

**SUPPLEMENT TO MAG
SPECIFICATIONS
AND
DETAILS**

**City of
Show Low, Arizona**

JULY 2011

CITY OF SHOW LOW SUPPLEMENT TO MAG SPECIFICATIONS

INDEX

EXHIBIT A GENERAL INFORMATION

PERMITS AND POLICIES

EXHIBIT B CONDITIONS OF PERMIT

EXHIBIT C GENERAL SERVICE INSTALLATION

EXHIBIT D WATER TAP

EXHIBIT E SEWER TAP

EXHIBIT F CULVERTS

EXHIBIT G PAVEMENT INFORMATION

EXHIBIT H STREET DESIGN PRINCIPLES AND DEVELOPMENT STANDARDS

EXHIBIT I LOW PRESSURE SEWER SYSTEMS

PAVEMENT INFORMATION

P-01 TYPICAL STREET AND UTILITY PLACEMENT DETAIL

P-02 BACKFILL, PAVEMENT & SURFACE REPLACEMENT DETAIL

P-03 STREET/STOP SIGN DETAIL

P-04 SIGN BRACKET DETAIL

SEWER INFORMATION

S-01 SEWER MANHOLE DETAIL

S-02 SEWER MANHOLE SECTION DETAIL

S-03 PRE-CAST CONCRETE SEWER MANHOLE DETAIL

CITY OF SHOW LOW
SUPPLEMENT TO MAG
SPECIFICATIONS

INDEX CONTINUED

- S-05 SEWER LATERAL SERVICE DETAIL
- S-06 SEWER MANHOLE COVER DETAIL
- S-07 SEWER MAIN TRENCH DETAIL
- S-08 SEWER CAST IRON VALVE BOX DETAIL

WATER INFORMATION

- W-01 WATER LINE AIR RELEASE DETAIL
- W-02 WATER LINE BLOW OFF DETAIL
- W-03 WATER SERVICE DETAIL
- W-04 RESIDENTIAL METER SET DETAIL
- W-05 COMMERCIAL METER SET DETAIL
- W-06 WATER MAIN TRENCH DETAIL
- W-07 FIRE HYDRANT INSTALLATION DETAIL
- W-08 VALVE BOX INSTALLATION DETAIL
- W-09 DEBRIS CAP INSTALLATION DETAIL
- W-10 TAPPING SLEEVES AND VALVES DETAIL
- W-11 PRESSURE REDUCING STATION DETAIL
- W-12 VERTICAL REALIGNMENT OF WATER MAINS DETAIL
- W-13 WATER PIPE RESTRAINED JOINT TABLES DETAIL

GENERAL INFORMATION

1. These details have been prepared in an effort to standardize construction details. They are to be used in conjunction with the current edition of the "Uniform Standard Specifications for Public Works Construction" sponsored and distributed by the Maricopa Association of Governments.
2. Many notes within these details refer to various sections of the "Uniform Standard Specifications for Public Works Construction." Where this reference is made, only the abbreviation "Sect." is used. An example of this reference would be: "Class 'A' Concrete per Sect. 725."
3. Many notes within these details refer to other details within this book. Where this reference is made, the abbreviation "Std. Detail" is used. An example of this would be: "See Std. Detail W-09 for Valve Box Installation."
4. Many details cover more than one sheet. These sheets have been given the same number with a suffix letter. Example: W-02A and W-02B.
5. An effort has been made to include the most commonly used construction details in this book. Items that require design consideration by the designing engineer have not been included.
6. Some of the details printed here in may be used by some of the agencies and not by others. The designing engineer should therefore contact the agency with in whose jurisdiction he is working, for direction as to which detail or portions of details should be used.
7. The details in this book are not to scale.

GENERAL INFORMATION

CHLORINATION

1. Pressure testing to be supervised by the Public Works Department and/or Engineering Department to AWWA specifications C-600.
2. All microbiological drinking water tests on new mains shall be taken by the Public Works Department. The number of tests shall be determined by the Public Works Water Supervisor and/or Engineering Department. The cost of the microbiological analysis report shall be the responsibility of the owner/developer.
3. If, after three testing attempts by a certified laboratory, the microbiological analysis tests results are still positive for total coliform bacteria, the Engineering Department and/or Public Works Department may, at their determination, require the developer to mechanically flush the lines utilizing properly sized equipment. After this procedure the water lines shall be pressure tested and rechlorinated per City of Show Low specifications.
 - a. Infrastructure Improvement Agreement Item #20
The City of Show Low Public Works Department shall perform the chlorine residual and bacteriological tests. The applicant shall schedule the test to be performed after the water line has been pressure tested. The City Inspector shall be present during testing and sampling. The applicant shall pay all costs associated with performing the tests (i.e. lab fees) before the tests are performed.
4. Valves shall not be manipulated so that strong chlorine in the line being treated will flow back into the line supplying the water. This procedure will be supervised by the Public Works Department and/or Engineering Department.
5. Flushing of water mains prior to microbiological testing shall be performed by the Public Works Department and/or Engineering Department.
6. Sodium Hypochlorite and/or Calcium Hypochlorite is preferred for chlorination of water mains. HtH "High test hypochlorite" will be allowed only if dissolved in solution prior to injection, with a Hydro-static pump which may be provided only by the City of Show Low – gas alternate if qualified, contractor assumes full responsibility.
7. All new water main extensions shall have a tap saddle installed within two (2) feet of an existing water valve for chlorination purposes.
8. Water trucks, water wagons and private water trailers with pumps shall not be used for chlorination.

GENERAL INFORMATION

WATER VALVES

1. Line valves shall be placed no more than 1,000 feet apart per AWWA specifications.
2. There shall be a minimum of two valves on every tee, three valves on every cross per AWWA specifications.
3. All water valves shall be concreted up to five feet off roadway per City of Show Low Detail W-08 and MAG standard detail 391-1. There is to be no concrete or bricks on top of valves.
4. Operating nuts deeper than five-foot shall have an extension to fit each installation – MAG standard detail 391-2.
5. All valves installed in the distribution system shall have a two-inch square valve nut.
6. Inserting valves “hot-tap” may be installed by the Public Works Water Department for a fee. Contractors may perform this procedure only if supervised by the Public Works Water Department and/or Engineering Department.
7. Debris caps shall be installed by the developer in every valve per MAG standard detail 392. Styrofoam caps are not allowed.
8. It is the developer’s responsibility to insure that all valves are open prior to fire flow tests supervised by the Engineering Department. Valves are to remain open from that point on.

METERS

1. All water meters shall be provided, maintained and installed by the Public Works Department.
2. Bulk water meters and backflow assemblies shall be provided, maintained and installed by the Public Works Department.
3. Barrel locks shall be provided by the developer and installed locked-off by the Public Works Department.
4. Copper washers shall not be used. Rubber washers shall be used on all resetters.

GENERAL INFORMATION

FIRE HYDRANT

1. All fire hydrants installed in the distribution system shall be dry barrel Mueller or Waterous only and to be manufacturer's painted yellow.
2. Fire hydrants shall be installed per requirements outlined in the most current adopted fire code and approved by the Engineering Department.
3. Fire flow tests will be performed by the Public Works Water Department and shall have a minimum total flow of 1,000 GPM for residential and 1,500 GPM for commercial at 20 PSI residual pressure per current fire code.
4. Fire hydrants shall be installed per City of Show Low Specification W-07. Use C-900 only.
5. Fire hydrants shall be checked by developer after installation for proper oil level. Mueller or Waterous fire hydrant oil only.
6. All fire hydrants shall have a minimum clearance of 18" from base to nozzles. The base shall have a 3' radius clear of debris.

AIR RELEASE VALVE (ARV) and PRESSURE REDUCING VALVE (PRV)

1. All ARV's shall be manufactured by Crispin, or approved equal.
2. Installation of ARV's shall conform to City of Show Low Detail W-01.
3. All PRV's shall be manufactured by Cla-Val.
4. Installation of PRV's shall conform to City of Show Low Detail W-11

MISCELLANEOUS

1. Water/Sewer services shall be installed with a minimum 6-foot separation.
2. If a City appurtenance falls on a back slope, they shall be relocated wherever possible, or installed four (4) feet into the public utility easement (PUE).
3. Twelve gauge coated tracer wire shall be installed on water mains and be tied to the fire hydrant nozzle and on water services run up in Meter Box.
4. All water services shall be sized by the design engineer for each specific use but shall not be smaller than 1 inch.
5. If more than one (1) tap is to be installed, they shall have a minimum of 12" separation between tap saddles.
6. All tracer wires to be tested for continuity prior to acceptance.

7. Thrust blocks are required for all taps. Refer to MAG Standards for sizing. Provide calculations for site specific soil conditions.

PERMITS AND POLICIES

CONDITIONS OF PERMIT

1. The proposed work shall be located and constructed to the satisfaction of the City of Show Low. Two sets of construction plans shall be submitted with the ROW permit application.
2. Traffic control for any work performed within the public right-of-way shall conform to the most current Manual of Uniform Traffic Control Devices and Phoenix Traffic Barricade Manual. A traffic control plan shall be submitted with the right to correct deficient barricading and charge the applicant.
3. The applicant shall conform to all provisions of the Arizona Blue Stake Law, and shall call 1-800-STAKE-IT a minimum of 48 hours prior to any work involving excavation.
4. The City Public Works Department (532-4100) shall be notified 24 hours prior to starting work under this permit and as the work proceeds for these activities that require City inspection (i.e. backfilling). Failure to provide said notification would subject the work to re-excavation, removal or replacement at the permittee's expense.
5. The permittee shall take full responsibility for all work done under this permit and shall complete the work in a workmanlike manner, including cleanup, restoration of right-of-way and repair of damaged property. In addition, the permittee will warranty the work for two years from the date of completion.
6. All work shall be at the sole expense of the applicant and shall be done using standard traffic control procedures in order to cause the least inconvenience and hazard to vehicular and pedestrian traffic.
7. Excavated or stored material shall not be stored on pavement, sidewalk, or traveled roadway surface unless specifically stated and approved on the permit.
8. The applicant assumes the responsibility and all liability for any injury or damage to said street in a lawful manner, caused by or arising out of the exercise of this permit.
9. Boring shall be required in lieu of pavement cuts, where practical, for newly surfaced roadways for a period of two years from the date of acceptance of surfacing. Boring pits shall be placed a minimum of two feet from pavement edge where practical. Open cutting of paved roads, if not specifically requested in the application, will require notification to, and permission of, the City of Show Low Public Works Department. Backfill and patching will meet the requirements of standard detail number P-01.

PERMITS AND POLICIES

CONDITIONS OF PERMIT

10. The applicant also agrees to contact the City of Show Low Public Works Department for final inspection after installation is complete. If installation does not meet the City of Show Low requirements, connection to City utilities will not be established.
11. Any contractor working within the City of Show Low right-of-way shall have the appropriate contractor's certification.
12. Taps on City owned lines **shall be made by Public Works personnel only,** unless prior permission has been obtained from Public Works.
13. Driveways shall maintain the same slope of the roadway for at least five (5) feet toward the property, and shall be paved with at least four (4) inches of a City approved paving material (asphalt or concrete) from the roadway to the property line.

PERMITS AND POLICIES

GENERAL SERVICE INSTALLATION

The City of Show Low City Council believes that privatizing sewer tap, water tap, and culvert installation will benefit the public by enhancing building construction schedules and by reducing the public subsidy for undeveloped land owners. Because of this belief, the City has developed guidelines for contractors and property owners to assist them in such projects. This new policy will positively affect the public, the City, and homebuilder in various fashions.

Currently, the City of Show Low charges flat rates for sewer tap and water tap installations. This rate does not reflect the level of difficulty involved in the job. Therefore, property owners of undeveloped lots pay the same rate as developed lot owners for such service installations. This flat rate is causing developed lot owners to subsidize undeveloped lot owners due to the severity of work difference in the job. Furthermore, the actual cost of the tap or culvert installation is not covered by the rate charged to the property owner. The difference in cost must be made up from general fund subsidies, thus taking away from other maintenance funding.

City maintenance crews often encounter delays in service installations due to other routine maintenance projects and other calls for unscheduled services. The new service installation policy allows for city maintenance crews to focus on routine maintenance instead of requests for installation thus enabling for better maintenance planning and better maintained infrastructure. Moreover, this policy benefits the homebuilder by not inhibiting construction because of City maintenance crew scheduling. The property owner is able to schedule service installations sooner thus better meeting their building schedule.

The privatization of service installations should improve the overall performance of these projects. This will occur due to better responsiveness, greater property owner control, and an increase level of City service from concentration on more maintenance and infrastructure management. Because of this great number of positive factors, privatization is the apparent option for the City.

However, many property owners may for various reasons prefer not to hire a private contractor and instead to have the City perform these services. The City crews will perform these services but the property owner will be required to pay the cost of all equipment, material, and labor. An estimate will be generated for the property owner. The estimate is not a binding quote on the City since all work will be performed on a time and material basis. The property owner will be required to pay fifty percent (50%) of the estimate before any work by the City is initiated.

PERMITS AND POLICIES

GENERAL SERVICE INSTALLATION

The City of Show Low Public Works Department has established policies following direction from the City Council and all applicable State Statutes for the installations of the subsequent services.

1. If work is needed to be performed in the right-of-way (ROW), a ROW permit must be obtained and traffic control plan must be provided.
2. The City of Show Low and State law will only permit licensed, bonded, and insured contractors to work in the ROW. All contractors must have City approval prior to commencing any work. Only those contractors with an "A" or "A-12" license classification as designated by the Registrar of Contractors are authorized to perform work in the right-of-way. It is recommended that the property owner should be confident by checking with the Registrar of Contractor that a contractor has the proper license before entering into any agreement.
3. If work is performed in the ROW, geotechnical compaction test report for the backfill must be provided or concrete slurry backfill must be used.
4. The pavement replacement, as required, shall be completed to Maricopa Association of Government (M.A.G.) Specifications and Standard Details and as modified by the City of Show Low.
5. All contractors must abide by Occupational Safety and Health administration (OSHA) regulations and Chapter 6 "Work Zone Safety" of the Manual of Uniform Traffic Control Devices (MUTCD).
6. Appointments for inspection must be made by the property owner of their representative after the service is installed, after the backfill is placed, and after the asphaltic pavement is replaced, as required.

PERMITS AND POLICIES

WATER TAP

1. The property owner is responsible for exposing the main line, if using contractor.
2. Only the City of Show Low will be allowed to provide the saddle and corporation stop and will perform the actual tap to the main line for a fee.
3. If water service exists to the property and if the service is to be shared between properties, the property owner must install a tee fitting and a curb stop, as required.
4. If the property owner resides in Park Valley Unit 4 Subdivision, the existing gate valve must be replaced by the property owner with an acceptable curb stop and a tee fitting as needed.
5. Ford, Mueller, or City approved fittings are required for all water fittings. All fittings shall be manufactured in the United States.
6. All water service pipes are required to be high density polyethylene of iron pipe size.
7. The City of Show Low is responsible for the water quality of the water in the main line.
8. Further specifications are provided in the *Water Service Detail (W-03)* in the City of Show Low standard details.

PERMITS AND POLICIES

SEWER TAP

1. The property owner is responsible for exposing the main line, if using a contractor.
2. The City of Show Low is responsible for installing the sewer lateral tap.
3. The property owner is responsible for the installation of the sewer service from the sewer lateral tap to the house. The sewer service must include a one way clean-out at the property line and every 100' as required by the Uniform Plumbing Code (UPC).
4. The property owner is responsible for all repairs and maintenance from the property line to the house.
5. The City of Show Low requires all sewer pipes lying under a roadway to be SDR-35 pipe.
6. The City of Show Low requires "ring-tight" pipe to be used for sewer taps.
7. Further specifications are provided in the *Sewer Service Detail (S-05)* in the City of Show Low standard details.
8. Adjustable ring and covers shall not be used in the City of Show Low.
9. All sewer manholes shall be accessible to the City of Show Low.

PERMITS AND POLICIES

CULVERTS

1. The property owner is responsible for all the installations and maintenance of culverts located on their property. Culvert, headwall, and all other appurtenances must be compatible with snow removal operations and roadway safety in the public right-of-way.
2. Prior to the culvert installation in the public right-of-way, the property owner shall contact the City of Show Low to obtain a RIGHT-OF-WAY permit so that the culvert can be sized.
3. With the completion of the culvert installation, the City shall be contacted for an inspection of the installation for culverts in the public right-of-way.
4. The City of Show Low requires all culverts to be of 16 gauge CMP or stronger and shall be sized by City of Show Low Public Works. A diameter smaller than 12 inches shall not be allowed.
5. Culverts shall be installed per steel pipe manufacturer's guidelines with regard to bedding, slope, etc.
6. Culvert inverts shall match ditch flow line. Ditch may require grading to provide minimum cover at the culvert. If ditch is re-graded, the flow line shall be constructed to provide positive drainage.

PERMITS AND POLICIES

PAVEMENT INFORMATION

Pavement replacement and backfill which is used for the repair of the roadway and shoulders will be performed in accordance with Maricopa Association of Government (M.A.G.) Standard Detail 200. This detail requires that a 12-inch "T" Top be utilized when normal traffic flow is perpendicular to any one of the four sides of the trench excavation. The "T" Top shall not be cut until the trench has been backfilled. The "T" Top shall be saw cut.

In general, the following criteria will govern which type is used:

Type "A" Trench Repair pavement replacement per MAG 200-1, will be utilized on all streets where excavation is parallel and transverse to the centerline of the street.

"T-Top" Trench Repair pavement replacement Per MAG 200-1, may be utilized on all streets where excavation is parallel and transverse to the centerline of the street due to trench conditions and deemed necessary by the Construction Inspector or Engineering Department.

Where a longitudinal trench is partly in pavement, the pavement shall be replaced to the outside edge of the existing pavement on a straight line to establish the pavement width.

Where no part of a trench is in pavement, surfacing replacement will only be specified where existing surfacing materials have been removed.

When a trench cut is in aggregate surfaced area, the surfacing replacement shall be of a like type and depth as the existing material, compacted to the densities required in Maricopa Association of Government (M.A.G.) Standard Specifications.

Asphalt Concrete Pavement

All street sections without curb and gutter are required to have a thickened edge per MAG Standard Detail No. 201 – Type A. Curbs shall be replaced to the original condition. Sidewalks shall be removed to full panel sections and replaced to the original condition.

PERMITS AND POLICIES

PAVEMENT INFORMATION

Preservative Seal

Preservative seal on streets classified as residential and local collector shall be in accordance with MAG Section 718, polymer modified "Type C". At the City's discretion, cash in-lieu of the installation of the preservative seal may be required. This cost will be estimated based on the paved area multiplied by a fair market unit cost.

Concrete Curb, Gutter, Sidewalk, Driveway and Alley Entrance

All Installed sidewalk panels, valley gutters, curb and gutters, ribbon curbs and aprons with cracks shall be replaced by the Contractor. Any section of the work deficient in depth or not conforming to the plans or specifications shall be removed and replaced by the Contractor at no additional cost to the Contracting Agency.

STREET DESIGN PRINCIPLES AND DEVELOPMENT STANDARDS

STREET LOCATION AND ARRANGEMENT

1. The arrangement, character, extent, width, grade, and location of all streets should conform to the City's General and Transportation Plans and should ensure public safety and convenience, and respond to existing natural features of terrain, vegetation, and drainage.
2. Street layout shall provide for the continuation of existing principal streets through new subdivisions. Principal streets typically follow section or mid-section lines. However, if the alignment is impractical then right-of-way should be provided at least every three thousand (3,000) feet.
3. Certain proposed streets, shall be extended to the tract boundary to provide future connection with adjoining unplatted lands.
 - a. Street connections to an adjoining platted tract shall be made only to those extended streets of the platted tract.
 - b. Street connections shall be designed to accommodate the amount of increased traffic flow generated by the proposed subdivision, as determined by an approved traffic study performed by a P.E. or as approved by the Public Works Department.
4. Local streets shall be so arranged as to discourage their use by through traffic. If topography allows and suitable alternate locations are available, a minimum of two accesses are highly recommended for ingress/egress into the subdivision.
5. The maximum length of cul-de-sac streets shall be 1,200 feet measured from the intersection of the right-of-way lines to the extreme depth of the turning circle along the street centerline. However, no cul-de-sac shall provide access to more than twenty-five single family residences.
6. Where a proposed subdivision abuts or contains an existing or proposed arterial and collector routes, sufficient right-of-way may be required for access, frontage streets, and/or turning movements or for reverse frontage combined with a one-foot non-access easement abutting the major route; or for such other treatment as may be justified for protection of residential properties from function of the major route.
7. Where a subdivision abuts or contains the right-of-way of a limited access highway or an irrigation canal or abuts a commercial or industrial land use, the Planning and Zoning Director may recommend location of a street approximately parallel to and on each side of such right-of-way at a distance suitable for appropriate use of the intervening land. Such distance shall be determined with due regard for approach grades, drainage, bridges or future grade separations.

STREET DESIGN PRINCIPLES AND DEVELOPMENT STANDARDS

STREET LOCATION AND ARRANGEMENT

8. Streets shall be so arranged in relation to existing topography as to produce desirable lots of maximum utility and streets of reasonable gradient and to facilitate adequate drainage.
9. No alleys may be constructed in residential, commercial, and industrial subdivisions, except that the Planning and Zoning Director may waive the requirements in certain areas because of topography, open area provided or service access.
10. Half streets shall be discouraged, but may be permissible where necessary to provide right-of-way required by the City's General and Transportation Plans, to complete a street pattern already begun or to assure reasonable development of a number of adjoining parcels. The minimum paved street width of a half street is 20 feet. Where there exists a platted half street abutting the tract to be subdivided, the remaining half shall be platted within the tract. In lieu of the actual construction of a half street, the subdivider may provide a cash payment that is based on a cost estimate prepared by a registered civil engineer and that is approved by the Public Works Director. This money will be disbursed to the City at the time the contract is awarded for the City project to improve the full width of the street.
11. A minimum of two (2) permanent reference survey monuments shall be required for a street as a recoverable point for future surveys.

STREET DESIGN PRINCIPLES AND DEVELOPMENT STANDARDS

STREET DESIGN

All streets in the City, unless otherwise specified in this Code, shall be designed to the standards in Table 1 in this section and as follows:

Minimum Required Right-of-Way Width

1. Principal and minor arterial streets and highways as indicated by City standards but, in any event, no less than 100 feet or as required by the Arizona Department of Transportation standards.
2. Collector streets as indicated by current City standards but, in any event, no less than 80 feet.
3. Local streets as indicated by current City standards but, in any event, no less than 50 feet, unless otherwise specified in this Code.
 - a. Cul-de-sac streets shall terminate in a circular right-of-way 50 feet in radius with a minimum improved traffic turning circle 40 feet in radius. The Planning and Zoning Director may approve an equally convenient form of space where extreme conditions justify.
 - b. Dead end streets will not be approved except in locations designated by the Planning and Zoning Director as necessary to future extension in development of adjacent lands. A dead end street serving more than four lots shall provide a temporary turning circle with a 40 foot radius or other acceptable design to accomplish adequate access.
 - c. Local roads for industrial subdivisions are highly recommended at 60 feet. However, when the size of subdivisions or other factors limit the inclusion of the 60 foot rights-of-way, the Planning and Zoning Director may approve the use of 50 foot rights-of-way with all intersection radii at 45 feet.
4. Access or Frontage Streets - As required by a traffic impact study or as needed for principal arterials.

TABLE 1

Item	Principal Arterial (1)	Minor Arterial	Collector	Residential Four Dwellings per Acre or Greater	Residential Less than Four Dwellings per Acre	Cul-de-sac	Commercial	Industrial
Minimum Right of Way	Per ADOT (1)	100'	80'	50'	50'	50'	50'	50'
Minimum Width w/o On-street Parking	Per ADOT	42'	28'	24'	24'	22'	28'	28'
Pavement Treatment	7" ADOT C&G	5" VER. C&G	Ribbon Curb or Roll Curb and Gutter	Ribbon Curb or Roll Curb and Gutter	Ribbon Curb or Roll Curb and Gutter	Ribbon Curb or Roll Curb and Gutter	6" VER. C&G	Ribbon Curb
Sidewalk	6' each side	Yes (3)	Yes (3)	See Table 1A	See Table 1A	See Table 1A	5' Min Each Side (2)	NOTE (3)
Asphaltic Concrete (4)	Per ADOT	3"	3"	3"	3"	3"	3"	4"
Roadway Base (5)	Per ADOT	8"	8"	8"	8"	8"	8"	10"
Longitudinal Slope	Per ADOT	5%-6%	5%-6%	5%-12% (6)	5%-12% (5)	5%-12% (6)	5%-12%	5%-12%
Cross Slope	Per ADOT	2%-4%	2%-4%	2%-4%	2%-4%	2%-4%	2%-4%	2%-4%
Curb Return Radius	Per ADOT	35'	35'	25'	25'	25'	25'	35'
Right of Way Radius	Per ADOT	35'	35'	25'	25'	25'	25'	35'
Minimum Center Line Radius	Per ADOT	500'	500'	150'	150'	150'	150'	150'
Tangent Between Reverse Curves	Per ADOT (7)	100'	100'	100'	100'	100'	150'	150'
Vertical Curve (VC) Minimum Length (3)	Per ADOT	100'	100'	100'	100'	100'	100'	100'
VC Required Algebraic Difference Exceeds	Per ADOT	1%	1%	1%	1%	1%	1%	1%
On-street Parking	No	No	No	Yes (10)	Yes (10)	Yes (10)	No	No
ADOT (Information only, not for design purposes)	>14,000	8,000-14,000	2,500-8,000	<2,500	<2,500	<250	<2,500	<2,500

Editor's note—Ord. No. 2008-01, adopted Jan. 15, 2008, replaces Tables 1, Street Design Standards, and 1A, Sidewalk Design Standards, in their entirety.

STREET DESIGN PRINCIPLES AND DEVELOPMENT STANDARDS

Street Design Notes

- (1) Currently, all principal arterial routes are state highways owned and maintained by the Arizona Department of Transportation.
- (2) Sidewalk may be required on only one side of the road with an increased width if approved by the planning and zoning director and the public works director. (Also, see note #3.)
- (3) Sidewalk type, location, and width will be determined in conjunction with Table 1A.
- (4) Asphaltic concrete thickness to be as recommended in the geotechnical report for each project or the specified minimum, whichever is greater.
- (5) ABC thickness to be as recommended in the geotechnical report for each project or the specified minimum, whichever is greater. ABC thickness may be reduced or eliminated with an alternate base or sub-base stabilization method as recommended by the geotechnical report and approved by the public works director. For residential streets, an acceptable substitute for eight (8) inches of ABC is six (6) inches of ABC over six (6) inches of ADOT Class 6 sub-base material. (Gradation of Class 6 material to be supplied by the city.)
- (6) Maximum longitudinal slopes of up to eighteen percent (18%) may be used for a distance not to exceed three hundred (300) feet if existing terrain dictates and if approved by the planning and zoning director and public works director.
- (7) The tangent between reverse curves may be reduced to fifty (50) feet if the centerline radius exceeds seven hundred fifty (750) feet.
- (8) The tangent between reverse curves may be reduced to fifty (50) feet if the centerline radius exceeds two hundred fifty (250) feet or if approved by the public works director.
- (9) The actual length of a vertical curve shall be determined using AASHTO standards but shall not be less than one hundred (100) feet. For residential streets, the length of the vertical curve may be reduced to fifty (50) feet if existing terrain dictates and if approved by the planning and zoning director and public works director.
- (10) On-street parking requires an additional eight (8) feet of pavement to the minimum roadway width for each lane of parking.

Note: These standards are primarily for new roadway construction. These standards may be adjusted on projects involving rehabilitation or reconstruction of existing improvements as approved by the public works director.

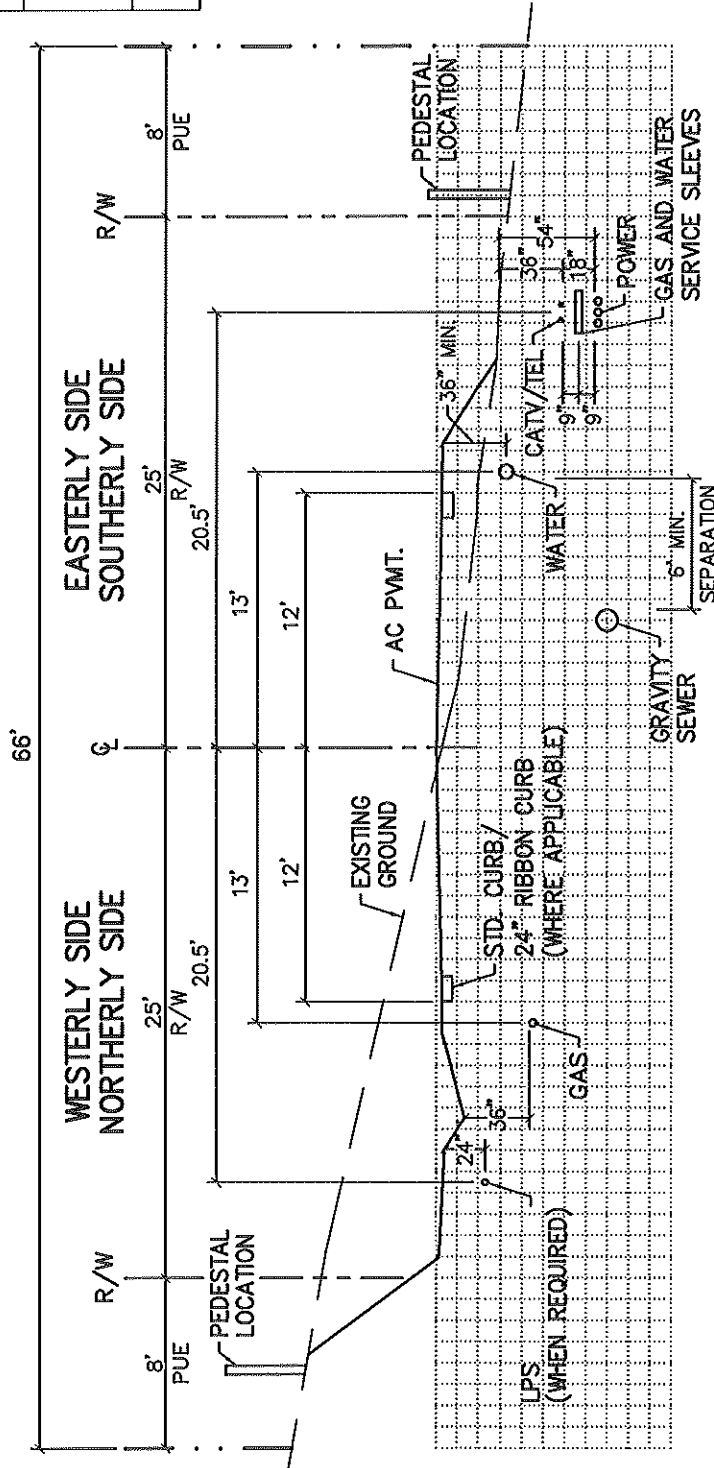
Vertical line of marks on the left side of the page.

LOW PRESSURE SEWER SYSTEMS

GENERAL INFORMATION

Not approved, only accepted by the City of Show Low under special circumstances. If approved, guidelines and specifications will be provided by the City Engineer's office.

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



**CROSS-SECTION LOOKING
NORTH/EAST**

- NOTES:
- 1) LOCATION OF WATER AND SEWER LINES MAY VARY PER TERRAIN
 - 2) KEEP VALVE AND MANHOLES OUT OF ADA SIDEWALK RAMP

FILE: T:\JEFF PERDEORT\STANDARD SPECS\P-01

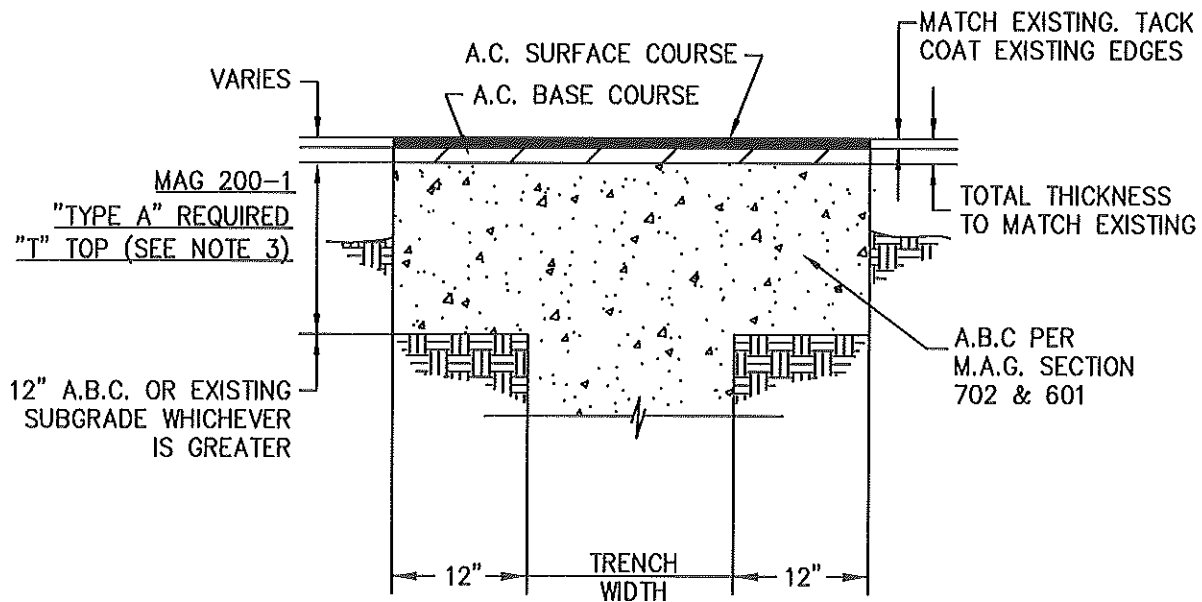
DETAIL NO.
P-01
SHEET 1 OF 1



STANDARD DETAIL
**TYP. STREET AND
UTILITY PLACEMENT DETAIL**

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTES:

1. BEDDING PER MAG SECTION 601.
2. ASPHALT CONCRETE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF MAG SECT 321.
3. "T TOP" TRENCH REPAIR PER MAG 200-1 MAY BE REQUIRED BASED ON TRENCH CONDITION AND DEEMED NECESSARY BY ENGINEERING DEPARTMENT.
4. IF HOT MIX AC IS NOT SEASONALLY AVAILABLE, CONTRACTOR TO PLACE 3,000 PSI TEMPORARY CONCRETE PATCH. CONTRACTOR SHALL REMOVE PORTLAND CEMENT CONCRETE PATCH AND REPLACE WITH AC WHEN CONDITIONS PERMIT (NO MORE THAN 7 MONTHS).

FILE: I:\JEFF PERDEORT\STANDARD SPECS\P-02

DETAIL NO.
P-02
SHEET 1 OF 1



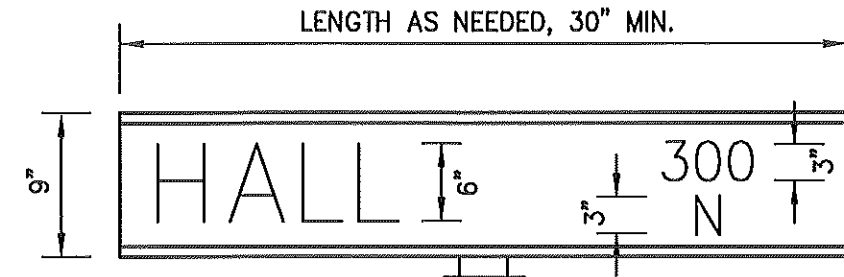
STANDARD DETAIL
BACKFILL, PAVEMENT & SURFACE REPLACEMENT DETAIL

APPROVED BY

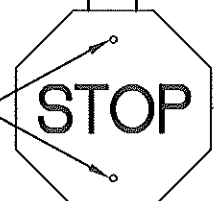
NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

REFLECTIVE WHITE
LETTERS ON
REFLECTIVE GREEN
BACKGROUND

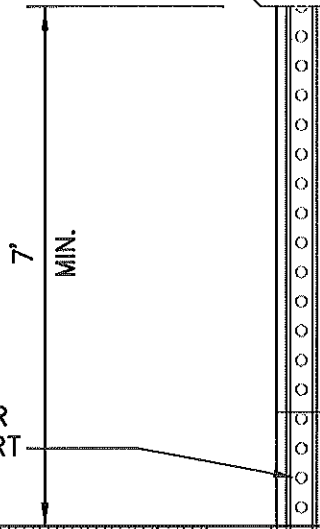
12 GAUGE (.080 IN.)
ALUMINUM NAME PLATE



$\frac{3}{8}$ " STEEL DRIVE RIVET
ZUMAR PART #TL3806



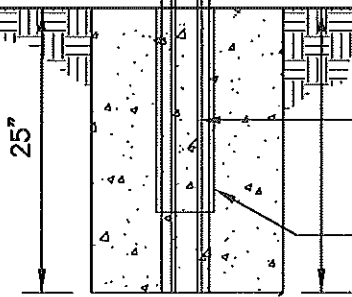
STOP SIGN
(R1-1)
30"x30"



12-GAUGE STEEL
SQUARE POST 2"x2"x12'

2ND HOLE CORNER
BOLT ZUMAR PART
#TL070M

FINISHED GROUND



12-GAUGE STEEL
4-HOLE ONLY ANCHOR
2 $\frac{1}{4}$ "x2 $\frac{1}{4}$ "x29"

12-GAUGE STEEL SLEEVE
2 $\frac{1}{2}$ "x2 $\frac{1}{2}$ "x18"

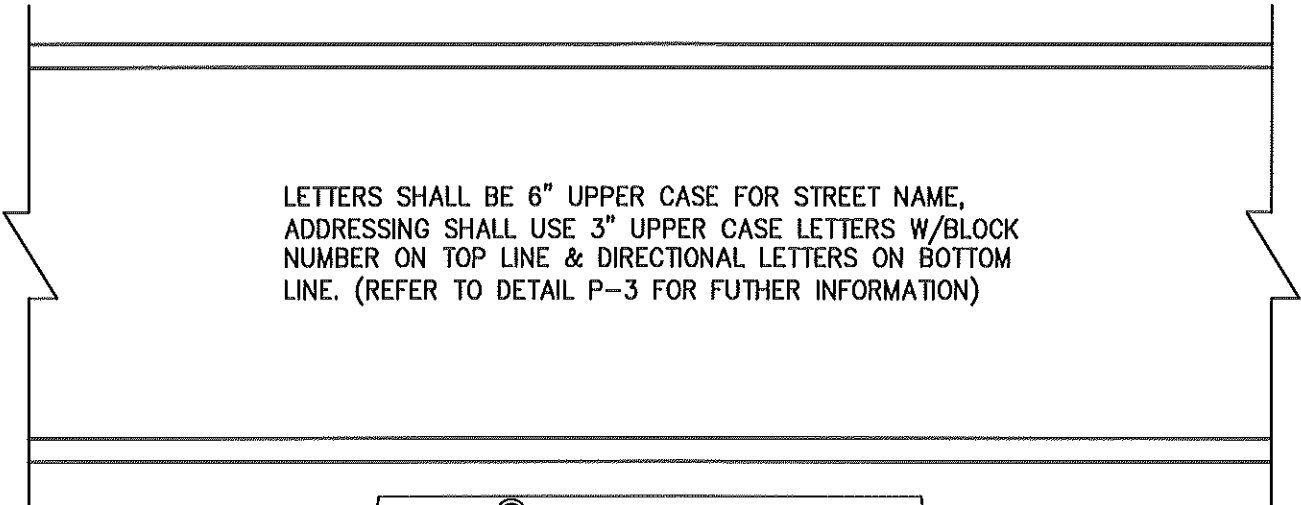
NOTES:

- 2 BAGS CONCRETE MINIMUM IN HOLE.
- NO CONCRETE INSIDE OF ANCHOR.
- HEIGHT & PLACEMENT OF SIGNS SHALL CONFORM TO THE MUTCD.
- SIGN BRACKETS: SHALL BE A MIN. OF 12" IN LENGTH WITH TWO $\frac{1}{4}$ " STEEL RIVETS TO HOLD SIGN TO BRACKET AND BRACKET TO POST. (REFER TO DETAIL P-4 FOR FURTHER INFORMATION)

FILE: T:\JEFF PFERDEORT\STANDARD SPECS\P-04

DETAIL NO.		STANDARD DETAIL	APPROVED BY
P-03		SIGN DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTES:

NAME PLATE: EXTRUDED BLADE WITH 0.250" BULB & 0.091" WEB.

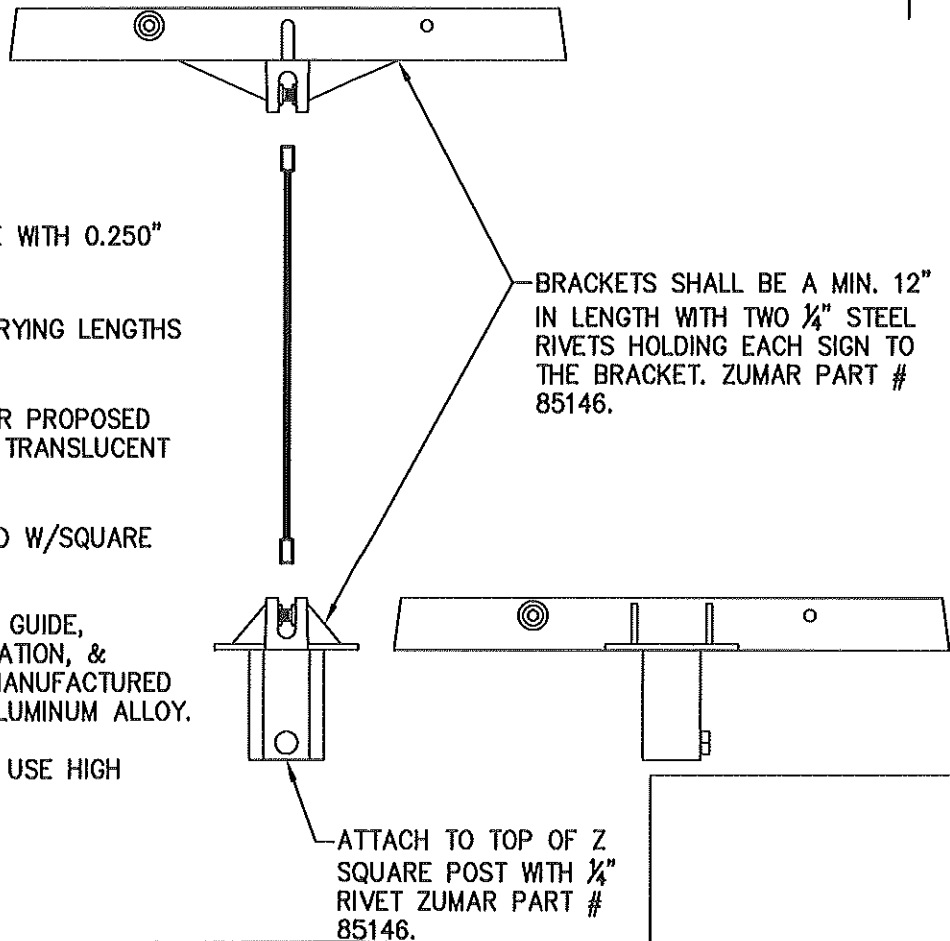
SIGN SIZE SHALL BE 9" BY VARYING LENGTHS 30" MIN., 48" MAX.

SHEETING SHALL BE 3M DG3 OR PROPOSED ASTM 11 WITH 3M 1177 GREEN TRANSLUCENT OVERLAY OR EQUIVALENT.

SIGNS SHALL BE DOUBLE FACED W/SQUARE CORNERS.

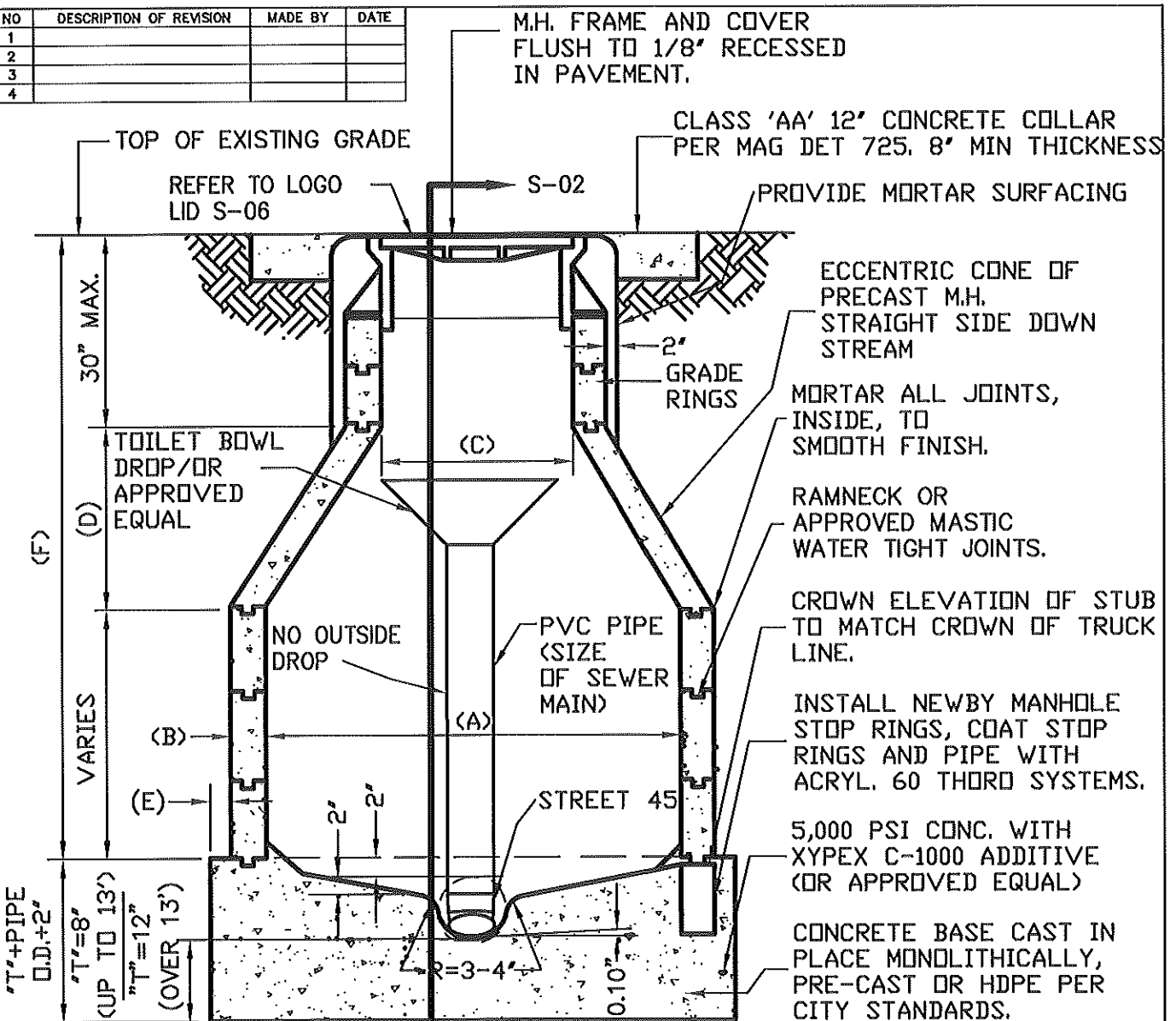
SIGNS: REGULATORY, WARNING, GUIDE, CONSTRUCTION, PUBLIC INFORMATION, & SPECIALTY SIGNS ARE TO BE MANUFACTURED FROM 6061T6 OR 5052-H38 ALUMINUM ALLOY.

ALL REGULATORY SIGNS SHALL USE HIGH INTENSITY PRISMATIC SHEETING.



DETAIL NO.		STANDARD DETAIL	APPROVED BY
P-04		SIGN BRACKET DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTES:

1. IF MANHOLE IS LOCATE OUTSIDE IF PAVEMENT LID SHALL BE 6"-9" ABOVE ADJACENT GRADE.
2. ALL MANHOLE EXCAVATIONS SHALL BE BACKFILLED WITH A 1-SACK SLURRY MIX THAT IS APPROVED BY THE ENGINEER.
3. BOLT DOWN LIDS MAY BE REQUIRED BY CITY DEPENDING ON LOCATION

PIPE SIZE	(A)	(B)	(C)	(D)
17" OR LESS	48"	6"	24"	24"
18" TO 36"	60"	8"	36"	32"

(F)	BASE THICKNESS	(E)
UP TO 8'	6"	8"
8-12'	8"	8"
OVER 12'	12"	12"

FILE: T:\JEFF PFERDEORT\STANDARD SPECS\S-01

DETAIL NO.

S-01

SHEET 1 OF 1

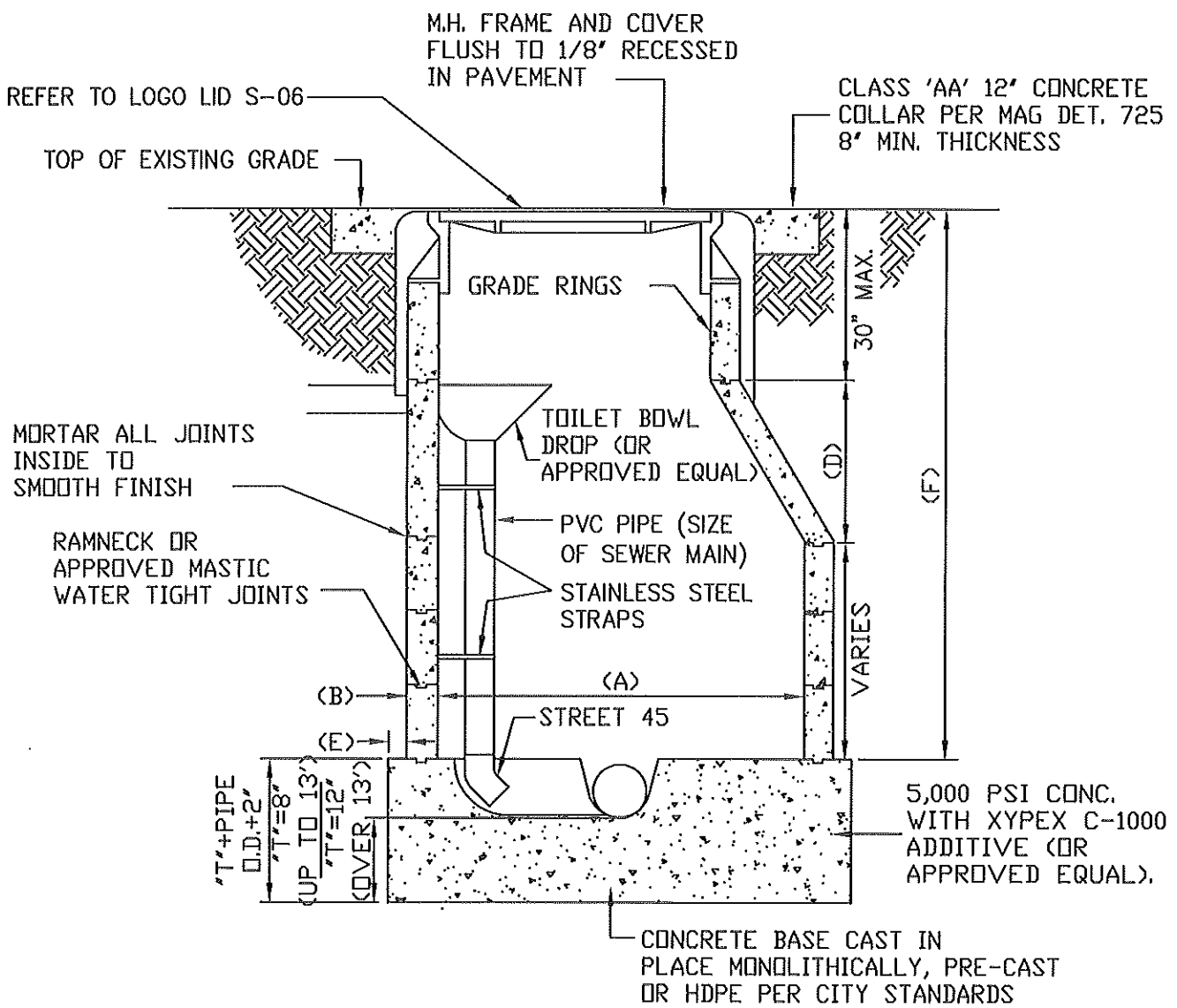


STANDARD DETAIL

SEWER MANHOLE DETAIL

APPROVED BY


NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



PIPE SIZE	(A)	(B)	(C)	(D)
17' OR LESS	48"	6"	24"	24"
18' TO 36'	60"	8"	36"	32"

(F)	BASE THICKNESS	(E)
UP TO 8'	6"	8"
8-12'	8"	8"
OVER 12'	12"	12"

FILE: T:\JEFF PFERDEORT\STANDARD SPECS\S-02

DETAIL NO.		STANDARD DETAIL	
S-02		SEWER MANHOLE SECTION DETAIL	
SHEET 1 OF 1		APPROVED BY	

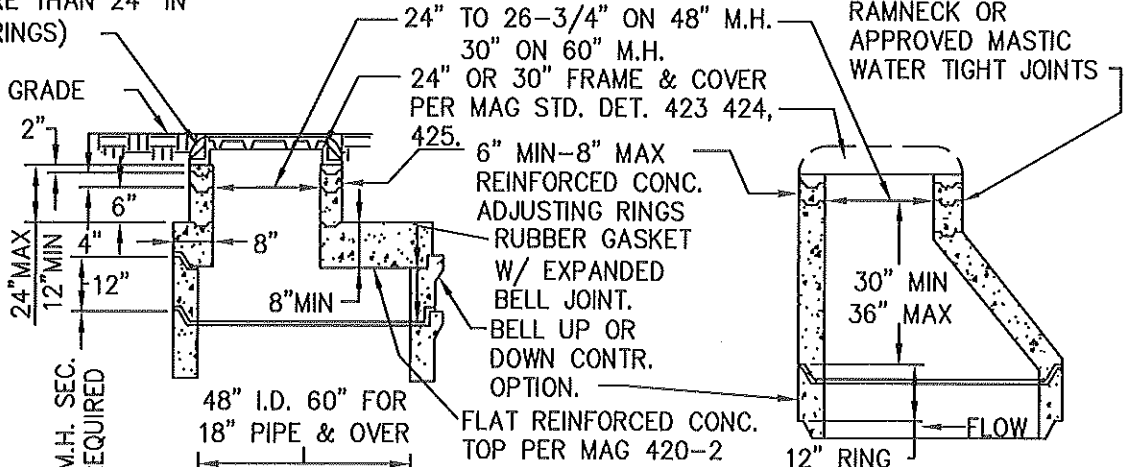
NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

NOTES:

PRE-CAST, REINFORCED M.H. SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH A.S.T.M. C-478 EXCEPT AS MODIFIED BY STANDARD DETAILS BELOW LEFT. USE LOW ALKALI CEMENT ONLY. ALL MANHOLES WILL BE VACUUM TESTED TO CITY SPECS.

CONCRETE GRADE RINGS FOR FINAL ADJUSTMENT. (NO MORE THAN 24" IN GRADE RINGS)

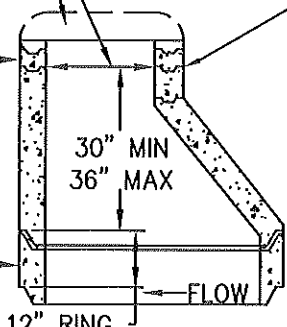
FINISHED GRADE



RAMNECK OR APPROVED MASTIC WATER TIGHT JOINTS

24" MAX
12" MIN

6" MIN-8" MAX REINFORCED CONC. ADJUSTING RINGS
RUBBER GASKET W/ EXPANDED BELL JOINT.
BELL UP OR DOWN CONTR. OPTION.



STD. M.H. SEC. AS REQUIRED

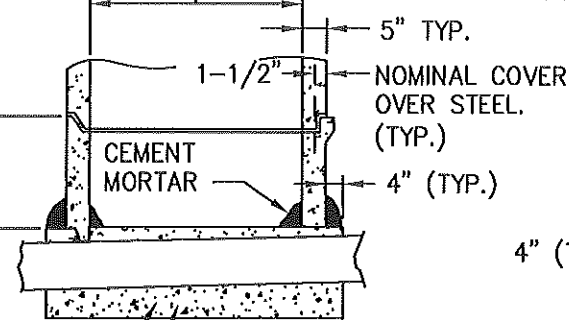
48" I.D. 60" FOR 18" PIPE & OVER

FLAT REINFORCED CONC. TOP PER MAG 420-2

12" RING

ALTERNATE BASE ** WITH KNOCKOUTS FOR PIPES. CLEARANCE AROUND PIPES 1" MIN.-3" MAX. EXCEPT LOWER CORNERS.

BOTTOM M.H. SEC. "L" AS REQUIRED

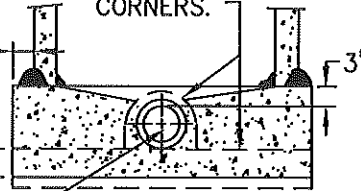


5" TYP.

NOMINAL COVER OVER STEEL. (TYP.)

4" (TYP.)

4" (TYP.)



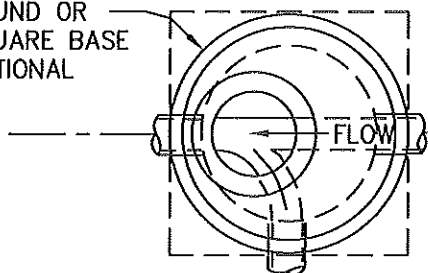
5000 PSI CONC. BASE WITH XYPEX C-1000 ADDITIVE (OR APPROVED EQUAL)

CAST IN PLACE

** 12" IF MANHOLE IS OVER 13' DEEP.

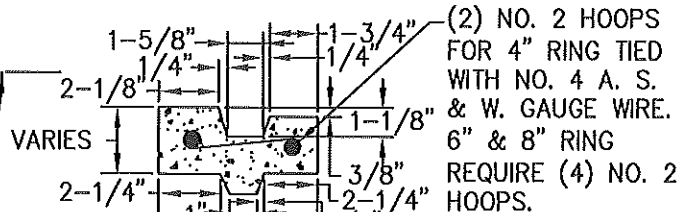
WATER STOPS SHALL BE INSTALLED ON INLET AND OUTLET PIPES.

ROUND OR SQUARE BASE OPTIONAL



DROP THROUGH M.H. 0.1' FOR 0' - 90'

90° MAX



(2) NO. 2 HOOPS FOR 4" RING TIED WITH NO. 4 A. S. & W. GAUGE WIRE. 6" & 8" RING REQUIRE (4) NO. 2 HOOPS.

SPACING OF MANHOLES PER ADEQ
8" TO 15" NO MORE THAN 500FT
18" TO 30" NO MORE THAN 600FT

FILE: T:\JEFF PERDEORT\STANDARD SPECS\S-03

DETAIL NO.

S-03

SHEET 1 OF 1



STANDARD DETAIL

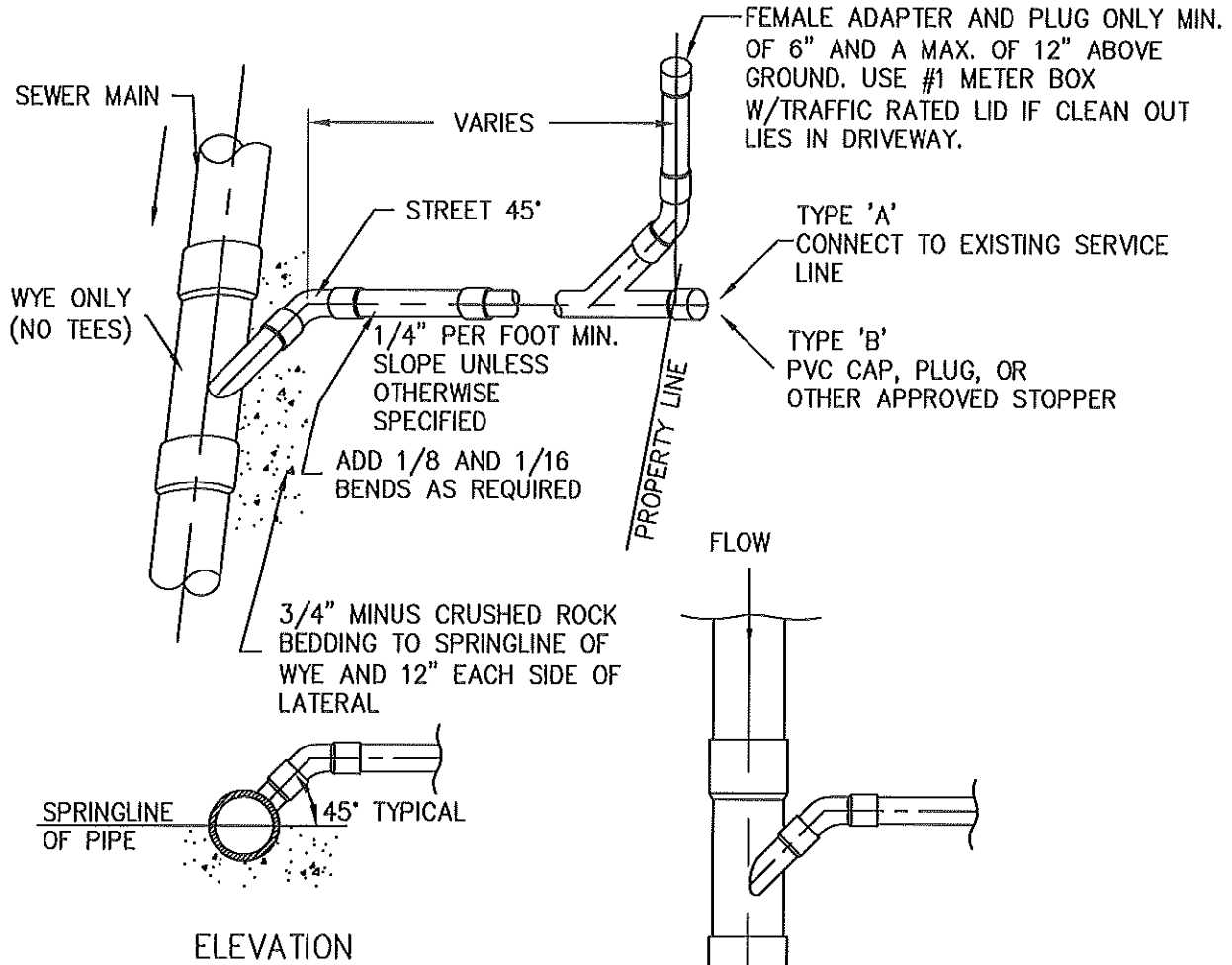
PRE-CAST CONCRETE SEWER MANHOLE DETAIL

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

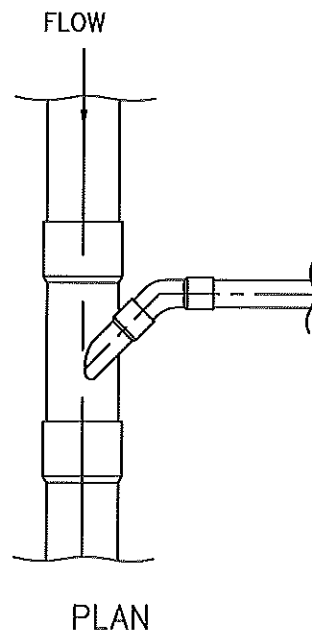
NOTE:

MIN. 6' SEPARATION BETWEEN CLEAN OUT AND WATER METER.



NOTES:

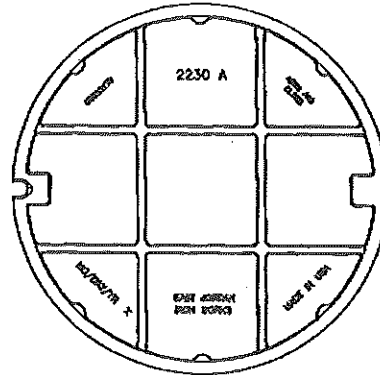
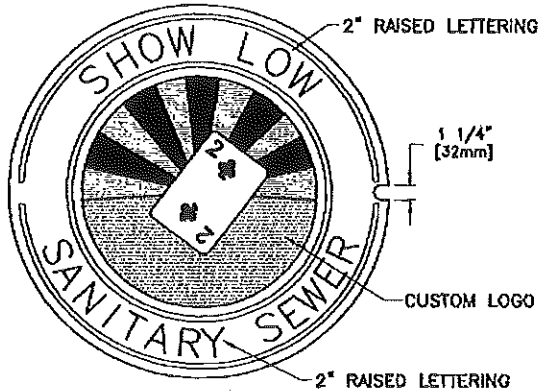
1. WHERE WYE IS INSTALLED WITHOUT HOUSE LATERAL, AN APPROVED CAP, PLUG OF STOPPER SHALL BE INSTALLED.
2. LATERAL SIZE TO BE 4" FOR SINGLE OR MULTIPLE FAMILY RESIDENTIAL, AND 6" FOR COMMERCIAL.
3. THE LATERAL SHALL BE BEDDED THE SAME AS THE MAIN LINE SEWER.
4. FOR LATERALS IN CUL-DE-SACS AND LATERALS THAT ARE OTHER THAN 90° TO THE MAIN, 12 GA. TRACER WIRE SHALL BE INSTALLED.



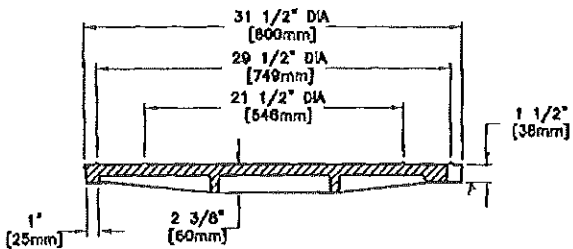
FILE: T:\JEFF PERDORT\STANDARD SPECS\S-05

DETAIL NO.		STANDARD DETAIL	
S-05		SEWER LATERAL SERVICE DETAIL	
SHEET 1 OF 1			APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



BOTTOM VIEW OF COVER



COVER SECTION

▽ MACHINED SURFACE

EAST JORDAN IRON WORKS, INC.
P.O. BOX 439
EAST JORDAN, MI. 49727
1-800-874-4100
FAX 231-536-4458

DRAWN SMH	DATE 07/27/05
APPROVED	DATE

MANHOLE COVER

PRODUCT NO.
00223172

CATALOG NO.
2230 A

REF. LOGO DRAWING
00223171

EST. WT.
COVER: 221 LBS 100kg

OPEN AREA
N/A

MAT'L SPEC.
COVER-- GRAY IRON
ASTM A48 CL35B

LOAD RATING
HEAVY DUTY

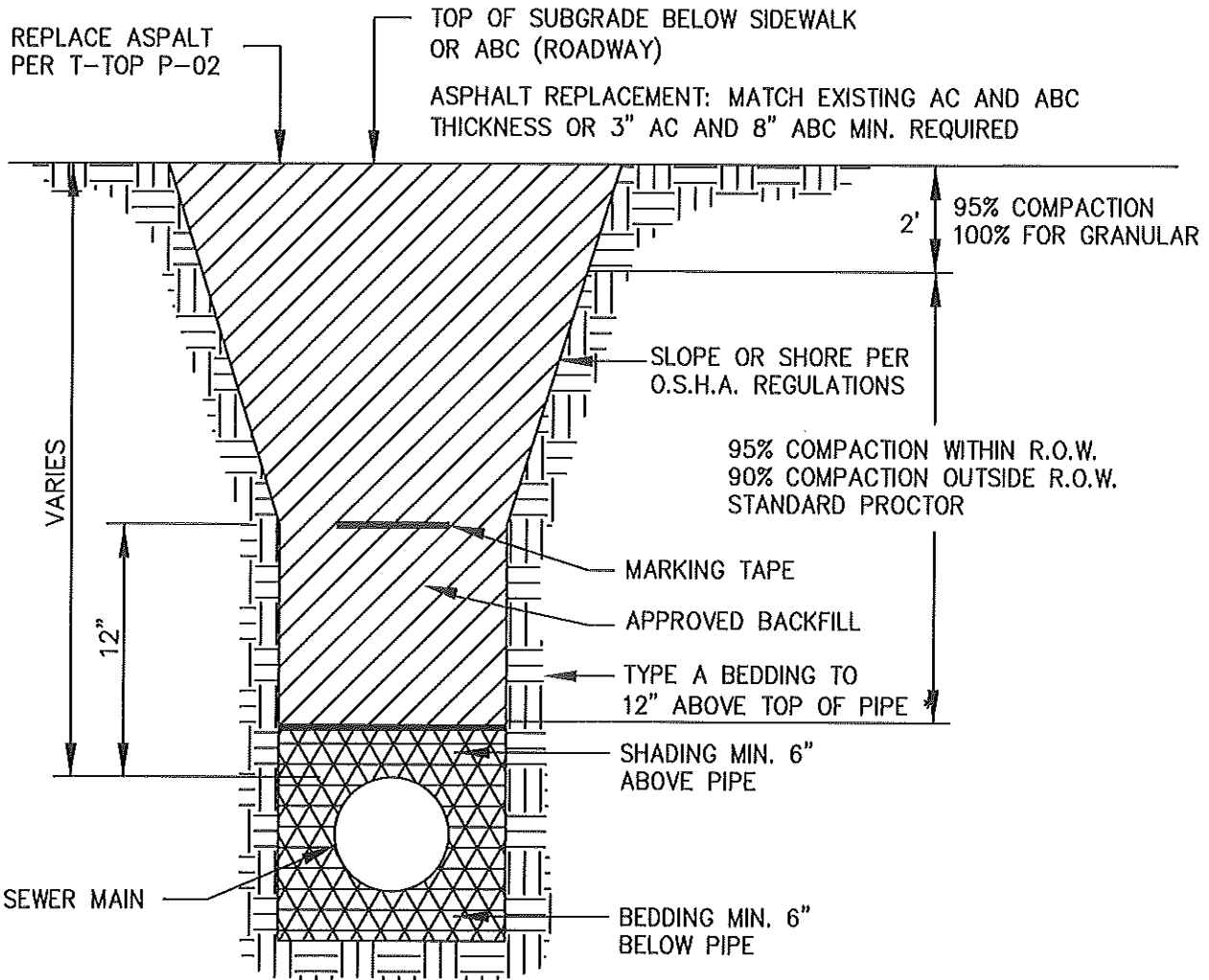
TOP OF CASTINGS CAN'T BE HIGHER THAN RIM OF FRAME

FILE: T:\JEFF PERDEORT\STANDARD SPECS\S-06

DETAIL NO.		STANDARD DETAIL
S-06		SEWER MANHOLE COVER DETAIL
SHEET 1 OF 1		

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



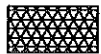
BEDDING AND SHADING MATERIAL APPROVED BY ENGINEER AND COMPACTED TO 95%. PLSD BLEND MATERIAL SHALL NOT BE USED.

NOTE:

1. A SLURRY MIX (1 SACK) WILL BE ALLOWED AS BACKFILL IN THE TRENCH ABOVE THE MARKING TAPE. IF SEWER MAIN IS IN ADOT ROW, SLURRY MIX SHALL MEET ADOT SPECIFICATIONS.



BACKFILL PER CITY SPEC. SEC.



BEDDING MATERIAL



UNDISTURBED EARTH

FILE: T:\EFF PERDEORY STANDARD SPECS\S-07

DETAIL NO.

S-07

SHEET 1 OF 1

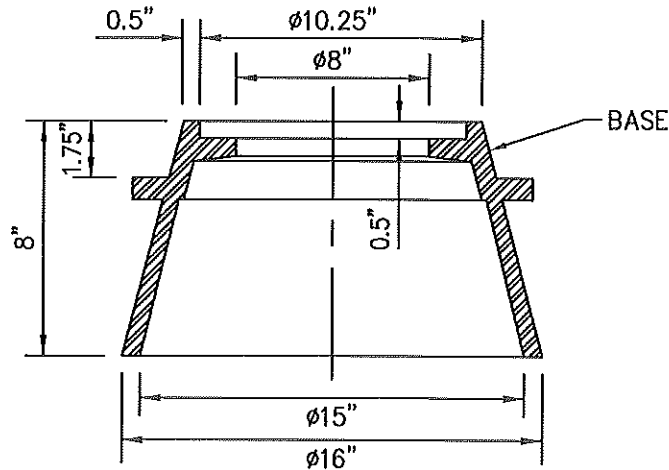
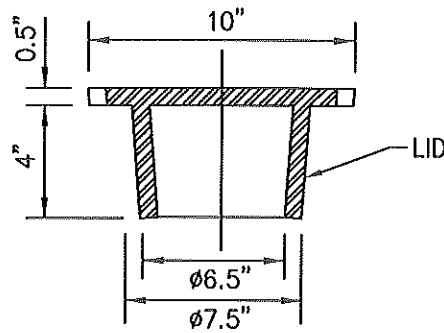
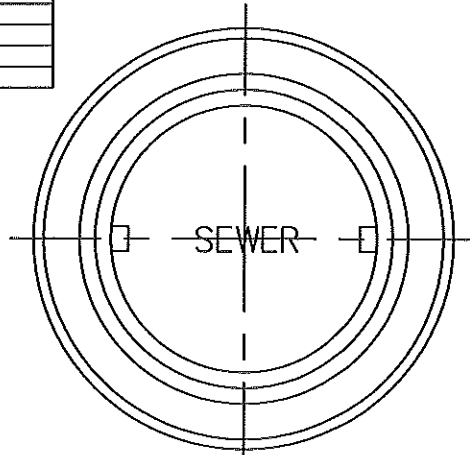


STANDARD DETAIL

SEWER MAIN TRENCH DETAIL

APPROVED BY


NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTES:

1. MATERIAL TO BE CAST IRON VALVE BOX VBDLT198 PER ASTM A48 CLASS 30B.
2. APPROXIMATE WEIGHT IS 63 LBS. FOR THE BASE AND 16 LBS. FOR THE LID.
3. TOP OF SEWER CLEANOUT TO BE MAX. 3" BELOW CAST IRON LID.
4. SEWER CLEANOUT SHALL BE AT PROPERTY LINE, THE WORD "SEWER" SHALL BE VISIBLE IN CONCRETE DRIVEWAY.
5. MATERIALS AVAILABLE AT LOCAL SUPPLIERS.

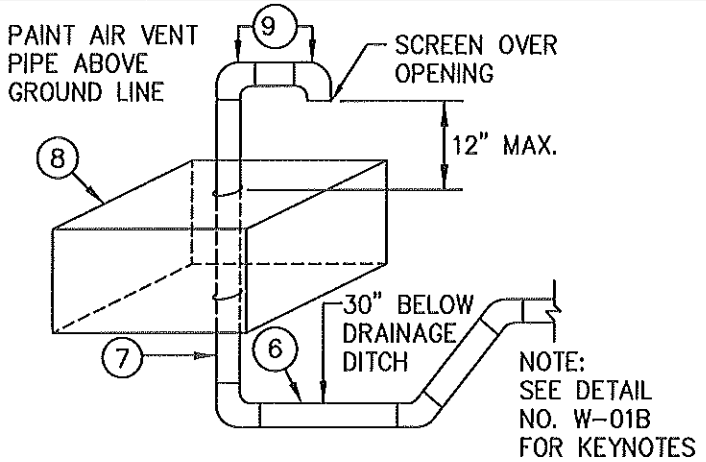
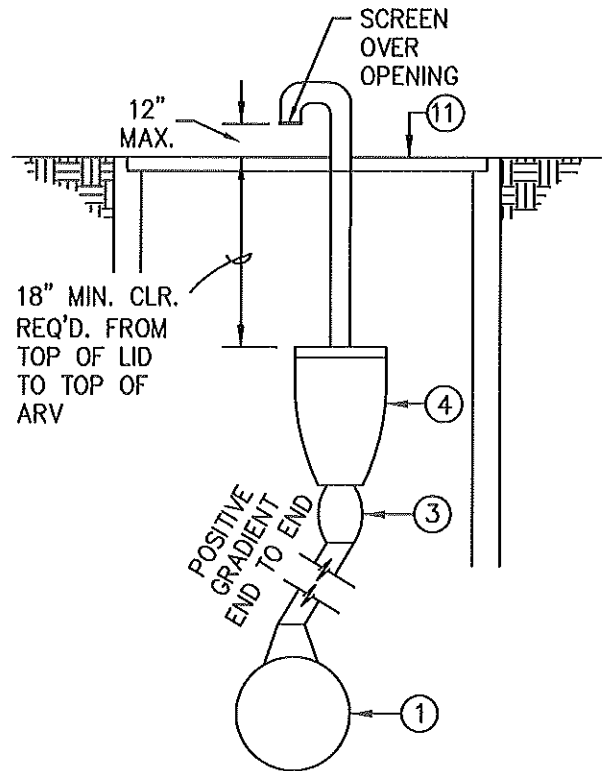
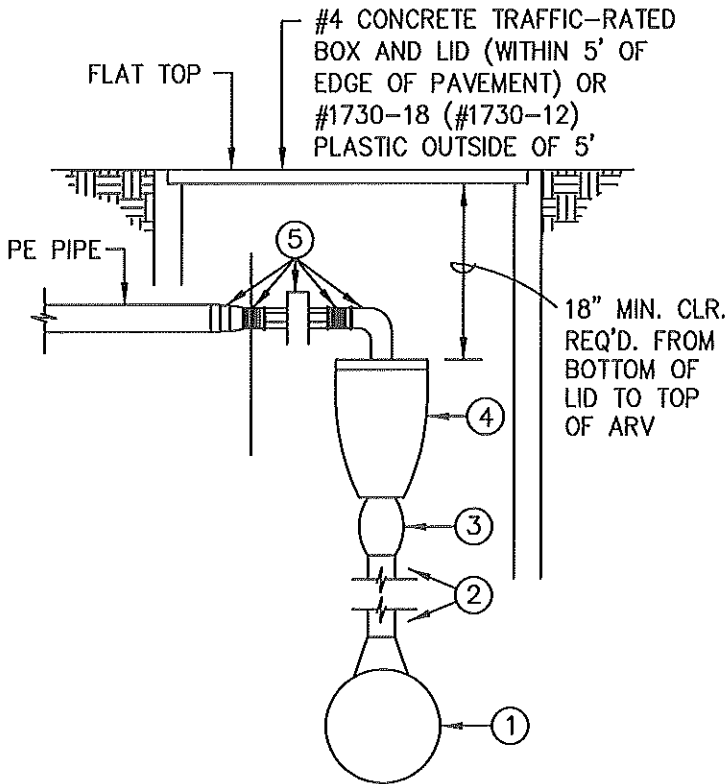
FILE: T:\EFF PFERDERT\STANDARD SPECS\S-08

DETAIL NO.		STANDARD DETAIL	
S-08		SEWER CAST IRON VALVE BOX DETAIL	
SHEET 1 OF 1			APPROVED BY


NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

NOTE:
LOCATION MAY VARY, PLACE
IN CITY APPROVED LOCATION.

NOTE:
REALIGN THIS LOCATION
TO INSIDE OF PUE.



NOTE:
SEE DETAIL
NO. W-01B
FOR KEYNOTES


DETAIL NO.		STANDARD DETAIL	APPROVED BY
W-01A		WATER LINE AIR RELEASE DETAIL	
SHEET 1 OF 2			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

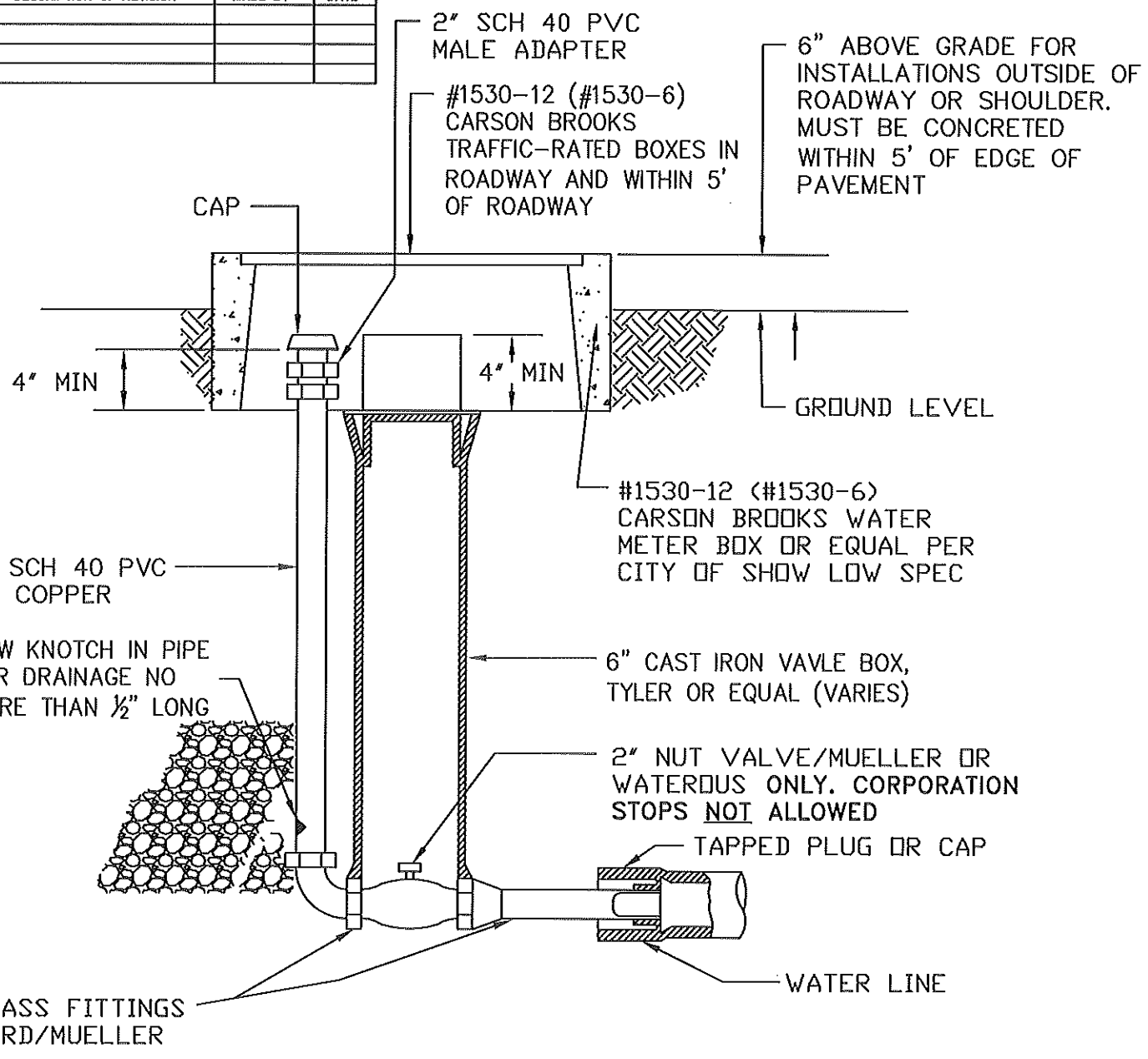
NOTES:

1. FORD/MUELLER TAP SADDLE.
2. BRASS OR COPPER PIPE.
3. FORD/MUELLER CORPORATION STOP.
4. CRISPIN AIR-RELEASE VALVE, OR EQUAL.
5. A. MALE PEP PIPE ADAPTER.
B. 2" NIPPLES, GALVANIZED OR BRASS.
C. UNION, GALVANIZED OR BRASS.
D. STREET 90 ELL, GALVANIZED OR BRASS.
6. GALVANIZED, BRASS COPPER PIPE, OR POLY.
7. RISER (GALVANIZED, BRASS OR COPPER) PIPE.
8. #1530-12 (#1530-6) CARSON/BROOKS METER BOX WITH LID AND 1" HOLE DRILLED IN THE CENTER FOR RISER. PLACE IN CITY APPROVED LOCATION.
9. 2-90° ELL'S WITH FINE MESH SCREEN OVER OPENING.
10. PVC NOT APPROVED FOR ANY NON-BURIED INSTALLATION.
11. 1730-18 (#1730-12) CARSON/BROOKS METER BOX WITH LID AND 1" HOLE DRILLED IN THE CENTER FOR RISER. PLACE IN CITY APPROVED LOCATION.

APPROVED BY

DETAIL NO.		STANDARD DETAIL	
W-01B		WATER LINE AIR RELEASE DETAIL	
SHEET 2 OF 2			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTE:

- GRAVEL OR CINDERS, MEGA LUGS ARE REQUIRED; LENGTH OF RESTRAINT TO BE DETERMINED BY DESIGN ENGINEER.

DETAIL NO.		STANDARD DETAIL	APPROVED BY
W-02		WATER LINE BLOW OFF DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

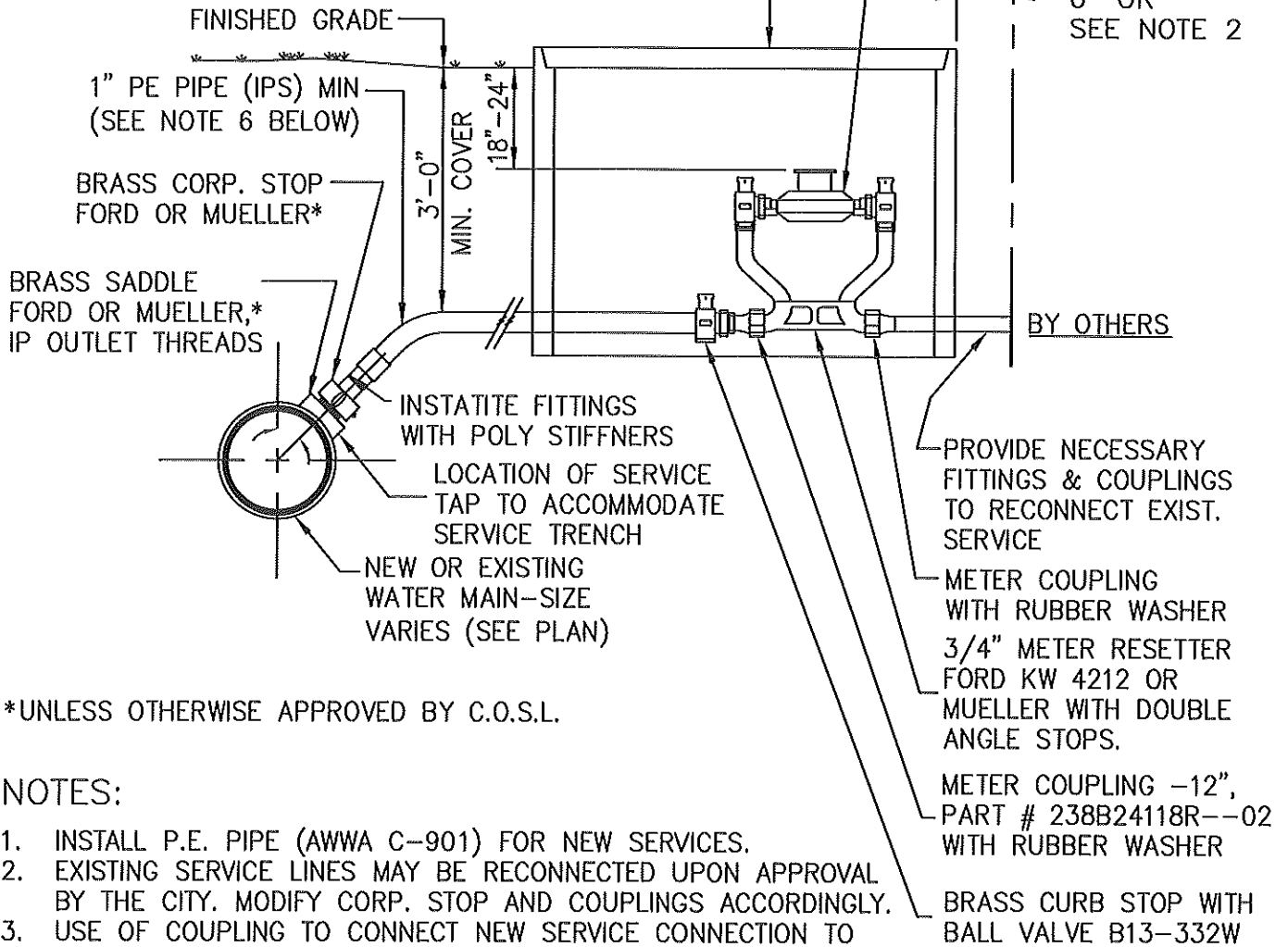
INSTALL 3/4" IDLER @
FUTURE METER LOCATION
(METER NOT IN CONTRACT)

#1220-12 (#1220-6) PLASTIC
METER BOX WITH EXTENSION,
CARSON BROOKS OR EQUAL.
(#1730-18 (#1730-12)
FOR DOUBLE METER)

R.O.W.

PUBLIC | PRIVATE

6" OR
SEE NOTE 2



*UNLESS OTHERWISE APPROVED BY C.O.S.L.

NOTES:

1. INSTALL P.E. PIPE (AWWA C-901) FOR NEW SERVICES.
2. EXISTING SERVICE LINES MAY BE RECONNECTED UPON APPROVAL BY THE CITY. MODIFY CORP. STOP AND COUPLINGS ACCORDINGLY.
3. USE OF COUPLING TO CONNECT NEW SERVICE CONNECTION TO EXISTING SERVICE LINE ONLY BY APPROVAL BY THE CITY.
4. ALL FITTINGS FROM THE CITY WATER MAIN TO INSIDE THE METER BOX SHALL BE BRASS. NO GALVANIZED FITTINGS SHALL BE USED.
5. COUPLINGS SHALL BE MUELLER AND FORD COMPRESSION TYPE WITH POLY STIFFENERS.
6. WATER METERS AND SERVICE LINES FROM THE METER TO THE RESIDENCE SHALL BE SIZED PER THE CURRENT ADOPTED VERSION OF THE UNIFORM PLUMBING CODE BY DESIGN ENGINEER.
7. COPPER WASHERS ARE NOT ALLOWED. USE RUBBER WASHERS ONLY.

PROVIDE NECESSARY
FITTINGS & COUPLINGS
TO RECONNECT EXIST.
SERVICE

METER COUPLING
WITH RUBBER WASHER
3/4" METER RESETTER
FORD KW 4212 OR
MUELLER WITH DOUBLE
ANGLE STOPS.

METER COUPLING -12",
PART # 238B24118R--02
WITH RUBBER WASHER

BRASS CURB STOP WITH
BALL VALVE B13-332W

DETAIL NO.

W-03

SHEET 1 OF 1



STANDARD DETAIL

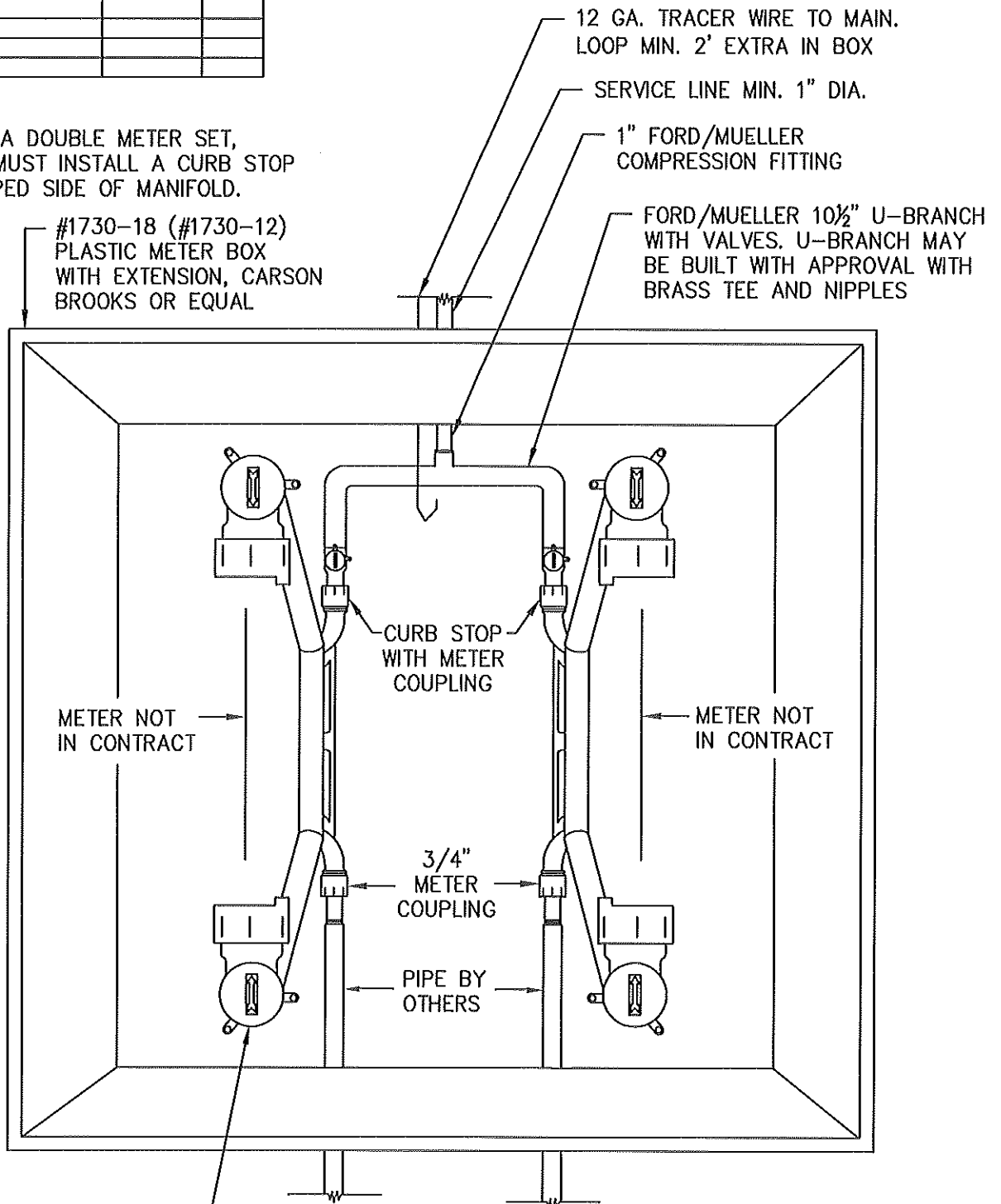
WATER SERVICE DETAIL

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

NOTE:

IF INSTALLING A DOUBLE METER SET, CONTRACTOR MUST INSTALL A CURB STOP ON UNDEVELOPED SIDE OF MANIFOLD.



#1730-18 (#1730-12)
PLASTIC METER BOX
WITH EXTENSION, CARSON
BROOKS OR EQUAL

12 GA. TRACER WIRE TO MAIN.
LOOP MIN. 2' EXTRA IN BOX

SERVICE LINE MIN. 1" DIA.

1" FORD/MUELLER
COMPRESSION FITTING

FORD/MUELLER 10 1/2" U-BRANCH
WITH VALVES. U-BRANCH MAY
BE BUILT WITH APPROVAL WITH
BRASS TEE AND NIPPLES

METER NOT
IN CONTRACT

METER NOT
IN CONTRACT

3/4"
METER
COUPLING

PIPE BY
OTHERS

CURB STOP
WITH METER
COUPLING

9" OR 12" FORD/MUELLER
RESETTERS WITH DOUBLE
ANGLE STOPS

NOTES:

1. NO GALVANIZED PIPE CONNECTED TO METER COUPLING
2. COPPER WASHERS NOT ALLOWED
3. WATER METERS AND SERVICE LINES FROM THE METER TO THE RESIDENCE SHALL BE SIZED PER THE CURRENT ADOPTED VERSION OF THE UNIFORM PLUMBING CODE BY THE DESIGN ENGINEER.

DETAIL NO.
W-04
SHEET 1 OF 1



STANDARD DETAIL
RESIDENTIAL METER SET DETAIL

APPROVED BY

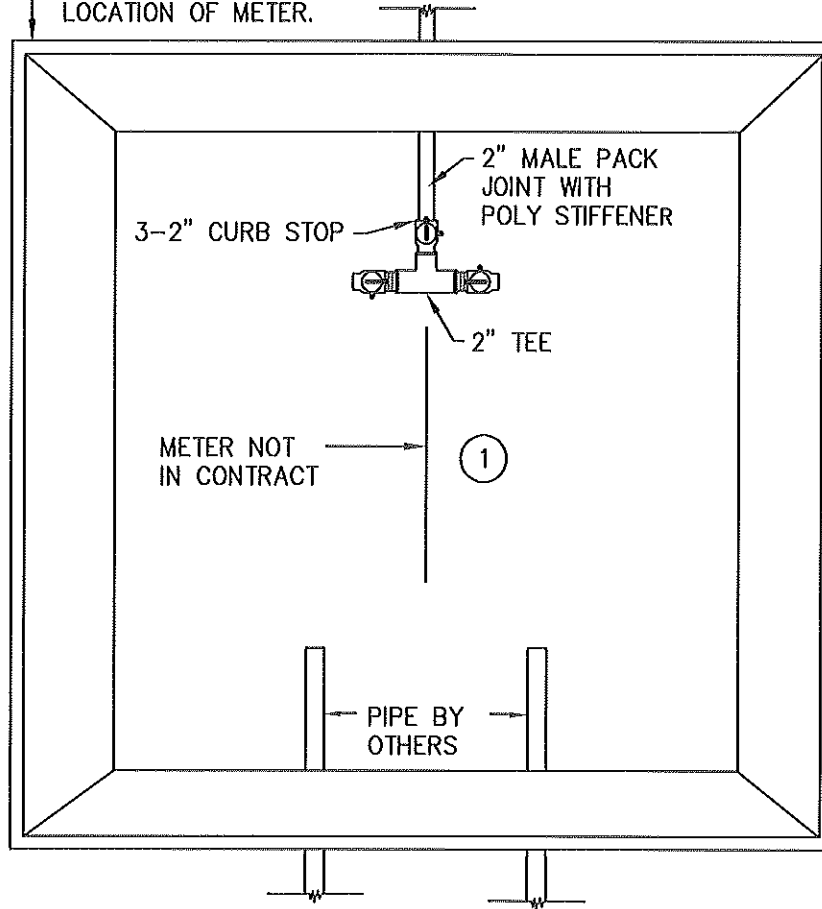
NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

NOTES:

1. IF COMMERCIAL RESETTER IS USED, SERVICE DEPTH MUST BE ADJUSTED TO PROVIDE 18"-24" FROM TOP OF METER TO GROUND LEVEL.
2. 1-1/2" MIN. P.E. (IPS) SERVICE WITH INSTANTITE FITTINGS AND POLY STIFFNERS. SERVICE LINE AND METER TO BE SIZED PER CURRENT EDITION U.P.C. BY THE DESIGN ENGINEER.

#1730-18 (#1730-12)
 PLASTIC OR CONCRETE
 METER BOX
 WITH EXTENSION, CARSON
 BROOKS OR EQUAL.

TRAFFIC RATED BOX MAY
 BE REQUIRED BY THE
 CITY DEPENDING ON
 LOCATION OF METER.



DETAIL NO.
W-05
SHEET 1 OF 1



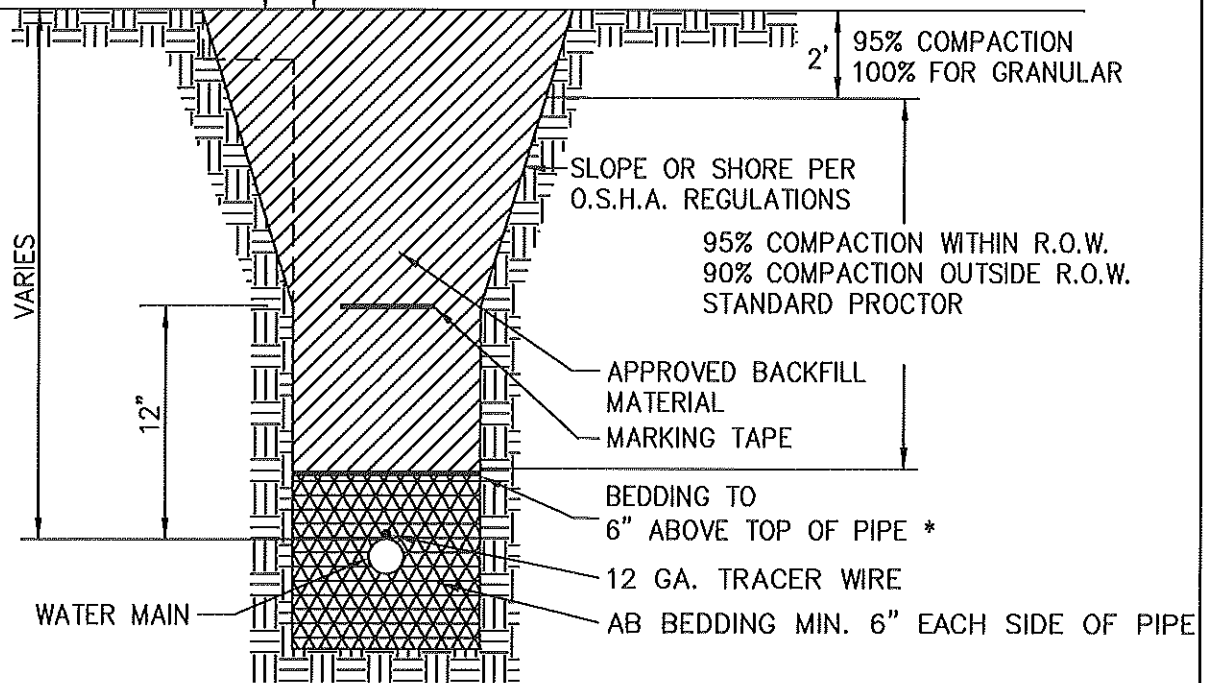
STANDARD DETAIL
COMMERCIAL METER SET DETAIL

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

T-CUT TRENCH REQUIRED FOR ROADWAY INSTALLATIONS, SEE DETAIL P-02

TOP OF SUBGRADE BELOW SIDEWALK OR ABC (ROADWAY)
 ASPHALT REPLACEMENT: MATCH EXISTING AC AND ABC THICKNESS OR 3" AC AND 8" ABC MIN. REQUIRED



2' 95% COMPACTION 100% FOR GRANULAR

SLOPE OR SHORE PER O.S.H.A. REGULATIONS

95% COMPACTION WITHIN R.O.W. 90% COMPACTION OUTSIDE R.O.W. STANDARD PROCTOR

APPROVED BACKFILL MATERIAL MARKING TAPE

BEDDING TO 6" ABOVE TOP OF PIPE *

12 GA. TRACER WIRE




AB BEDDING MIN. 6" EACH SIDE OF PIPE

WATER MAIN


*BEDDING MATERIAL APPROVED BY ENGINEER AND COMPACTED TO 95% MIN.

NOTES:

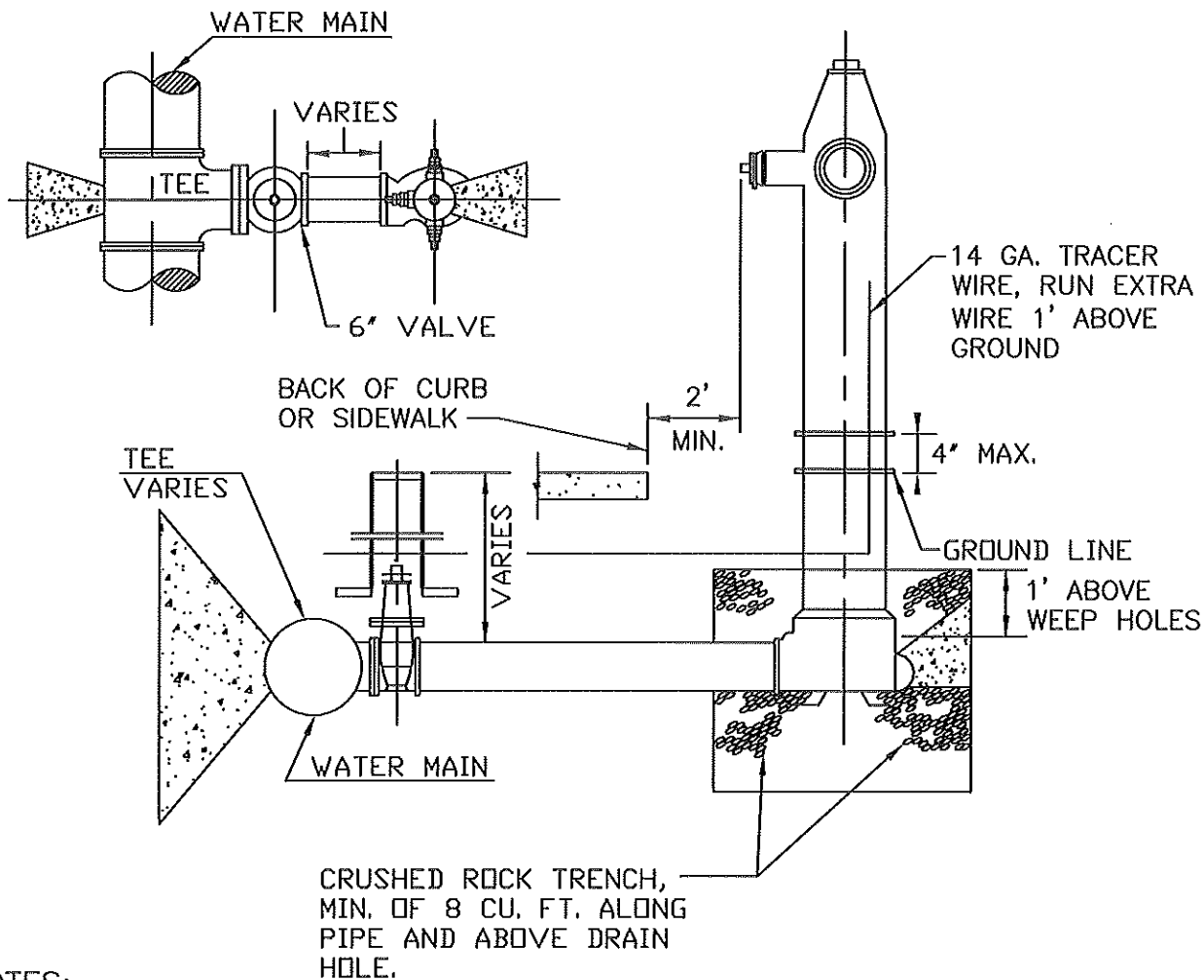
1. A SLURRY MIX (1 SACK) WILL BE ALLOWED AS BACKFILL IN THE TRENCH. INSTALL MARKING TAPE ON TOP OF PIPE BEDDING, WHEN USING SLURRY. IF WATER MAIN IS IN ADOT ROW, SLURRY MIX SHALL MEET ADOT SPECIFICATIONS.
2. RESTRAINT LENGTH MAY INCREASE WITH ALTERNATE BEDDING MATERIAL. CALCULATIONS ARE REQUIRED.

-  BACKFILL PER CITY SPEC.
-  BEDDING MATERIAL
-  UNDISTURBED EARTH

FILE: T:\JEFF PFERDEORT\STANDARD SPECS\W-06

DETAIL NO.		STANDARD DETAIL	
W-06		WATER MAIN TRENCH DETAIL	
SHEET 1 OF 1			APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

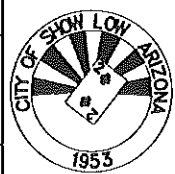


NOTES:

1. ALL JOINTS BETWEEN THE VALVE AND HYDRANT SHALL BE RESTRAINED MECHANICAL TYPE.
2. A FLANGE JOINT BY MECHANICAL JOINT VALVE MAY BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.
3. SEE STANDARD DETAIL W-07C FOR LOCATION OF HYDRANT.
4. WATEROUS OR MUELLER HYDRANTS ONLY.
5. DO NOT INSTALL HYDRANTS IN ROADSIDE DITCHES.
6. IN CASES WHERE A HYDRANT IS ADDED TO AN EXISTING MAIN OR WHERE A TAPPING VALVE IS USED, CONCRETE THRUST BLOCKS MUST BE INSTALLED BEHIND TEE. MAG ST.DETAIL 340.
7. F.H. EXTENSION MAY BE USED TO ADJUST TO PROPER GRADE.

FILE: T:\JEFF PERDEORT\STANDARD SPECS\W-07A

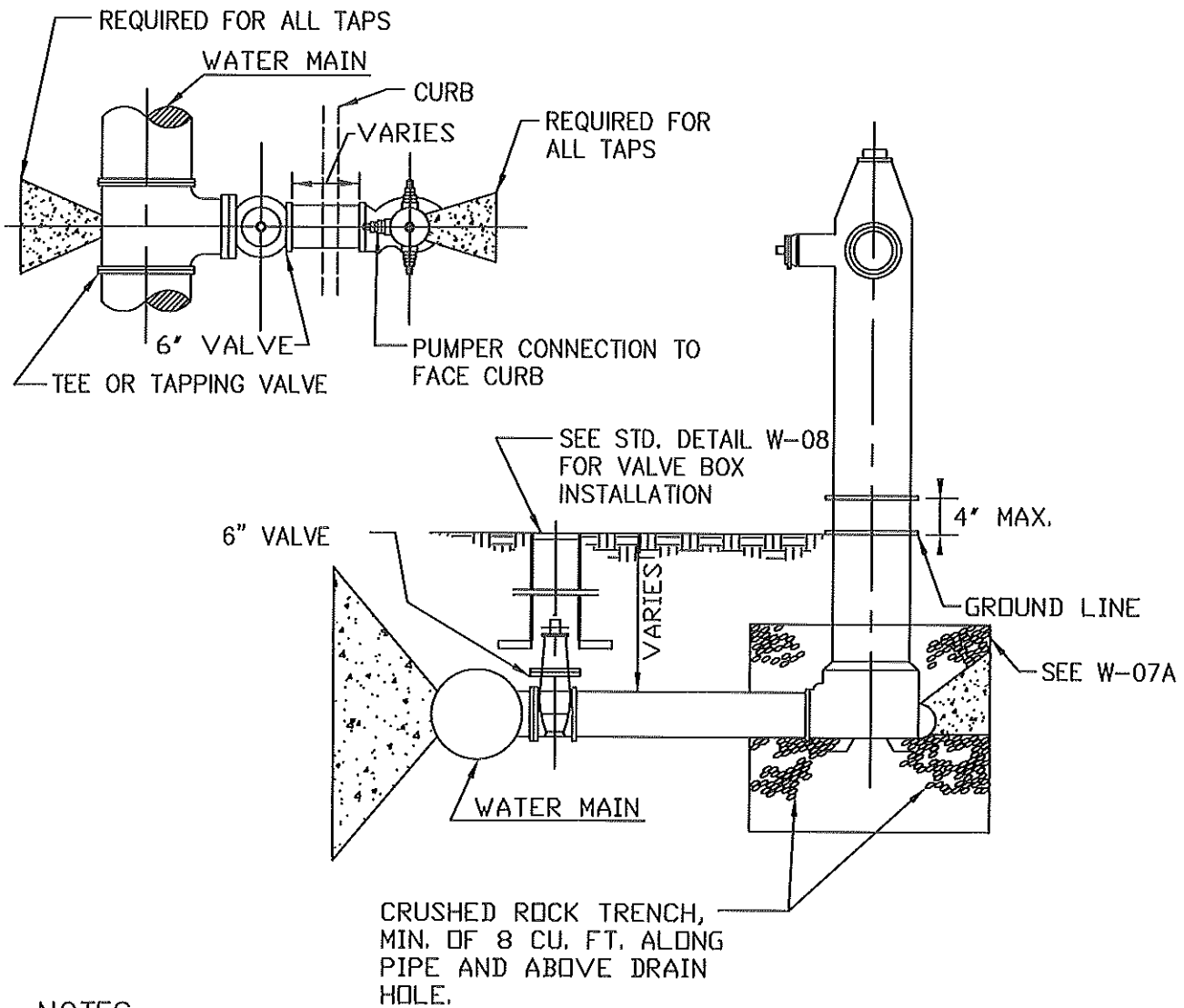
DETAIL NO.
W-07A
SHEET 1 OF 3



STANDARD DETAIL
FIRE HYDRANT INSTALLATION

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

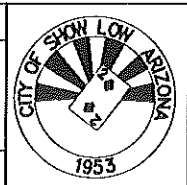


NOTES:

1. JOINTS BETWEEN THE VALVE AND THE MAIN MAY BE FLANGED TYPE. JOINTS BETWEEN THE VALVE AND HYDRANT SHALL BE MECHANICAL JOINT RESTRAINT TYPE.
2. FOR CONCRETE THRUST BLOCKS, SEE STD. DETAIL W-10.
3. A FLANGE JOINT BY MECHANICAL JOINT VALVE MAY BE USED AS THE TRANSITION BETWEEN THE JOINT TYPES.
4. SEE STD. DETAIL W-07C FOR LOCATION OF HYDRANT.
5. F.H. EXTENSION MAY BE USED TO ADJUST TO PROPER GRADE.
6. IF CONCRETE IS USED, DRAIN HOLES MUST REMAIN OPEN.

FILE: T:\JEFF PERDEORT\STANDARD SPECS\W-07B

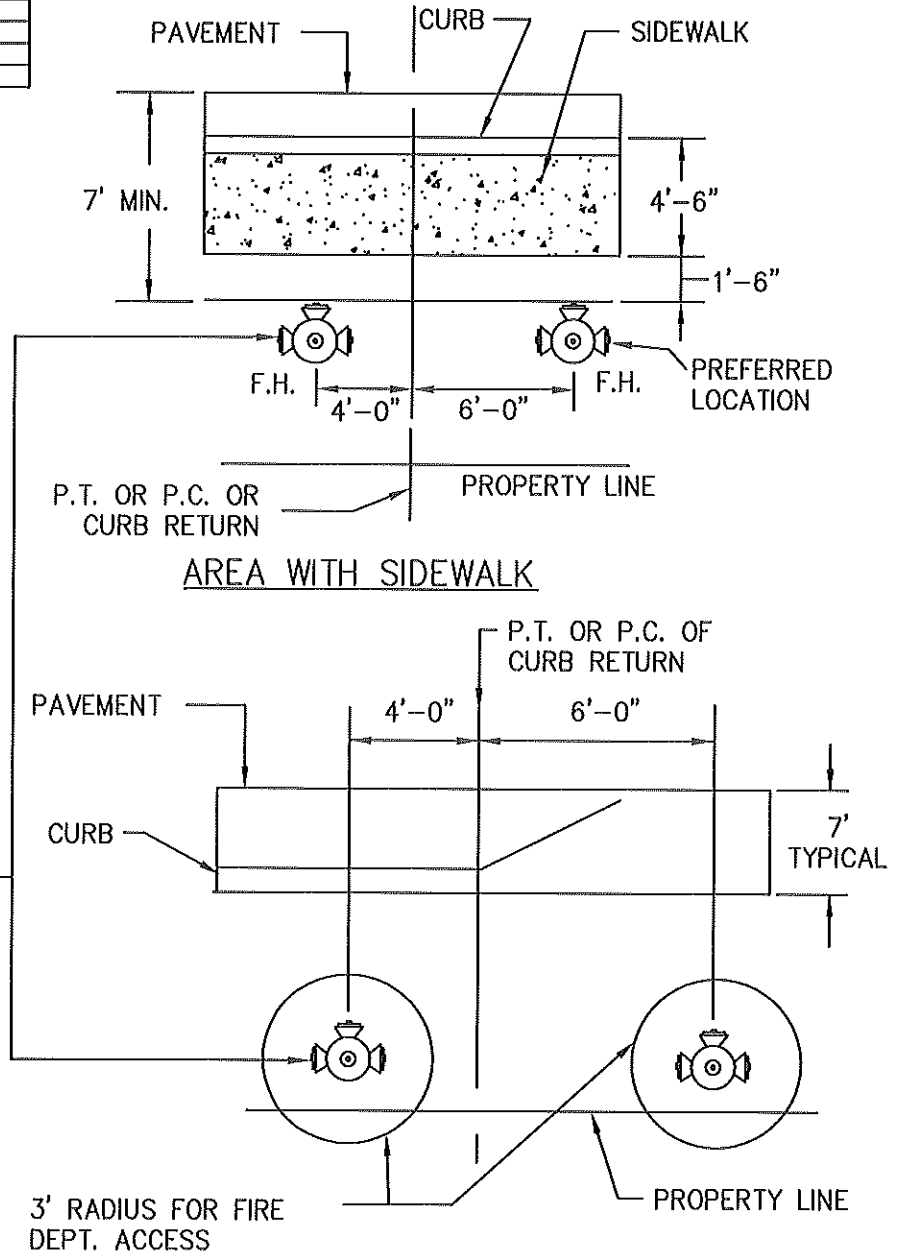
DETAIL NO.
W-07B
SHEET 2 OF 3



STANDARD DETAIL
FIRE HYDRANT INSTALLATION DETAIL

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



ACCEPTABLE LOCATION IF CURB RADIUS IS 20' OR MORE

NOTES:

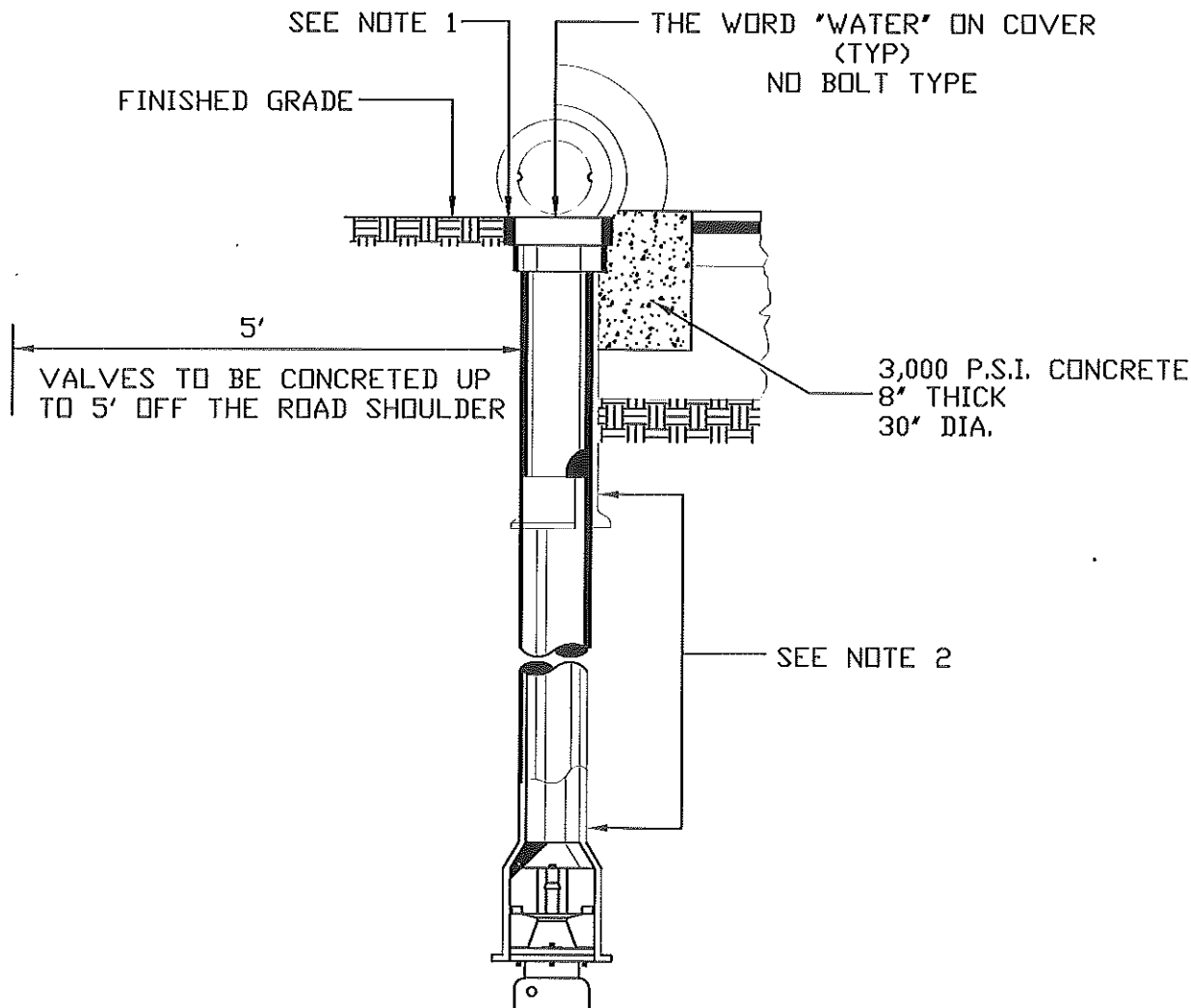
1. NO OBSTRUCTIONS SUCH AS UTILITY POLES, STREET SIGNS, IRRIGATION BOXES, FENCES, ETC., MAY BE PLACED BETWEEN CURB AND HYDRANT.
2. ON LOCATIONS IN MID BLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.
3. DO NOT INSTALL HYDRANT IN ROADWAY DITCH.
4. IF HYDRANT LIES IN DITCH BACK SLOPE, EXCAVATE AND BENCH TO MIN. RADIUS FOR ACCESS.

PARKWAY AREA OR NO SIDEWALK

FILE: T:\JEFF PFERDEORT\STANDARD SPECS\W-07C

DETAIL NO.		STANDARD DETAIL	<div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto;"></div>
W-07C		FIRE HYDRANT INSTALLATION DETAIL	
SHEET 3 OF 3		APPROVED BY	

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



NOTES:

1. VALVE BOX SHALL BE ADJUSTED TO THE FINAL FINISHED GRADE AFTER PLACEMENT OF THE ASPHALTIC CONCRETE, ABC, OR CONCRETE SURFACE.
2. USE PARKSON TYLER, APCO, OR EQUAL DEEP SKIRTED LID (4" OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON VALVE BOX. C.I. MIN. T.S. 30,000 P.S.I. DOMESTIC
3. VALVES THAT ARE DEEPER THAN 5' MUST HAVE A FIBERGLASS EXTENSION.
4. CONCRETE COLLARS REQUIRED WITHIN ALL ROADWAY RIGHT OF WAYS AND EASEMENTS UP TO 5' OFF OF ROADWAY.
5. DOMESTIC ONLY - TYLER, EAST JORDAN OR EQUAL.

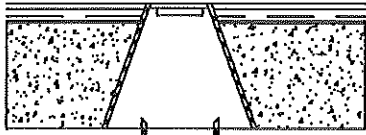
APPROVED BY

DETAIL NO.
W-08
SHEET 1 OF 1



STANDARD DETAIL
VALVE BOX INSTALLATION DETAIL

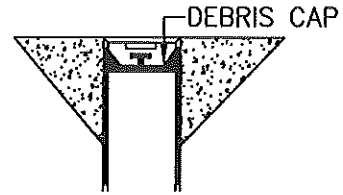
NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



DEBRIS CAP

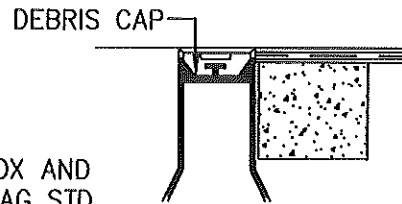
VALVE BOX AND
COVER MAG STD.
DETAIL 391-1
TYPE "A"

TYPE "A"



VALVE BOX AND
COVER MAG STD.
DETAIL 391-1
TYPE "B"

TYPE "B"



VALVE BOX AND
COVER MAG STD.
DETAIL 391-1
TYPE "C"

TYPE "C"

NOTES:

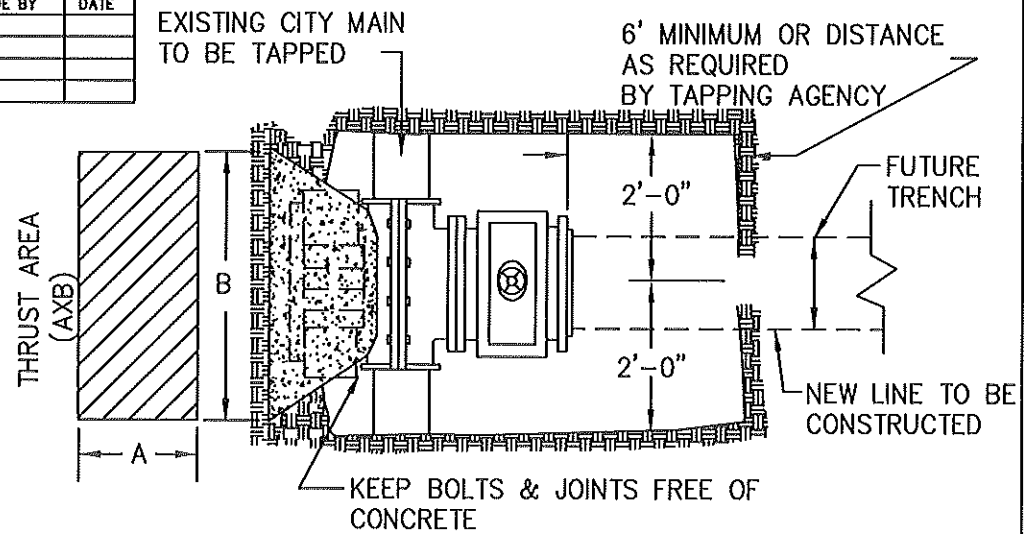
1. THE DEBRIS CAP SHALL BE DESIGNED AND INSTALLED TO PREVENT DEBRIS SUCH AS DIRT, DUST, SAND, ETC., FROM PASSING AROUND THE CAP AND DOWN INTO THE VALVE HOUSING. THE CAP SHALL BE HELD IN PLACE BY A MECHANISM WHICH WILL NOT DAMAGE THE VALVE HOUSING. ONCE INSTALLED THE CAP MUST WITHSTAND, WITHOUT SLIPPAGE, A MINIMUM VERTICAL FORCE OF 50 POUNDS, AT A LOADING RATE OF 1.0 IN./MIN.
2. THE CAP SHALL BE MANUFACTURED OF CORROSIVE RESISTANT MATERIAL.
3. DEBRIS CAP SHALL BE INSTALLED AS CLOSE AS POSSIBLE UNDER THE CAST IRON COVER WITHOUT INTERFERING WITH COVER OPERATION.
4. THE CAP SHALL BE CAPABLE OF SECURELY HOLDING A STANDARD LOCATING COIL, "SCOTCH MARK" 4 DISK MARKER BY 3M OR EQUAL.
5. THE HANDLE AND/OR BODY OF THE CAP SHALL BE INTEGRALLY COLORED IF REQUIRED BY THE AGENCY. IF REQUIRED, THE COLOR SHALL CONFORM TO THE ONE CALL LOCATING SERVICE (BLUE STAKE) COLORS (ARS 40-360.21)
6. THE CAP SHALL BE INSTALLED IN ALL VALVE HOUSINGS AS REQUIRED BY THE CONTRACT DOCUMENTS OR BY THE AGENCY'S POLICIES.
7. THE DEBRIS CAP SHALL BE MANUFACTURED BY SW SERVICES, INC., PHOENIX, ARIZONA OR EQUAL.

FILE: I:\JEFF PFERDEORT\STANDARD SPECS\W-09

DETAIL NO.		STANDARD DETAIL
W-09		DEBRIS CAP INSTALLATION DETAIL
SHEET 1 OF 1		

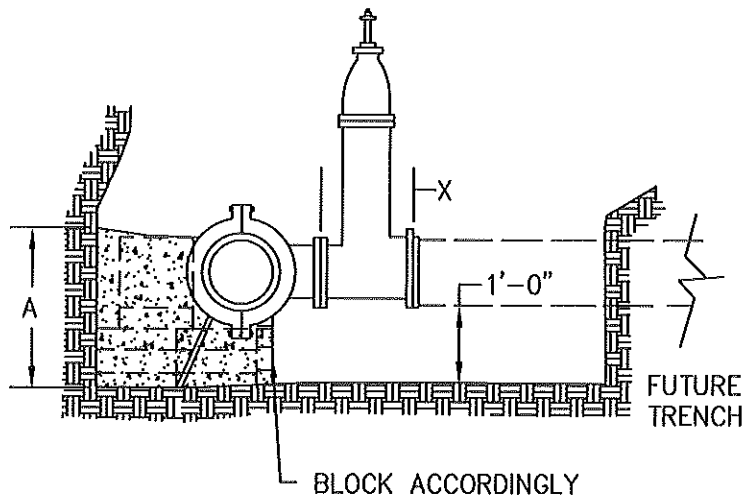
APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



OPTIONAL BLOCKING—2"X8"X12" SOLID CONCRETE MASONRY UNITS AS INDICATED.

SIZE OF PIPE BEING CONNECTED	MINIMUM THRUST AREA REQUIRED EQUALS (AXB)
4" & LESS	3 SQUARE FEET
6"	4 " "
8"	6 " "
10"	9 " "
12"	13 " "
16"	23 " "



NOTES:

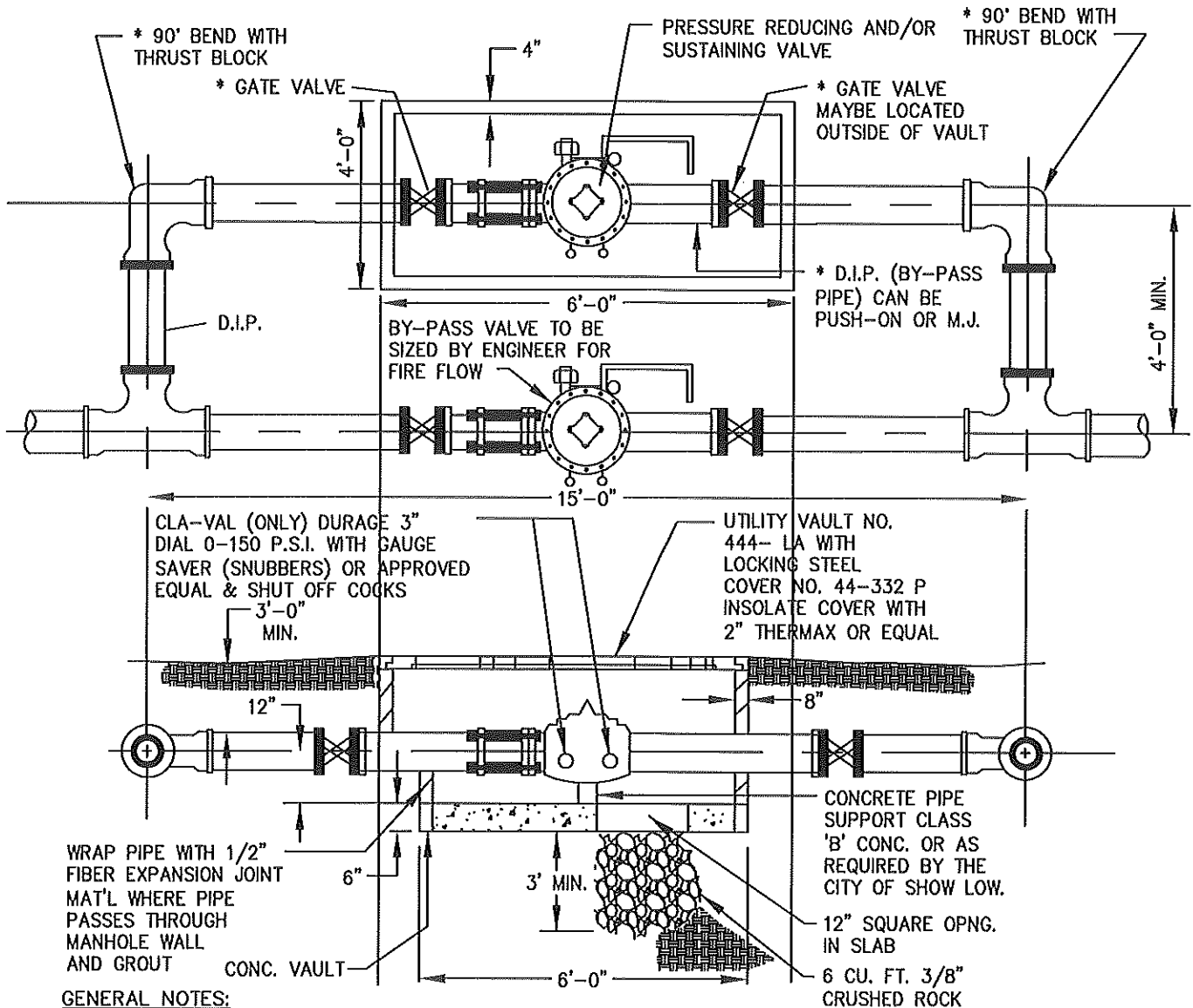
1. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" FROM ANY BELL COUPLING, VALVE, FITTING, OR OTHER OBSTRUCTION.
2. CONTRACTOR SHALL EXCAVATE AS SHOWN AND SHALL SET TAPPING SLEEVE AND VALVE AND TIGHTEN ALL BOLTS PRIOR TO THE PRESSURE TEST.
3. ALL TAPPING SLEEVES AND VALVES MUST BE PRESSURE TESTED PRIOR TO BLOCKING OR TAPPING. THE TEST MUST BE WITNESSED AND APPROVED BY THE INSPECTOR OR WATER DEPARTMENT.
4. BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND AND BE INSTALLED BEFORE THE TAP IS MADE. ALL FLANGE BOLTS SHALL BE FREE AND CLEAR OF CONCRETE.
5. TAPS SHALL BE MADE BY CITY CREWS AT PREVAILING RATES OR BY APPROVED CONTRACTORS WHEN ALLOWED BY CITY.
6. THIS DETAIL COVERS TAPPING SLEEVES 4" THROUGH 16" IN SIZE ON DUCTILE IRON, C-900 AND ASBESTOS CEMENT PIPE. ANY OTHER SIZE OR TYPE OF PIPE WILL REQUIRE A SEPARATE SUBMITTAL AND APPROVAL BY THE ENGINEER.

DETAIL NO.		STANDARD DETAIL	APPROVED BY
W-10		TAPPING SLEEVES AND VALVES DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

*** NOTE:**

PIPE, FITTINGS AND VALVES TO BE SAME SIZE AS P.R. AND S.V.

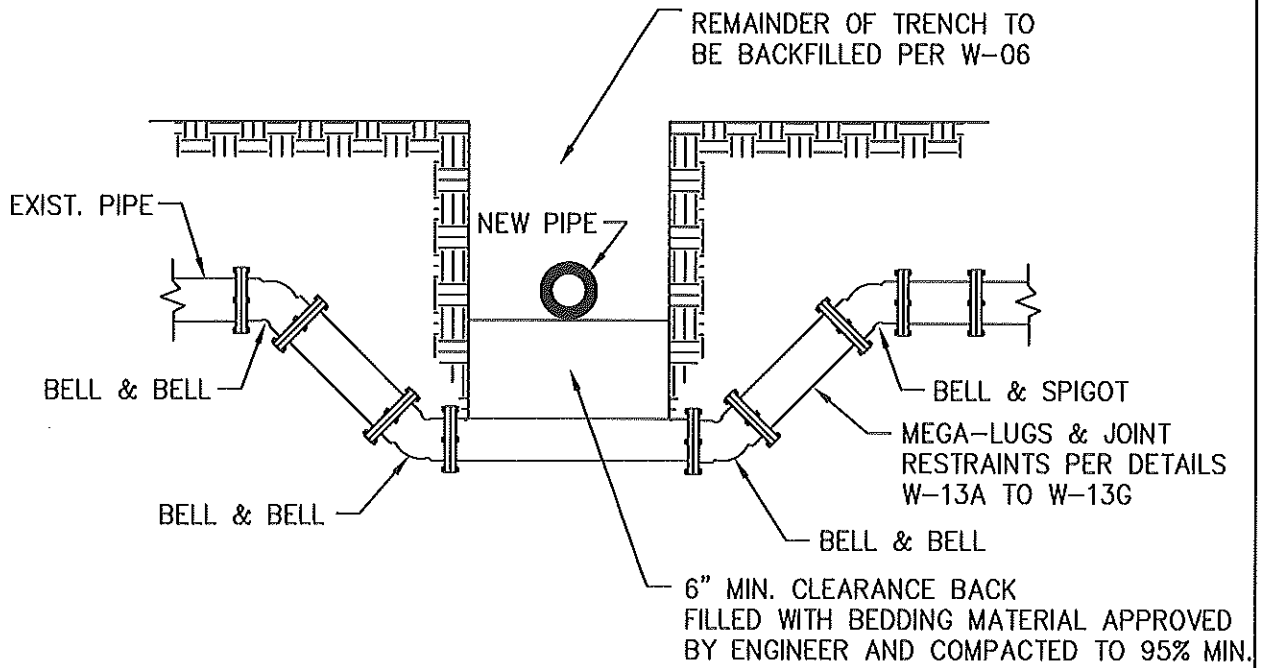


GENERAL NOTES:

1. VALVE SHALL BE IRON BODY, CLASS 125, FLANGED ENDS, HYDRAULICALLY OPERATED, PILOT CONTROLLED, DIAPHRAGM TYPE, GLOVE PATTERNED VALVE. IT SHALL BE TREATED AT 175 P.S.I. MINIMUM PRESSURE.
2. MANUFACTURER'S NAME, YEAR OF MANUFACTURE, SIZE OF VALVE AND GUARANTEED WORKING PRESSURE SHALL BE ENGRAVED ON THE VALVE OR ON A NAMEPLATE ATTACHED TO THE VALVE.
3. VALVE SHALL BE OPERATED BY A CONTROL SYSTEM WHICH INCLUDES PILOT CONTROLS FOR PRESSURE REDUCING AND FOR SUSTAINING IF SO DEEMED BY ENGINEER. BOTH PILOT CONTROLS SHALL BE FIELD ADJUSTABLE FOR ANY PRESSURE IN THE RANGE OF 40 TO 120 P.S.I.
4. ALL FITTINGS SHALL HAVE MEGA LUG JOINT RESTRAINTS AND/OR FLANGE TYPE.
5. CAST IRON VALVE BOXES INSTALLED ON ALL VALVES, TYLER OR EQUAL. DOMESTIC ONLY
6. BY-PASS VALVE MAY BE OUTSIDE OF VAULT.


DETAIL NO.		STANDARD DETAIL	APPROVED BY
W-11		PRESSURE REDUCING STATION DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			



C-900 / DUCTILE PIPE
MECHANICAL JOINT


APPROVED BY

DETAIL NO.		STANDARD DETAIL	
W-12		VERTICAL REALIGNMENT OF WATER MAINS DETAIL	
SHEET 1 OF 1			

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

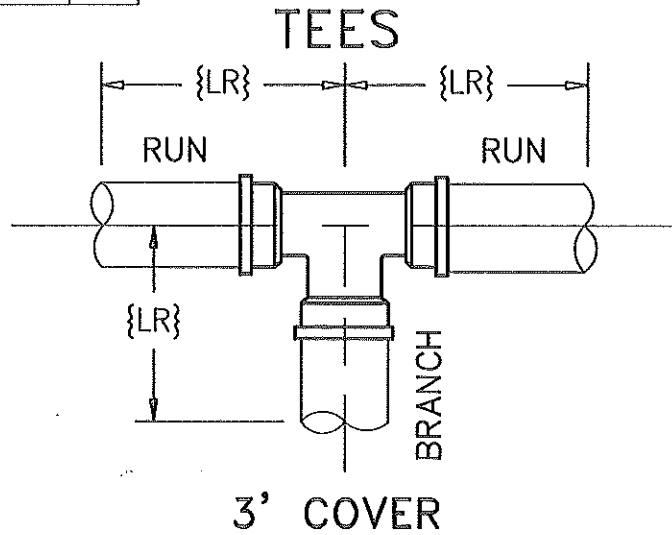
GENERAL NOTES:

1. THE LENGTHS OF RESTRAINT OR CONTINUOUS PIPE CALLED OUT IN THE FOLLOWING TABLES ARE FOR INSTALLATION OF MECHANICALLY RESTRAINT FITTINGS AND ARE CALCULATED BASED ON THE FOLLOWING PARAMETERS:
 - A. THE PIPE MATERIAL IS POLYVINYL CHLORIDE (PVC).
 - B. THE SOIL TYPE IS "ML" AS DEFINED BY THE UNIFIED SOIL CLASSIFICATION, ASTM STANDARD D2487.
 - C. THE SAFETY FACTOR RATIO IS 1.5 TO 1.
 - D. THE TRENCH IS TYPE 5, AS PER ANSI/AWWA C 150/A21.5, TRENCH CONDITIONS.
 - E. THE DEPTH OF COVER IS AS SHOWN ON THE FOLLOWING TABLES.
 - F. THE TEST PRESSURE OF THE WATER SYSTEM IS ONE HUNDRED AND FIFTY POUNDS PER SQUARE INCH (150 PSI).
2. EBAA IRON INC., RESTRAINT LENGTH CALCULATOR (VERSION 5.0.2) PROGRAM WAS USED ALONG WITH THE ABOVE LISTED DESIGN PARAMETERS TO CALCULATE THE LENGTHS SHOWN IN THE TABLES ON THE FOLLOWING SHEETS.
3. CONSERVATIVE ASSUMPTIONS HAVE BEEN MADE IN THE DESIGN OF THE FOLLOWING TABLES. DESIGN ENGINEERS MAY OPT TO PROVIDE THEIR OWN CALCULATIONS PROVIDED THAT THE CALCULATIONS ARE STAMPED BY AN ARIZONA REGISTERED PROFESSIONAL ENGINEER.

DETAIL NO.		STANDARD DETAIL	
W-13A		WATER PIPE LENGTH RESTRAINT TABLES DETAIL	
SHEET 1 OF 6		GENERAL NOTES	

T:\PROJECTS\TAND\TAND-EGS\TAND-EGS-13A.dwg

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			




TEE SIZE & PIPE MATERIAL		MINIMUM ATTACHED LENGTH OF PIPE (LR)											
		0'	2'	4'	6'	8'	10'	12'	14'	16'	18'	20'	
PVC	4x4	51'	37'	23'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	6x4	48'	29'	20'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	6x6	71'	57'	43'	30'	20'	20'	20'	20'	20'	20'	20'	20'
	8x4	45'	21'	20'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	8x6	68'	50'	33'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	8x8	93'	79'	65'	51'	37'	23'	20'	20'	20'	20'	20'	20'

4' COVER

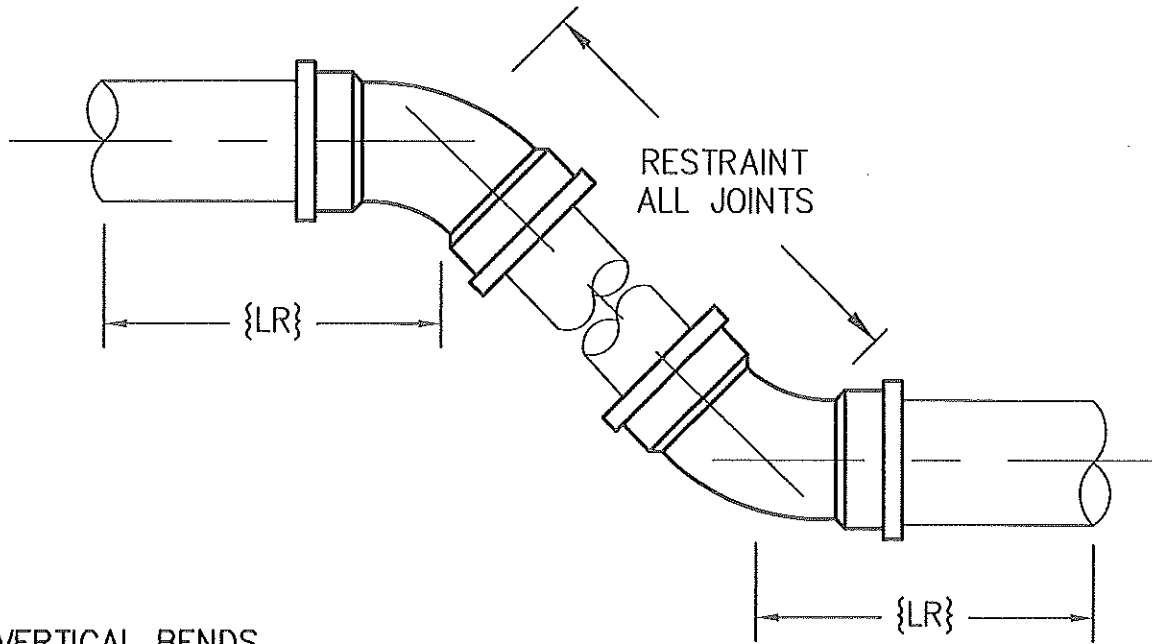
TEE SIZE & PIPE MATERIAL		MINIMUM ATTACHED LENGTH OF PIPE (LR)											
		0'	2'	4'	6'	8'	10'	12'	14'	16'	18'	20'	
PVC	12x6	48'	24'	20'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	12x8	67'	47'	27'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	12x12	101'	87'	73'	59'	45'	30'	20'	20'	20'	20'	20'	20'
	16x8	61'	36'	20'	20'	20'	20'	20'	20'	20'	20'	20'	20'
	16x12	95'	77'	59'	41'	22'	20'	20'	20'	20'	20'	20'	20'
	16x16	130'	116'	101'	87'	73'	58'	44'	30'	20'	20'	20'	20'

FILE: T:\JEFF PERDEORT\STANDARD SPECS\W-13C

DETAIL NO.		STANDARD DETAIL	
W-13B		WATER PIPE LENGTH RESTRAINT TABLES DETAIL	
SHEET 2 OF 6		TEES	

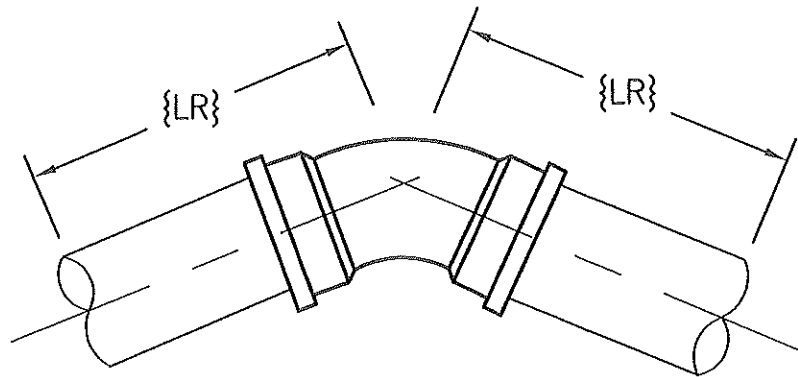
NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

BENDS



VERTICAL BENDS

THE MINIMUM PIPE LENGTH RESTRAINT (LR) TO BE RESTRAINT ON BOTH SIDES OF THE VERTICAL OFFSET SHALL BE DERIVED FROM THE TABLES ON DETAIL NO. W-13E.



HORIZONTAL BENDS

THE MINIMUM PIPE LENGTH RESTRAINT (LR) TO EXTEND IN BOTH DIRECTIONS FROM THE HORIZONTAL BEND SHALL BE DERIVED FROM THE TABLES ON DETAIL NO. W-13E.

DETAIL NO.

W-13C

SHEET 3 OF 6



STANDARD DETAIL

WATER PIPE LENGTH
RESTRAINT TABLES DETAIL
BENDS

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

BENDS


3' COVER

PIPE SIZE & MATERIAL		HORIZONTAL BENDS				VERTICAL BENDS		
		11.25°	22.5°	45°	90°	11.25°	22.5°	45°
PVC	4"	2'	4'	7'	16'	6'	11'	22'
	6"	3'	5'	9'	22'	8'	15'	31'
	8"	3'	6'	12'	29'	10'	20'	40'

4' COVER

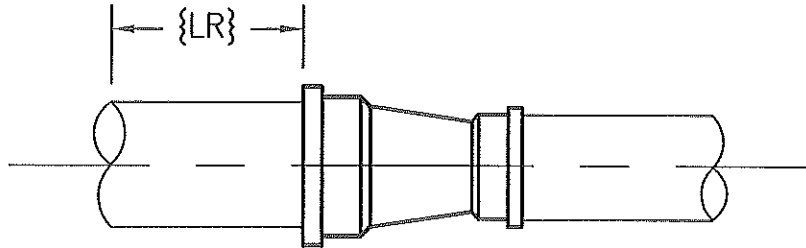
PIPE SIZE & MATERIAL		HORIZONTAL BENDS				VERTICAL BENDS		
		11.25°	22.5°	45°	90°	11.25°	22.5°	45°
PVC	12"	3'	7'	12'	31'	11'	21'	44'
	16"	4'	8'	17'	39'	14'	27'	56'

FILE: T:\VERT-PERFORM\STANDARD\W-13D-ECS-W-13D

DETAIL NO.		STANDARD DETAIL	APPROVED BY
W-13D		WATER PIPE LENGTH RESTRAINT TABLES DETAIL	
SHEET 4 OF 6		BENDS	

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

REDUCERS



REDUCERS

THE MINIMUM PIPE LENGTH RESTRAINT (LR) TO BE RESTRAINT ON THE LARGE SIDE OF THE REDUCER SHALL BE DERIVED FROM THE TABLES BELOW.

3' COVER

REDUCER SIZE & PIPE MATERIAL		MINIMUM LENGTH RESTRAINT
PVC	6x4	38'
	8x4	70'
	8x6	41'

4' COVER

REDUCER SIZE & PIPE MATERIAL		MINIMUM LENGTH RESTRAINT
PVC	12x4	91'
	12x6	76'
	12x8	56'
	16x6	114'
	16x8	99'
	16x12	58'

DETAIL NO.

W-13E

SHEET 5 OF 6



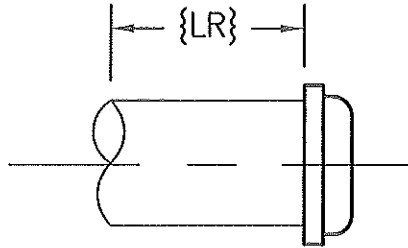
STANDARD DETAIL

WATER PIPE LENGTH
RESTRAINT TABLES DETAIL
REDUCERS

APPROVED BY

NO	DESCRIPTION OF REVISION	MADE BY	DATE
1			
2			
3			
4			

DEAD ENDS



DEAD ENDS

THE MINIMUM PIPE LENGTH RESTRAINT (LR) TO BE RESTRAINT ON A DEAD END SHALL BE DERIVED FROM THE TABLES BELOW.

3' COVER

DEAD END SIZE & PIPE MATERIAL		MINIMUM LENGTH RESTRAINT
PVC	4"	53'
	6"	74'
	8"	97'

4' COVER

DEAD END SIZE & PIPE MATERIAL		MINIMUM LENGTH RESTRAINT
PVC	12"	105'
	16"	135'

FILE: T:\DEF\PERDOKT\STANDARD\SPCS\W-13F

DETAIL NO.		STANDARD DETAIL		
W-13F		WATER PIPE LENGTH RESTRAINT TABLES DETAIL DEAD ENDS		
SHEET 6 OF 6		APPROVED BY		