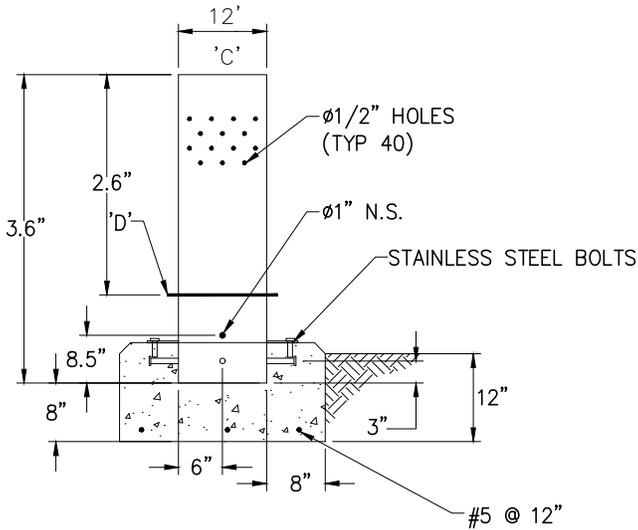
TRENCH DETAILS

WCS-03

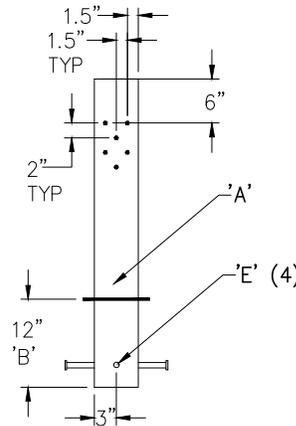
DATE: 07-10-19



| PARTS LIST | | |
|------------|-----|----------------------------|
| ITEM | QTY | DESCRIPTION |
| A | 1 | TS 12" x 6" x 1/4" x 2'-6" |
| B | 1 | TS 12" x 6" x 1/4" x 12" |
| C | 1 | 1/4" PL - 6" x 1'-0" |
| D | 2 | 1/4" PL - 9" x 1'-3" |
| E | 4 | Ø3/4" x 4" H.S.A. |
| F | 10 | Ø1/2" x 3" BREAKAWAY BOLTS |



VENT COVER



SIDE VIEW
ITEMS REMOVED FOR CLARITY

1. OPEN TO AIR—PLACE A NO. 14 MESH NON-CORRODIBLE SCREEN OVER THE OPEN END OF P.V.C. PIPE. ATTACH W/S.S. HOSE CLAMP.
2. HOT DIPPED GALVANIZED STEEL STAND PIPE FOR AIR VENT.
3. 1-1/2" MIN. CHAMFER ALL AROUND CONCRETE BASE.

GALV. STEEL VENT CAP WITH #14 STAINLESS MESH SCREEN (TYP.)

VENT PIPE 6" SCH 10 GALV. STEEL

3'x3'x4" CONCRETE PAD IN PARK STRIP

SLEEVED PIPE OPENING "METHOD A" (TYP.)

GALV. STEEL VENT CAP WITH #14 STAINLESS MESH SCREEN (TYP.)

VENT PIPE 6" SCH 10 GALV. STEEL

SLEEVED PIPE OPENING "METHOD B" (TYP.)

PIPE CLAMP (TYP.)

ØMUSHROOM CAP DETAIL

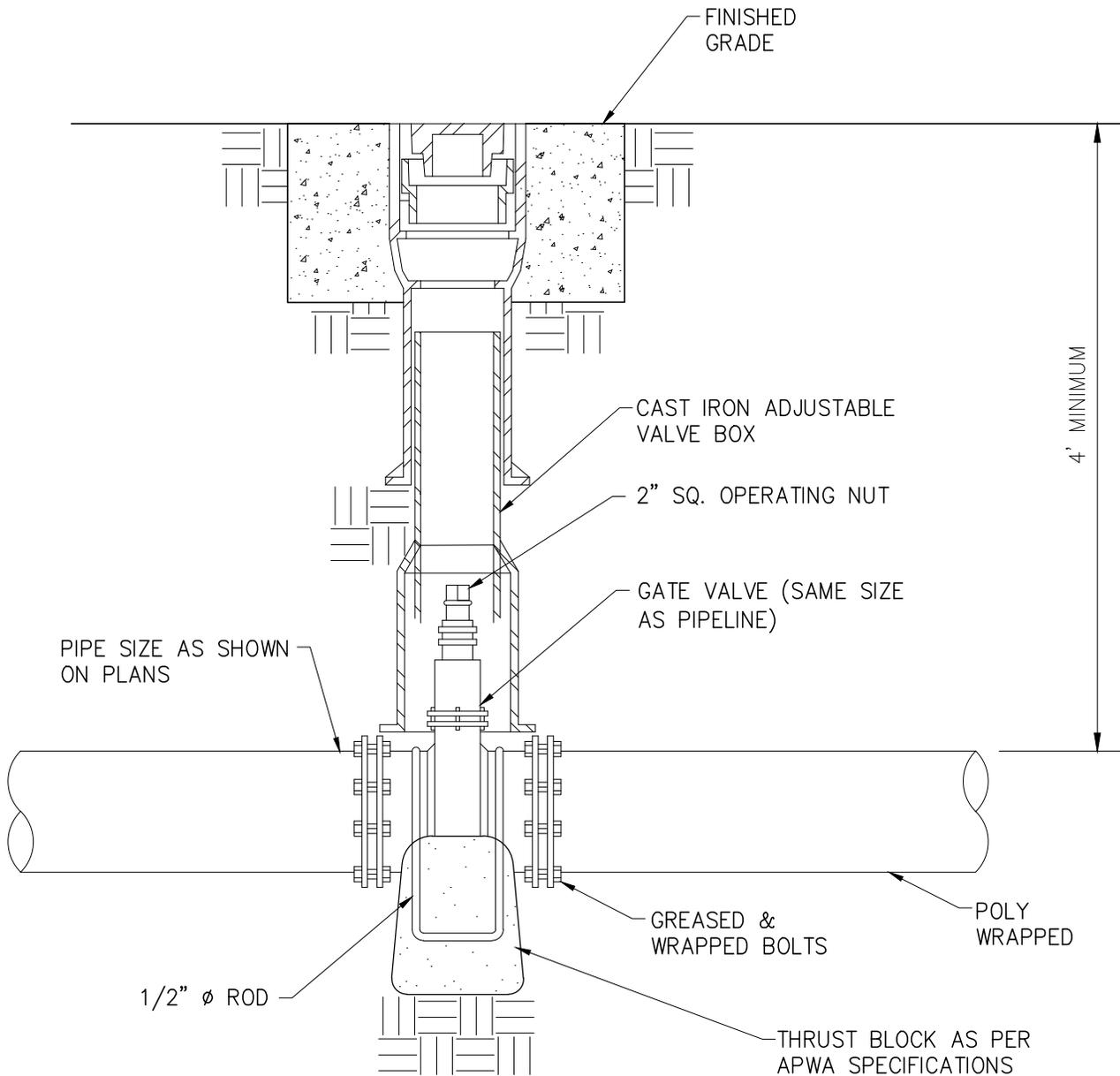
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VENT COVER
VENT DETAIL

WCS-04

DATE: 07-10-19



NOTE: VALVE BOX SHALL BE CLEAN, PLUMB AND PROPERLY ALIGNED ON THE VALVE.

WHITE CITY WATER IMPROVEMENT DISTRICT

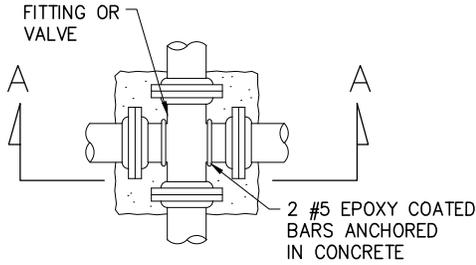
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GATE VALVE

WCS-05

DATE: 07-10-19

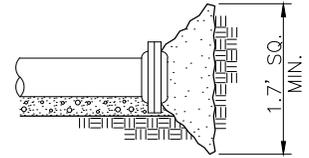
CONCRETE THRUST BLOCK RESTRAINING SYSTEM DETAILS



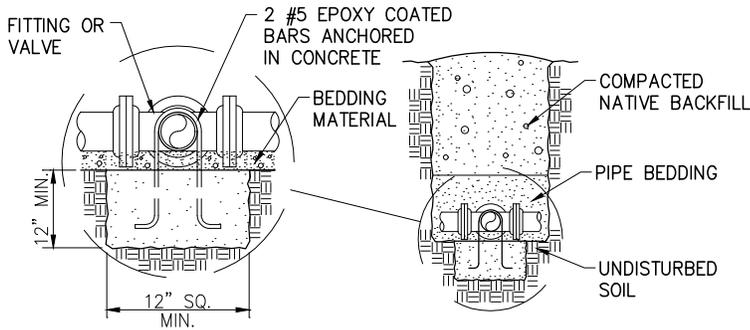
PLAN – THRUST BLOCK

NOTE

CONTRACTOR SHALL USE EITHER MEGALUG OR CONCRETE THRUST RESTRAINING SYSTEM FOR THE ENTIRE PROJECT.



DETAIL – DEAD END
THRUST BLOCK



SECTION A-A

| THRUST BLOCK BEARING AREA IN SQ. FT. | | | | | | | | | | |
|--------------------------------------|-------|------|------|----------|-------|----------|----------|------------|-------------|--|
| PIPE SIZE | CROSS | TEE | WYE | DEAD END | VALVE | 90° BEND | 45° BEND | 22.5° BEND | 11.25° BEND | |
| 4 | 2.4 | 1.7 | 1.7 | 1.7 | — | 2.4 | 1.3 | 1.0 | 1.0 | |
| 6 | 5.4 | 3.8 | 3.8 | 3.8 | — | 5.4 | 2.9 | 1.5 | 1.0 | |
| 8 | 9.6 | 6.8 | 6.8 | 6.8 | — | 9.6 | 5.2 | 2.7 | 1.4 | |
| 10 | 15.0 | 10.6 | 10.6 | 10.6 | — | 15.0 | 8.1 | 4.2 | 2.1 | |
| 12 | 21.5 | 15.2 | 15.2 | 15.2 | 15.2 | 21.5 | 11.7 | 6.0 | 3.0 | |
| 14 | 29.3 | 20.7 | 20.7 | 20.7 | 20.7 | 29.3 | 15.9 | 8.1 | 4.1 | |
| 16 | 38.2 | 27.0 | 27.0 | 27.0 | 27.0 | 38.2 | 20.7 | 10.6 | 5.3 | |
| 18 | 48.4 | 34.2 | 34.2 | 34.2 | 34.2 | 48.4 | 26.2 | 13.4 | 6.7 | |
| 20 | 59.7 | 42.2 | 42.2 | 42.2 | 42.2 | 59.7 | 32.3 | 16.5 | 8.3 | |
| 24 | 85.9 | 60.8 | 60.8 | 60.8 | 60.8 | 85.9 | 46.5 | 23.7 | 11.9 | |
| REDUCER | | | | | | | | | | |
| D2 \ D1 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| 4 | 2.1 | 5.1 | 8.8 | 13.4 | — | — | — | — | — | |
| 6 | — | 3.0 | 6.7 | 11.3 | 16.8 | 23.1 | — | — | — | |
| 8 | — | — | 3.8 | 8.4 | 13.8 | 20.1 | 27.2 | — | — | |
| 10 | — | — | — | 4.6 | 10.1 | 16.3 | 23.5 | 31.4 | — | |
| 12 | — | — | — | — | 5.5 | 11.7 | 18.8 | 26.8 | 45.2 | |
| 14 | — | — | — | — | — | 6.3 | 13.4 | 21.3 | 39.8 | |
| 16 | — | — | — | — | — | — | 7.1 | 15.1 | 33.5 | |
| 18 | — | — | — | — | — | — | — | 8.0 | 26.3 | |
| 20 | — | — | — | — | — | — | — | — | 18.4 | |

NOTES:

1. ALL THRUST BLOCK BEARING FACES SHALL BE PLACED AGAINST UNDISTURBED SOIL OR APPROVED COMPACTED BACKFILL.
2. SQUARE ALL EDGES TO RECEIVE CONCRETE.
3. CONCRETE SHALL BE CLASS C.
4. CALCULATED ON 200 PSI TEST PRESSURE AND ALLOWABLE BEARING PRESSURE OF 1500 LBS. PER SQ. FT.
5. IN POORER SOILS SPECIAL DESIGN IS REQUIRED.
6. ALL FITTINGS AND VALVES SHALL BE ANCHORED WITH TWO EPOXY COATED #5 REBAR. ONLY ONE REQ'D FOR REDUCER.
7. CENTER ALL FITTINGS OVER THRUST BLOCKS.

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**CONCRETE THRUST BLOCK
RESTRAINING SYSTEM DETAILS**

WCS-06

DATE: 07-10-19

NOTE:
CONTRACTOR SHALL USE
EITHER MEGALUG OR
CONCRETE THRUST
RESTRAINING SYSTEM FOR
THE ENTIRE PROJECT.

MEGALUG THRUST RESTRAINING SYSTEM DETAILS

* CALCULATIONS DERIVED FROM EBAA IRON SALES

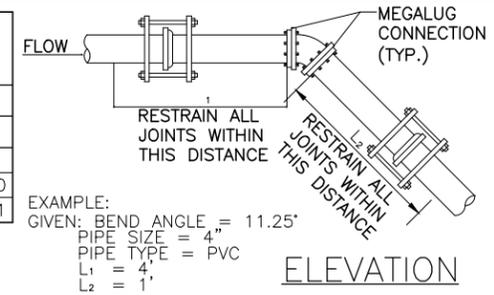
BASED ON:
TEST PRESSURE 200 PSI
SOIL TYPE: GM-SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURE
BURIAL DEPTH: 4 FT.
TRENCH TYPE: 5-PIPE BEDDED IN COMPACTED GRANULAR MATERIAL TO THE CENTER LINE OF PIPE, 4" MIN. UNDER PIPE.
COMPACTED GRANULAR OR SELECT MATERIAL TO TOP OF PIPE. (APPROX. 90% STANDARD PROCTOR, AASHTO T-99)
SAFETY FACTOR: 1.5

| PVC VERTICAL BEND RESTRAINED LENGTHS IN FT. (L ₁ - BEFORE CONNECTION / L ₂ - AFTER CONNECTION) | | | | | | | | | | |
|---|-----------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| BEND ANGLE | PIPE SIZE | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 11.25 | 4/1 | 5/2 | 7/2 | 9/3 | 10/3 | 12/4 | 13/4 | 15/5 | 16/5 | 19/6 |
| 22.5 | 8/3 | 11/4 | 15/5 | 17/6 | 21/7 | 24/8 | 27/9 | 30/9 | 33/10 | 38/12 |
| 45 | 16/5 | 23/8 | 30/10 | 36/12 | 43/14 | 49/16 | 56/18 | 62/20 | 68/21 | 79/25 |

CALCULATIONS BASED ON THE ELEVATION OF THE PIPE REMAINING CONSTANT WITH THE CONTOUR OF THE GROUND.
FOR TWO WAY FLOW, SUCH AS FOUND IN DISTRIBUTION SYSTEMS, USE L₁ ON BOTH SIDES OF FITTING.

| DIP VERTICAL BEND RESTRAINED LENGTHS IN FT. (L ₁ - BEFORE CONNECTION / L ₂ - AFTER CONNECTION) | | | | | | | | | | |
|---|-----------|------|------|-------|-------|-------|-------|-------|-------|-------|
| BEND ANGLE | PIPE SIZE | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 11.25 | 2/1 | 4/2 | 5/2 | 6/2 | 7/3 | 8/3 | 8/4 | 9/4 | 10/4 | 12/5 |
| 22.5 | 5/2 | 7/3 | 9/4 | 11/5 | 13/6 | 15/6 | 17/7 | 19/8 | 21/9 | 24/10 |
| 45 | 11/5 | 15/6 | 20/8 | 23/10 | 28/12 | 32/13 | 36/15 | 40/17 | 43/18 | 51/21 |

CALCULATIONS BASED ON THE ELEVATION OF THE PIPE REMAINING CONSTANT WITH THE CONTOUR OF THE GROUND.



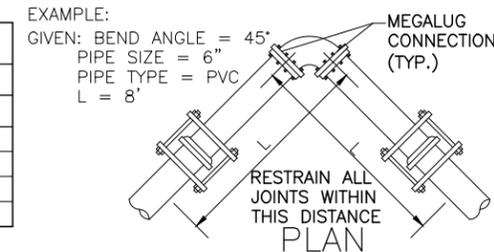
EXAMPLE:
GIVEN: BEND ANGLE = 11.25°
PIPE SIZE = 4"
PIPE TYPE = PVC
L₁ = 4'
L₂ = 1'

| PVC HORIZONTAL BEND RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|--|-----------|----|----|----|----|----|----|----|----|----|
| BEND ANGLE | PIPE SIZE | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 11.25 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 |
| 22.5 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9 | 10 | 12 |
| 45 | 5 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 21 | 25 |
| 90 | 13 | 18 | 24 | 29 | 34 | 38 | 43 | 47 | 52 | 60 |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED

| DIP HORIZONTAL BEND RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|--|-----------|----|----|----|----|----|----|----|----|----|
| BEND ANGLE | PIPE SIZE | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 11.25 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 5 |
| 22.5 | 2 | 3 | 4 | 5 | 6 | 6 | 7 | 8 | 9 | 10 |
| 45 | 5 | 6 | 8 | 10 | 12 | 13 | 15 | 17 | 18 | 21 |
| 90 | 11 | 15 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 51 |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED



EXAMPLE:
GIVEN: BEND ANGLE = 45°
PIPE SIZE = 6"
PIPE TYPE = PVC
L = 8'

| PVC TEE RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|--------------------------------------|-------------------|---|---|----|----|----|----|----|----|----|
| BRANCH SIZE DIA. | RUN SIZE DIAMETER | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 4 | * | * | * | * | * | * | * | * | * | * |
| 6 | - | * | * | * | * | * | * | * | * | * |
| 8 | - | - | * | * | * | * | * | * | * | * |
| 10 | - | - | - | * | * | * | * | * | * | * |
| 12 | - | - | - | - | * | * | * | * | * | * |
| 14 | - | - | - | - | - | * | * | * | * | * |
| 16 | - | - | - | - | - | - | 7 | * | * | * |
| 18 | - | - | - | - | - | - | - | 20 | 4 | * |
| 20 | - | - | - | - | - | - | - | - | 34 | 3 |
| 24 | - | - | - | - | - | - | - | - | - | 60 |

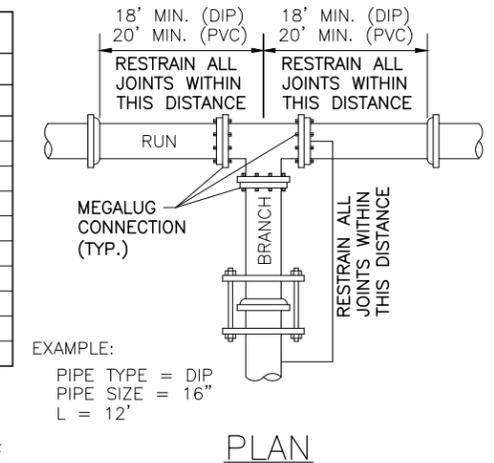
* = FOR THIS CONDITION NEED ONLY RESTRAIN THE OUTLETS OF TEE

NOTES:
1. RESTRAIN THE THREE MECHANICAL JOINTS ON THE TEE.
2. ALL JOINTS WITHIN THE "L" DISTANCE ON THE BRANCH SIDE OF TEE SHALL BE RESTRAINED AND ALL JOINTS WITHIN 18' ON THE RUN SIDE OF THE TEE SHALL BE RESTRAINED.

| DIP TEE RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|--------------------------------------|-------------------|---|---|----|----|----|----|----|----|----|
| BRANCH SIZE DIA. | RUN SIZE DIAMETER | | | | | | | | | |
| | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| 4 | * | * | * | * | * | * | * | * | * | * |
| 6 | - | * | * | * | * | * | * | * | * | * |
| 8 | - | - | * | * | * | * | * | * | * | * |
| 10 | - | - | - | * | * | * | * | * | * | * |
| 12 | - | - | - | - | * | * | * | * | * | * |
| 14 | - | - | - | - | - | * | * | * | * | * |
| 16 | - | - | - | - | - | - | 12 | 2 | * | * |
| 18 | - | - | - | - | - | - | - | 21 | 12 | * |
| 20 | - | - | - | - | - | - | - | - | 30 | 12 |
| 24 | - | - | - | - | - | - | - | - | - | 47 |

* = FOR THIS CONDITION NEED ONLY RESTRAIN THE OUTLETS OF TEE

NOTES:
1. RESTRAIN THE THREE MECHANICAL JOINTS ON THE TEE.
2. ALL JOINTS WITHIN THE "L" DISTANCE ON THE BRANCH SIDE OF TEE SHALL BE RESTRAINED AND ALL JOINTS WITHIN 18' ON THE RUN SIDE OF THE TEE SHALL BE RESTRAINED.



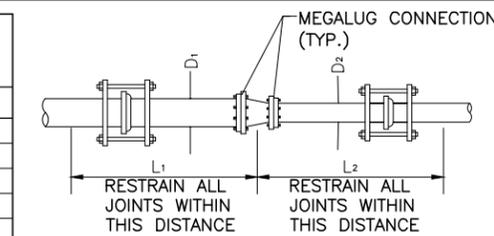
EXAMPLE:
PIPE TYPE = DIP
PIPE SIZE = 16"
L = 12'

| PVC REDUCER RESTRAINED LENGTHS L, IN FT. (SMALL SIDE / LARGE SIDE) | | | | | | | | | | |
|---|-------|--------|--------|--------|--------|---------|---------|---------|---------|--|
| D2 \ D1 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| 4 | 42/29 | 100/52 | 171/71 | 258/90 | - | - | - | - | - | |
| 6 | - | 40/31 | 88/54 | 147/75 | 217/95 | 297/113 | - | - | - | |
| 8 | - | - | 37/29 | 82/55 | 135/77 | 197/98 | 266/117 | - | - | |
| 10 | - | - | - | 36/30 | 79/56 | 128/80 | 183/100 | 244/120 | - | |
| 12 | - | - | - | - | 36/30 | 77/57 | 123/80 | 174/102 | 293/142 | |
| 14 | - | - | - | - | - | 35/30 | 74/57 | 118/81 | 219/124 | |
| 16 | - | - | - | - | - | - | 34/30 | 73/57 | 161/104 | |
| 18 | - | - | - | - | - | - | - | 34/30 | 111/82 | |
| 20 | - | - | - | - | - | - | - | - | 70/57 | |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED

| DIP REDUCER RESTRAINED LENGTHS L, IN FT. (SMALL SIDE / LARGE SIDE) | | | | | | | | | | |
|---|-------|-------|--------|--------|--------|--------|--------|--------|--------|--|
| D2 \ D1 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| 4 | 27/18 | 65/34 | 110/46 | 166/58 | - | - | - | - | - | |
| 6 | - | 26/20 | 57/35 | 95/48 | 140/61 | 192/73 | - | - | - | |
| 8 | - | - | 24/19 | 53/35 | 87/50 | 127/63 | 171/75 | - | - | |
| 10 | - | - | - | 23/20 | 51/36 | 82/51 | 118/64 | 158/77 | - | |
| 12 | - | - | - | - | 23/20 | 49/37 | 79/52 | 112/66 | 188/91 | |
| 14 | - | - | - | - | - | 22/20 | 48/37 | 76/52 | 141/80 | |
| 16 | - | - | - | - | - | - | 22/19 | 47/37 | 103/67 | |
| 18 | - | - | - | - | - | - | - | 22/19 | 72/53 | |
| 20 | - | - | - | - | - | - | - | - | 45/37 | |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED



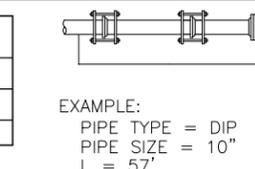
EXAMPLE:
PIPE TYPE = PVC
D₁ = 8"
D₂ = 6"
L₁ = 31'
L₂ = 40'

| PVC DEAD END RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|---|----|----|----|-----|-----|-----|-----|-----|-----|--|
| PIPE SIZE | | | | | | | | | | |
| 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| 39 | 55 | 73 | 88 | 104 | 119 | 134 | 149 | 163 | 192 | |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED

| DIP DEAD END RESTRAINED LENGTHS L, IN FT. | | | | | | | | | | |
|---|----|----|----|----|----|----|----|-----|-----|--|
| PIPE SIZE | | | | | | | | | | |
| 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| 25 | 36 | 47 | 57 | 67 | 76 | 86 | 95 | 105 | 123 | |

1. ALL JOINTS WITHIN THE "L" DISTANCE SHALL BE RESTRAINED



EXAMPLE:
PIPE TYPE = DIP
PIPE SIZE = 10"
L = 57'

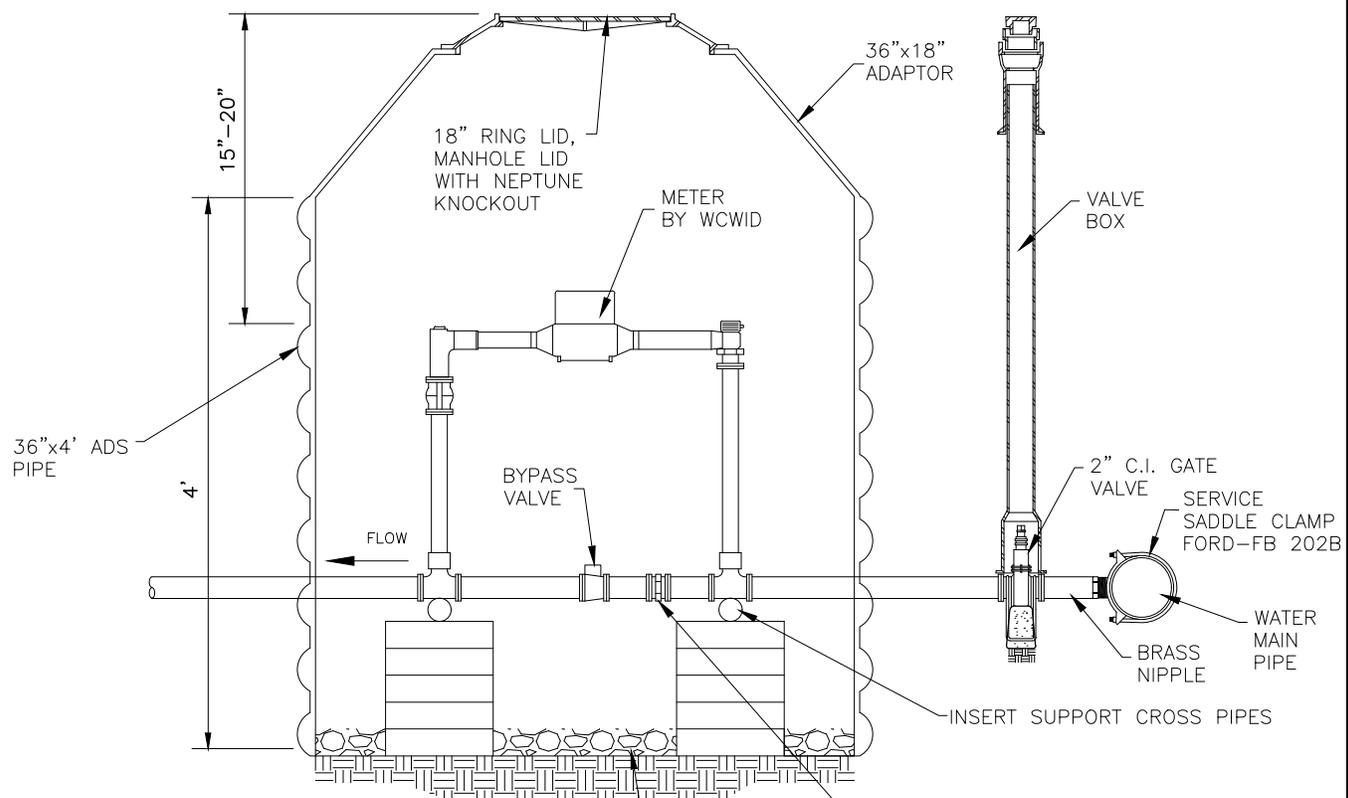
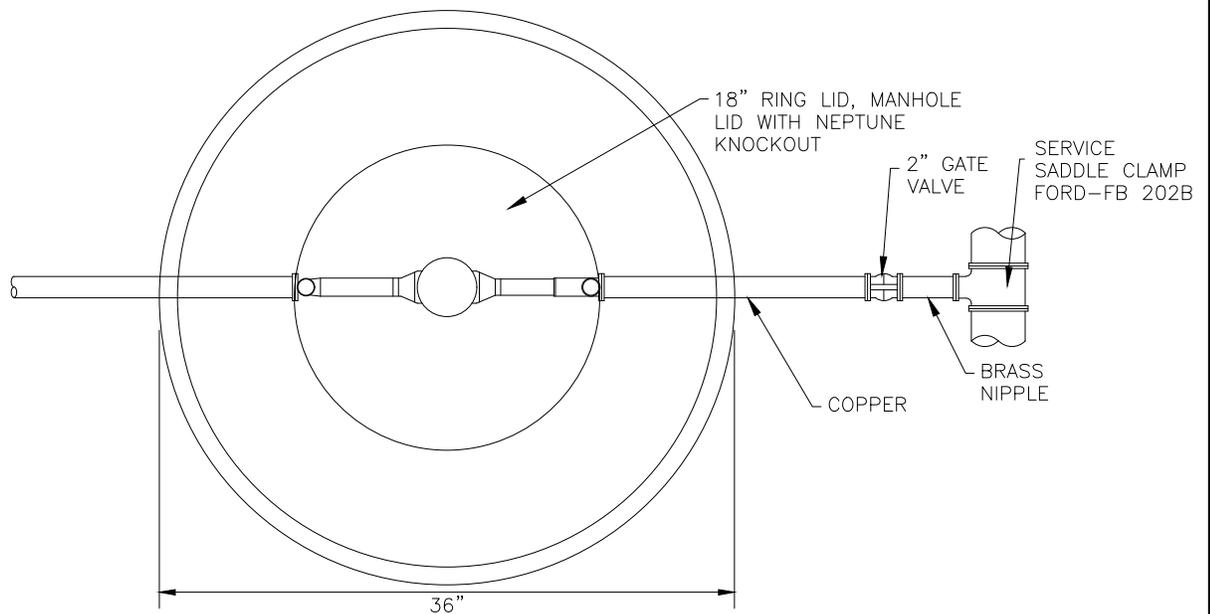
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**MEGALUG
THRUST RESTRAINING
SYSTEM DETAILS**

DATE: 07-10-19

WCS-07



- NOTE:
1. NO HARD SURFACES OVER PLASTIC METER BARREL.
 2. OWNER APPROVAL REQUIRED FOR METER INSTALLATION WITHIN TRAFFIC AREA.
 3. IN TRAFFIC AREA USE 4'X4'X4' CONCRETE BOX WITH TRAFFIC "WATER" MANHOLE LID.

FORD 2" VBHH18W1177 OR FORD 1 1/2" VBHH18W1166 WITH SHUTOFF VALVE, DUAL CHECK VALVE, AND BYPASS LINE.

4" DRAIN GRAVEL

1 1/2" TO 2" METER

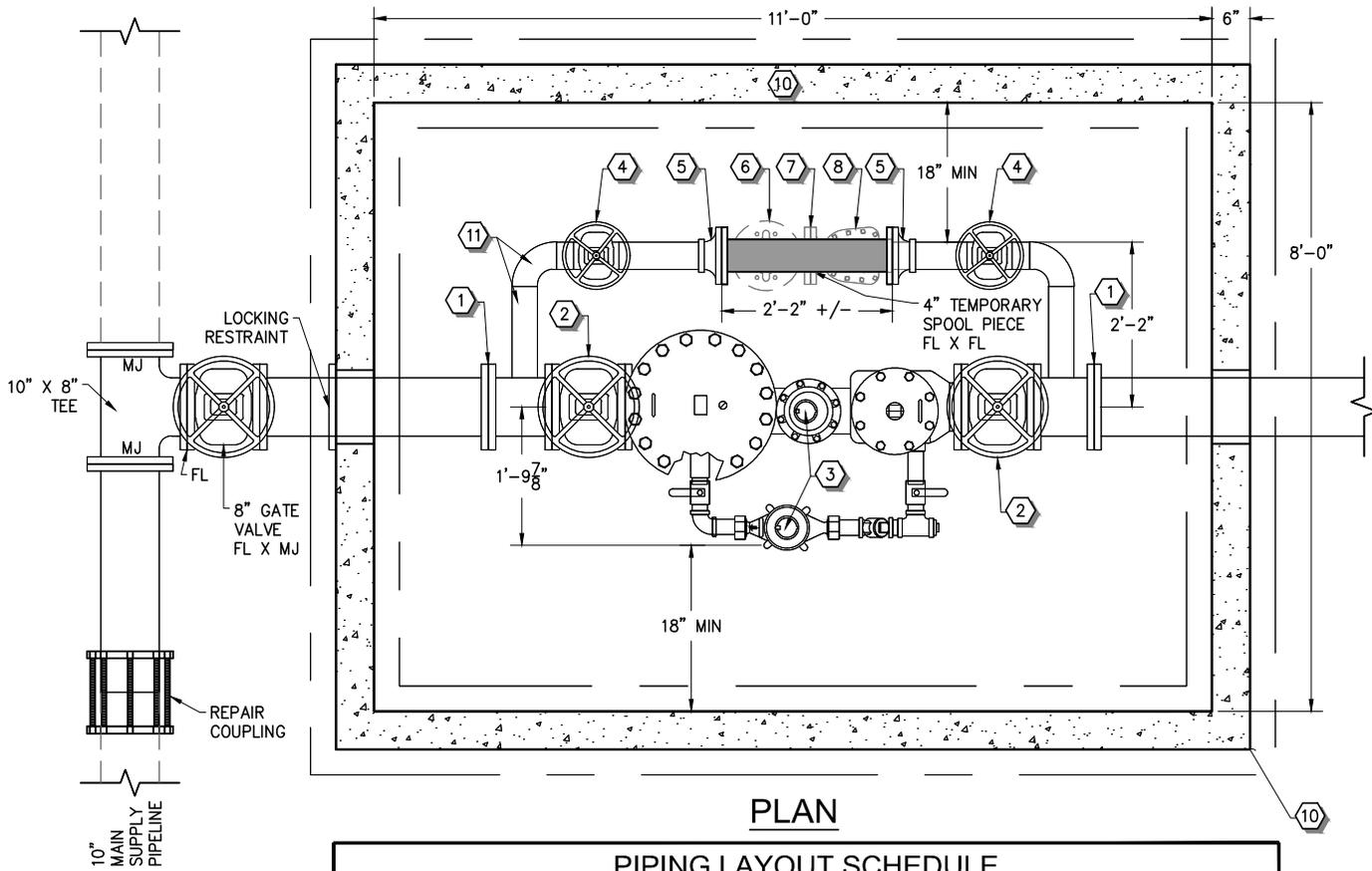
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1 1/2"-2" METER

WCS-08

DATE: 07-10-19



PLAN

| PIPING LAYOUT SCHEDULE | | | | |
|------------------------|--------------------------------------|-------------------|------|--|
| NO. | DESCRIPTION | SIZE | QTY. | REMARKS |
| ① | FL X MJ ADAPTER | 8" | 2 | |
| ② | GATE VALVE W/ 2"x2" OPERATING NUT | 8" | 2 | |
| ③ | METER ASSEMBLY | 8" x 2" | 1 | 8" NEPTUNE HP PROTECTUS III SS FIRE METER W/R900i PIT REGISTER/20' ANTENNA X 2" HP TURBINE METER |
| ④ | GATE VALVE | 4" | 2 | |
| ⑤ | METER FLANGE | 4" | 1 | |
| ⑥ | TURBINE METER | 4" | 1 | (**FUTURE**) 4" NEPTUNE TURBINE METER W/R900i PIT REGISTER W/20' ANTENNA |
| ⑦ | MALE METER FLANGE | 4" | 1 | (**FUTURE**) |
| ⑧ | CHECK VALVE | 4" | 1 | (**FUTURE**) |
| ⑨ | FRAME & COVER | 27" | 1 | |
| ⑩ | CONCRETE BOX | 11' x 8' INTERIOR | 1 | |
| ⑪ | COPPER PIPING | 4" | | |

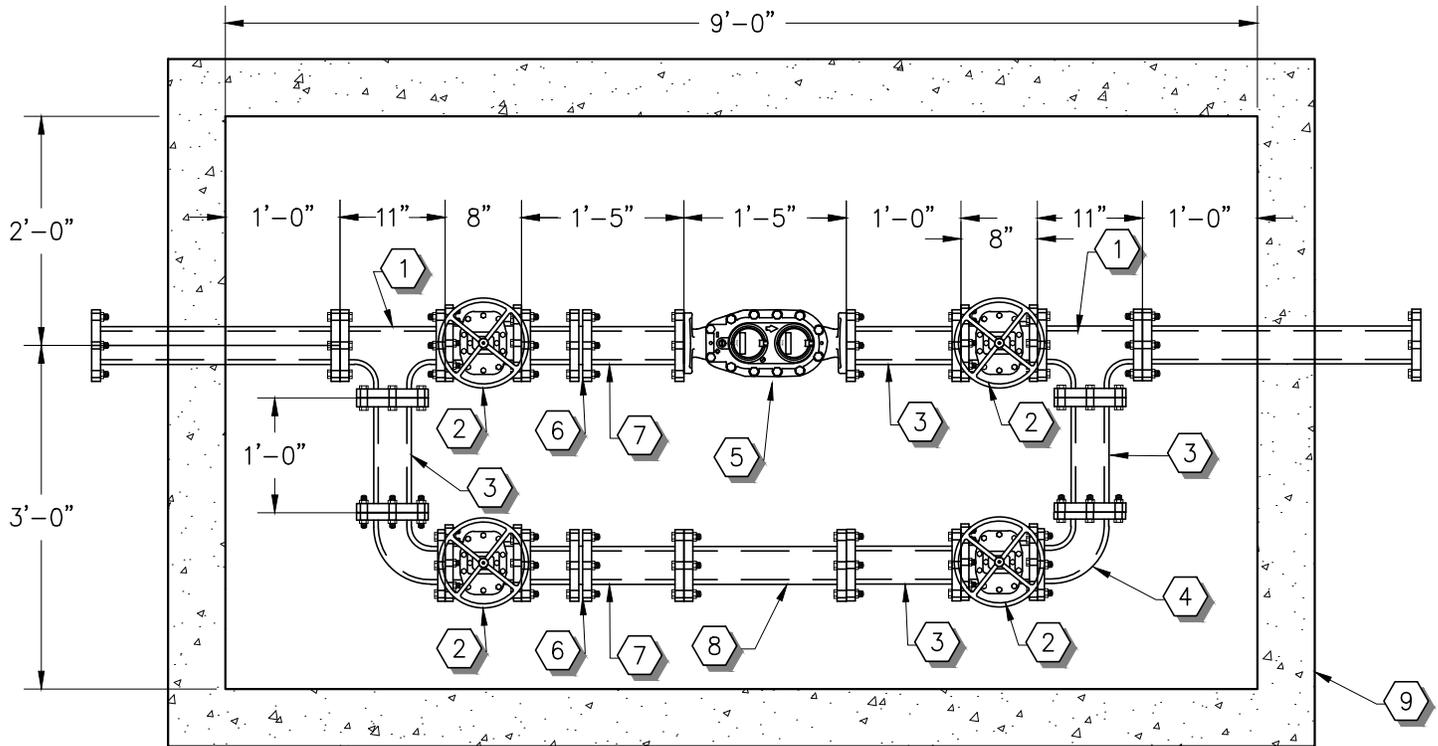
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8" FIRE SERVICE METER

WCS-09

DATE: 07-10-19



PIPING LAYOUT SCHEDULE

| NO. | DESCRIPTION | SIZE | QTY. | REMARKS |
|-----|---------------------------------|----------|------|-----------------|
| 1 | TEE | 3"X3"X3' | 2 | FLXFLXFL |
| 2 | C.I. GATE VALVE W/ HANDWHEEL | 3" | 4 | FLXFL |
| 3 | 3"X12" SPOOL | 3" x 12" | 4 | FLXFL |
| 4 | 90 DEGREE ELBOW | 3" | 2 | FLXFL |
| 5 | METER | 3" | 1 | NEPTUNE TRU/FLO |
| 6 | DRESSER | 3" | 2 | - |
| 7 | SPOOL | 3" | 1 | FL X CUT TO FIT |
| 8 | SPOOL | 3" X 17" | 1 | FL X FL |
| 9 | VAULT (PRECAST) | 9' X 5' | 1 | - |

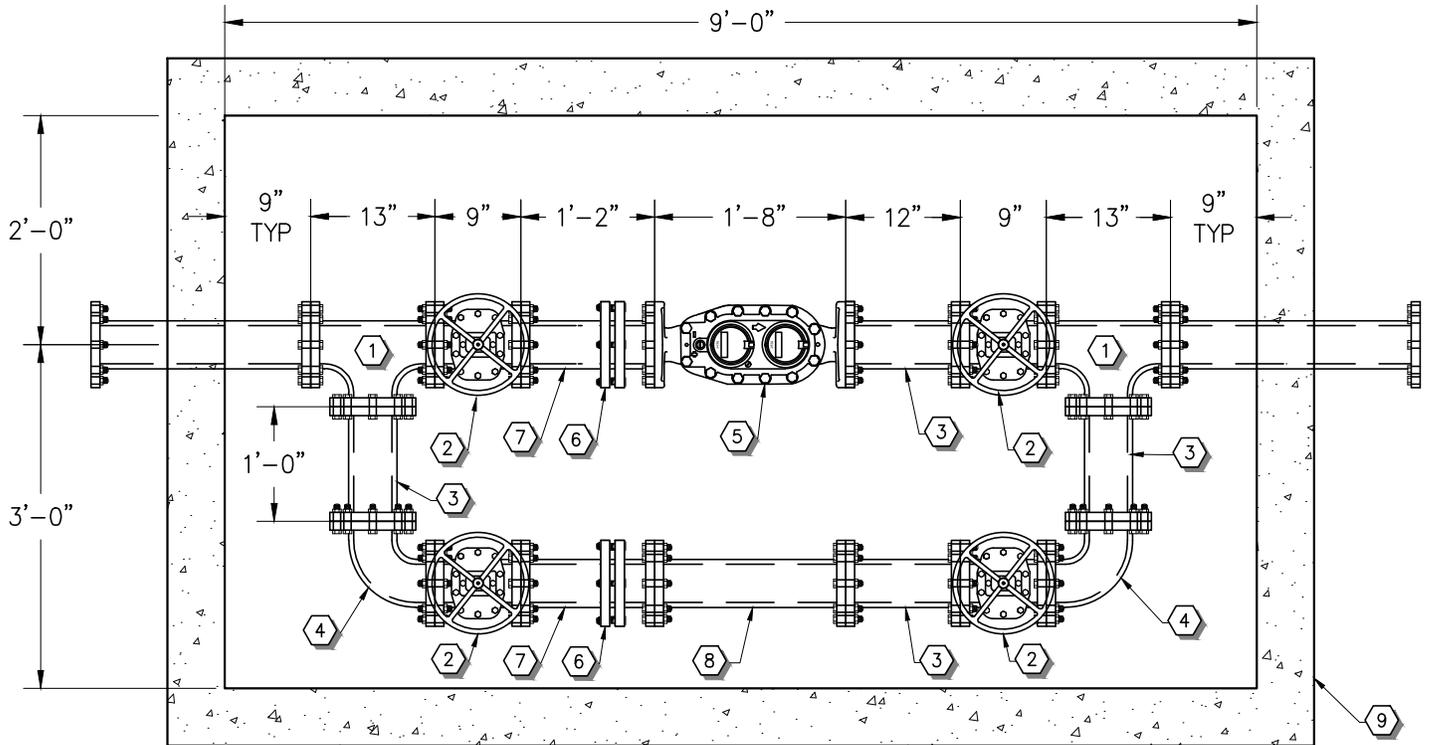
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3" COMPOUND METER W/BY-PASS

WCS-10

DATE: 07-10-19



PIPING LAYOUT SCHEDULE

| NO. | DESCRIPTION | SIZE | QTY. | REMARKS |
|-----|---------------------------------|--------------|------|-----------------|
| 1 | TEE | 4" x 4" x 4" | 2 | FLxFLxFL |
| 2 | C.I. GATE VALVE W/ HANDWHEEL | 4" | 4 | FLxFL |
| 3 | 4" X 12" SPOOL | 4" x 12" | 4 | FLxFL |
| 4 | 90 DEGREE ELBOW | 4" | 2 | FLxFL |
| 5 | METER | 4" | 1 | NEPTUNE TRU/FLO |
| 6 | DRESSER | 4" | 2 | - |
| 7 | SPOOL | 4" | 1 | FL x CUT TO FIT |
| 8 | SPOOL | 4" x 20" | 1 | FL x FL |
| 9 | VAULT (PRECAST) | 9' x 5' | 1 | - |

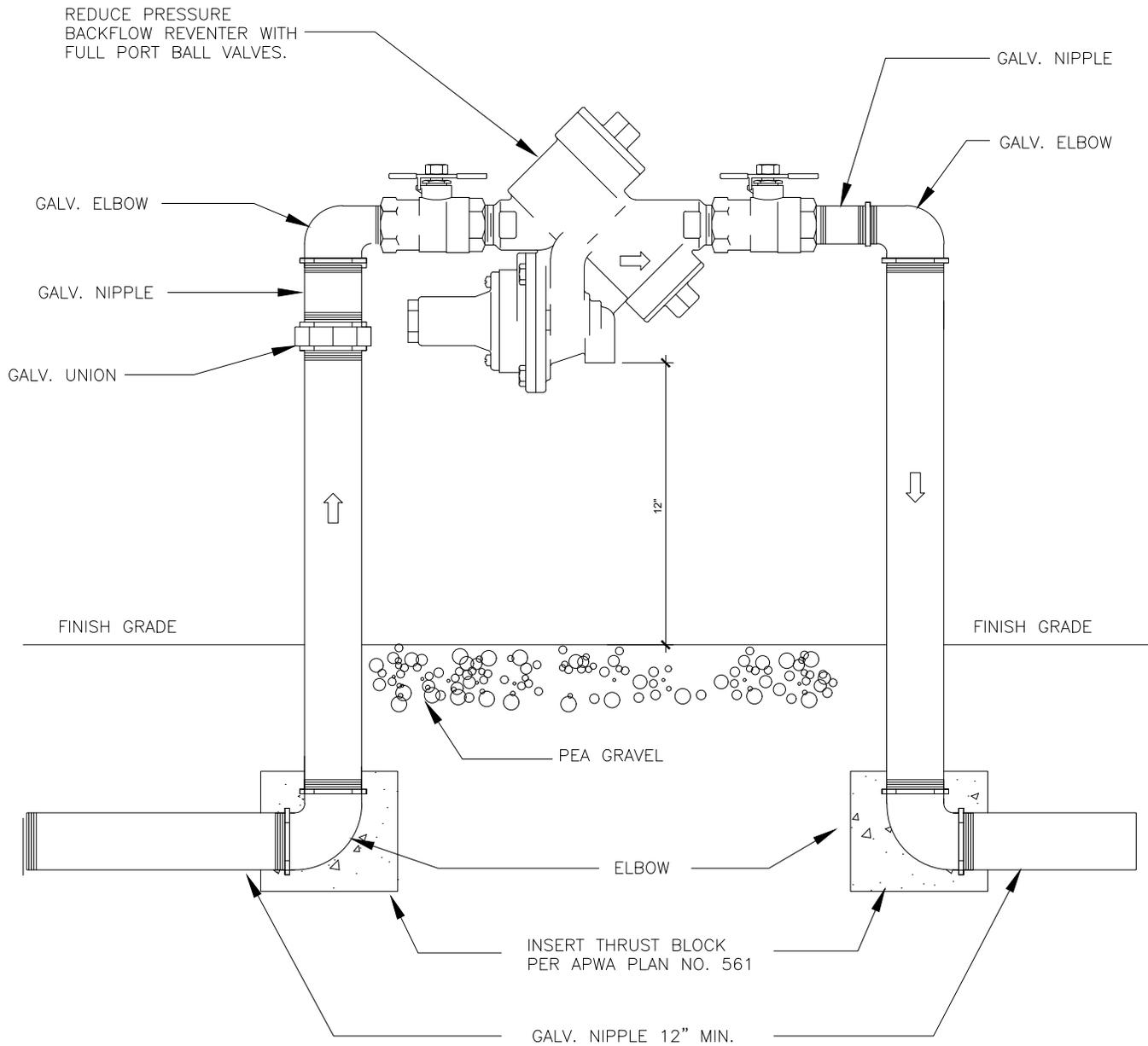
WHITE CITY WATER IMPROVEMENT DISTRICT

999 EAST GALENA DRIVE SANDY, UTAH 84094
 OFFICE: (801) 571-3991 MOBILE: (801) 232-9559 FAX: (801) 571-2688

4" COMPOUND METER W/BY-PASS

WCS-11

DATE: 07-10-19



NOTES:

1. ABOVE GROUND INSTALLATION PREFERRED. UNIT MAY BE INSTALLED BELOW GROUND IF DRAINAGE ENSURES UNIT WILL NOT BE SUBMERGED.
2. PIPELINE SHALL BE FLUSHED BEFORE UNIT IS INSTALLED.
3. MOUNT UNIT IN UPRIGHT POSITION IN A HORIZONTAL PIPE RUN. INSTALL SUPPORTS PER MANUFACTURER RECOMMENDATION.
4. ALLOW MIN. 12" CLEARANCE AROUND UNIT TO CONDUCT TESTS AND REPAIRS.
5. NEW INSTALLATION SHALL BE INSPECTED AND TESTED BY LICENSED BACK-FLOW PREVENTION TESTER
6. TEST TO BE PERFORMED BY OWNER OF ASSEMBLY WITHIN 10 DAYS OF INITIAL USE.
7. ENSURE TEST COCK PLUGS ARE INSTALLED SECURELY AND ARE LEAK PROOF.

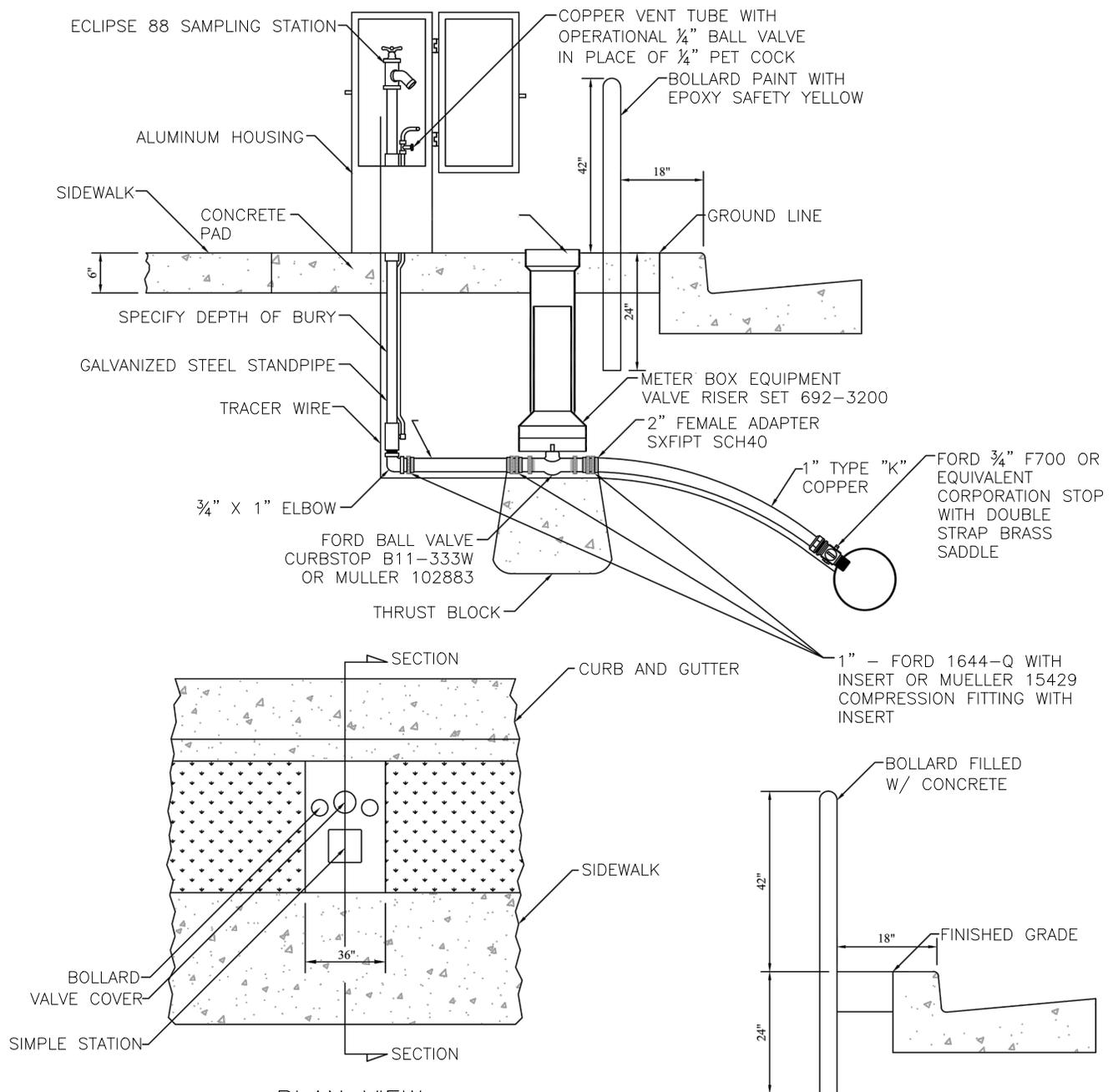
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**REDUCED PRESSURE ZONE (RPZ)
 VALVE (SURFACE)**

WCS-12

DATE: 07-10-19



NOTES:

1. SAMPLING STATIONS SHALL BE 4'-0" BURY, WITH A 3/4" FLIP INLET, AND A 3/4" UNTHREADED NOZZLE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NONREMOVABLE, ALUMINUM-CAST HOUSING.
3. WHEN OPENED, THE STATION SHALL REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY.
4. ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING.
5. A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE BACTERIA GROWTH.
6. ECLIPSE NO. 88 SAMPLING STATION SHALL BE MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS. MO 63102.
7. DRAWING NOT TO SCALE.
8. ALL DEVELOPERS ARE REQUIRED TO INSTALL A SAMPLING STATION AS REQUIRED BY WCWID.
9. DUCTILE IRON MAY BE TAPPED

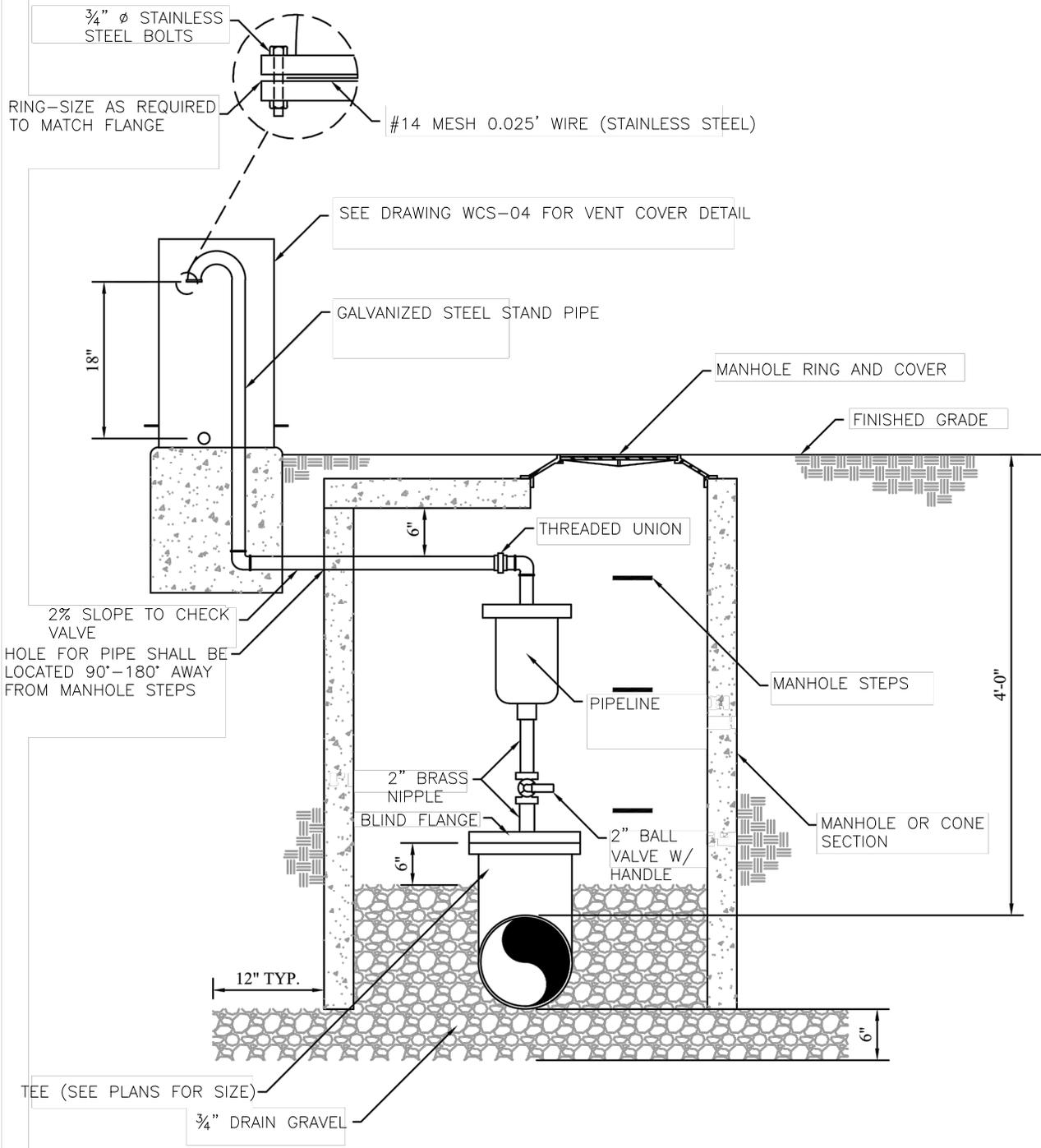
WHITE CITY WATER IMPROVEMENT DISTRICT

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SAMPLING STATION

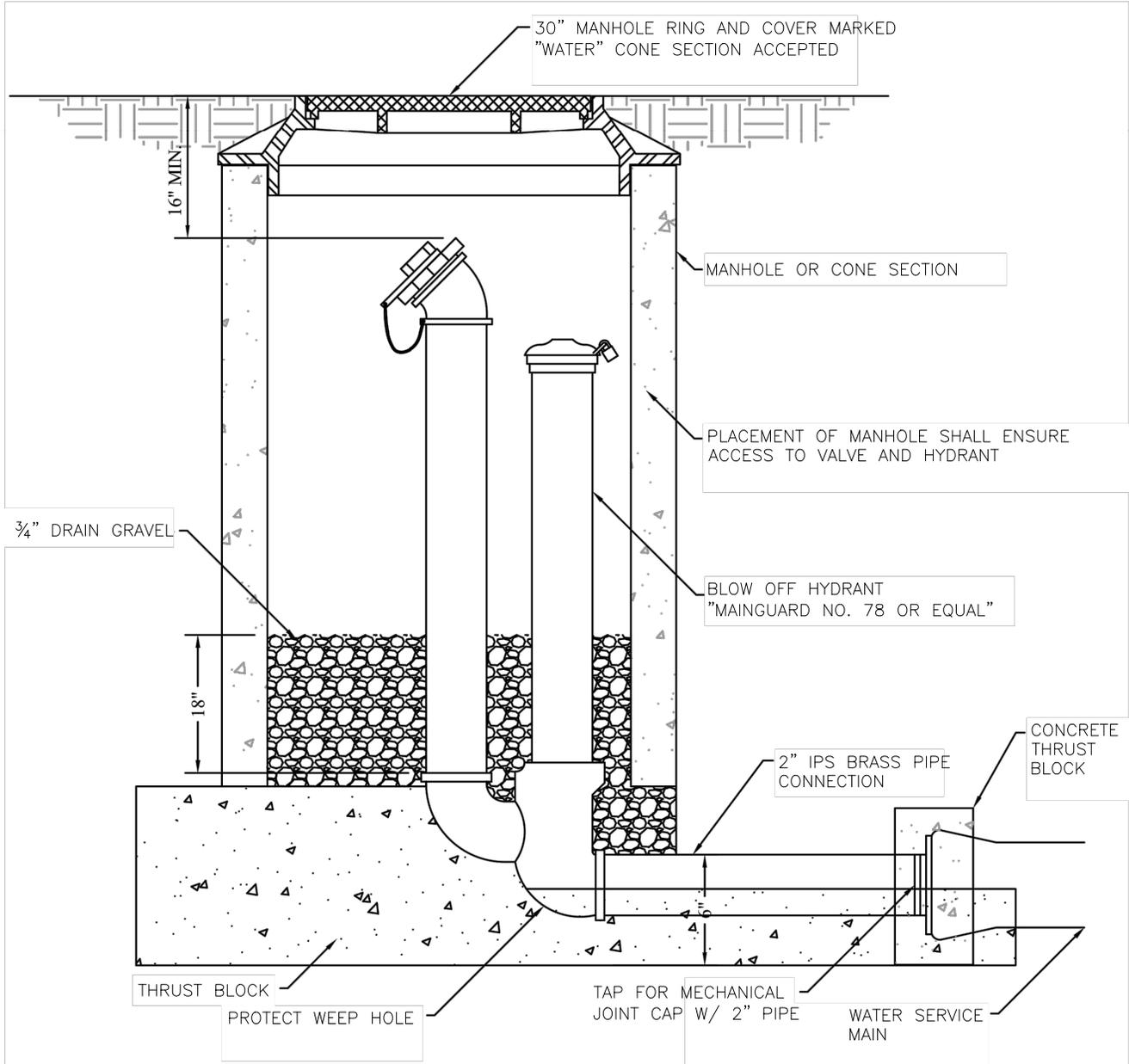
WCS-13

DATE: 07-10-19



NOTES:

1. VENT SHALL BE LOCATED IN PARK STRIP OR CITY PROPERTY.
2. SCHEDULE 80 PVC PIPE, POLY, OR GALVANIZED STEEL WITH TRACER WIRE MAY BE USED BETWEEN AIR/VAC VALVE AND THE STAND PIPE



NOTES;

1. INSPECTION: PRIOR TO BACKFILLING AROUND THE ASSEMBLY. SECURE INSPECTION OF INSTALLATION BY ENGINEER.
2. BACKFILL: INSTALL AND COMPACT BACKFILL MATERIAL PER APWA SECTION 31 05 20
3. CONCRETE: CLASS 4,000 PER APWA SECTION 03 30 04, APPLY A SEALING/CURING COMPOUND PER APWA SECTION 03 39 00.
4. WORKING PARTS: ALL WORKING PARTS SHALL BE BRONZE TO BRONZE DESIGN, AND BE SERVICEABLE FROM ABOVE GROUND WITH NO DIGGING.
5. POST HYDRANTS SHALL BE NON-FREEZING, SELF DRAINING TYPE WITH 36" BURY. HYDRANTS WILL BE FURNISHED WITH A 2" FLIP INLET, A NON-TURNING OPERATING ROD, AND SHALL OPEN TO THE LEFT.
6. LOCKING: HYDRANTS SHALL BE LOCKABLE TO PREVENT UNAUTHORIZED USE AS MANUFACTURED BY KUPFERLE FOUNDRY CO., ST. LOUIS, MO., OR APPROVED EQUIVALENT.
7. MUST BE INSTALLED IN ROAD, NOT PARKSTRIP.

WHITE CITY WATER IMPROVEMENT DISTRICT

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BLOW OFF HYDRANT

WCS-15

DATE: 07-10-19