

GENERAL SPECIFICATIONS FOR ELECTRIC CONSTRUCTION



ROLLA MUNICIPAL UTILITIES
102 West 9th Street
Rolla, Missouri 65401
(573) 364-1572

~ TABLE OF CONTENTS ~

	Page
1. GENERAL INFORMATION	1
1.1 AUTHORITY AND INTENT	
1.2 DEFINITIONS	
2. SERVICE RULES	1
2.1 TYPE OF SERVICE, VOLTAGE AND PHASE	
• Temporary Electric Service	
• Permanent Service	
• Single-phase Service, 120/240V, Grounded Neutral	
• Three-phase, Four-wire Service, 120/208V, Grounded Wye	
• Three-phase, Four-wire Service, 277/480V, Grounded Wye	
• Three-phase Primary Distribution Service	
2.2 BALANCING LOAD	
2.3 INSTALLATION OF RMU TRANSFORMERS ON OWNER PROPERTY	
2.4 SERVICE CONNECTIONS	
• Number of Services	
• Secondary Voltage Service Connection	
• Primary Voltage Service Connection	
3. SERVICE WIRING	3
3.1 ELECTRICAL SAFETY AND CODE CLEARANCES	
3.2 MINIMUM CLEARANCE FROM OVERHEAD LINES	
3.3 EQUIPMENT OPERATION AROUND FACILITIES	
• Overhead	
• Scheduled Outages and Line Coverup	
• Underground	
3.4 SERVICE SUPPLY CONDUCTORS - OVERHEAD	
• Ownership of Overhead Service	
• Location and Clearances - Service Wires, 600V or less	
• Service Entrance Location	
• Service Drop Attachment	
• Service Entrance Height	
• Service Entrance, Spacing	
• Service Entrance, Adjoining Property	
• Service Entrance - Conductor Length	
• Re-Wire Existing Service Entrance	
3.5 UNDERGROUND SERVICES	
• Ownership of Underground Service	
• Location, General	
• Underground Service Conduit	
• Underground Service Cable	
• Conduit Seals	
4. METERING	6
4.1 METERING RULES	
• One Main Meter for Service of Same Type	
• Meter Installation	
• Acquisition and Installation of Meter Mounting Equipment (Meter Socket)	
4.2 METER LOCATIONS AND WIRING	
• Meter Location	
• Re-Wire Work and Meter Location on Existing Buildings	
4.3 SERVICE DISCONNECT	
4.4 METER MOUNTING HEIGHTS	
4.5 MULTI-METER INSTALLATIONS	
4.6 REQUIREMENTS, SECURITY AND WIRING	
4.7 CURRENT TRANSFORMER INSTALLATIONS - SERVICES UNDER 600 V	
• Service Requiring Current Transformers	
• Installation Requirements	

5.	OWNER FURNISHED METER MOUNTING EQUIPMENT REQUIREMENTS	10
	5.1 GENERAL REQUIREMENTS	
	5.2 <i>blank</i>	
	5.3 BOLT-IN METER SOCKETS	
	5.4 MISCELLANEOUS REQUIREMENTS	
	5.5 SPECIAL REQUIREMENTS	
6.	OWNER WIRING AND INSTALLATION.....	11
	6.1 NOTIFY RMU OF NEW OR RE-WIRE WORK	
	6.2 INSPECTIONS OF WIRING	
	6.3 EMERGENCY REPAIRS AFTER HOURS, WEEKENDS, AND HOLIDAYS	
	6.4 <i>blank</i>	
	6.5 OWNER ACCESS	
	6.6 GROUNDING	
	6.7 CONNECTION OF SERVICE	
7.	MOTORS AND APPARATUS	12
	7.1 GENERAL	
	7.2 PHASE & VOLTAGE	
	7.3 PROTECTION AGAINST ABNORMAL CONDITIONS	
8.	GENERATORS	12
	8.1 EMERGENCY GENERATORS	
	8.2 CO-GENERATION/NET METERING	
9.	RESIDENTIAL AND NON-RESIDENTIAL DEVELOPMENT PROJECTS.....	13
10.	SYSTEM ALTERATIONS AND CONVERSION.....	13
	10.1 CONVERSION OF EXISTING SYSTEM	
	10.2 LINE EXTENSION REQUIREMENTS	
11.	DIAGRAMS	14

GENERAL SPECIFICATIONS FOR ELECTRIC CONSTRUCTION

1. GENERAL INFORMATION

1.1 AUTHORITY AND INTENT

These specifications are drawn and approved by the Rolla Board of Public Works of the Rolla Municipal Utilities, Rolla, Missouri and shall be enforced, and no part thereof altered without approval of said Board or their duly appointed representative. The specifications herein supersede all previous electric specifications and drawings issued by Rolla Municipal Utilities (RMU) prior to this date and are subject to change without notice.

These specifications are intended to govern all electric service supplied by RMU. They are supplementary to, and are not intended to conflict with, any applicable City codes and ordinances, the National Electrical Safety Code, and the National Electrical Code. All specifications contained herein apply to Customers, Contractors, Developers, and/or any others who act on behalf of an Owner.

RMU reserves the right to specify the phase and nominal voltage at which service shall be supplied and to serve at different voltages where distribution is made at other nominal voltages.

Copies of RMU's General Rules and Regulations and electric rate and fee schedules are available at RMU's Business Office during normal business hours and at www.rmurolla.org.

Should there be any questions or comments in regards to these specifications, please contact RMU by phone at (573)364-1572, by fax at (573)364-1540 or email at info@rmurolla.org.

1.2 DEFINITIONS

RMU: Rolla Municipal Utilities

City: City of Rolla, Rolla, Missouri

Staff: Employees of Rolla Municipal Utilities

Owner or referred to by male gender (i.e. his, him, etc): Any person or company applying for, receiving, using, or accepting electric service or any other service supplied by RMU; any Contractor, Developer, or Customer; and/or any person(s) acting on behalf of the Owner.

A: Amp(s)

V: Volt(s)

AC: Alternating Current

NEC: National Electrical Code, 2005 or later edition, as adopted by the Rolla City Council.

NESC: National Electric Safety Code, C2-2007 or later edition as adopted by the Rolla City Council.

2. SERVICE RULES

2.1 TYPE OF SERVICE, VOLTAGE AND PHASE

Before purchasing equipment for installation on RMU service, transferring such equipment to a new location or before starting to rewire an existing installation which may necessitate a relocation of the service entrance, elimination of obsolete wiring, or increasing the capacity of the main service switch or of the wiring, etc., Owner should contact RMU. The purpose of this contact is to determine the type of service which will be available for the load contemplated, the voltage and phase at which the service will be supplied, and the location on the premises of the Owner to which RMU will connect the service conductors. Early contact will enable RMU to meet requests for electric service more promptly. It will help to reduce delays in providing the required service facilities and avoid the installation of equipment not suitable for operation on the type of service which RMU will supply.

The standard electric service offered by RMU is 60 Hertz alternating current.

All secondary service provided is solidly grounded at the distribution transformer. Secondary service requires that the grounded neutral or grounded phase conductor be terminated at Owner's main service disconnect and approved ground. (See Section 6 herein.) Owner desiring ungrounded or impedance grounded service should provide isolation transformers or consider primary service for this purpose.

Choice of voltage and type of system offered depends on location and size of load. Owner should consult RMU to determine the voltage and method of supply that will be available.

2.1.1 TEMPORARY SERVICE - Temporary service is defined as electric service provided for a short term need, such as that service required by Owners during building construction. Where temporary service is to be provided from an overhead line, Owner shall provide the support for attachment of the service wire and metering, as shown on Detail #1. For service from underground lines, Owner shall provide the support for meter, cable and service equipment, as shown on Detail #2.

The Owner is required to furnish and install all materials for the service entrance. The service must be self-supporting, and may not be attached to any RMU pole or equipment for support. It must be equipped with ground fault circuit interrupters and conform in all aspects to the NEC and NESC. Overhead services shall be located at least 10 feet, and not more than one span unless otherwise approved, from RMU poles and equipment, and RMU may charge costs associated with installation of a temporary service if beyond one span.

A Temporary Service must be initially inspected by the appropriate inspection authority before it can be connected by RMU. It is the Owner's responsibility to notify the inspector when the service work is complete and ready for inspection.

Please refer to RMU's General Rules and Regulations and/or call RMU for additional information.

- 2.1.2 PERMANENT SERVICE - Unless specific arrangements are made to the contrary, electric service shall be considered rendered on a continuous, permanent basis subject to termination as provided in the RMU General Rules and Regulations.

- 2.1.3 SINGLE-PHASE SERVICE, 120/240V, GROUNDED NEUTRAL - This service is suitable for lighting, small motors and general household appliances nominally rated 110V to 120V or from 220V to 240V. The 120/240V three-wire service is normally limited to 800A.

Single-phase installations requiring in excess of 800A in service capacity at 120/240V, may be increased beyond 800A by preferably installing 120/208V three-phase, four-wire service entrances, or subject to RMU approval, installing multiple single-phase, 120/240V services.

- 2.1.4 THREE-PHASE, FOUR-WIRE SERVICE, 120/208V, GROUNDED WYE - Three-phase, four-wire service will normally be designated for new connections for the following conditions:

- A. The load cannot, in RMU judgement, be supplied from a single-phase supply.
- B. The power load is of such character as not to interfere with the lighting load.

Service is supplied from a Y-connected secondary from which 120/208V three-phase, four-wire service may be supplied. Multiple three-wire services connected at a common three-phase, four-wire distribution point shall be balanced between phases.

Service entrance panel ampacity is limited to 3000A for 120/208V, three-phase, four-wire service. Service entrance requirements greater than 3000A at 120/208V shall be reviewed with RMU.

- 2.1.5 THREE-PHASE, FOUR-WIRE SERVICE, 277/480V, GROUNDED WYE - Three-phase, four-wire, 277/480V service will be designated for qualifying Owners whose load is of such nature as to be unable to be supplied at 120/208V. It may also be requested by Owner in lieu of 120/208V service. Where this voltage may be designated by RMU or desired by the Owner, RMU should be consulted before purchasing equipment or the start of wiring on the premises.

Service is supplied from a Y-connected secondary from which 277/480V, three-phase, four-wire service may be supplied.

Service entrance ampacity is limited to 3000A for 277/480V, three-phase, four-wire service. Service entrance requirements greater than 3000A at 277/480V shall be reviewed with RMU.

- 2.1.6 THREE-PHASE PRIMARY DISTRIBUTION SERVICE - Primary service is offered at voltages designated by RMU. Such service is normally supplied by extending primary distribution lines to a substation located on Owner's premises. However, there are locations within the RMU service area to which circuits at these distribution voltages have not been extended and for engineering, economic or other reasons RMU may, in some cases, elect to supply primary service from a substation located on the Owner's property. Owner is requested to discuss power requirements with RMU before purchasing equipment or the start of Owner wiring.

2.2 BALANCING LOAD

When three-wire, single-phase AC is supplied, all 120V apparatus must be connected as equally as possible on the two sides of the circuit.

Where single-phase load is connected to a meter measuring three-phase, three-wire or four-wire service, the unbalancing of the phases arising from the use of such single-phase load shall not exceed 10% of the total demand in kilowatts measured at the time of maximum use.

2.3 INSTALLATION OF RMU TRANSFORMERS ON OWNER PROPERTY

Where construction, safety or engineering requirements do not permit the installation of RMU transformers on existing easements or public property, Owner shall provide sufficient space and easements for transformers, switches and related equipment adjacent to paved surfaces intended for normal vehicular traffic or parking, for the purpose of installing or changing RMU equipment. This equipment will be installed in one of the following ways, as determined by specific conditions through consultation with RMU.

- A. Pole Installation: Used where equipment can be pole mounted. Requires relatively little space.
- B. Pad Mounted Transformer Installations: The transformer must be located and/or protected from the hazard of physical damage. The transformer must also be located away from building walls, fences, decorative or protective walls and barriers and shrubs to permit maintenance and operation of the unit. *Clearance requirements and protective barriers are shown on Detail #14.* Owner installing the foundation pad must receive RMU approval of pad orientation for primary and secondary cable access.

2.4 SERVICE CONNECTIONS

Service connections may be at primary or secondary voltage, delivered from overhead or underground facilities, and may involve an Owner substation. These circumstances are described in the following sections.

2.4.1 NUMBER OF SERVICES - Number of services is governed the NEC and if multiple services to a building are requested RMU must approve.

2.4.2 SECONDARY VOLTAGE SERVICE CONNECTION

- a. Overhead Service: The overhead service is the service wires, called a service drop, extending from a pole on an easement strip or public right-of-way to the premises. Owner is to provide an attachment point for the service drop to attach to the building and to connect to the service head at a location nearest agreed upon RMU service point (refer to Section 3). Owner will normally locate the service entrance based on rules herein. If there is a doubt as to which point on the building will be nearest RMU service point, a request should be made for RMU to review the point where the service drop will be attached to the building and the routing of the overhead service line. When construction or extensive remodeling of existing buildings are planned, Owner shall consult with RMU for the appropriate service entrance location. Drawings are to be submitted for the purpose of securing adequate service facilities, meter locations and proper Owner-owned service equipment.
- b. Underground Service: The Owner is required to provide trenching and cable for the service portion of the underground system. Installation of cable within conduit is at the discretion of the Owner. Owner is urged to notify RMU of proposed work because approval of construction plans will have to be completed prior to lateral installation. The normal service connection point to building should be nearest to the direction from which the service lateral enters the property to be served. Owner installations must be in accordance with all applicable building codes and RMU specifications.

2.4.3 PRIMARY VOLTAGE SERVICE CONNECTION - Owners planning primary service connections should promptly contact RMU, and obtain RMU specifications on connection requirements, relaying and fuse coordination, meter equipment and location, before ordering service equipment. RMU reserves the right to specify whether primary service connection will be made overhead or underground.

3. SERVICE WIRING

3.1 ELECTRICAL SAFETY AND CODE CLEARANCES

It is the policy of Rolla Municipal Utilities to operate the electric transmission and distribution system with care and safety for the public and RMU Staff. The NESC is used for design, construction, maintenance, and operation of the electric transmission and distribution system by RMU, as well as any associated activity by the public and private industry. The applicable NESC in effect at the time of installation will apply. RMU reserves the right to terminate service without prior notice when a hazardous condition exists. The current edition of the NESC should be consulted for current electrical safety code clearances.

3.2 MINIMUM CLEARANCE FROM OVERHEAD LINES

For this section, the term "clearance" means the shortest distance between any two surfaces.

Minimum clearance between any building or other structure and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provision of latest edition of the NESC.

Minimum clearance between signs, chimneys, radio and television antennas, storage tanks, and other structures, and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provisions of the NESC.

Minimum clearance over streets, alleys, parking lots, rights-of-way, easements, etc., by overhead distribution facilities, will be maintained in accordance with provisions of NESC.

Any Owner who proposes any action that would result in violation of the minimum clearances as set out in Section 3 of this document will give ninety (90) days prior notice of such proposed action to RMU.

Any Owner who proposes to change the use of land or change the grade of land that would result in conflict with Section 3 of this document will give ninety (90) days prior notice of such action. Upon such a notice, RMU will determine the feasibility of relocating such line, distribution facility, and/or electric utility pole which is in conflict with the proposed action to a suitable and safe location.

Should RMU determine that such relocation is feasible, RMU will perform the necessary relocation at the expense of the Owner whose proposed action violates the minimum clearance requirements. Relocation of such overhead transmission line, distribution facility, and/or electric utility pole may begin on a mutually agreed upon date.

Should RMU determine that the relocation of a transmission line, distribution facility, and/or electric utility pole is not feasible, RMU may require action to prevent a violation of the minimum clearance requirement. Any action that RMU requires pursuant to this subsection will be performed at the expense of the Owner whose proposed action violates the minimum clearance requirement.

3.3 EQUIPMENT OPERATION AROUND FACILITIES

3.3.1 OVERHEAD - When operating equipment around overhead electrical lines, Federal Occupational Safety & Occupational Health Administration (OSHA) standards shall be maintained. Contacting the line can result in severe injury or death. If work must be accomplished near an overhead electrical line, contact RMU for assistance in avoiding contact with these energized facilities.

When performing tree trimming near energized power lines, the Owner must stay a minimum of 10 feet away from the power line. If the Owner needs to trim or cut trees which are closer than 10 feet, RMU must be contacted.

3.3.2 SCHEDULED OUTAGES AND LINE COVERUP - RMU will de-energize a power line or place line coverup for construction purposes, provided that no other Owners are affected by this action and/or the integrity of the electric system is not damaged by the action. If a power outage or line coverup is requested, a minimum of seven (7) working days advance notice is required to schedule the work with RMU. Contact RMU to request a scheduled power outage or line coverup.

The expense, for a scheduled power outage or placement of line coverup that occurs outside of normal business hours or a scheduled power outage or placement of a line cover up that requires what staff deems to be extensive work, shall be the responsibility of the party who requests the work be performed. If necessary, RMU Staff will prepare a cost estimate and notify the Owner requesting the scheduled outage or line coverup of the estimated cost. Included in this estimate are non-refundable labor charges for all work performed by RMU and may include a refundable deposit on line coverup materials. After RMU receives payment of the deposit (if required), the work will be scheduled with RMU. The labor will be charged on an actual cost basis upon completion of the work. The deposit will be refunded when RMU receives a written request for coverup removal, and all labor costs are paid in full.

3.3.3 UNDERGROUND - All excavation shall be done in accordance with the Underground Facility Safety and Damage Prevention Act of Missouri.

Grading or excavation work shall not be started until an underground facilities location has been completed. Digging into underground power lines can result in severe injury or death to the operator and others, and can cause interruption of service to wide areas. Contact Missouri One-Call at 1-800-DIG-RITE (800-344-7483) or 811 or missouri-811.org.

3.4 SERVICE SUPPLY CONDUCTORS - OVERHEAD

3.4.1 OWNERSHIP OF OVERHEAD SERVICE - RMU shall own and maintain the service wire from the point of connection to the RMU system to the service drop attachment point. Refer to Section 3.4.4.

3.4.2 LOCATION AND CLEARANCES - SERVICE WIRES, 600V OR LESS - RMU will review the proposed location and alignment of the overhead service drop with the Owner. The location of such shall be as approved by RMU. Service drop clearances shall comply with appropriate requirements of the NESC and the NEC. Service drop conductors shall not be readily accessible to physical contact. Changes, additions, and/or grading on Owner premises shall not cause clearances under and around service wires to be less than indicated herein. RMU shall be advised when clearance problems exist. In some cases, Owner may be responsible for costs incurred to restore clearances. Improper clearance is reason for disconnection of service.

3.4.3 SERVICE ENTRANCE LOCATION - The service drop and attachment point, service bus or service entrance shall not be enclosed in any building, alteration, facade or addition.

Service entrance and service drop attachment shall be located at a point closest to RMU supply point. RMU shall approve the service entrance and service drop attachment point. If any doubts exist as to the proper location, please consult RMU.

For multi-tenant buildings, including townhouses, service entrances of less than 400A per tenant can utilize ganged meter packs at a location(s) approved by RMU to facilitate connection to a single service drop(s). Service of 400A or more per tenant for multi-tenant buildings shall be handled on a case-by-case basis.

Pre-bussed service boxes and associated risers shall be provided by the Owner. They shall be sized to accommodate the proposed services and installed on the outside of the building at approved locations. Individual conduits or service cable shall be provided from the service box to the meter location to assure integrity and security of the unmetered circuit. Meters shall be located as close as practical to service box. Combination pre-bussed ganged meter bases are also an acceptable alternate.

- 3.4.4 SERVICE DROP ATTACHMENT - The service entrance must be located where there is adequate material and strength for RMU to attach its service drop. The attachment must have sufficient height to provide the required service drop and drip loop clearances as specified herein. The attachment point must be accessible by ladder. Preferred points of attachment are building studs or solid masonry at least one foot from a corner. Some trim and soffit boards are acceptable when substantially reinforced. Owner shall be responsible for the installation and maintenance of an adequate attachment point.
- 3.4.5 SERVICE ENTRANCE HEIGHT - When the structure is too low to obtain proper clearance for the service wire attachment, the Owner must provide an approved upright or service mast of rigid metal conduit of sufficient strength and height for the attachment of the service drop wires. When an acceptable upright or mast is installed, RMU will supply and install the service cable from pole to the structure.
- 3.4.6 SERVICE ENTRANCE, SPACING - When more than one service entrance is provided on a building for the same class of service, the spacing between the service entrances should not exceed twenty-four (24) inches, unless approved by RMU.
- 3.4.7 SERVICE ENTRANCE, ADJOINING PROPERTY - Thirty-six (36) inches is required as the minimum permissible clearance between the wall through which the service entrance is brought out and the adjacent property line. The service entrance shall not overhang adjoining property.
- 3.4.8 SERVICE ENTRANCE - CONDUCTOR LENGTH
 - a. Services 800A or less: Service entrance conductors shall extend at least twenty-four (24) inches beyond the raceway and be left free for RMU to make the attachment to the service drop.
 - b. Services over 800A: Coordinate with Rolla Municipal Utilities.
- 3.4.9 RE-WIRE EXISTING SERVICE ENTRANCE - All re-wiring work shall be in compliance with applicable building codes and RMU specifications.

3.5 UNDERGROUND SERVICES

- 3.5.1 OWNERSHIP OF UNDERGROUND SERVICE - Owner shall own and maintain service wire and conduit, if installed, to the point of connection with the RMU system.
- 3.5.2 LOCATION, GENERAL - Service entrance provided from underground distribution systems shall be located and terminated in accordance with RMU specifications. The service lateral shall not be enclosed within or covered by any alteration, facade or addition to the building.
- 3.5.3 UNDERGROUND SERVICE CONDUIT
 - a. The underground service conduit will extend from the Owner service entrance to an RMU approved point of service on the Owner property, on public right-of-way or on utility easements adjacent to Owner property. Any portion of the service entrance that shall be exposed on utility poles must be adequately protected as approved by RMU. A minimum of Schedule 40 PVC is required for the portion of the service entrance which is buried or above grade on the customers' building. *Refer to Details #10, #11, #12, and #13.*
 - b. Service entrance riser shall extend up the utility pole to a point designated by RMU Staff. The proper location of the riser on the pole (quadrant) shall be obtained from RMU. Where the service entrance is to be extended to a location requiring pole setting, replacement or alteration

- by RMU, such extension shall not be made until the pole work has been completed by RMU.
- c. Conduit installations shall not include any conduit elbow fittings (LB) ahead of the meter.
- d. Conduits are to be installed by the Owner into existing transformer compartments or pedestals. Owner shall contact RMU to schedule the opening of the transformer or pedestal and safety cover up of energized parts.
- e. Conduit ownership remains with the Owner and any necessary repairs, including that portion extending up the pole, are the Owner's responsibility.

3.5.4 UNDERGROUND SERVICE CABLE

- a. Underground service cables shall be provided in lengths adequate to extend up the pole to the secondary or the transformer terminals (including street crossings). Owner will completely install the entire length of the service cable.
- b. Cables exposed to sunlight at the top of the pole, shall be ultra-violet (U.V.) resistant.
- c. Cables to be installed in conduit or buried in direct contact with the earth shall be a type approved by the inspection authorities.
- d. Cable ownership remains with the Owner and any necessary repairs, including that portion extending up the pole, are the Owner's responsibility.
- e. For future maintenance, RMU will assist with the removal of the cable from the pole to allow repair or replacement and re-connect same to the secondary upon completion of the work.

3.5.5 CONDUIT SEALS - Termination of secondary distribution conduits within the building below grade is not a preferred installation due to water seepage problems. It has proven to be very difficult to insure long term water tightness of the conduit and cables through the building wall. It is the Owner's responsibility to provide drainage and sealing as needed to prevent damage to the electrical facilities and other property inside the building.

4. METERING

4.1 METERING RULES

All meters, overhead service drops, and other electrical facilities installed by RMU at the expense of RMU on the Owner's premises for the purpose of delivering or measuring energy to the Owner, will continue to be the property of RMU.

The Owner will provide and maintain without cost to RMU sufficient and proper facilities for the installation of meters and other apparatus at a readily accessible location.

4.1.1 ONE MAIN METER FOR SERVICE OF SAME TYPE - RMU will furnish and install only one main watthour meter to register all energy supplied to Owner at any individual premises, unless accuracy of measurement, engineering, safety reasons, rates or legal provisions require the installation of more than one meter. The Owner shall provide all necessary transformation equipment behind the meter to provide other types of service or voltage requirements. There may be Owner expense for additional requested meters.

4.1.2 METER INSTALLATION - All meter and service connections shall be made by RMU and no person other than RMU Staff is permitted to connect, disconnect or in any way remove an electric meter owned by RMU.

4.1.3 ACQUISITION AND INSTALLATION OF METER MOUNTING EQUIPMENT (METER SOCKET):

- a. RMU will provide and install the watthour meter.
- b. Where service is provided at primary voltages: Unless otherwise approved by RMU, the electric service shall utilize an underground service and a padmounted metering enclosure is to be installed the Owner shall provide and install a complete padmounted primary metering cabinet (including Current Transformers), except that RMU will provide (for installation by Owner) the 13 terminal meter socket.
- c. Where service is provided at secondary voltages:
 - i. Where the electric service will require installation of a Current Transformer utilizing a 13 terminal meter socket RMU will supply the 13 terminal meter socket that the Owner is required to install. The owner is required to provide and install the CT metering cabinet and all associated connections along with the conductor. RMU will provide and install the Current Transformers.
 - ii. For all other metering configurations, the Owner shall be responsible for acquisition and installation of the meter mounting equipment (meter socket). If Current Transformer(s) are needed they will be provided and installed by RMU.

4.2 METER LOCATIONS AND WIRING

4.2.1 **METER LOCATION** - In general, all electric meters must be located outdoors at the point closest to the service drop or lateral termination.

This policy applies to all new installations and re-wire work where the meter and/or service equipment is involved. All meters shall be located and mounted in devices in accordance with RMU specifications.

Meter locations required for new or re-wire work shall conform to this policy, even though other existing meters on the premises may not conform. It is recommended, but not necessarily required, that existing meters which are not involved in the wiring work, be upgraded to present standards.

Meter locations will be approved by RMU and must meet the following conditions in addition to other electric service requirements:

- a. Where multiple meters are to be installed the meters should be grouped at locations approved by RMU.
- b. Where Current Transformers (CT's) are required for a secondary service, the metering, including CT's, shall be located on the line side (ahead) of service disconnecting device unless otherwise approved or required by any applicable building codes.
- c. Meter shall be located to directly measure Owner load and energy. Series (subtractive) metering will not be allowed.
- d. All CT's shall be located outdoors and installed in weather tight, approved cabinets, unless otherwise specified by RMU. Approved Current Transformer locations are:
 - i. Mounted at the weatherhead;
 - ii. Outdoor CT cabinet (location to be approved by RMU);
- e. Service will be refused if meters and current transformers are not installed in accordance with RMU specifications and building code requirements. Unapproved metering locations include:
 - i. Over stairs and in stair wells, either indoors or outdoors.
 - ii. In basements, where the only entrance is through a trap door.
 - iii. On lattice or metal lath partitions.
 - iv. In or on walls of storage lockers or bins.
 - v. Meter locations inside occupant or tenant space, in single or multi-occupant buildings.
 - vi. In bedrooms, bathrooms, toilet rooms, restaurant kitchens, stairways, elevator or ventilating shafts, or in any place where it will cause inconvenience to either Owner or RMU representatives.
 - vii. Over windows, doors, stoves, furnaces, radiators, heaters, boilers, sinks, tubs or any place subject to flying objects or dust, grease, excessive heat, moisture or fumes.
 - viii. Under water pipes or other pipes from which condensation may drop, or within five feet of belts or moving machinery.
 - ix. In that part of a basement extending under a sidewalk.
 - x. Where the meter would be subject to excessive vibration.
 - xi. On a wall abutting a street or alley when subject to mechanical damage.
 - xii. On outside walls over air conditioning units where units are less than three feet from wall, including air conditioning units that are installed after meter equipment is mounted.

4.2.2 **RE-WIRE WORK AND METER LOCATION ON EXISTING BUILDINGS**

- a. If the existing service needs to be changed to provide increased capacity or maintenance to the service as the result of a change in location, disconnection of service due to other improvements, or a damaged service line needs to be replaced, the electric service as a whole must be revised as necessary to meet current RMU specifications.
- b. All work performed in conjunction with rework must be in compliance with any applicable building codes.

4.3 SERVICE DISCONNECT

All services shall have a means of disconnect.

For locations that utilize a 480V service with a capacity of 400 amps or less the installation must include a service disconnect on the line side of the meter.

4.4 METER MOUNTING HEIGHTS

Meter mounting heights are shown on Detail #3.

4.4.1 **OVERHEAD** supplied individual meter sockets shall be mounted such that the bottom of the meter opening is between 5'0" and 5'6" above finish grade.

4.4.2 **UNDERGROUND** supplied individual meter sockets shall be mounted such that the bottom of the meter opening is between 5'0" and 5'6" above finish grade.

- 4.4.3 EXCEPTION: RESIDENTIAL SERVICE ONLY - If meter socket is located over a driveway or walkway 36" in width or narrower, the meter socket shall be raised to 6'6" as measured from bottom of meter opening to final grade.
- 4.4.4 NON-RESIDENTIAL SERVICE rate meter sockets and enclosures shall not be elevated to avoid hazards, but must be protected from pedestrian and vehicular traffic or parking hazards by Owner. Details of suggested barrier are *shown on Detail #4*.
- 4.4.5 Current transformer enclosures shall be mounted such that the bottom of the enclosure is no higher than 6 feet above final grade and no lower than 1'6" above final grade.
- 4.4.6 Vertically grouped multi-meter centers shall be installed such that the top meter as measured from the bottom of the meter opening to final grade shall not exceed 6'6". The lowest meter measured as above shall be no lower than 2'0" outdoors.
- 4.4.7 Horizontally ganged meter centers shall be installed at the same heights as individual meter sockets.
- 4.4.8 RMU provided transformer rated, three-phase meter mounting equipment shall be mounted between 5'0" and 5'6" as measured from the bottom of the meter window on enclosures or meter opening on sockets to final grade.
- 4.4.9 RMU provided single-phase transformer rated meter socket shall be located similarly. Residential sockets may be elevated to 6'6", *see Section 4.4.3*.

4.5 MULTI-METER INSTALLATIONS

- 4.5.1 Refer to Owner Furnished Meter Mounting Equipment Requirements, Section 5 of these specifications.
- 4.5.2 The owner must install a means of disconnect in accordance with all applicable building codes.
- 4.5.3 If the service is 480 volts and 400 amps or less the meter shall be placed on the load side of the disconnect. For all other service conditions where the number of meters and/or fault duty requires a main service disconnect, the individual meters shall be located on the line side (ahead) of each Owner disconnect.
- 4.5.4 Pre-fabricated, combination multi-meter equipment with fused or circuit breaker type disconnects shall be provided subject to RMU approval of meter sockets, location, electrical one line, cable landing space, security provisions, etc., before fabrication.
- 4.5.5 All disconnecting devices located ahead of meters shall be provided with lock-off capability to permit isolating of service.
- 4.5.6 Meters shall be grouped in location(s) approved by RMU. Owner is responsible to permanently mark the flat, apartment, office or location identification at each meter before the meter is set.

4.6 REQUIREMENTS, SECURITY AND WIRING

- 4.6.1 Metered and unmetered wires shall not be installed in the same wireway, pull box, enclosure, etc.
- 4.6.2 Adequate provisions must be made for the sealing (see Section 5.4.6) and security of meter, unmetered service equipment and circuits. Covers of all unmetered service equipment, pull boxes, troughs, wireways, busways, etc., shall be drilled and tapped for one or more 1/4" x 20 bolts to adequately seal the covers. Sealing bolts shall be furnished with the equipment or by Owner. Maintenance access to unmetered disconnects will not normally be sealed. (i.e. breakers, fuses)
- 4.6.3 All unmetered feeder busways shall be approved by RMU. Busway openings shall be Owner pre-engineered for installation. "Plug-in" busway shall not be used. Busway approval is required before energize the electric service..
- 4.6.4 When aluminum service entrance conductors are used in the meter device, the wire should be thoroughly cleaned with a wire brush and then liberally coated with oxide inhibitor.

- 4.6.5 A minimum clearance of three (3) inches shall be maintained from the outer edge of the meter base and the service entrance switch, another meter base, wiring troughs, or any obstruction such as down spouts, doors, chimneys, shutters or building projections.
- 4.6.6 All sockets energized before a meter is set are a hazard and shall be covered with a meter socket cover furnished by RMU. These will be furnished and installed by RMU.
- 4.6.7 Unused hubs or openings shall not be left open. Hubs shall be closed with a threaded pipe plug and knockouts with knockout closures.
- 4.6.8 Raceway or conduit connections at the top of meter device shall be watertight and the bottom knockouts closed.
- 4.6.9 Meter socket mounting must be plumb and rigidly supported to prevent movement, sway and vibration. Meter sockets, not mounted to a permanent structure, must be supported in a manner approved by RMU. *Refer to Detail #6 and #7 for a preferred meter socket support.*
- 4.6.10 Meter mounting equipment shall be surface mounted including line side conduits.
- 4.6.11 Meter cabinet covers, pull boxes, CT cabinet covers and any miscellaneous service equipment covers shall include hinged covers unless otherwise approved by RMU.
- 4.6.12 Owner shall provide appropriate cable lugs for the termination of RMU maintained conductors.

4.7 CURRENT TRANSFORMER INSTALLATIONS - FOR SERVICES UNDER 600V

- 4.7.1 **SERVICE REQUIRING CURRENT TRANSFORMERS:** Current transformers (CT) shall be installed on services whose rated ampacity is greater than 400A.
- 4.7.2 **INSTALLATION REQUIREMENTS**
 - a. CT Cabinet: CT's shall be installed in Owner provided, owned, installed and maintained enclosure, compartment, box or as part of panel boards as specified herein. The CT enclosure, compartment, box, etc., is dedicated for metering purposes only. Unauthorized access is not permitted. (see Section 4.7.2.F) No Owner equipment or other wiring shall be allowed in or to pass through the dedicated space. Mounting height limitations are stated in Section 4.4. CT's for 480 volt services that are 400 amps or less shall normally be installed on the load side of the service disconnect while for all other services the CT's shall be installed on the line side of the disconnect, unless otherwise approved by RMU.
 - b. Meter Enclosure: The transformer rated meter enclosure and sockets shall be provided as noted in section 4.1.3. The meter socket shall be installed by Owner. The meter device shall be mounted on an outside building wall at a point approved by RMU. (See Section 4.6.9.) The meter enclosure or socket shall be located as close as practical to the CT's.
 - c. Current Transformers: RMU provides and installs the CTs. Owner provides the CT enclosure, and installs line and load side wiring. The CT enclosure for three-phase shall be a minimum 32"x36"x9" deep, and for single-phase shall be a minimum 24"x32"x9" deep.
 - d. Meter Loop:
 - i. The metering conduit between CTs and meter device are Owner installed. (No "LBs" will be permitted). The conduit shall have a minimum diameter of 1" and shall be rigid metal, with a minimum of conduit fittings. Owner wiring is not permitted in this conduit. RMU will provide the meter "loop" wires consisting of No. 12 AWG, solid copper wires with individually colored insulation. Splicing of meter loop wires and the installation of pull boxes are prohibited.
 - ii. RMU Staff will terminate meter loop and ground wires in CT box and on meter equipment in the meter enclosure or socket.
 - e. CT Cabinet Enclosure Covers and Sealing:
 - i. All Owner provided CT enclosure covers shall be provided with a hasp for padlocking if hinged or, if not hinged, shall be sealed with 1/4" x 20 sealing studs as needed to prevent removal of cover. (see Section 5.4.6.) If the CT space is part of panel boards or switchgear, the CT space shall be barricaded from within and covered with its own, separately sealed steel cover or door.
 - ii. All CT cabinets must include a hinged cover. CT cabinets shall be weather and rain resistant for outdoor installation.

5. METER MOUNTING EQUIPMENT REQUIREMENTS

The watt-hour meters will be furnished, installed and maintained by RMU.

All meter mounting equipment shall meet RMU requirements stated herein.

RMU will not maintain lists of approved manufacturer's catalog numbers. RMU will be available to review information provided by the Owner as they work to meet these requirements by reviewing and commenting on designs and/or manufactured samples.

Failure by Owner to install a meter mounting device, also known as meter socket, meeting these requirements may lead to the delay of service until these requirements are met. Other sections of these specifications pertain to mounting location, mounting heights and other service requirements.

5.1 GENERAL REQUIREMENTS

5.1.1 The meter socket and any integrated electrical equipment shall meet requirements of the Underwriters Laboratories (UL) and shall be labeled UL approved for the type of service equipment provided. Meter sockets shall meet standards contained in the latest revision of UL414 and ANSI C-12, Code for Electricity Metering.

5.1.2 Devices shall be labeled as to ampacity class, maximum voltage and manufacturer's name and catalog number.

5.1.3 If the service is 480 volts and 400 amps or less the meter shall be placed on the load side of the disconnect. For all other service conditions where the number of meters and/or fault duty requires a main service disconnect, the individual meters shall be located on the line side (ahead) of each Owner disconnect.

5.1.4 All meter socket equipment and line side wiring shall be surface mounted. Flush or semi-flush equipment is prohibited.

5.1.5 The meter socket shall be of steel construction, weather and rain resistant and have a baked painted finish over galvanized steel sheet. Fabrication with aluminum sheet, fiberglass or non-metallic material is prohibited.

5.1.6 All meter socket covers shall be ringless. See 5.4.6 for sealing.

5.2 *Section 5.2 intentionally blank*

5.3 BOLT-IN METER SOCKETS

Bolt-in meter sockets are not allowed for new construction and where revisions are taking place that require changes to the electric service the Owner must make revisions as needed to eliminate the use of any bolt-in meter socket.

5.4 MISCELLANEOUS REQUIREMENTS

5.4.1 Meter sockets shall meet all applicable RMU specifications and building codes.

5.4.2 On all individual meter sockets for underground service, the line conductors will be installed to wrap around the socket interior to the top lugs. Side wire way designs for direct upward connection of U.G. cables are not permitted.

5.4.3 Bypass type meter sockets shall be provided with a clear polycarbonate safety shield over the socket interior.

5.4.4 The 5th terminal on non-bypass and horn bypass sockets shall be located in the 9 o'clock position and on clamp jaw bypass sockets the 5th terminal shall be located in the 6 o'clock position.

5.4.5 The meter neutral terminal on 5 and 7 terminal sockets shall be bonded to the neutral conductor. Where needed due to local requirements, the socket shall include a grounding electrode bonding clamp.

5.4.6 Sealing - All covers shall be equipped with no more than one securely fastened hasp or stud for padlocking and sealing by RMU utilizing a meter or transformer seal. Depending on the cover size, non-sealable fasteners may be used to mechanically secure the cover in addition to the single sealing hasp. Covers that secure more than one meter, shall similarly be secured with only one sealing and padlocking hasp or stud.

5.5 SPECIAL REQUIREMENTS

- 5.5.1 Where Owner disconnects and/or fuses are combined with the meter equipment, the cover for the meter and the cover for Owner access to the switch/fuse and load side wiring shall be separated such that RMU meter and lines side service compartments may be secured and sealed (see Section 5.4.6) separately from Owner side. On such combination units, internal barriers shall be permanently installed to prevent access to meters and unmetered wiring via Owner compartments. On multi-meter equipment, the line side cable terminal compartments shall have sealable and lockable covers separate from meter covers.

6. OWNER WIRING AND INSTALLATION

6.1 NOTIFY RMU OF NEW OR RE-WIRE WORK

Owner shall promptly notify RMU (refer to Section 2) of the electrical work planned. Prompt notification will minimize delays when work is completed.

6.2 INSPECTIONS OF WIRING

Owner wiring shall be subject to inspection and approval by local code authority and/or RMU. Contact the City of Rolla for code requirements.

When inspections are required, RMU will not provide service until Owner wiring has been approved by the proper authorities. RMU reserves the right to refuse service at any time that it deems that the inspecting authority has been remiss or if the service is otherwise unacceptable.

6.3 EMERGENCY REPAIRS AFTER HOURS, WEEKENDS, AND HOLIDAYS —

Reconnection can be made for emergency reasons if Owner provides RMU with name and address, along with number on business license if applicable. RMU will promptly notify electrical inspection authority of this action.

6.4 *Section 6.4 intentionally blank*

6.5 OWNER ACCESS

Owner may access RMU owned and RMU secured meter, and CT equipment in the pursuit of legitimate work. The Owner is instructed to obtain prior approval from RMU for such action and work intended. Failure to obtain prior approval and to provide prompt notification will cause access to be considered unauthorized and subject to legal action.

When a new service or rewired service originates from an energized, unmetered Owner owned service compartment (i.e., connection box, pull box, terminal box, trough, etc.), Owner must inform RMU for the purpose and extent of the work before starting any work. Generally, a job site meeting with RMU Staff will be necessary to review capacity and suitability of the service compartment and to schedule the work. Only after specific RMU approval, will Owner be permitted to terminate service wires within the compartment. Owner is not permitted to energize new wiring beyond the meter socket unless emergency situations exist and such work is specifically approved by RMU before work is started. Owner should schedule outages to other tenants as needed to complete the wiring.

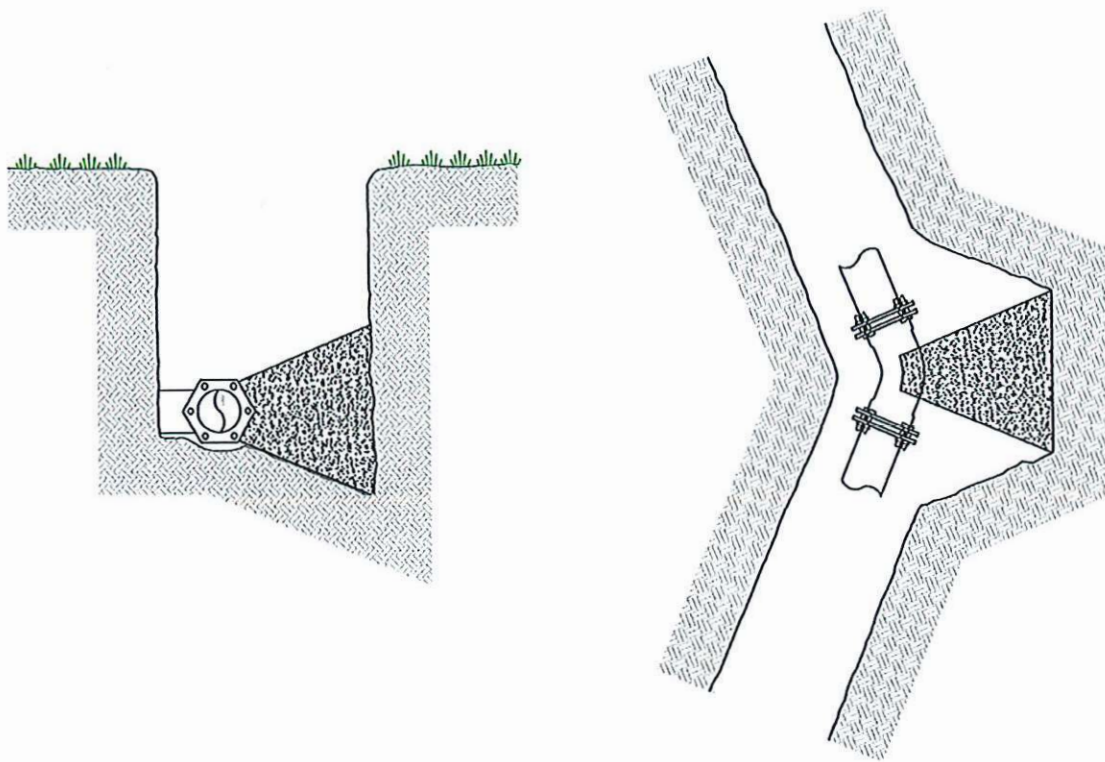
6.6 GROUNDING

All secondary AC supply systems shall have a grounded neutral or grounded phase conductor from RMU point of distribution to Owner service entrance disconnect equipment and approved ground. Owner shall install a grounding conductor as prescribed in the NEC or by local regulations. All electrical supply systems must be grounded. A solid copper conductor No. 6 for 100A service and No. 4 for 200A service, must be run from the appropriate lug on the neutral bus in the circuit breaker or fuse panel to 1/2 inch ground rod driven 8 feet into the earth. The conductor must be secured to the adjacent wall to protect it or the conductor must be run in a conduit. When grounded to a cold water pipe, the ground wire shall be attached by means of an approved ground clamp and connected to the ground terminal of the service switch.

A ground wire connection to the water pipe must consider the location of the water meter.

If an external grounding electrode is used, the grounding electrode conductor from the service equipment may exit the meter socket at the approved knockout. As an option, the grounding electrode conductor may extend from the grounding electrode to an approved grounding lug inside the meter socket, if the socket is so equipped.

Telephone and/or other electronic equipment may require grounding external to Owner premises. Such ground connections are not permitted inside RMU sealed (see Section 5.4.6.) and secured cable and meter compartments.



Notes:

1. Thrust blocks shall be cast-in-place at each change in the direction of a pipe line and at all tees, plugs, caps and bends. Use 4,000 psi concrete mix.
2. Backing shall be placed between solid ground and the fitting to be anchored and shall be of such bearing areas as to assure adequate resistance to the thrust to be encountered.
3. Before concrete is poured, the fitting to be anchored is to be covered with 3 mil polyethelene to such extent as to insure that at no time will any of the concrete come into contact with any portion of the fitting to be anchored or its accessories.

REACTION BACKING

BEARING AREA: SQUARE FEET AGAINST TRENCH WALL (BASED ON WATER PRESSURE OF 150 PSI AND ALLOWABLE SOIL PRESSURE OF 1000 PSF).

PIPE SIZE	TEE & PLUGS	HYDRANTS & 90° ELLS	WYES & 45° ELLS	22 1/2° ELLS	11 1/4° ELLS
4"	3	4	2	1	1
6"	6	8	4	2	1
8"	10	14	7	4	2
10"	15	21	11	6	3
12"	21	29	16	8	4
16"	36	50	27	14	7

ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

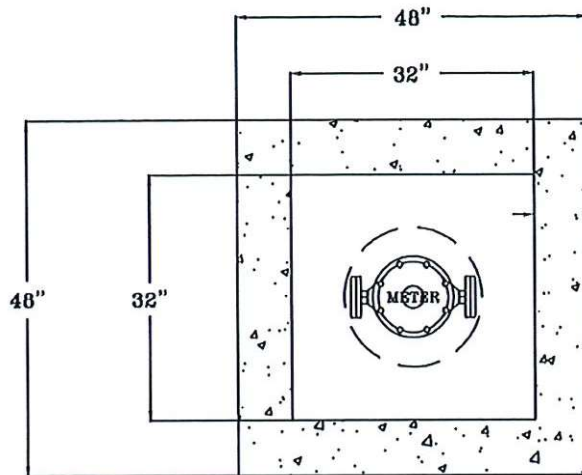
THRUST BLOCK DETAIL



WATER SPECIFICATIONS
DETAIL #01

SCALE N/A REVISION DATE 03-18-2019

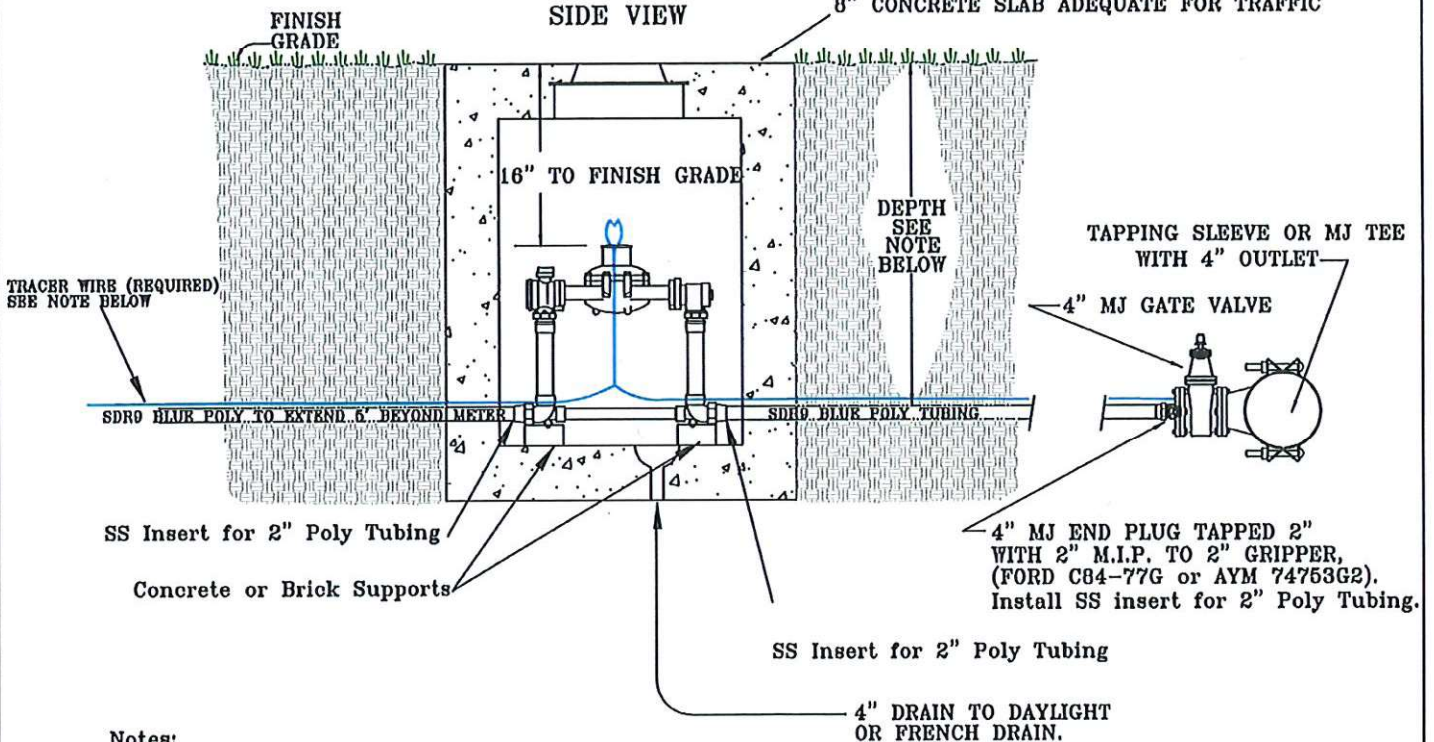
PLAN VIEW



CONCRETE STRUCTURE TO BE CAST IN PLACE OR PRE-CAST. (BY OWNER)

SIDE VIEW

8" CONCRETE SLAB ADEQUATE FOR TRAFFIC



Notes:

1. For a 2" meter, meter set shall be Ford VBH77-18-44-77-G or AYM 721-718WDGG 770.
2. Stainless steel inserts shall installed at each connection with poly tubing.
3. Tracer wire is required on poly tubing with at least 5' inside meter pit. It is recommended to install tracer wire from meter pit to structure. See detail #9 for installation.
4. All materials shown, with the exception of the meter are the responsibility of the Owner.
5. Meter by-pass will not be allowed.
6. Depth as needed for top of meter to be 16" below finished grade.

ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

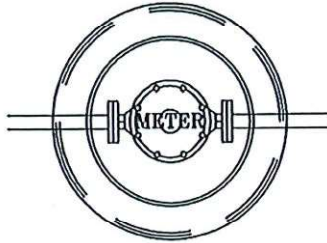
2" METER PIT FOR AREAS SUBJECT TO VEHICULAR TRAFFIC



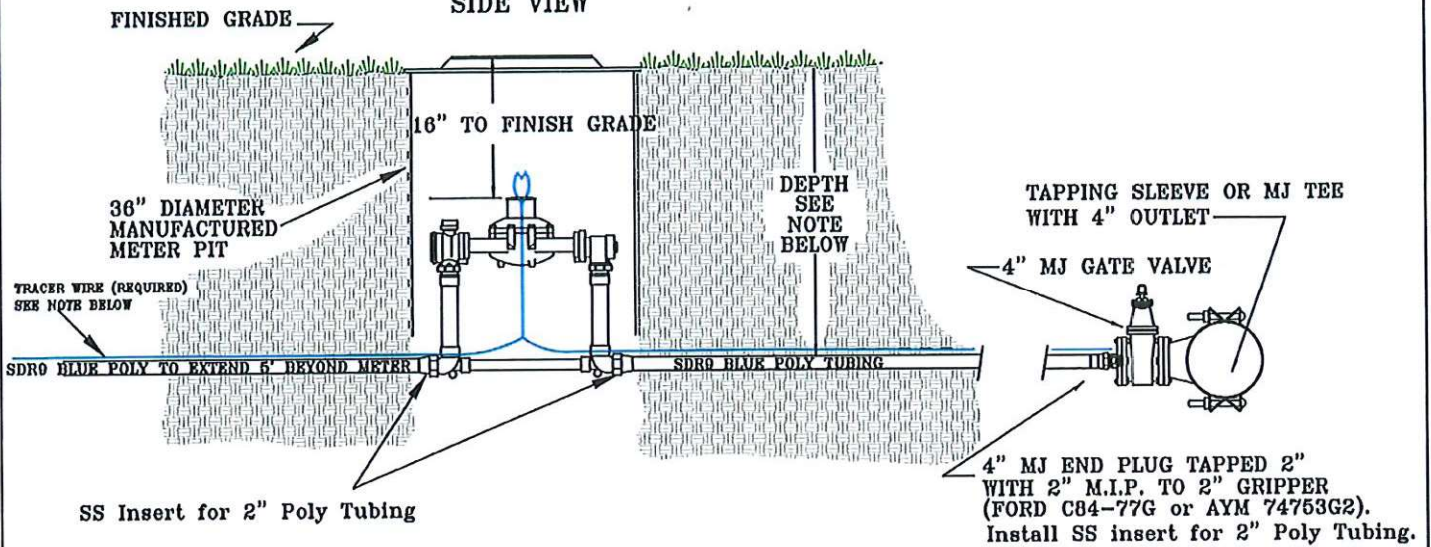
WATER SPECIFICATIONS
DETAIL #03

SCALE N/A REVISION DATE 03-10-2019

PLAN VIEW



SIDE VIEW



Notes:

1. For a 2" meter, meter set shall be Ford VBH77-18-44-77-G or AYM 721-718WDGG 770.
2. Stainless steel inserts shall be installed at each connection with poly tubing.
3. Tracer wire is required on poly tubing with at least 5' inside meter pit. It is recommended to install tracer wire from meter pit to structure. See detail #9 for installation.
7. For a new installation where the service will be a direct customer of RMU the meter pit, ring, and lid will be provided by RMU for installation by the Owner where the pit is not located in a traffic area. For all customers located such that the property will be served by Phelps County Water Supply District Number 2 the Owner will be required to provide all materials (other than the meter).
8. All materials shown, with the exception of the meter are the responsibility of the Owner.
9. Meter by-pass will not be allowed.
10. Depth as needed for top of meter to be 16" below finished grade.

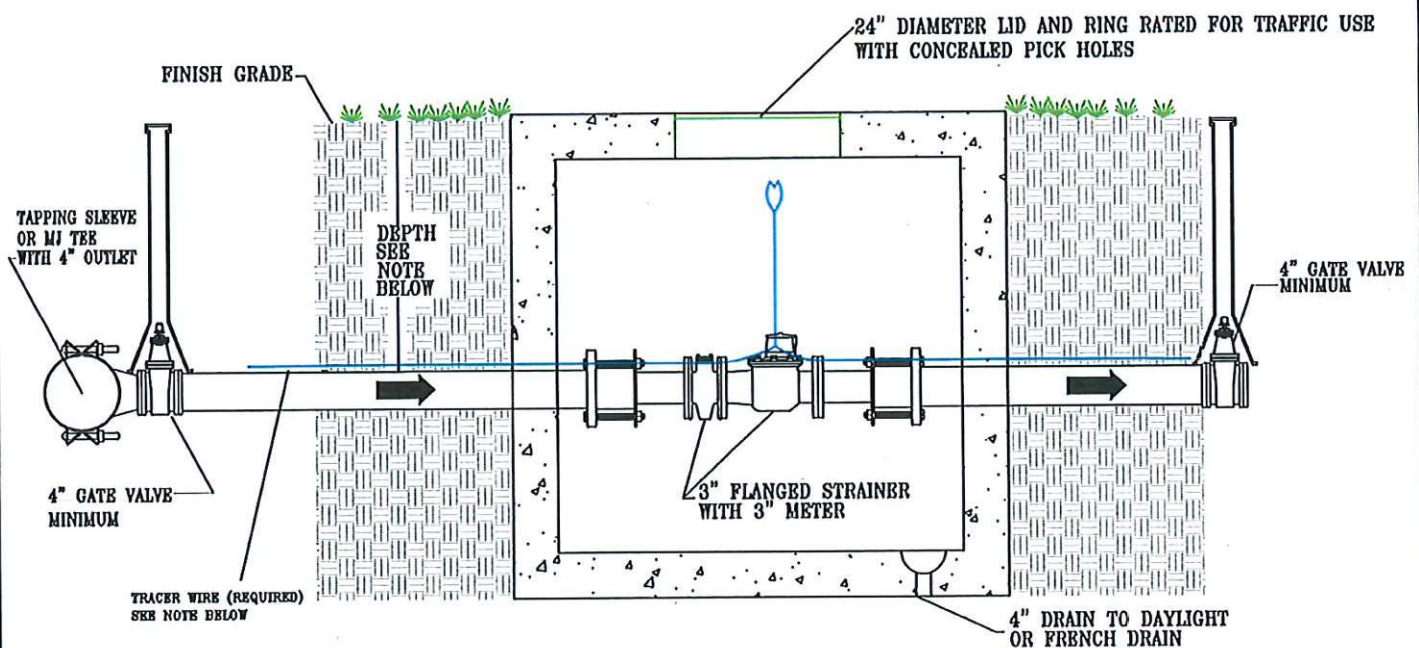
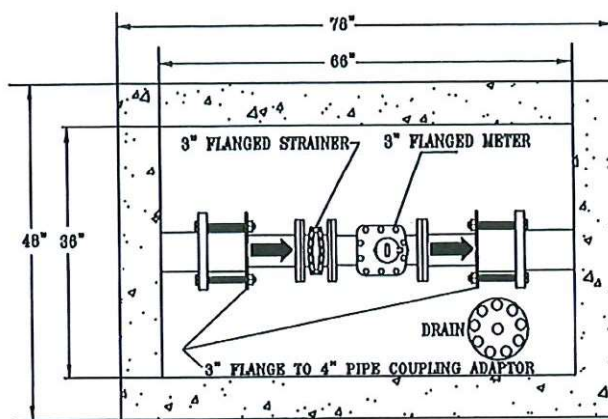
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

2" METER PIT FOR AREAS NOT
SUBJECT TO VEHICULAR TRAFFIC



WATER SPECIFICATIONS
DETAIL #04

SCALE N/A REVISION DATE 03-16-2019



Notes:

1. The meter shall be placed under the center of the meter lid cover.
2. Depth as needed for top of meter to be 16" below finished grade.
3. Water service line must be valved on both sides of the meter pit. Service line reduction shall be accomplished using SMITH BLAIR (Cat #914-0480-03) or FORD (Cat #FCA4.80-D3R) Coupling Adaptor, 3" Flange to 4" Pipe, Type 914. The service line on one side of the meter shall be out 1/2" to 1" short to allow for installation and removal of the meter.
4. Provide masonry support for meter.
5. All materials shown, with the exception of the meter and strainer are the responsibility of the owner.
6. Tracer wire is required on all mains with at least 5' inside meter pit. It is recommended to install tracer wire from meter pit to structure. See detail #9 for installation.
7. Meter bypass will not be allowed.

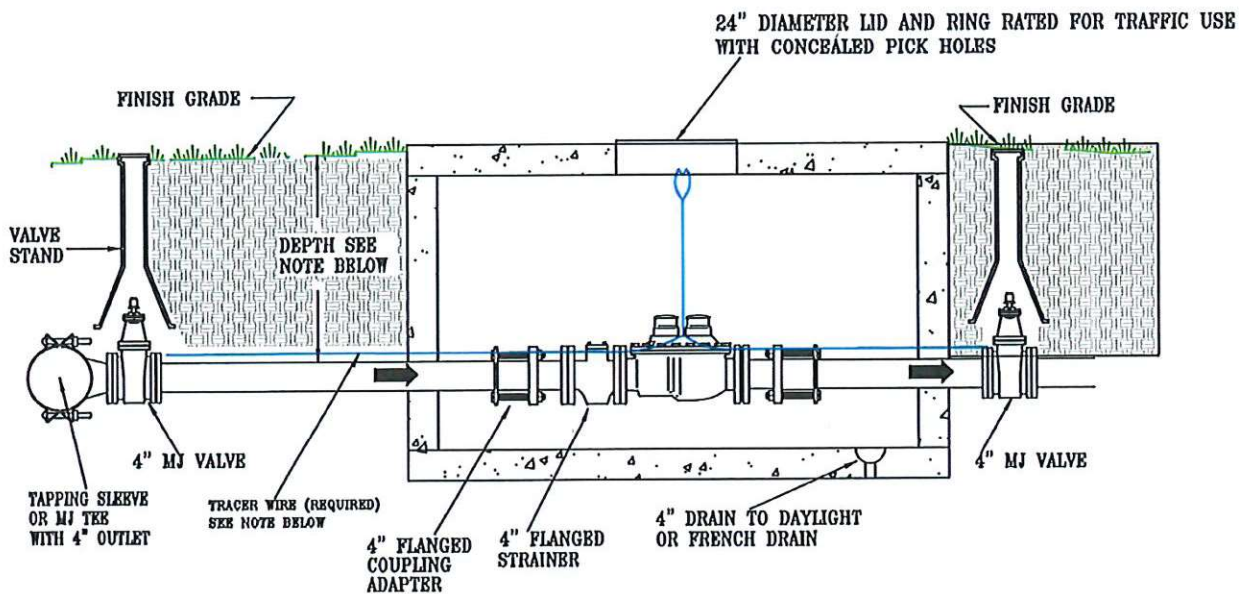
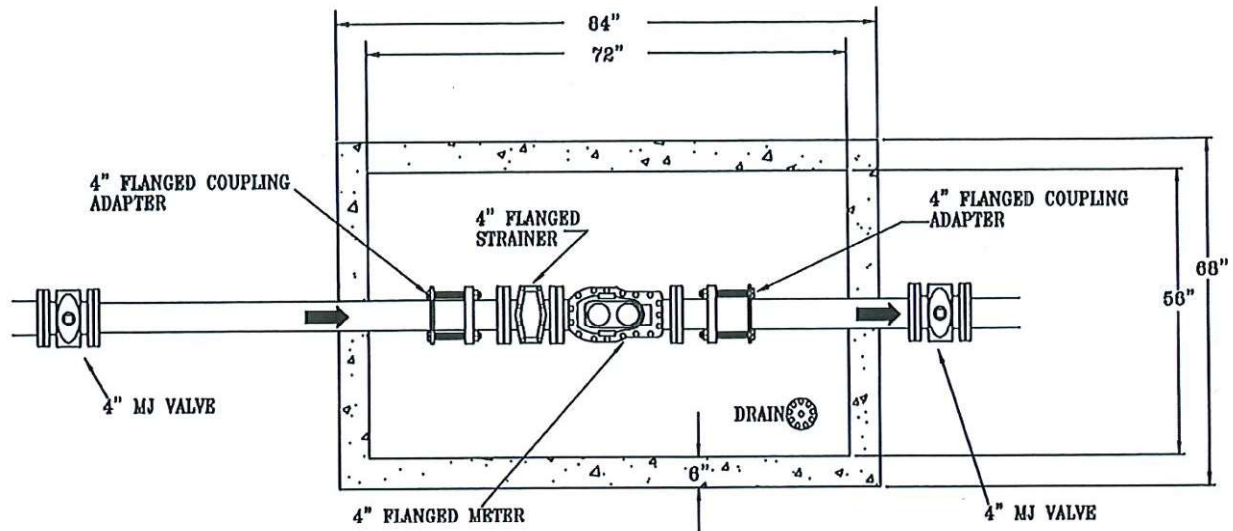
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

3" METER PIT



WATER SPECIFICATIONS
DETAIL #05

SCALE N/A REVISION DATE 03-16-2019



Notes:

1. The meter shall be placed under the center of the meter lid cover.
2. Depth as needed for top of meter to be 16" below finished grade.
3. Water service line must be valved on both sides of the meter pit.
4. Provide masonry support for meter.
All materials shown, including the meter are the responsibility of the Owner.
5. Tracer wire is required on all mains with at least 5' inside meter pit. It is recommended to install tracer wire from meter pit to structure. See detail #9 for installation.
6. Meter bypass will not be allowed.

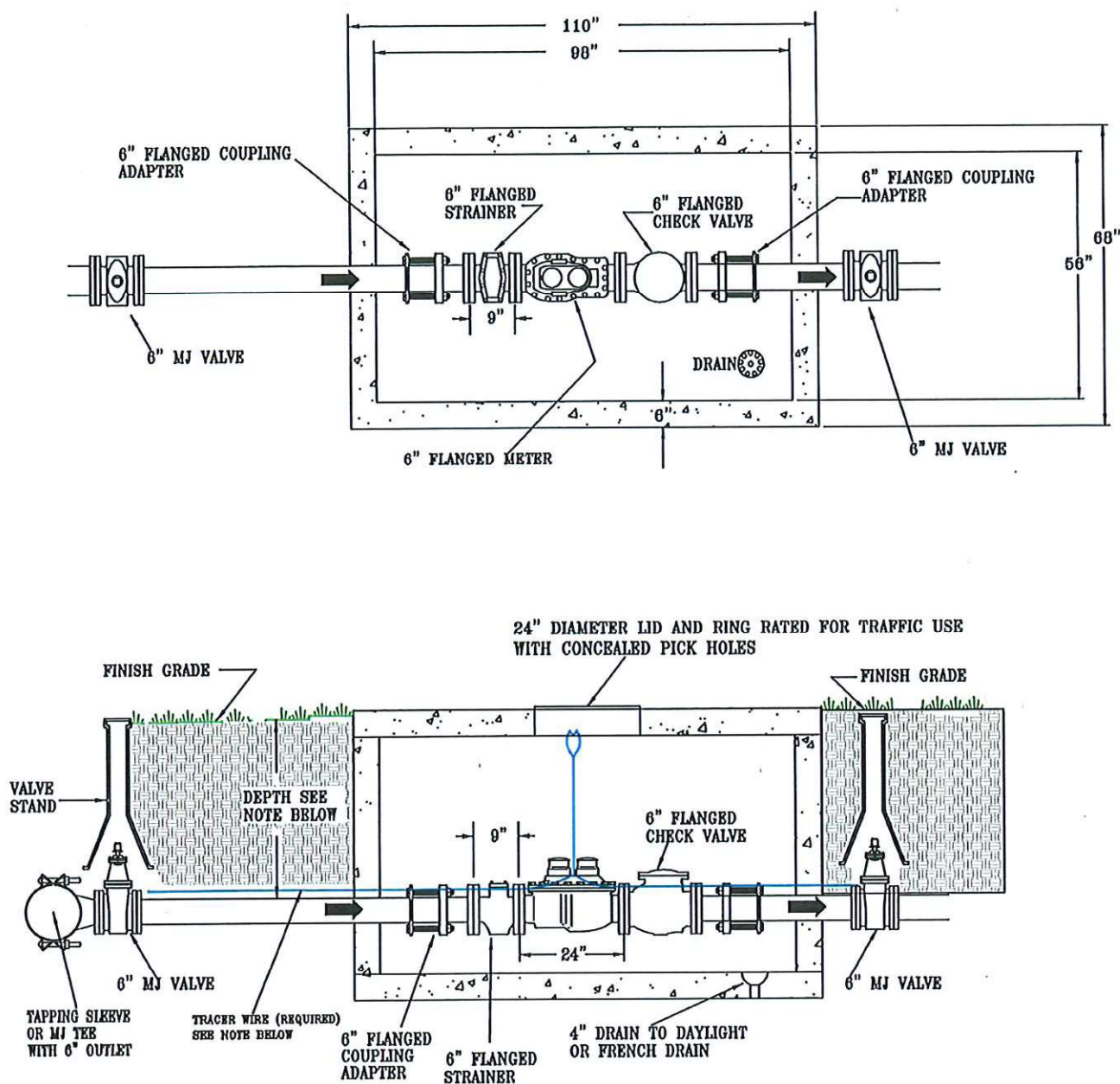
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

4" COMPOUND METER PIT



WATER SPECIFICATIONS
DETAIL #06

SCALE N/A REVISION DATE 03-10-2019



Notes:

1. The meter shall be placed under the center of the meter lid cover.
2. Depth of pit will be determined by the depth of the existing water mains.
3. Water service line must be valved on both sides of the meter pit.
4. Provide masonry support for meter.
5. All materials shown, including the meter are the responsibility of the Owner.
6. Tracer wire is required on all mains with at least 5' inside meter pit. It is recommended to install tracer wire from meter pit to structure. See detail #9 for installation.
7. Meter bypass will not be allowed.

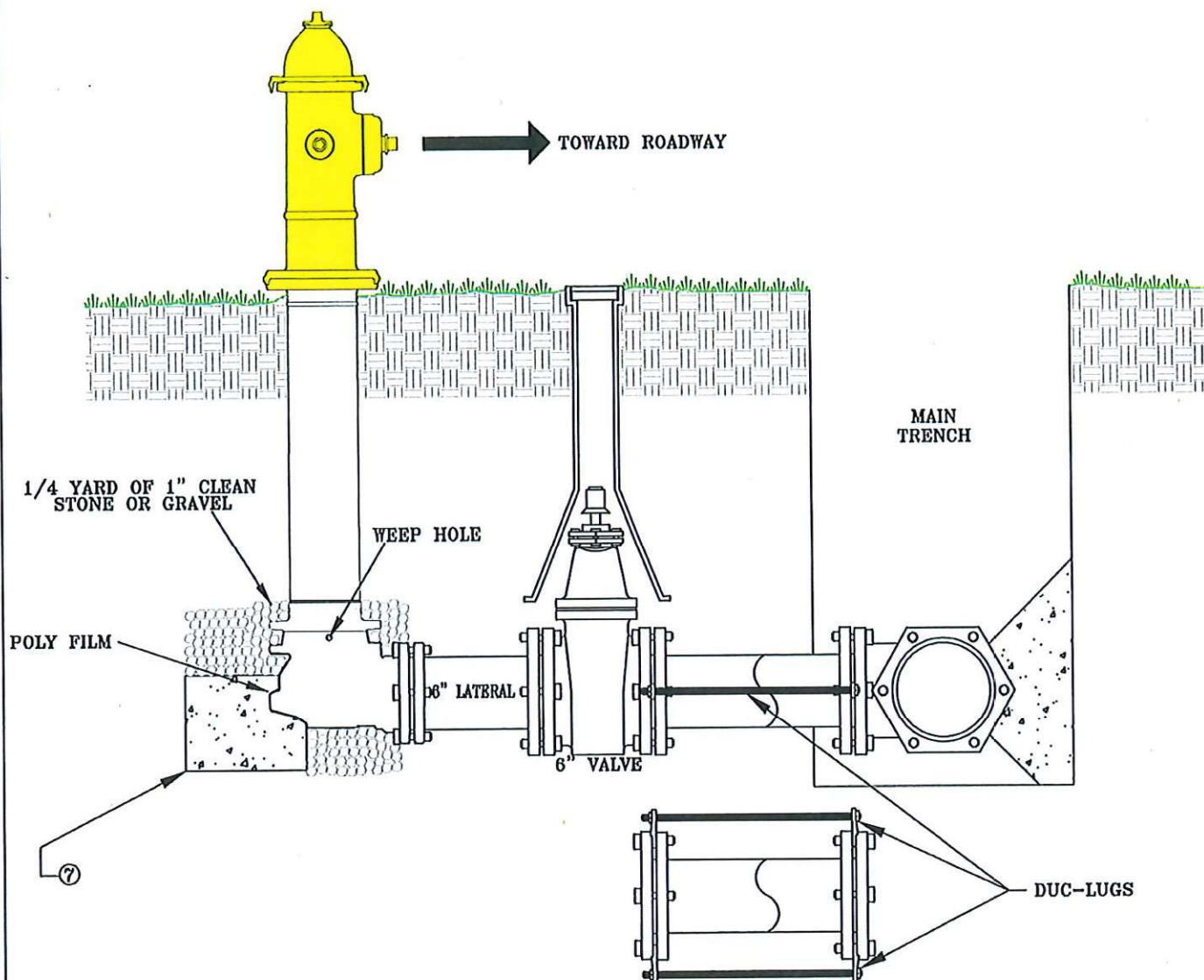
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

6" COMPOUND METER PIT



WATER SPECIFICATIONS
DETAIL #07

SCALE N/A REVISION DATE 03-16-2019



Notes:

1. All fire hydrants shall fully conform to AWWA C-502.
2. All three-way hydrants shall be Mueller#A423 Centurion, Clow Medallion or AVK Series 2780, 5 1/4" valve with six (6) inch mechanical joint shoe. Three way hydrants shall be adapted with one (1) 4 1/2" "Steamer" connection as pumper nozzle and two 2 1/2" hose connections (4 threads per inch).
3. All two-way hydrants shall be Mueller#A425, Clow Medallion or AVK Series 2756, 5 1/4" valve with six (6) inch mechanical joint shoe. Two-way hydrants shall be adapted with two (2) 4 1/2" "Steamer" connections as pumper nozzles (4 threads per inch).
4. Two-way hydrants shall be installed on all mains sized 12" and larger.
5. Color of all hydrants is to be safety yellow.
6. Forty-two inch bury shall be standard, however individual conditions may warrant deviation, any deviation in depth shall be approved by RMU.
7. Pour a minimum 6 cubic feet of concrete blocking against 6 square feet of undisturbed earth. That area of fire hydrant associated with the hydrant thrust block shall be wrapped with 3 mil polyethylene to insure concrete does not contact any portion of the hydrant.
8. No hydrant shall be connected to, or located within 10 feet of sanitary or storm sewers.

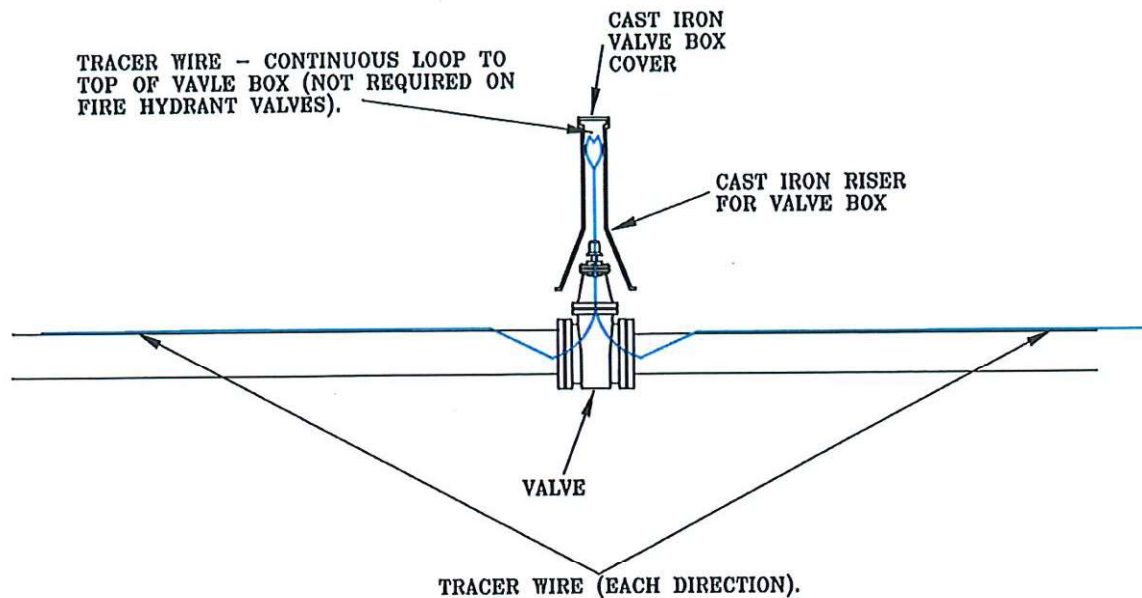
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

FIRE HYDRANT INSTALLATION



WATER SPECIFICATIONS
DETAIL #08

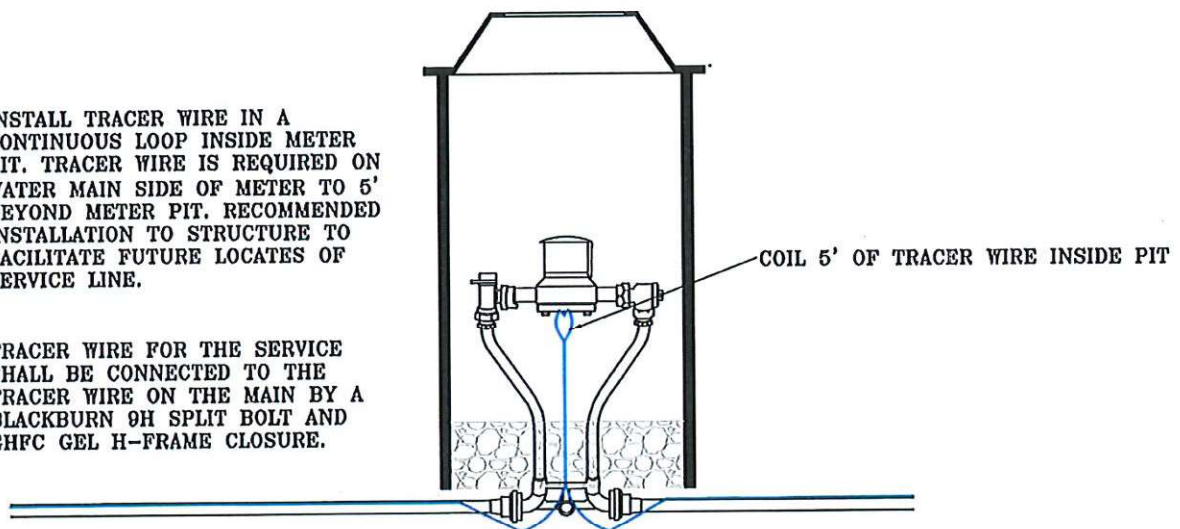
SCALE N/A REVISION DATE 03-18-2019



TRACER WIRE SHALL BE SECURED TO THE TOP OF THE MAIN BY TAPE A MINIMUM OF THREE TIMES IN EACH LENGTH OF PIPE.

INSTALL TRACER WIRE IN A CONTINUOUS LOOP INSIDE METER PIT. TRACER WIRE IS REQUIRED ON WATER MAIN SIDE OF METER TO 5' BEYOND METER PIT. RECOMMENDED INSTALLATION TO STRUCTURE TO FACILITATE FUTURE LOCATES OF SERVICE LINE.

TRACER WIRE FOR THE SERVICE SHALL BE CONNECTED TO THE TRACER WIRE ON THE MAIN BY A BLACKBURN 9H SPLIT BOLT AND GHFC GEL H-FRAME CLOSURE.



TRACER WIRE SHALL BE SECURED TO THE TOP OF THE POLY BY TAPE A MINIMUM OF EVERY 10'.

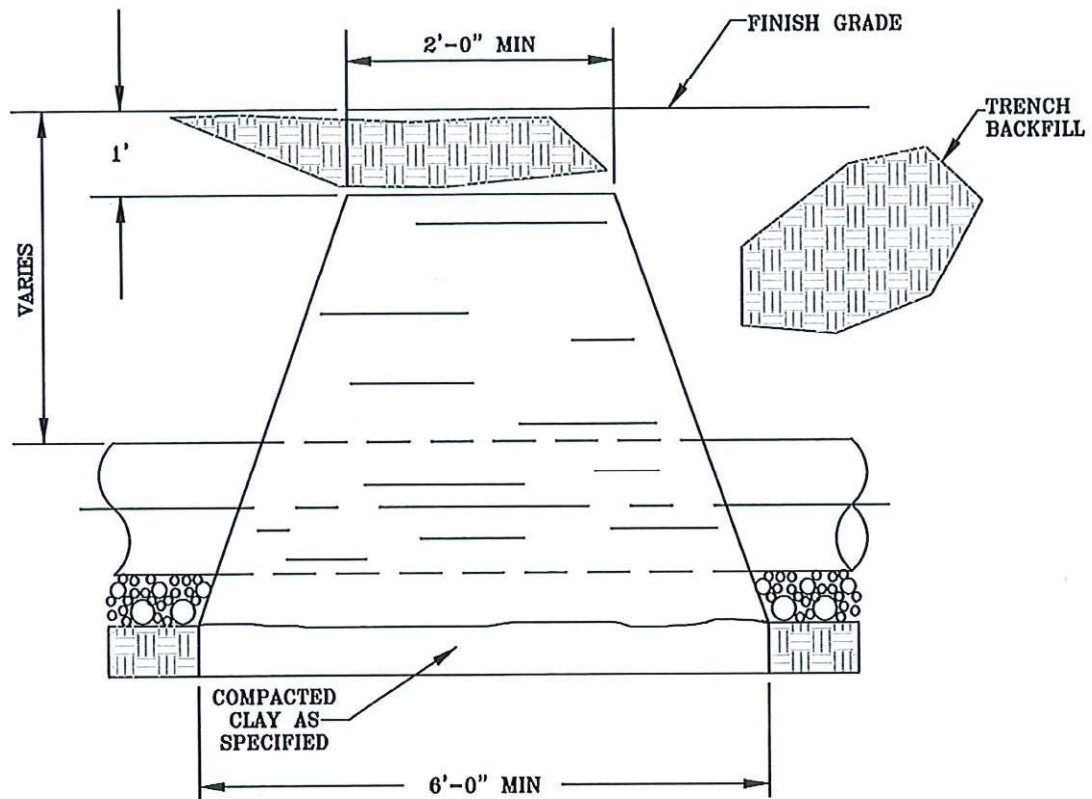
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

TRACER WIRE INSTALLATION



WATER SPECIFICATIONS
DETAIL #00

SCALE N/A REVISION DATE 03-18-2019



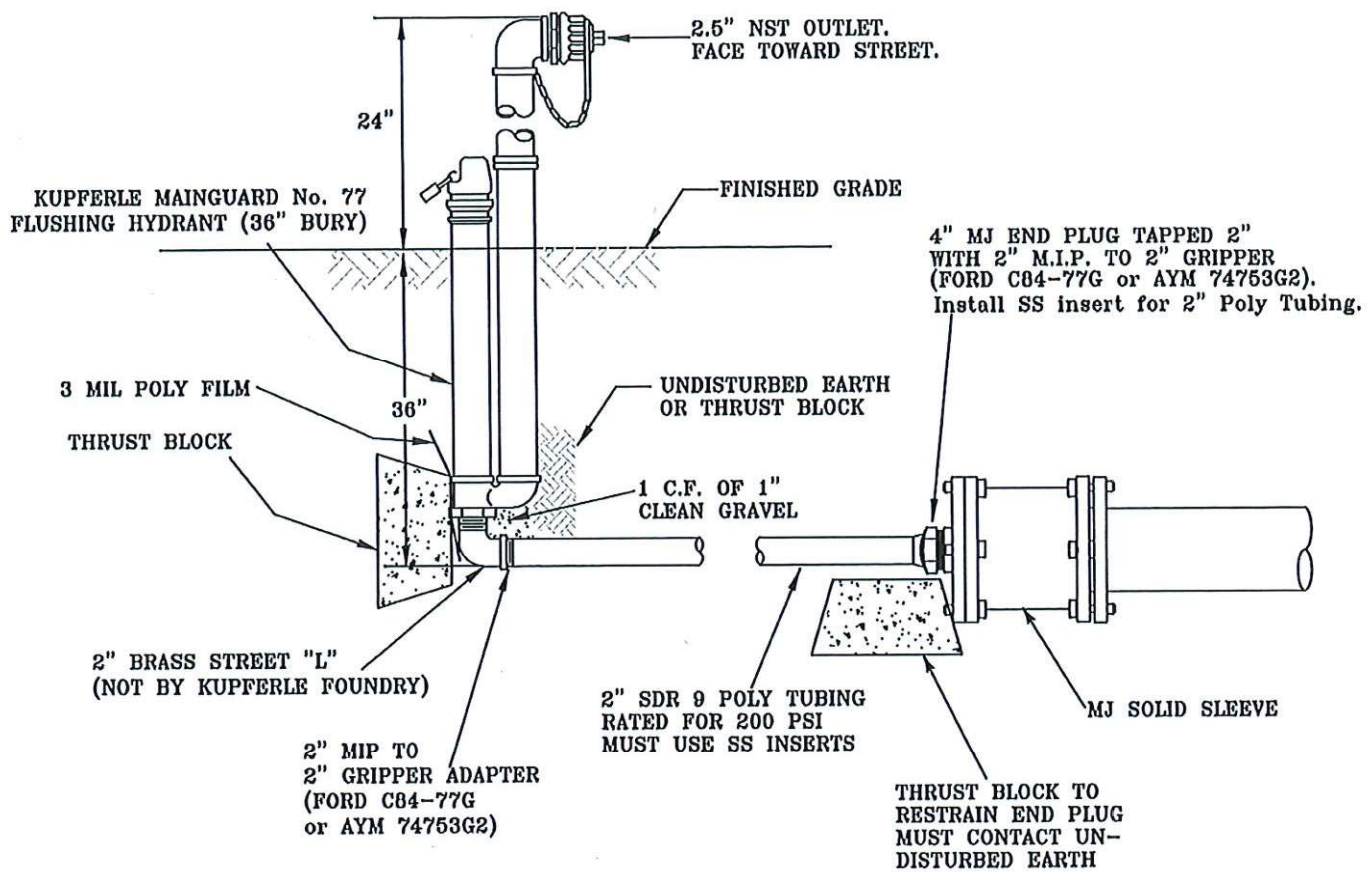
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

TRENCH CHECK

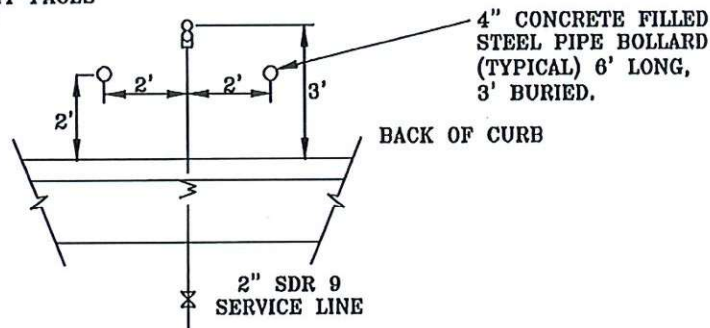


WATER SPECIFICATIONS
DETAIL #10

SCALE N/A REVISION DATE 03-16-2019



HYDRANT FACES
STREET



Notes:

1. Flush hydrants shall be non-freezing, self draining type with a 36" bury.
2. Flush hydrants shall be furnished with a 2" FIP inlet, a non-turning operating rod, and shall open to the left. All working parts shall be bronze-to-bronze design, and be serviceable from above grade with no digging. The outlet shall also be bronze and be 2 1/2" NST.
3. Flush hydrants shall be lockable to prevent unauthorized use.
4. Flush hydrants shall be as manufactured by Kupferle Foundry, or RMU approved equal.

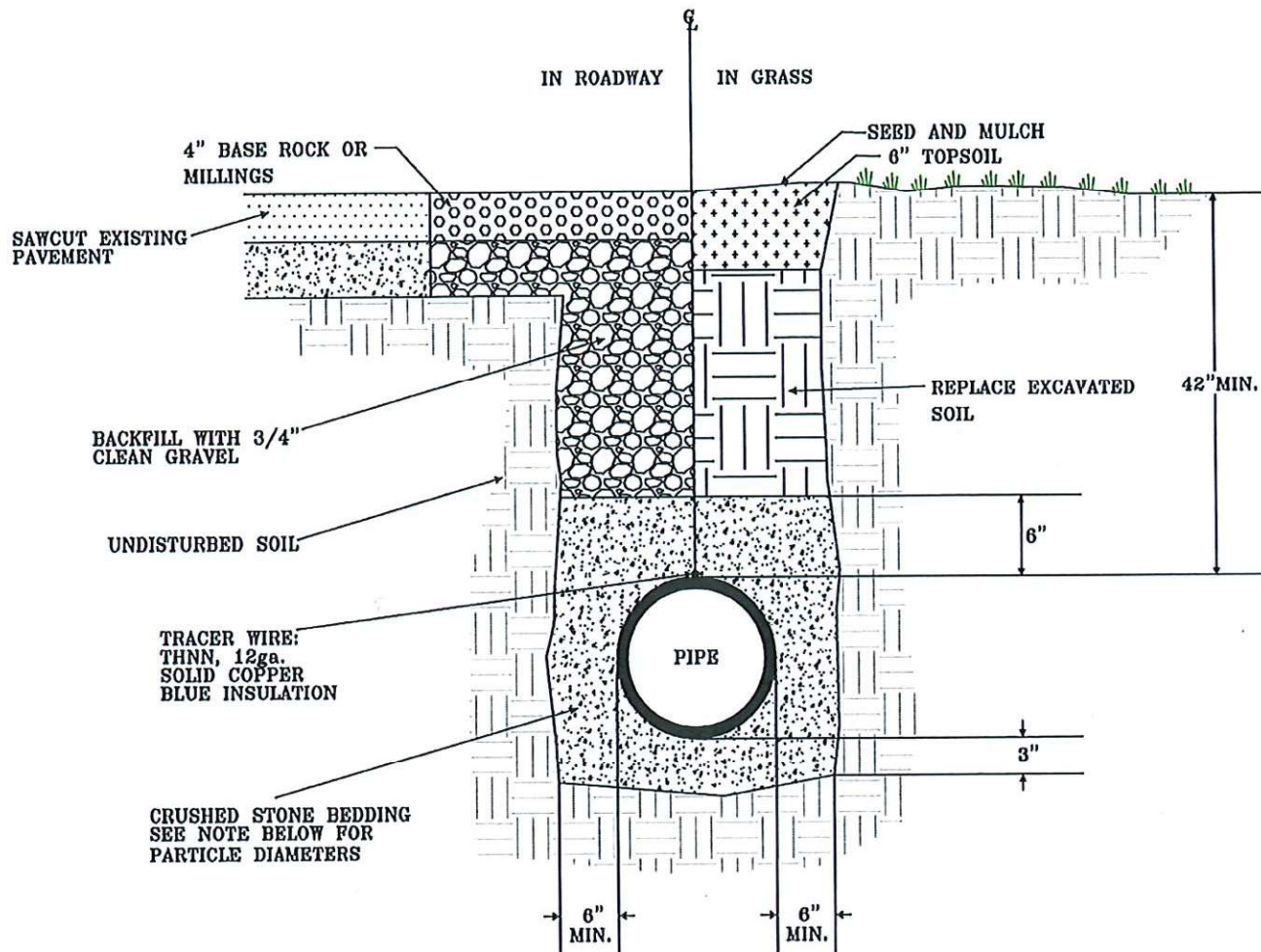
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

FLUSH HYDRANT



WATER SPECIFICATIONS
DETAIL #11

SCALE N/A REVISION DATE 03-18-2019



Notes:

1. Embedment material diameters for plastic pipes:
No greater than $\frac{1}{8}$ inch for 4-inch diameter pipes
No greater than $\frac{3}{8}$ inch for 6-inch and larger diameter pipes
2. City of Rolla to determine pavement requirements.

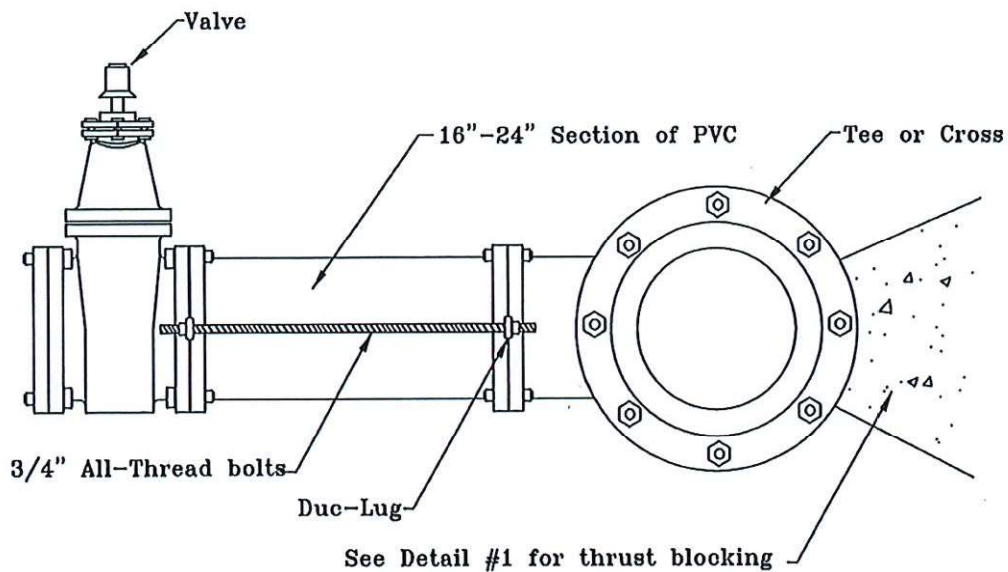
ROLLA MUNICIPAL UTILITIES
102 WEST 9TH STREET
ROLLA, MISSOURI 65401

TRENCH BACKFILL



WATER SPECIFICATIONS
DETAIL #12

SCALE N/A REVISION DATE 03-28-2028



1. All valves associated with a tee or cross shall be restrained with Duc-lugs and All-thread bolts in the quantity described in the table below.
2. There shall be a 16"-24" section of pipe installed between the valve and tee or cross.
3. Refer to Detail #1 for thrust blocking requirements.

DUC LUG & ALL-THREAD BOLT REQUIREMENTS		
VALVE SIZE	NO. OF DUC LUGS	NO. BOLTS
4"	4	2
6"	4	2
8"	8	4
10"	12	6
12"	16	8
16"	20	10

ROLLA MUNICIPAL UTILITIES 102 WEST 9TH STREET ROLLA, MISSOURI 65401	
VALVE RESTRAINT AT TEES AND CROSSES FOR LINES 6" - 16"	
	WATER SPECIFICATIONS DETAIL #13 SCALE <u>N/A</u> REVISION DATE <u>03-18-2019</u>