

5. Oil Filters: Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
6. Fuel Pumps: An engine driven, mechanical, positive displacement fuel pump, and fuel filter with replaceable spin-on canister element.
7. Air cleaner: Replaceable dry element air cleaner with restriction indicator.
8. Fuel Lines: Flexible supply and return fuel lines.
9. Battery Charging Alternator Engine mounted battery charging alternator, 45-ampere minimum, and solid-state voltage regulator.

#### 2.4 AC GENERATOR

- A. General: The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 125 degrees Centigrade.
- B. Power The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.
- C. Excitation: A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

#### 2.5 CONTROL

- A. General: The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
- B. Mounting: The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.
- C. Standards: The control shall be UL508 listed, CSA282-M1989 certified, and meet IEC8528 part 4. All switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std. 461C part 9, and I EC Std. 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE587 for voltage surge resistance.
- D. Features
  1. Mode Select Switch: The mode select switch shall initiate the following control modes. When in the RUN or Manual position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage. A dry contact shall be provided to indicate auto position of the selector switch.
  2. Emergency Stop Switch: Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
  3. Reset Switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. **Analog Output Metering:** The generator set shall be provided with a metering set including the following features and functions. Analog voltmeter, ammeter, frequency meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Ammeter and KW meter scales shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red.
5. **Generator Set alarm Display:** The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel:
  - low oil pressure (alarm)
  - low oil pressure (shutdown)
  - oil pressure sender failure (alarm)
  - low coolant temperature (alarm)
  - high coolant temperature (alarm)
  - engine temperature sender failure (alarm)
  - low coolant level (alarm or shutdown--selectable) fail to crank (shutdown)
  - over crank (shutdown)
  - over speed (shutdown)
  - low DC voltage (alarm)
  - high DC voltage (alarm)
  - weak battery (alarm)
  - low fuel-daytank (alarm)
  - high AC voltage (shutdown)
  - low AC voltage (shutdown)
  - under frequency (shutdown)
  - over current (shutdown)
  - short circuit (shutdown)
  - over load (alarm)
  - emergency stop (shutdown)
6. **Special Alarm or Shutdown Conditions:** Provisions shall be made for indication of two additional alarm or shutdown conditions. Labeling of the alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions.
7. **Engine Status Monitoring:** The following information shall be available from a digital status panel on the generator set control:
  - engine oil pressure (psi or kPA)
  - engine coolant temperature (degrees F or C)
  - engine oil temperature (degrees F or C)
  - engine speed (rpm)
  - number of hours of operation (hours)
  - number of start attempts
  - battery voltage (DC volts)

## 2.6 CONTROL FUNCTIONS

- A. Cycle Cranking System: The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
- B. Idle Mode Control: The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
- C. Engine Governor Control: The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
- D. Time Delay Start The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

## 2.7 ALTERNATOR CONTROL FUNCTIONS

- A. Voltage Regulation: The generator set shall include an automatic voltage regulation system that is matched and prototype tested with the governing system provided. It shall be immune from mis-operation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of [58-59] HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via voltage adjusting rheostat.
- B. Output Current: Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.
- C. Output Power: Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load-shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
- D. Over/under Voltage Monitor: An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.
- E. Battery Monitoring System: A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine starting, the low voltage limit shall be disabled, and if DC voltage drops to less than 14.4 volts for more than two seconds a "weak battery" alarm shall be initiated.

## 2.08 CONTROL INTERFACES FOR REMOTE MONITORING

- A. General: All control and interconnection points from the generator set to remote components shall be brought to a separate connection box. No field connections shall be made in the control enclosure or in the AC power output enclosure. **Provide the following features in the control system:**
- B. Alarm or Shutdown: Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any alarm or shutdown condition on the generator set.
- C. Generator Set on: One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.

- D. Power Supply Circuit — Switched: A fused 10 amp switched 24VDC-power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
- E. Power Supply Circuit — Continuous: A fused 20 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

F. Following alarms and status shall be monitored by the dialer:

1. Common Fault
2. Low Battery
3. Low Level Fuel
4. HOA switch not in Auto Mode
5. Over Crank Alarm
6. Generator On

## 2.9 BASE

A. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down dampers within the rails.

## 2.10 AUXILIARY EQUIPMENT AND ACCESSORIES

- A. Coolant Heater Engine mounted thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be 208V, 1 phase. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater(s); installation shall be specifically designed to provide proper venting of the system. The coolant heater(s) shall be installed using quick disconnect couplers to isolate the heater for replacement of the heater element. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss. The coolant heater shall be provided with a thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA110 requirements.
- B. Vibration Isolators: Vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer.
- C. Starting and Control Batteries: Starting battery bank, calcium/lead antimony type, 24 volt DC, sized as recommended by the generator set manufacturer, shall be supplied for each generator set with battery cables and connectors.
- D. Exhaust Silencer: Exhaust muffler(s) shall be provided for each engine, size and type as recommended by the generator set manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed according to the generator set manufacturers recommendations and applicable codes and standards.

## 2.11 BATTERY CHARGER

- A. A UL listed/CSA certified 10-amp voltage regulated battery charger shall be provided in the engine-generator set enclosure. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:
- Loss of AC power – red light
  - Low battery voltage – red light
  - High battery voltage – red light
  - Power ON – green light (no relay contact)
- Analog DC voltmeter and ammeter, 12 hour equalize charge timer, AC and DC fuses shall also be provided on the charger.

## 2.12 OUTDOOR WEATHER – PROTECTIVE HOUSING, SOUND ATTENUATED TYPE



- A. Outdoor Weather-Protective Housing: Generator set housing shall be provided factory-assembled to generator set base and radiator cowling, and shall be of the sound-attenuated type. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. The housing shall have hinged side-access doors and rear control door. All doors shall be lockable. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two step electro-coating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating, which meets the following requirements:  
Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.  
Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.  
Crosshatch adhesion, per ASTM D3359-93, 4B-5B.  
Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.  
Salt Spray, per ASTM B117-90, 1000+ hours.  
Humidity, per ASTM D2247-92, 1000+ hours.  
Water Soak, per ASTM D2247-92, 1000+hours.  
Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.

#### 2.13 FUEL STORAGE TANK

- A. Provide a dual wall sub-base fuel storage tank with 8 hours at 100% load usable capacity. The tank shall be constructed of corrosion resistant steel and shall be UL listed. The equipment, as installed, shall meet all local and regional requirements for above ground tanks.

#### 2.14 CIRCUIT BREAKER

- A. Furnish and install a generator mounted molded case circuit breaker of the rating and size as indicated on the drawing. The circuit breaker shall meet the specification in Section 16480. The generator manufacturer shall coordinate the circuit breaker with the MCC manufacturer for compatibility. The circuit breaker shall be rated at 65 KAIC.

### PART 3 - EXECUTION

#### 3.1 COORDINATION

- A. Coordinate with other trades, equipment and systems to the fullest extent possible.

#### 3.2 INSTALLATION

- A. Provide services of a qualified field representative to check the installation of the generator unit to ensure a proper installation.  
B. Install the generator set with sub — base fuel tank on the concrete pad as shown on the drawings. Install the vibro — isolators between the sub — base fuel tank and the generator set. Installation shall be in accordance with the manufacturer's recommendations.

#### 3.3 EQUIPMENT START-UP

- A. Operate unit to demonstrate ability to operate continuously without vibration, jamming, leakage or overheating and to perform specified functions, after installation and after manufacturer's representative check of installed equipment.  
B. Comply with manufacturer's operating and maintenance instructions during start-up and operation.  
C. Promptly correct improper installation of equipment.  
D. Cooperate with supplier of equipment at time of start-up and in making of all final adjustments necessary to place equipment in satisfactory working order Start-up shall not commence without the presence of the manufacturer's representative.

#### 3.4 FIELD TEST



- A. Upon completion of the installation and as soon as conditions permit, the emergency power supply system including the engine driven generator, electrical circuits, controls, transfer switch and other devices shall be tested in the presence of the Engineer by the Contractor and the service representative for the manufacturer of the engine driven generator unit to assure that the system functions as specified.
  - 1. Prior to scheduling the test, notify the Engineer in writing that all requirements and provisions of the Contract Documents have been fulfilled, that all apparatus shall be clean, properly adjusted and ready for operation and that the Instruction Manuals, parts lists and record drawings described in Paragraph 1.03 above, have been submitted.
  - 2. The manufacturers' representatives shall make such changes in wiring or connections and such adjustments, repairs or replacements necessary to make the circuit, device or control system function as specified and otherwise comply with the Contract Documents.
- B. As part of the field test, each of the automatic shutdown devices shall be tested and the respective values recorded at which the devices will stop the engine. Any adjustments required shall be made in the devices to make the operating values correspond to those recommended by the engine manufacturer and as recorded during the stop test.
- C. After the two hour test has been completed, additional testing shall be performed to demonstrate the emergency power supply systems ability to meet the automatic starting, load transfer and motor starting requirements as specified under Paragraph 1.06C above.
- D. Piping shall be tested in strict accordance with the manufacturers testing requirements. For each double wall fuel oil line entering the building, provide a pressure test port with threaded plug in the double wall piping termination filling. Piping shall be subjected to an air test of 10 psig maximum.
- E. If the emergency power supply system fails to fulfill the performance requirements of this specification, corrective action shall be taken and the system retested to assure full compliance. All expenses associated with the field tests, including any corrective action, shall be borne to the Contractor.

END OF SECTION

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## **SECTION 1015 GAS CHLORINATION**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

This specification governs the materials, equipment, manufacture, and installation of a complete and working gas chlorination system.

#### **1.2 DRAWINGS AND SPECIFICATIONS**

Construction shall be governed by the CITY OF FARMERSVILLE'S drawings and specifications showing general dimensions and construction details.

#### **1.3 SUBMITTALS**

- A. This data shall include drawings and descriptive information in sufficient detail to show kind, material, and size, (i.e. catalog cut-sheets for all, items, appurtenances, etc.) and dimensions needed for installation and correlation with other materials and equipment. Information shall be submitted by specifications section. Data submitted shall include drawings showing essential details of any changes proposed by the CONTRACTOR with detailed layouts. If the cut-sheets contain information not pertaining to the supplied equipment, all extraneous information shall be clearly crossed out and pertinent information highlighted.
- B. No work shall be performed in connection with the fabrication or manufacture of materials and equipment nor shall any accessory or appurtenance be purchased until the drawings and data thereof have been approved by the ENGINEER and CITY OF FARMERSVILLE, except at the CONTRACTOR's own risk and responsibility.

### **PART 2 – PRODUCT**

All components of the chlorinating equipment shall be the products of a single manufacturer. The chlorinator shall be vacuum operated; solution feed type and shall automatically switch the gas supply from an empty source to a full source. The system shall have an automatic reset and shall not permit return to the initial source until the second source is empty. The gas feeder shall have a maximum capacity to 100 pounds per day (PPD) of chlorine and shall be equipped with a remote mounted gas flowmeter with an operating range from 2.5 to 50 PPD of gas feed. Equipment shall have capacity at least 50% greater than highest expected dosage to be applied at any one time. The chlorinator shall be installed in the building shown on the drawings and specified herein.

#### **2.1 ACCEPTABLE MANUFACTURERS**

- Regal

CITY OF FARMERSVILLE shall have final selection of the manufacturer.

#### **2.2 DESIGN**

The gas feeder design shall provide for conveying the gas under vacuum from the vacuum regulator to the ejector-check valve assembly to insure complete system safety. The gas feeder design shall permit the entire system to be vacuum checked in the field without using special tools or manometers. The gas feeder shall be constructed of materials specially selected for wet or dry gas services. All springs used in the gas feeder shall be of a tantalum alloy. The rate valve and seat shall be provided for vacuum regulation. The rate of gas feed shall be set manually and shall remain constant until manually changed.

The gas feeder shall be comprised of the following: vacuum regulators, indicating meter, gas flowmeter with manual rate valve, pressure relief valve, ejector-diffuser assembly, gas supply indicator, automatic switch over module and manifold. The equipment shall also include a two cylinder scale.

- A. Safety: Chlorinator shall provide positive gas shutoff under any abnormal condition. Spring diaphragm and ball check valves in the injector shall prevent flooding of the chlorinator. Chlorine pressure and vacuum regulating valves shall have permanently sealed diaphragm units.



- B. Safety Equipment: The CONTRACTOR shall provide the following safety equipment:
1. Chlorine gas detector: The detector shall continuously scan and display the sensor data using an indicator to present the current chlorine gas concentration level and the peak level. The detector shall have six (6) relay circuits as such: two (2) warning relays, two (2) danger relays, one (1) horn/failure relay and one (1) latch relay. The warning relay shall activate at one (1) PPM chlorine gas. The danger relay shall activate at three (3) PPM chlorine gas. The latch relay shall activate if the warning level is reached and holds for the interval as set by the latch time. The latch relay shall activate immediately when the danger level is reached. The horn/failure relay may be configured for a continuous or pulsed alarm. The horn/failure relay shall activate on a loss of signal from the sensor and a fail indicator/message will appear on the display.
  2. One (1) OSHA-approved gas mask with self-contained compressed air cylinders. The CONTRACTOR shall provide and install an all-weather outdoor enclosure mounted on the outside wall of the building suitable for housing the mask.
  3. Eight (8) ounce bottle of ammonia solution.
- C. Accuracy: The V-notch system shall maintain the gas feed within four percent (4%) of the original setting.
- D. Vacuum Regulators: Each vacuum regulator shall mount directly on the gas valve by means of a positive yoke type, gasket connection. Vacuum shall be controlled by a spring opposed diaphragm regulator which shall close tight upon loss of vacuum. Each regulator shall be equipped with a gravity actuated loss of gas indicator.
- E. Gas Flowmeter and Rate Valve: The gas flowmeter with solid silver rate valves and solid silver seats shall be mounted on a chemical resistant panel for wall mounting. The gas flowmeters shall indicate the flow of gas to a minimum of 1/20 maximum feed.
- F. Relief Valve: Pressure will be prevented from building up in the system by means of a spring loaded, diaphragm actuated pressure relief valve located at the vacuum regulator. The gas shall vent at the vacuum regulator.
- G. Ejector: The ejector assembly shall receive all gas and ejector water and discharge the resulting solution to the solution piping. The ejector shall be equipped with a check valve which will prevent water from backing up into the vacuum regulators. A loss of water supply shall automatically shut-off the gas flow.
- Generally, the amount of water required to operate the ejector depends upon the chlorine flow rate. The higher the chlorine flow rate, the greater the water flow needed.
- Ejector supply pressure must be 30 to 40 psig greater than the pressure into which solution is injected. This requirement may vary with the particular application.
- The contractor shall size the ejector based on the developed back pressure and a 50 PPD rate.
- H. Supply Indicator: Each gas feeder shall be equipped with a gravity actuated device, directly connected to the main control diaphragm, to indicate when gas supply is exhausted.
- I. Valve Direction Indicator: A gas valve direction indicator shall be provided with each gas feeder.
- J. Automatic Switchover Module: The automatic switch-over module shall be vacuum operated, switching from any empty gas source to a full source. There shall be no manual reset required when switch-over has been made and the empty container replaced with a full container.
- The module shall be wall mounted and operated on a spring loaded toggle. The switch-over module shall be factory set and shall not require field adjustment.
- K. Power: Power supply to the drip leg heater shall be 120 Volt A.C., 60 hertz single phase. Power consumption shall be 25 watts.
- L. Two Cylinder Scale: One (1) two-cylinder scale shall be provided with a PVC platform. The scale shall be designed to provide for direct, continuous and independent read-out of gas remaining in each cylinder. Safety chains shall be provided for cylinder support.

The scale shall be equipped with two separate weighing platforms and built-in stops to prevent overload damage.

Display shall allow values to be read from up to ten feet away. The electronics shall be housed in a NEMA 4X enclosure.

Bumper pads shall be provided on the enclosure support column to protect the electronics during cylinder change. A safety chain shall be supplied to support two cylinders while in operation. To protect components from the corrosive environment, all exposed parts shall be either stainless steel or coated with polyurethane. Exposed printed circuit boards shall be sealed and impervious to moisture.

Low profile, rounded platform bases shall allow easy on/easy off movement of gas cylinders. Each platform shall have an independent tare weight adjustment and built-in stops to prevent overload damage.

Operation shall be from a 120 Vac, 50/60 Hz, single phase power supply.

The scale shall be accurate to  $\pm 0.5\%$  of the gross weight capacity. Resolution shall be one (1) pound or 0.1 kilogram.

If SCADA is shown in the drawings then the scale shall have a 4-20ma output.

M. Building: The building shall be equipped with the following devices:

1. A weatherproof switch for lamp and fan operation on the outside wall near the door.
2. Vapor proof lamps with protective grid.
3. Exterior mounted chlorine alarm light.
4. Two (2) duplex ground fault interrupting (GFI) utility receptacles providing 120 volts, 60 hertz single phase current to be mounted on the interior wall. The receptacles shall be protected by a 15 ampere thermal magnetic circuit breaker.
5. A corrosion resistant intake blower of sufficient capacity to change the air in the building once every two minutes. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide over-current and overload protection. Blower intake shall be protected by a screen, and shall be designed to prevent the entrance of rain, snow, rocks, and foreign material.
6. One corrosion resistant screened interior vent and corrosion resistant exterior louvers shall be installed in an exterior wall as indicated on plans. The louvers shall operate synchronous with the blower motor.
7. The blower motor, vent louvers, and lights shall operate from a door operated switch.
8. If the wattage is not specified on the plans then a 1500 watt thermostatically controlled heater is to be installed as indicated on the plan.
9. Appropriate chlorine gas and water piping.
10. The door shall be of fiberglass construction and gas tight with an eye level gas tight window. The door shall have corrosion resistant locking hardware, hinges and seals. The interior handle shall be a 'panic bar' type.
11. There shall be a sign on the door stating "Danger Chlorine Gas" or "Caution Liquid Chlorine". There shall be a sign on the door stating "Operate Fan for 60 Seconds Before Entering".
12. All hardware inside the chlorine room shall be corrosion resistant.

N. Injector Water Supply: There shall be installed a high pressure water supply system consisting of pipe, valves, and fittings according to the drawings.

O. Booster Pump: If a booster pump is shown in the drawings then it shall be installed to pump raw/chlorinated water through the injector to the tank fill line for elevated storage tank applications and other instances when the ejection head is greater than the injection head. Pump shall be sized according to well output volume and injection/ejection pressure.

P. Additional Components: Included with the chlorinator shall be:

1. Chlorine inlet pressure gauge
2. Chlorine outlet pressure gauge
3. Injector
4. Lubricant
5. Gaskets
6. Wrenches
7. Vent screen
8. Instruction book
9. Container valves and connections
10. Vent line
11. Solenoid valve
12. Piping

### PART 3 - EXECUTION

#### 3.1 GAS CHLORINATION INSTALLATION

The CONTRACTOR shall install a complete and operable system. These plans and specifications call for certain essential elements which shall be supplied together with such other devices and components that are necessary for a safe and ready-to-use system completed to a first-rate standard.

#### 3.2 OPERATION

- A. The chlorinator is clamped on the chlorine cylinder valve. The ejector assembly is normally attached to the solution diffuser at the point of injection. A vacuum line connects these two units.
- B. Water, under pressure, is forced through the ejector nozzle which creates a strong vacuum in the ejector body. This pulls gas into the ejector through a special back-flow double check valve and then into the nozzle outlet. The gas mixes with the ejector water and is discharged through the diffuser into the water being treated.
- C. The ejector vacuum is transmitted back to the chlorinator through the vacuum line; then through the rate valve and the flow meter and to the back of the chlorinator diaphragm.
- D. With sufficient vacuum, the diaphragm moves backward, opening the spring loaded inlet regulating valve to allow chlorine to enter from the cylinder.
- E. The chlorine passes through the flow rate indicating meter, flow rate adjusting valve and to the ejector.

#### 3.3 FLOW RATE ADJUSTMENT

Flow rate is manually adjustable by means of a flow rate control valve located at the top of the flow meter. Flow rate is then regulated by a special spring-opposed diaphragm operated valve. The system is automatic. It will go off and on as the ejector water is turned off and on and will always return to the pre-set flow rate.

END OF SECTION

## **SECTION 1016 BUTTERFLY VALVES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section describes the manufacture and installation of butterfly valves for use in potable water service.
- B. Related Work Specified Elsewhere.
  - 1. Section 205 – Water Line Installation

#### **1.2 SUBMITTALS**

Submit catalogue cuts and detail prints on all valves furnished indicating materials of construction and construction details. Also, submit torque calculations for all electric actuators.

#### **1.3 VALVE MANUFACTURER**

Valve shall be as manufactured by Mueller, Bray or approved equal.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

All butterfly valves shall conform to AWWA 0-504 except as modified herein. All valves shall be new. Valves shall have a pressure rating of at least 150 psi unless otherwise noted.

#### **2.2 VALVES**

- A. Butterfly valves shall be tight-closing, rubber-seated cast- iron or ductile-iron valves as per section 1.3 above. All valves shall be furnished in strict accordance with AWWA rubber-seated butterfly valves specification.
- B. The body shall be cast iron ASTM A126, Class B and shall have face-to-face dimensions according to AWWA Standards for short body, Class 150-B. The butterfly valve shall have a floating body seat ring to compensate for change in direction of flow to assure a bottle-tight seal in either direction.
- C. The valve shaft shall be an 18-8, Type 304 stainless steel and shall be of stub design. Valve disc and shaft shall be attached by means of "O" ring sealed tapered pins with locknuts.
- D. The valve disc shall be ductile iron ASTM A-536, Grade 65-45-12. Valve discs shall be of the offset design providing 360 degrees uninterrupted seating. The resilient seat shall be natural rubber bonded to an 18-8, Type 304 stainless steel retaining ring secured to the discs by an 18-8, Type 304 stainless steel set screws. Resilient seats in all sizes shall be adjustable and replaceable in the field.
- E. All butterfly valves shall be spray coated with a two component epoxy to cover all interior ferrous surfaces that contact water. Interior coating shall be factory applied to a nominal thickness of 3-4 mils. Exterior coatings shall be according to the Painting Specifications described elsewhere in these specifications.

The interior coating shall be a two-part thermosetting epoxy protective coating, food grade, and shall function as a physical, chemical and electrical barrier between the base metal to which it is applied and the surroundings. The coating shall be nontoxic and shall not impart taste to water. The coating must be formulated from materials deemed acceptable per the Food and Drug Administration Document Title 21 of the Federal Regulations of Food Additives, Section 121.2514 entitled, Resins and Polymeric Coatings. The coating shall have a satin finish and shall be suitable for field over coating and touch up with same coating material without sanding or special surface preparation, or application of heat greater than room temperature. The coating shall have a successful record of performance in valves, pipe or other allied equipment for a minimum of two years.

The interior coating adhesion to the substrate shall exceed cohesion of the coating film as demonstrated by the following tests:

- 1. Prepare a test panel and apply coating per manufacturer's recommendation.

2. After the sample has properly cured per manufacturer's recommendation, scribe and "X" using a sharp knife or scalpel through the coating to the metal surface.
3. With the point of the knife at the junction of two scribes, attempt to lift off coating. Coating should not lift off the substrate or between coated ready, but should break up leaving coating material on the substrate of this damaged area.
4. No disbondment of the film shall be noted as tested above after immersion in tap water for 1500 hours at 100 degrees F.

A falling sand abrasion test using ASTM D968 shall produce an abrasion coefficient of 25-30 liters/mil. As an alternative, a Tabor Abrader Test should find 3.5 – 3.7 milligrams coating loss per 100 cycles when using a CSF Wheel (1000 gram weight).

- F. Valve discs shall set at 90 degrees to the axis of the valve and revolve through 90 degrees from full open to close.

## 2.3 ELECTRIC VALVE OPERATORS

### A. General

The actuator shall be by a company with at least 10 years experience in the manufacture of electric valve actuators. The actuator shall include motor, power gearing, limit switches, torque switches and electrical switchgear compartments in one compact assembly. Components shall have a continuous running torque equal to the maximum torque applied by the valve as multiplied by any gear reducers and allowing for gear losses.

### B. Gearing and Bearings

All gears and shafting shall be supported on anti-friction bearings. All gearing and bearings shall be grease or oil lubricated. Seals shall be provided at all exit points of the gear case to prevent leakage of lubricant. Critical area subject or high wear shall be double sealed. Lubricants shall be suitable for year round service based on prevailing ambient temperature conditions. Special attention should be paid to environments with temperature below 0° F.

### C. Handwheel

A permanently attached, automatic declutching, handwheel shall be provided which will not rotate while in motor operation mode. The declutching device shall provide power override of handwheel at all times. Handwheel engagements shall be by positive mechanical means not requiring periodic adjustment or depending on friction to function. The handwheel shall require an effort of no more than 80 pounds on the rim for seating or unseating load, or 60 pounds for running load.

### D. Limit Switches

Limit switches shall be geared to valve movement at all times. A minimum of sixteen (16) limit switch contacts are required.

### E. Motor

The motor shall be designed specifically for valve actuator service, of the high starting torque, totally enclosed nonventilated type, with the rotor mounted on prelubricated, sealed anti-friction bearings. Insulation shall be NEMA Class "F" as a minimum with a Class "B" temperature rise. Duty rating of the motor shall be sufficient for four consecutive one direction valve strokes without exceeding its allowable temperature rating. Overload protection shall be by means of inherent motor thermal sensors embedded in the windings.

Motor shall be 1800 RPM, the voltage, phasing and frequency is specified in the drawings.

### F. Valve Closing Times

All electric operated valves shall have opening times that meet the requirements of the CUSTOMER and/or ENGINEER.

### G. Torque Switches

The actuator shall include an adjustable torque limiting switch arrangement to break the control power circuit when the valve has reached the stops on the open or closed position or an obstruction has been encountered in either direction of travel.

### H. Electrical Controls



The motor starter compartment shall be an integral part of the actuator assembly and shall be of adequate size to contain all components in an accessible arrangement for ease of maintenance. The following items shall be furnished beyond the basic limit and torque switches and shall be factory prewired according to the wiring diagrams.

1. Reversing motor starter, mechanically and electrically interlocked and suitable for mounting in any position.
2. Three push-buttons (open, close and stop).
3. Red and green valve position indicating lights.
4. Local-off-remote selector switch.
5. Isolated contacts for remote status indication.
6. 120V AC control power transformer, encapsulated and with fused secondary.
7. Mechanical dial position indicator for continuous local readout, graduated in percent of valve opening.
8. All enclosures for electrical devices shall be NEMA 4X. Push buttons and switches shall be oil tight.

I. Acceptable Products

Furnish Auma, EIM or approved equivalent.

## 2.4 BOLTING

All valve and actuator bolting, fasteners, washers and similar hardware that are attached to the valve or valve components and are exposed directly to earth or water shall be Type 304 stainless steel. Buried or immersed flange bolts not encapsulated in reinforced mortar shall be stainless steel. Mechanical joint T bolts need not be stainless steel provided they meet AWWA requirements.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Handle valves carefully to prevent damage to any parts of the valve. Valves should be lowered into the trench using chains and a hoisting device.
- B. Place valves in position with stems in a vertical position and secure the valve until all connections have been made. Set all valves on a concrete slab and brace each side with 2000 psi concrete. Do not cover the joint or any bolt or operating nut with concrete.
- C. Install valve boxes plumb over the wrench nut of the valve and firmly support the box against movement during backfilling operations. Check each valve to insure that a standard valve wrench will easily slip over the operating nut and operate the valve. Valve installations will be rejected if the above condition cannot be met or if the valve box has mud, rocks or construction debris in it.
- D. Construct a concrete collar around the outside of the valve box as shown on the plans for gate valve installation.

END OF SECTION

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## **SECTION 1017 GATE VALVES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section describes the manufacture and installation of gate valves 4 inches and larger for use in water service.
- B. Related Work Specified Elsewhere.
  - 1. Section 205 – Water Line Installation

#### **1.2 SUBMITTALS**

Submit catalogue cuts and detail prints on all valves furnished indicating materials of construction and construction details.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. All valves shall be iron body, bronze mounted, nonrising stem, internal wedging type. All valves shall be new. Valves shall have a pressure rating of at least 150 psi unless otherwise noted.
- B. All gate valves in sizes 4" through 16" shall conform to AWWA C-509 except as modified herein.
- C. All gate valves larger than 16" shall conform to AWWA C-500 except as modified herein.

#### **2.2 ENDS**

- A. Valves shall be mechanical joint. Mechanical joint ends shall conform to AWWAC-111 (ASAA-21.11).
- B. Bolt and nuts for mechanical joints will be of a high-strength low-alloy corrosion resistant steel and conform to AWWA C-III. All mechanical joint glands will be cast iron.

#### **2.3 RESILIENT SEATED VALVES**

- A. Seat  
The seat shall be made of Styrene Butadiene rubber and provide a positive water tight seal. The seat shall be permanently bonded or mechanically attached to the wedge with stainless steel screws. If bonded, ASTM P-429 requirements shall be followed.
- B. Body and Castings  
Cast iron body shall be of iron with an even grain and shall possess a tensile strength of not less than 32,000 pounds per square inch. All bronze castings, except the stem, shall have a tensile strength of not less than 30,000 pounds per square inch. The entire internal valve body surfaces shall be coated with a factory applied 2-component epoxy system or approved equal. The seating surface shall be machined or otherwise constructed to provide a smooth, even surface for the resilient seat. All valves shall open to the left (counterclockwise) and have a 2" square wrench nut unless specified otherwise.
- C. Stems  
Gate valve stems, 4" through 12", shall be fabricated from solid bronze rod having a tensile strength of not less than 60,000 pounds per square inch, and a minimum yield strength of 30,000 pounds per square inch, meeting ASTM B-98 standards.

#### **2.4 STUFFING BOXES**

- A. All valves two (2") inches through sixteen (16') inches shall be equipped with double O-rings, provided arrangement is made for replacement under pressure of the upper O-ring when the valve is fully open. The thrust collar shall work in an "O" ring Sal lubricant reservoir or against bearings or washers, above and below, constructed of Delrin or approved equal material. All geared valves will be equipped with conventional packing in the main stuffing box.
- B. All horizontal valves will have attached stuffing boxes according to the above AWWA Specification.

C. Stuffing box bolts and nuts for buried valves shall be stainless steel.

## 2.5 BOLTING AND GLANDS

A. All bolting that will be in direct contact with the earth or water shall be Everdur bronze or stainless steel. Included, but not necessarily limited to, are the following:

1. Bonnet bolts.
2. Gland bolts and nuts.
3. Bolts and nuts on any valve accessory.

B. Gland flanges or followers that are a separate part may be cast iron or bronze.

C. Glands for valves more than twelve (12") inches in diameter shall be solid bronze or cast iron bronze bushed.

## 2.6 TAPPING VALVES

Tapping valves shall to all requirements of this section with the following exceptions:

A. Tapping valves shall have oversize seat rings or permit entry of standard tapping machine cutters.

B. In the open position, valve gates shall be clear of the ports, so that the cutter shall pass through without making contact with the gates.

C. Valves shall have an inlet flange conforming to AWWA Standard C 10, Class 125, with a machined projection or recess to mate with tapping sleeve outlet flange to assure correct alignment.

D. Valve shall have standard mechanical joint outlet and shall fit any standard tapping sleeve.

## 2.7 OPERATING NUTS

A. All valves shall be nut operated unless otherwise noted.

B. All valves shall open by turning to the left.

## 2.8 MISCELLANEOUS REQUIREMENTS

A. The valves more than sixteen (16") inches in diameter shall be designed for horizontal installation in a horizontal pipeline unless otherwise called for. All other valves are to be vertical.

B. Valves fourteen (14") inches and larger ordered for installation in a vertical pipeline shall be equipped with bronze shoes and slides.

C. A factory hydrostatic test of gate valves is not required.

D. All underground valves shall be furnished with operator shaft extensions if the operating nut is greater than four feet below finished grade. Shaft extensions shall be stainless steel or cast iron with stainless steel hardware. Shaft extensions shall be of such length to bring the operating nut to within two (2") inches of top of the valve box.

E. Bypass valves are required on all valves larger than sixteen inches in diameter. Bypass valves shall be at least one twelfth of the diameter of the main valve.

## 2.9 VALVE BOXES

A. Valve boxes shall be three (3) piece cast iron and shall be similar to Mueller No. H-10360 or an approved equal. The three (3) pieces shall consist of the top section, bottom section and cover. DR 35 PVC pipe extensions shall be provided as required.

B. For fourteen (14") inch and sixteen (16") inch valves Mueller No. H-I 0357 with No. 160 base or equal shall be furnished and installed. For eighteen (18") inches and larger valves, manholes five (5') feet in diameter will be required.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Handle valves carefully to prevent damage to any parts of the valve. Lower valves in the trench using chains and a hoisting device.



- B. Place valves in position with stems in a vertical position and secure the valve until all connections have been made. Set all valves ten (10") inches and larger on a concrete slab and brace each side with 2000 psi concrete. Do not cover the joint or any bolt or operating nut with concrete.
- C. Install valve boxes plumb over the wrench nut of the valve and firmly support the box against movement during backfilling operations. Install extensions as required.
- D. Check each valve to insure that a standard valve wrench will easily slip over the operating nut and operate the valve. Valve installations will be rejected if the above condition cannot be met or if the valve box has mud, rocks or construction debris in it.
- E. Construct a concrete collar around the outside of the valve box as shown on the plans.

### 3.2 TAPPING VALVES

- A. Tapping valves and the tapping machine shall be connected to the tapping sleeve and bolts tightened to the manufacturers recommended torque.
- B. Before cuffing the pipe, test the tapping sleeve and valve for leakage using compressed air. The test pressure shall not be less than 100 psi. Check the entire assembly for leaks using a soap solution.
- C. Tap the pipe according to the tapping machine manufacturer's recommendations, removing the coupon.

END OF SECTION

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## **SECTION 1018 AIR AND VACUUM RELEASE VALVES**

### **PART 1 - GENERAL**

#### **1.1. DESCRIPTION**

The work as specified in this section shall include furnishing all labor, materials, and equipment necessary for constructing air and vacuum release valves as shown on the plans and as specified herein.

#### **1.2. MEASUREMENT AND PAYMENT**

Installation of air and vacuum release valves shall be measured per each installed complete in place and will be paid for at the Total Unit Price as shown in the bid proposal of the specified item.

#### **1.3. RELATED WORK DESCRIBED ELSEWHERE**

Gate Valves Section 906

### **PART 2 - PRODUCTS AND MATERIALS**

#### **2.1. AIR AND VACUUM RELEASE VALVES**

Combination air and vacuum release valves shall be CLA-VAL Series 33A, or approved equal.

#### **2.2. GATE VALVES**

Gate valves shall meet all the requirements of Section 906 of these specifications.

#### **2.3. PIPE**

Unless otherwise specified, pipe shall be TYPE "K" copper.

### **PART 3 - EXECUTION**

3.1. All items in this section shall be as shown on the plans or as directed by the Engineer.

**END OF SECTION**

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## SECTION 1019 GRATINGS AND FLOOR PLATES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Section includes formed metal gratings; flat surface floor plating and perimeter closure.

#### 1.2 RELATED SECTIONS

- A. Section 301 —Concrete Formwork.
- B. Section 805 — Miscellaneous Metal Fabrications.

#### 1.3 REFERENCES

- A. ASTM A 36/A 36M - Carbon Structural Steel.
- B. ASTM A 123/A 123M - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A 653/A 653M steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy- Coated (Galvannealed) by Hot-Dip Process.
- D. ASTM A 666 — Annealed or Cold Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- E. ASTM A 1011 —Steel Sheet and Strip, Hot-rolled, Carbon, Structural, High- Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- F. ASTM B 211/B 211M — Aluminum and Aluminum Alloy Bar, Rod and Wire.
- G. ASTM B 211/B 211M — Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubs.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- I. AWS D1.1 - Structural Welding Code - Steel.
- J. AWS D1.2 - Structural Welding Code — Aluminum.
- K. NAAMM MBG 531 — Metal Bar Grating Manual.
- L. NAAMM MBG 532— Heavy-Duty Metal Bar Grating Manual.
- M. SSPC — Steel Structures Painting Manual
- N. SSPC SP 3- Power Tool Cleaning.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for applicable loads.
- B. Load Design per NAAMM MBG 531 — Metal Bar Grating Manual.
- C. Design Live (Pedestrian) Load: Uniform load of 100 pounds per square foot minimum; concentrated load of force in 300 pounds.
- D. Maximum Allowable Deflection Under Live Load: 1/240 of span; size components for single span.

#### 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. Indicate details of gratings, plates, component supports, anchorage, openings, perimeter construction details, and tolerances.
  - 2. Indicate welded connections with AWS A2.4 welding symbols.
  - 3. Indicate net weld lengths.
- B. Product Data:
  - 1. Submit span and deflection tables.
- C. Samples: Submit two samples, 24 inches by 12 inches in size illustrating surface finish, color, and texture.

- D. Manufacturer's Installation Instructions: Submit special requirements of opening and perimeter framing.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

**1.6 QUALITY ASSURANCE**

- A. Fabricate structural steel members in accordance with AISC Code of Standard Practice.
- B. Fabricator Qualifications: Company specializing in performing the Work of this section with five years applicable experience, minimum, and holding current AISC Certification.
- C. Erector Qualifications: Company specializing in performing the Work of this section with five years applicable experience, minimum.

**1.7 DESIGN GRATINGS AND PLATES UNDER DIRECT SUPERVISION OF A PROFESSIONAL ENGINEER EXPERIENCED IN DESIGN OF THIS WORK AND LICENSED AT THE PLACE, WHERE THE PROJECT IS LOCATED.**

**1.8 FIELD MESURMENTS.**

- A. Verify field measurements prior to fabrication.

**1.9 COORDINATION**

- A. Coordinate Work with placement of frames, tolerances for placed frames and openings.

**PART 2 - PRODUCTS**

**2.1 GRATING AND FLOOR PLATES**

- A. Manufacturers:
  - 1. ACO Polymer Products, Inc.
  - 2. Arden Architectural Specialties.
  - 3. Barry Pattern & Foundry Co.
  - 4. GS Metals.
  - 5. Neenah Foundry.
  - 6. Or other approved by the ENGINEER.

**2.2 COMPONENTS**

- A. Sheet Steel for Die Stamping: ASTM A 653/A 653M, ASTM A 666 Stainless Steel with raised lug pattern.
- B. Formed Steel for Pressure locking: ASTM A 1011/A 1011 M, ASTM A 36/A 36 M, ASTM A 666 Stainless Steel for shapes indicated.
- C. Aluminum for Pressure Locking: ASTM B 221 extruded aluminum alloy of shapes indicated.
- D. Formed FRP: To shapes indicated with raised lug pattern.
- E. Cross Burs: ASTM B 211.
- F. Welding Materials: AWS D1.1 and AWS D1.2; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, and red oxide.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20, Type I Inorganic.
- I. Direct Tension Indicator Devices: ASTM F 959.

**2.3 ACCESSORIES**

- A. Fasteners and Saddle Clips.
- B. Perimeter Closure: Of same material as grating.

**2.4 FABRICATION**

- A. Grating Type: NAAMM Metal Bar Grating Manual Pressure Locked Type.
- B. Mechanically clinch joints of intersecting metal sections.
- C. Fabricate support framing for openings.



- D. Top surface: Non-slip.
  - E. Bearing Bar: Sized to meet deflection criteria; 1 — 3/16 inches maximum spacing, 1 - ¼ inch minimum acceptable depth for all grating.
  - F. Cross Bar: spaced at 4 inches on center.
  - G. Removable Panels: Provide removable grating sections in areas indicated on plans.
  - H. Anchorage: Stainless steel saddle clips required at all supported sides and at 2' - 0" on center at adjoining panels.
  - I. Provide banding on all sides and around all openings.
- 2.5 SHOP FINISHING
- A. Clean surface of rust, scale, grease, and foreign matters prior to finishing.
  - B. Do not prime surfaces in direct contact with concrete or where field welding is required.
  - C. Galvanizing: ASTM A 653 to G 90 weight; ASTM A 123 to 2 ounces per square foot required.
  - D. Aluminum: Mill finish.
  - E. Stainless Steel: No. 4 finish.
  - F. Non-slip Surfacing: Aluminum oxide.
- PART 3 - EXECUTION
- 3.1 EXAMINATION
- A. Verify that opening sizes and dimensional variations are acceptable to suit grating and plating tolerances.
  - B. Verify that supports and anchors are correctly positioned.
- 3.2 INSTALLATION
- A. Mechanically cut galvanized finish surfaces. Do not flame cut.
  - B. Anchor by bolting through saddle clips.
  - C. Set perimeter closure flush with top of grating and surrounding construction.
  - D. Secure grating with mechanical fasteners to prevent movement.
- 3.3 ERECTION TOLERANCES
- A. Conform to NAAMM Metal Bar Grating Manual.
  - B. Maximum Space between Adjoining Abutting Sections 1/2 inches.
  - C. Maximum Variation From Top Surface Plane of Adjoining Abutting Sections: 1/8 inch.

END OF SECTION

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## SECTION 1020 MANUFACTURED CHLORINATION BUILDING

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

This specification governs the materials, equipment, manufacture, and installation of a chlorination building. The system shall be complete with all components, equipment, and appurtenances.

#### 1.2 DRAWINGS AND SPECIFICATIONS

Construction shall be governed by the CITY OF FARMERSVILLE'S drawings and specifications showing general dimensions and construction details.

#### 1.3 QUALITY ASSURANCE

All materials and components shall be new and unused of first quality by well-known manufacturers. Inferior materials or components shall not be allowed.

### PART 2 – PRODUCT

#### 2.1 ACCEPTABLE MANUFACTURERS

- Chlorserv
- Global Treat
- Associated Fiberglass
- Or approved equal.

#### 2.2 BUILDING DESIGN

- A. Ventilation: The building shall be diagonally cross vented, with a high mounted, exterior hooded, louvered, screened supply fan. The louvers shall operate synchronous with the blower motor. There shall be a louvered screened exhaust vent installed 6 inches above the finished floor. The fan shall operate with the door open or closed. The fan switch shall be located on the outside of the building near the door in a weatherproof enclosure. All components are to be corrosion resistant.
- B. Lighting: The building shall have 1 interior incandescent light housed in a vapor tight corrosion resistant housing. The light switch shall be located on the outside of the building near the door in a weatherproof enclosure.
- C. Electrical outlet: Two duplex ground fault indicating utility receptacles providing 120 volts, 60 hertz single phase current to be mounted on the interior wall in a corrosion resistant enclosure. The receptacles shall be protected by a 20 ampere thermal magnetic circuit breaker.
- D. Door: The door shall be gas tight with an eye level gas tight window. The door shall be recessed and have corrosion resistant locking hardware, hinges and seals. The door shall be equipped with panic hardware on the inside.
- E. Sign: There shall be a sign on the door stating "Danger Chlorine Gas" or "Caution Liquid Chlorine" as specified. There shall be a sign on the door stating "Operate Fan for 60 Seconds Before Entering".
- F. Window: The window shall be of adequate size and located at eye level in the door to allow full view of the interior of the building with the door closed. The window shall be gas tight with corrosion resistant seals.
- G. Heater: The heater shall be of adequate size and thermostatically controlled with a dedicated outlet protected by a thermal magnetic circuit breaker. The heater shall be mounted a minimum of 48" above the finished floor.
- H. Drain: The building shall be equipped with a drain.
- I. Building:
  1. The building shall be one piece molded chemical and corrosion resistant construction.

2. The exterior shall be a maintenance free smooth white gel coat. The interior shall be a maintenance free finish.
3. The foundation shall be of sufficient strength to support liquid chlorine in drums.
4. The dimensions are as specified in the plans.
5. All interior electrical components and fittings shall be made of corrosion resistant materials and mounted a minimum of 48" above the finished floor. Unless otherwise specified in the plans.
6. There shall be a single point of electrical connection at the light/fan switch for connection to a breaker panel.
7. The building and all factory penetrations shall be rodent and animal proof.
8. The building shall be drillable for the installation of water lines and chlorine vent lines.
9. The building shall have interior mounting surfaces for the installation of chlorine metering equipment and its appurtenances.
10. The building shall be able to be secured to a foundation.

### **PART 3 - EXECUTION**

#### **3.1 BUILDING INSTALLATION**

The CONTRACTOR shall install a complete and operable system. These plans and specifications call for certain essential elements which shall be supplied together with such other devices and components that are necessary for a safe and ready-to-use system completed to a first-rate standard. The building shall be installed at the location as shown in the plans level and plumb for correct operation of the door.

**END OF SECTION**

## SECTION 1021 LIQUID CHLORINATION

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

This specification governs the materials, equipment, manufacture, and installation of a liquid chlorination system.

#### 1.2 DRAWINGS AND SPECIFICATIONS

Construction shall be governed by the CITY OF FARMERSVILLE'S drawings and specifications showing general dimensions and construction details.

#### 1.3 SUBMITTALS

- A. This data shall include drawings and descriptive information in sufficient detail to show kind, material, and size, (i.e. catalog cut-sheets for all, items, appurtenances, etc.) and dimensions needed for installation and correlation with other materials and equipment. Information shall be submitted by specifications section. Data submitted shall include drawings showing essential details of any changes proposed by the CONTRACTOR with detailed layouts. If the cut-sheets contain information not pertaining to the supplied equipment, all extraneous information shall be clearly crossed out and pertinent information highlighted.
- B. No work shall be performed in connection with the fabrication or manufacture of materials and equipment nor shall any accessory or appurtenance be purchased until the drawings and data thereof have been approved by the ENGINEER and CITY OF FARMERSVILLE, except at the CONTRACTOR's own risk and responsibility.

### PART 2 – PRODUCT

#### 2.1 GENERAL

Chlorinator shall be self contained, factory fabricated, and ready to install. It shall be fully operational as an electric system, which shall be supplied by the contractor as part of the system. The chlorinator shall be manually adjustable to provide concentrations of chlorine in the treated water of 0-10 ppm under flows of 0-7 gpm, and shall automatically supply a constant concentration under varying flow conditions. The chlorinator shall be installed in the building shown on the drawings and specified herein. The disinfectant injection rate shall be proportional to the clarifier effluent discharge flow.

#### 2.2 ACCEPTABLE MANUFACTURERS

- LMI
- Or approved equal

#### 2.3 DESIGN

The metering pump design shall provide for conveying the disinfectant from the storage drum to the injector/back pressure check valve assembly. The metering pump shall be a positive displacement type pump that is UL approved. The pump drive shall be totally enclosed with no exposed moving parts. Solid state electronic pulser shall be fully encapsulated and supplied with quick connect terminals. Electronics shall be housed in chemical resistant enclosure at the rear of the pump for protection against chemical spillage. Output volume shall be adjustable while the pump is in operation from zero to maximum capacity of 7.0 GPH. The metering pump shall be capable, without a hydraulically backed diagram, of injecting solutions against pressures up to 30 psig.

#### 2.4 MATERIALS SPECIFICATION

The liquid metering system shall be comprised of the following: metering pump, pulse rate and stroke, foot valve, injection/back pressure check valve, tubing and a solution drum.

- A. Safety: The metering pump shall automatically stop pulsating when discharge pressure exceeds pump pressure by not more than 35%.
- B. Accuracy: The system shall maintain the liquid feed within 4% of the original setting.



- C. Metering Pump: The pump housing shall be of chemically resistant thermoplastic. All exposed fasteners shall be stainless steel. The valves shall be ball type. Valve seat and seal ring shall be renewable by replacing the seat-seal ring or valve assembly. Pump head shall be of transparent material capable of resisted the pumped chlorine. Fittings and connections at the pump head shall be PVC or stainless steel. Each vacuum regulator shall mount directly on the gas valve by means of a positive yoke type, gasket connection. Vacuum shall be controlled by a spring opposed diaphragm regulator which shall close tight upon loss of vacuum. Each regulator shall be equipped with a gravity actuated loss of gas indicator.
- D. Pulserate and Stroke: The pulse rate shall be selectable by a 3-position switch as to internal-off-external. Stroke length shall be adjustable by means of a readily accessible dial knob.
- E. Footvalve: The footvalve shall be one piece with an integral strainer.
- F. Injector/back pressure check valve: The injection check valve shall incorporation a dilating orifice which prohibits scale formation and accumulation of crystalline deposits.
- G. Tubing: The tubing shall be polyethylene with compression connections.
- H. Solution Drum: The drum shall be a polyethylene solution drum with a fiberglass cover, a recessed area for setting the metering pump, and a capped opening for refilling the solution tank without removing the cover
- I. Power: Power supply to the drip leg heater shall be 120 Volt A.C., 60 hertz single phase. Power consumption shall not exceed 30 watts.

### PART 3 - EXECUTION

#### 3.1 LIQUID CHLORINATION INSTALLATION

The CONTRACTOR shall install a complete and operable system. These plans and specifications call for certain essential elements which shall be supplied together with such other devices and components that are necessary for a safe and ready-to-use system completed to a first-rate standard. The CONTRACTOR shall supply 2 full 55 gallon drums of liquid chlorine solution with both housed in the chlorine building.

#### 3.2 OPERATION

The disinfectant pulse rate shall be proportional to the clarifier effluent discharge flow to produce the required permitted chlorine residual.

#### 3.3 FLOW RATE ADJUSTMENT

Flow rate is adjustable by means of a pulse rate, 3-position switch – internal-off-external, and a stroke length knob. The stroke length meters the amount of disinfectant to be injected. The stroke frequency determines the rate of which the disinfectant is injected.

#### 3.4 TESTING

The CONTRACTOR shall test the chlorination equipment to assure that it is adjusted and operating properly and the chlorine contact chamber effluent discharge chlorine residual meets the permitted requirements.

END OF SECTION

## **SECTION 1022**

### **AIR COMPRESSOR FOR HYDROPNEUMATIC PUMP STATIONS**

#### **PART 1 - GENERAL**

##### **1.1 DESCRIPTION**

The work to be performed under this section includes all work materials and labor required to install an air compressor as shown on the plans. All equipment shall be furnished by one manufacturer.

##### **1.2 SUBMITTALS**

Submit for review, catalogue cuts of the air compressor to be furnished.

#### **PART 2 - PRODUCTS**

##### **2.1 AIR COMPRESSOR**

One new and unused, latest production model, stationary air compressor with all standard equipment to meet the following minimum specifications:

1. Oil free design or commercial heavy duty serviceable oil removal filter (air/oil separator) on outlet is acceptable.
2. Capable of 100% duty cycle.
3. Commercial heavy duty design and construction.
4. Belt driven, single-stage design with belt guard.
5. Serviceable commercial heavy duty air filters on intake.
6. Bronze check valve on outlet to prevent water entry from pressure tank.
7. CFM rating as shown on plans.
8. PSI rating as shown on plans.
9. Voltage requirements as shown on plans.
10. Horsepower as shown on plans.
11. CONTRACTOR to verify proposed horsepower and CFM sizing for application.
12. Air outlet equipped with ¼ turn ball valve downstream of oil removal filter (air/oil separator) and check valve.
13. Gauges must be enclosed in waterproof housing.
14. Commercial heavy duty regulator capable of achieving and maintaining the distribution system water pressure PSI requirements as shown on plans.
15. Automatic shut off for low oil pressure.
16. Service, parts and operators manuals.

Electrical panels for this air compressor will be furnished under another section.

#### **PART 3 - EXECUTION**

##### **3.1 INSTALLATION**

- A. Install air compressor at the location shown on plans.
- B. Route power in conduit between electrical panel and motor.
- C. Route control in conduit between control panel and motor starter.
- D. Route air lines as shown in plans
- E. Anchor air compressor using rubber bushings to the floor or suitable base.
- F. Connect all air lines.

##### **3.2 TESTS FOR COMPRESSOR**

- A. Test run the compressor to make sure all components are functioning properly.
- B. Ensure all safety devices are functioning.
- C. Ensure compressor stops after operating pressure is reached.
- D. Check air lines for leaks.

**END OF SECTION**



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## SECTION 1023 RADIO READ METER SYSTEM

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

This section describes the material and installation of Automatic Meter Reading residential water meters and the associated computer system(s) required for a complete turn-key product. The meter size shall be 5/8" x 3/4" through 2" bronze body cold-water positive displacement meters compatible with the specified radio read equipment and the materials employed in their fabrication. Multi-jet meters are a suitable alternative although they are not the preferred alternative. The meters are to be installed as shown on the plans.

#### 1.2 REFERENCE SPECIFICATIONS

Meters shall meet all provisions of AWWA C700, AWWA C707-R92, AWWA C708, and AWWA C700-90.

#### 1.3 SUBMITTALS

##### A. Product technical data including:

1. Acknowledgment that products submitted meets requirements of standards referenced.
2. Manufacturer's installation instructions.
3. Materials of construction.
4. Dimensions
5. Size and weight.
6. Performance data including
  - a. Minimum and maximum flow ranges.
  - b. Guaranteed measurement accuracy
  - c. Pressure loss curves.
7. Physical limits of components including temperature and pressure limits.
8. Electrical power requirements and wiring diagrams.

##### B. Certification of electrical area classification.

##### C. Operation and Maintenance Manuals

#### 1.4 QUALITY ASSURANCE

##### A. Water Meters

The accuracy of the flow meter shall be  $\pm 1.5\%$  of actual flow at the rated flow. Accuracy shall not be affected by pressure variation.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- Master Meter
- Elster
- Sensus

Manufacturers of radio read systems other than the ones listed shall be approved by the CITY OF FARMERSVILLE and ENGINEER.

#### 2.2 WATER METER

##### A. Main Case

1. Main cases shall be composed of bronze containing not less than eighty percent (80%) copper. All meters must meet NSF Standard 61 Certification (internal coating will not be allowed) and carry the NSF 61 mark molded on the housing.
2. All materials used in the construction of the main cases shall have sufficient dimensional stability to retain operating clearances at working temperature up to 105 degrees F.
3. The manufacturer shall warranty the main case for a period of 25 years from the date of shipment.



4. The meter serial number shall be stamped on the main case of the meter.
  5. The 5/8" meter shall have a laying length of 7-1/2 inches
  6. The 3/4" meter shall have a laying length of 9 inches.
  7. The 1" meter shall have a laying length of 10-3/4 inches.
  8. The 1-1/2" meter shall have a laying length of 13 inches.
  9. The 2" meter shall have a laying length of 15-1/4 inches.
- B. Bottom Plate
1. Bottom plates shall be made of cast iron or a suitable engineered plastic or bronze.
- C. Measuring Chamber
1. Measuring chambers shall be made of a suitable engineered plastic as described in AWWA C-700.
  2. A nutating disc style, floating ball, or oscillating piston style measuring chamber is preferred. A multi-jet measuring chamber is an acceptable alternative.
- D. Head Loss
1. Meters shall not exceed AWWA maximum head loss at safe maximum operating capacity.
- E. Accuracy
1. Meters shall be 100% factory tested for accuracy and have the factory test results provided with each meter.

Size of Meter	Normal Operating Flow Range	Minimum Flow Limits
5/8"	1.0 – 20 GPM	0.25 GPM
3/4"	2.0 – 30 GPM	0.50 GPM
1"	3.0 – 50 GPM	0.75 GPM
1 1/2"	5.0 – 100 GPM	1.50 GPM
2"	8.0 – 160 GPM	2.00 GPM

2. Meters shall be pressure tested to ensure against leakage.
3. Meters shall comply with the AWWA C700-90 accuracy requirements as specified in section 3.8 of the standard for a period of one year from the date of installation.
4. Additionally, the manufacturer shall warranty the meter to meet or exceed AWWA repaired meter accuracy standards per the following:

Size of Meter	Years of Warranty or	Millions of Gallons Registered
5/8"	15	1.75
3/4"	15	2.0
1"	15	3.0
1-1/2"	15	5.0
2"	15	8.0

- F. Strainers
1. All meters shall be provided with strainer screens installed in the meter.
  2. Strainers shall be rigid, fit snugly, be easy to remove, and have an effective straining area at least twice that of the inlet opening.
- G. Register Assembly
1. Registers shall be magnetic driven and permanently sealed by the manufacturer.
  2. Register shall provide straight reading odometers reading in US Gallons with 6 moving number wheels.
  4. The moving odometer number wheels shall be of contrasting colors with all digits 1000 gallons and higher being white wheels with black lettering.
  5. The numerals on the number wheels of the register shall not be less than 1/4" in height and should be legible at a 45-degree angle.
  6. Registers shall incorporate a center sweep test hand and a low flow indicator.
  7. The register shall be secured to the meter main case by a tamper resistant bayonet-style lock mechanism protecting against unauthorized removal of the register.

8. No special tools shall be required to remove the register.
  9. A register and/or meter ID number shall be clearly imprinted on the top of the register for field identification.
- H. Register Technology
1. The register shall be of the absolute encoded style and the electronic output from the register must be based upon the physical position of the number wheels.
  2. To ensure long life, the physical position of the number wheels shall be determined by capacitance, magnetic resonance or optical reading, but may not be determined by metal to metal contacts.
  3. Registers that output reading data generated through the use of switch closures or pulses of any kind including reed switches, piezo switches or weigand switches shall not be accepted.
  4. Registers must be factory wired to the radio module.
  5. Registers shall be free of defects for 20 years from the date of purchase and backed by a 20-year factory warranty. At minimum, the first ten years of the register warranty shall give 100% coverage against electronic failure or moisture intrusion.
  6. The register assembly shall be continuously submersible in water and operate in a temperature from 0 degrees Fahrenheit to 120 degrees Fahrenheit.

## 2.3 ROUTE MANAGEMENT SOFTWARE

The CITY OF FARMERSVILLE's billing system will supply all route information such as account number, current reading, high/low range and other data elements. This eliminates the need to maintain redundant data file and avoid opportunity for introduction of errors conflicting with the CITY OF FARMERSVILLE's system.

The Meter Reading Route Management Software (MRRMS) shall load and unload data into collection devices and allow reporting of collected data. Collected data will then be transferred back to the CITY OF FARMERSVILLE's billing system.

The software package provided shall meet each of the following provisions:

- A. Provide a standard interface so CITY OF FARMERSVILLE's billing system can input a file that is compatible with the required format. It will be the CONTRACTOR's responsibility to contact the billing system provider and provide the proper download and upload file format so a standard interface is maintained thereby allow phone support for issues related to the software.
- B. Output the route data for reading to the CITY OF FARMERSVILLE's choice of any or all of the following types of collection devices:
  1. Handheld computer for visual read and entry via alphanumeric keypad.
  2. Handheld computer with radio read receiver for radio reading.
  3. Laptop computer with radio read receiver for mobile radio reading.
- C. Support the use of manual entry, touchpad read and offsite (walk by) radio read technology as needed within the same route, giving the CITY OF FARMERSVILLE the maximum flexibility in use. Mobile radio read equipment shall be supported in separate routes.
- D. Support radio frequency data collection from one-way, open architecture radio read modules that use the prevalent encoder protocol available.

## 2.4 COMPUTER PLATFORM

The software shall:

- A. Be designed to operate within the following operating systems: Windows XP or newer.
- B. Be a Microsoft™ Windows application, which is designed meeting the Open Systems Foundation goals. The data utilized in the application shall be compatible with a host of other management and office applications such as spreadsheet and database tools include, but not, limited to, Microsoft Excel and Microsoft Access.

- C. Be capable of running on a computer that meets or exceed the following minimum requirements:
  - A. Pentium 300 MHz processor or faster.
  - B. 512 MB of RAM or more
  - C. At least 10 MB of free available hard disk space
  - D. Monitor and video adapter with 800 x 600 or higher resolution.
  - E. CD drive
  - F. Available USB 2.0 port.
- D. Be designed based on a modern design methodology that guarantees completeness of function and simplicity of use.

## 2.5 COMMUNICATIONS (PC TO HANDHELD/LAPTOP COMPUTER)

- A. The system shall load/unload reading data to and from handheld computer by USB 2.0 communications.
- B. Perform data transfers between the handheld computer(s) and the PC application with seconds, eliminating any necessity of off-hour execution capability.
- C. Communications during upload and download of handheld collection devices shall occur at a transmission rate of 480 Mbps to ensure fast and efficient transfer of data.
- D. All communications during upload and download of collection devices shall be extensively error checked to ensure data integrity.
- E. The system shall load/unload reading data from the mobile laptop computer via flash drive or network connection.

## 2.6 FUNCTIONS AND FEATURES FOR WALK-BY-OPERATION

- A. The handheld data collection device shall:
  - 1. Be a combination of a handheld device and a RF handheld interface unit and its antenna.
  - 2. Include communication cradles for charging and loading the handheld device.
  - 3. Be able to withstand a minimum six-foot drop to concrete.
  - 4. Be ergonomically designed to be comfortable for handheld meter reading.
  - 5. The battery capacity must be sufficient for a minimum of 8 hours of meter reading.
  - 6. Must come with a power management system designed to conserve power.
  - 7. Must come with an integrated intelligent fast charge capability that allows for full charge in 4 hours.
  - 8. Include rechargeable Lithium Ion batteries made with a technology that does not develop memory effect.
  - 9. Include a hand strap provided with each device and must provide ease of use for right or left-handed operators.
  - 10. The handheld device must include but not be limited to the following:
    - a. The device must operate in temperature range of -20°C to +50°C (-4° F to +122° F).
    - b. The device shall be water resistant, capable of unlimited exposure to spray or splash (such as rain or snow).
    - c. The device must be protected against an 8kV static discharge without loss of data.
    - d. The device must be resistant to various chemical products and must be sealed to keep out dust, humidity, and water.
    - e. The device must be shock resistant exceeding EIC68-2-32 method 1 (a 1-meter drop on concrete)
    - f. The device must be CE and FCC certified.
- B. The handheld data collection device software shall:
  - 1. Provide the ability to read and search for water accounts.
  - 2. Allow the meter read to read in route order, customer order, by location or by meter number.

3. Support the manual entry of meter reading and text message notes (i.e. to note damage, leaks, etc) via alphanumeric keypad or be selected from an CITY OF FARMERSVILLE's defined list of note options, into a handheld or laptop computer.
4. Provide the ability to perform sequential and dynamic searches along 4 paths: route number, customer name, location and meter serial number
5. Provide a display format for the handheld computer that includes all of the following information:
  - a. Account number
  - b. Customer name
  - c. Location
  - d. Meter number
  - e. Meter reader's initials
  - f. Current access mode (account, customer, location, or meter number)
  - g. High/low audit range
  - h. Previous reading
  - i. Messages
  - j. Notes
  - k. Unread meters
6. Provide touch screen interface and stylus.
7. Allow operation through the use of on screen menus, icons or the use of shortcut keys.
8. Allow the previous reading data to be viewed on the account screen or suppressed at the CITY OF FARMERSVILLE management's option
9. Provide the capability to transfer free form text notes and message both from the field to billing administration and vice-versa.
10. Permit the use of pre-selected CITY OF FARMERSVILLE defined notes from a drop down menu to expedite the meter reading process.
11. Provide high/low readings for reading and support an audible alarm, and an easy override feature.
12. Provide the ability to check for unread accounts during the meter reading process.
13. Provide date and timestamp and the meter reader's initial on all readings.
14. Allow for standard reporting through built-in reports. These report will be viewable in Excel and will include:
  - a. Reader notes
  - b. Zero consumption and duration
  - c. High/low exceptions
  - d. Route statistics
  - e. Unread meters
  - f. Backflow condition and duration
  - g. Leak detection severity and duration
15. Allow for custom reporting through transferring data into spreadsheet and database tools. All data must be in standard ASCII format that easily imports in Microsoft Excel and Microsoft Access for custom data management and reporting. Any databases used shall be ODBC (Open DataBase Connectivity) compliant.
16. Stamp meter readings with time and date of read. Time/date information shall be passed to the CITY OF FARMERSVILLE's billing system.

## 2.7 FUNCTIONS AND FEATURES FOR DRIVE-BY OPERATION

The software shall:

- A. Function with minimal required interaction by the operator to ensure safety while driving.
- B. Allow easy viewing of read or unread accounts
- C. Show route status including number of meters read, unread, and percentage complete.
- D. Allow reading of multiple routes at one time.



- E. Stamp meter readings with time and date of read. Time/date information shall be passed to the host billing system.

## 2.8 RADIO FREQUENCY MOBILE COLLECTION AND STORAGE DEVICES

Collection of the meter readings shall be achieved through the use of MIU modules that continuously transmit the meter reading in preset interval of two (2) seconds to insure high performance meter reading. As such, the meter reading, backflow, leak and tamper data is always available whenever the meter reader passes by, without the need to a wakeup call. Collection equipment included a radio receive and a laptop computer for collection and storage of the reading while the route is being read.

## 2.9 LAPTOP COMPUTER

- A. The system shall operate only on radio frequencies that do not require FCC licensing.
- B. The mobile collection components shall be lightweight and portable. They shall mount temporarily in the meter reading vehicle. No dedicated vehicle(s) shall be required.
- C. The system shall be capable of route sizes of 25,000 accounts per route.
- D. The laptop computer shall operate on a least a Microsoft Windows XP operating system.
- E. The laptop shall have a mobile Intel Pentium processor with:
  - A. 512MB of RAM or more
  - B. At least an 80GB hard drive
  - C. At least a 14.1" (diagonally measured) color LCD display with at least a 32MB video adapter.
  - D. Internal CD drive
  - E. Internal USB 2.0 port and nine-pin RS-232 port.
- E. Be designed based on a modern design methodology that guarantees completeness of function and simplicity of use.
- F. The system shall indicate visually to the operator if the laptop computer loses communications with the radio receiver during operation.
- G. The laptop computer shall have an internal time clock for time (hour/minutes/seconds.) and date (month/day/year) stamping of the meter readings as they are collected.

## 2.10 RECEIVER

- A. The receiver shall be small and lightweight for ease of handling and to permit transfer from one vehicle to another.
- B. The receiver shall be cable connected to the laptop computer via RS-232 port or USB 2.0 port.
- C. The receiver shall be capable of receiving transmissions on multiple discreet channels to facilitate MIU reception.
- D. The system shall operate only on radio frequencies that do not require FCC licensing.
- E. The receiver shall not weigh more than 16 ounces.
- F. The receiver shall incorporate LED lights to determine power and communications status.
- G. The receiver shall be powered by a power adapter that is plugged into the vehicle.
- H. The receiver shall be connected to the laptop by a nine-pin serial port cable or a USB 2.0 cable.

## PART 3 - EXECUTION

### 3.1 TRAINING

A proven, detailed training plan must be developed by the vendor with approval by the CITY OF FARMERSVILLE based on pre-implementation meetings. The following are items to be determined during these meetings:

- A. Identify the training personnel and the employees to be trained.
- B. Identify training schedules for hardware, software and total system products.
- C. Define acceptance criteria for system deployment.



- D. The vendor shall be responsible for assisting and fully training CITY OF FARMERSVILLE's personnel in the system mapping, deployment planning and installation of the Wi-Fi, fixed network components.

### 3.2 SUPPORT SERVICES

The VENDOR shall have a Customer Support Department. The Customer Support Department is required to maintain a telephone Help Desk and must have the capability of continuing the support through the use of a service agreement. A list of required services to be provided by the Help Desk includes but is not limited to the following:

- A. Answer and resolve hardware/operation/maintenance questions and problems.
- B. Answer and resolve software operation questions and problems.
- C. Evaluation of information for updates or revisions.
- D. Evaluation of personnel for training needs.
- E. Additional on-site training or evaluation as needed. The Help Desk must be available weekdays between 8:00 a.m. and 5:00 p.m. CST with after-hours numbers available to be used by the CITY OF FARMERSVILLE as needed.

### 3.3 INSTALLATION AND TRAINING

Complete installation and operating instructions will be included for all of the supplied hardware and software equipment. The training must be supplied by the system manufacturer or approved VENDOR representative. The proposal must include any additional costs for training and assistance to install and begin operation of the system. The VENDOR will also inform the CITY OF FARMERSVILLE of what pre-installation activities are to be completed and what support material will be needed for the initial installation.

### 3.4 SYSTEM MAINTENANCE AND SUPPORT

In addition to warranty periods, VENDORS are required to supply information on required or optional maintenance programs beyond the warranty period for both hardware and software. VENDOR must offer multiple-year maintenance contracts so CITY OF FARMERSVILLE can take advantage of multi-year discounts. The location of and procedures for obtaining such support shall be stated.

A toll-free Help Desk number must be provided for system support.

### 3.5 INSTALLATION

CONTRACTOR shall install the new water meters or update the current meters (including other brand meters) to radio read by the route chosen by the CITY OF FARMERSVILLE in accordance with the manufacturer's installation instructions. CONTRACTOR must install a meter appropriate for the size of water service line for each residence; however, the CITY OF FARMERSVILLE reserves the right to prescribe the size meter it deems appropriate for any installation site. An upstream strainer shall be installed on all services. All meters shall be installed in a neat and workman like manner.

CONTRACTOR will notify the CITY OF FARMERSVILLE of any problems in the meter box which prevent the CONTRACTOR from doing an installation, such as leaks in water lines, meter boxes or resident's water lines. Problems will be reported the same day CONTRACTOR discovers such problems. The CITY OF FARMERSVILLE will repair, direct the CONTRACTOR to repair or require the resident to repair any such water lines or system problems. If the CITY OF FARMERSVILLE repairs the problem, the CITY OF FARMERSVILLE will notify the CONTRACTOR of the completed repair and direct the CONTRACTOR to install the new meter. The CONTRACTOR will install the new meter within five (5) business days after receiving notice of completed repair from the CITY OF FARMERSVILLE.



CONTRACTOR is responsible to remove water from all flooded meter boxes by pumping out any meter box(es) before working on the installation. All precautions will be taken to prevent the resident's plumbing from damage and surrounding area from water discharge.

CONTRACTOR shall tag the removed meter noting date of removal and residence's address and then returned to CITY OF FARMERSVILLE. The following information shall be recorded at the time of meter removal and installation:

- A. Meter reading and serial number of removed meter with time and date
- B. Meter reading and serial number of installed meter with time and date
- C. Electronic Meter Identification number
- D. Account number
- E. Address
- F. Phone
- G. Name
- H. Installation notes (if any)

The CITY OF FARMERSVILLE will check all new water meter units installed by the CONTRACTOR and notify the CONTRACTOR of any faulty installations. CONTRACTOR will reinstall the meter within five (5) business days after receiving notice of faulty installation.

CONTRACTOR must quickly repair any damage caused by the CONTRACTOR to landscape, lawn, sprinkler system, or other property of any residence. Repairs and replacement to any residential property damaged by the CONTRACTOR must be as good as or better than prior to the damage. The CONTRACTOR will provide to the CITY OF FARMERSVILLE a written statement signed by the property City of Farmersville that the repairs are to the property City of Farmersville's satisfaction.

Prior notice of temporary water shut off must be given by the CONTRACTOR to each resident before disruption of water service. The notice must state with reasonable accuracy that the water will be shut off for 15 - 20 minutes (or other specified time period) while the installation occurs, and when the shut off will occur. CONTRACTOR shall notify each resident by personal contact on the day that the work occurs at the residence and leave a door hanger notification not less than 24 nor more than 48 hours before each shut off. CONTRACTOR will give each resident reasonable time to complete showering, laundry, or dishwasher cycles. CONTRACTOR will be courteous to residents and shall promptly report any complaints by residents, or unsolved equipment installation, damage or repair problems at any residence to the CITY OF FARMERSVILLE or ENGINEER.

The CITY OF FARMERSVILLE will be notified of all leaks. Customers are responsible for leaks on private service lines. If the leak is on the customer side of the meter, a notice of repair will be issued as deemed necessary by the CITY OF FARMERSVILLE. The CITY OF FARMERSVILLE is responsible for all leaks from the tap to the meter. The CITY OF FARMERSVILLE will repair all leaks on the CITY OF FARMERSVILLE side of the meter. Except as caused by CONTRACTOR or where the CONTRACTOR has connected to CITY OF FARMERSVILLE's service tap line or the Customer's service line.

END OF SECTION

## SECTION 1024

### CONFINED SPACE ENTRY PROCEDURE

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

- A. Definition: Confined space is any space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.
1. Confined spaces include, but are not limited to: storage tanks, pits, vats, vessels, sewer manholes, electrical manholes, vaults, pump or lift stations, septic tanks, boilers, pipelines, tunnels, ventilation and exhaust ducts, trenches, and excavations.
  2. Common hazards associated with confined space entry include: oxygen deficient atmospheres, flammable/explosive atmospheres, toxic atmospheres, engulfment/entrapment hazards, and/or chemical, electrical or mechanical hazards.

This procedure is to be used only if all hazards identified in the confined space have been eliminated, isolated, or otherwise controlled so as not to expose entrants to additional risk.

- B. The confined space supervisor must complete the back side of the Assessment Form prior to personnel entering the confined space.
- C. Establish personal protective equipment and procedural requirements for entry.
- D. Establish and maintain communication between entrants and personnel outside the confined space. Notify appropriate personnel when entry begins and all personnel have exited the confined space.
- E. Atmospheric testing must be conducted in sub-grade areas or areas where traffic or similar fumes may migrate into the space. Atmospheric testing results must be recorded on the Assessment Form.
- F. Should conditions arise that may affect the health or safety of personnel inside the space, the space must be evacuated and the confined space supervisor must reassess the confined space and reevaluate the entry procedure.
- G. Close out project on Assessment Form when work is completed. Submit back copy of form to the secretary.

#### PART 2 – ATMOSPHERIC TESTING

##### 2.1 GENERAL

Atmospheric testing may be performed only by persons qualified and trained to operate the testing instrument.

Initial air sampling will be conducted from outside the structure, and will be performed when possible at various levels within the confined space (e.g. at least top, middle and bottom), and around all conduits, pipes, or cables.

Atmospheric conditions will be considered unacceptable if:

- A. Oxygen levels are less than 19.5% or greater than 23.5% by volume,
- B. If a combustible gas is present at greater than 10% of its lower explosive limit (LEL),
- C. If a toxic substance exceeds an OSHA or American Conference of Governmental Industrial Hygienists (ACGIH) limit where exposure could result in death, acute illness, or impairment of ability to self-rescue,
- D. If an airborne combustible dust obscures vision to five feet or less, or,
- E. If any atmospheric condition recognized as immediately dangerous to life or health (IDLH) is present.

## 2.2 EQUIPMENT

Atmospheric testing must include oxygen concentration, combustible gases, and any known or suspected toxic substances. A properly calibrated direct reading gas monitor must be used. Direct reading gas detector tubes or other acceptable means may also be used to test potentially toxic atmospheres.

Intrinsically safe equipment will be used if a flammable atmosphere is present, or is suspected of being present.

Unacceptable levels may be indicated on a scale or by a visual alarm and **must** be indicated by an audible alarm.

## 2.3 CALIBRATION

Each atmospheric testing instrument shall be calibrated on a schedule and in the manner recommended by the manufacturer except:

- A. Any atmospheric testing instrument that has not been used within thirty (30) days shall be recalibrated prior to use.
- B. Each atmospheric testing instrument shall be calibrated at least every six (6) months.
- C. Calibration records must be maintained by the department.

Each atmospheric testing instrument will be field checked immediately prior to use to ensure that it is operating properly.

## PART 3 – ATMOSPHERIC TESTING

## Confined Space Entry Assessment Form/Permit

Identification	
Department:	Space/Entry:
Entry Purpose:	Date:

Hazardous Atmospheres									
	Range	Required	1	2	3	4	5	6	7
O <sub>2</sub>	19.5-23.5								
LEL	10% LEL								
H <sub>2</sub> S	10 ppm								
CO									
Other									
Initial									

Hazards and Controls			
Type		Yes (describe)/No	Isolated/Controlled (describe)
Entrap	Inwardly Sloping Walls		
	Sloping Floor		
Engulf	Dry Storage (grain, sand)		
	Liquid Storage		
Energy Sources	Electrical		
	Pneumatic/Hydraulic		
	Chemical		
	Thermal		
	Steam		
Work	Welding, cutting, brazing		
	Chemicals, painting, degreasing		
Other			

For the purposes of this entry:

- ☐ All identified hazards have been isolated or eliminated and space is not permit-required.
- ☐ The identified hazards will be controlled through continuous forced air ventilation and air monitoring.
- ☐ The space is permit-required. Complete information below. Contact EHSS for assistance.

\_\_\_\_\_  
**Supervisor's Name**

\_\_\_\_\_  
**Signature**

Permit Information	
Start Time:	End Time:
Authorized Entrants	Authorized Attendants
Date Trained:	Date Trained:
Date Trained:	Date Trained:
Date Trained:	Standby Safety Personnel
Date Trained:	Date Trained:

Notify emergency response personnel as appropriate.



## Confined Space Entry Assessment Form/Permit

Preparation					
Yes	N/A		Yes	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	Entry area free of debris and objects	<input type="checkbox"/>	<input type="checkbox"/>	No compressed cylinders in space
<input type="checkbox"/>	<input type="checkbox"/>	Warning barriers and signs in place	<input type="checkbox"/>	<input type="checkbox"/>	Host employer and/ or contractor notified
<input type="checkbox"/>	<input type="checkbox"/>	Atmospheric monitoring conducted	<input type="checkbox"/>	<input type="checkbox"/>	Entry and emergency procedures reviewed
<input type="checkbox"/>	<input type="checkbox"/>	Other hazards identified and isolated	<input type="checkbox"/>	<input type="checkbox"/>	Personnel have been trained
<input type="checkbox"/>	<input type="checkbox"/>	Hot work permitted	<input type="checkbox"/>	<input type="checkbox"/>	Personnel informed of potential hazards
<input type="checkbox"/>	<input type="checkbox"/>	Energy sources isolated/locked out	<input type="checkbox"/>	<input type="checkbox"/>	Electrical equipment is grounded
<input type="checkbox"/>	<input type="checkbox"/>	Confined space drained and flushed	<input type="checkbox"/>	<input type="checkbox"/>	

Equipment Required					
Yes	N/A		Yes	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	Forced air or exhaust ventilation	<input type="checkbox"/>	<input type="checkbox"/>	Non-sparking tools used
<input type="checkbox"/>	<input type="checkbox"/>	Ground fault interrupters (GFCI)	<input type="checkbox"/>	<input type="checkbox"/>	Low voltage lighting used
<input type="checkbox"/>	<input type="checkbox"/>	Retrieval Equipment	<input type="checkbox"/>	<input type="checkbox"/>	Equipment rated for explosive atmospheres
<input type="checkbox"/>	<input type="checkbox"/>	Fire Extinguishers	<input type="checkbox"/>	<input type="checkbox"/>	Communication Equipment

Personal Protective Equipment Required					
Yes	N/A		Yes	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>	<input type="checkbox"/>	Protective Clothing
<input type="checkbox"/>	<input type="checkbox"/>	Eye/Face Protection	<input type="checkbox"/>	<input type="checkbox"/>	Hearing Protection
<input type="checkbox"/>	<input type="checkbox"/>	Gloves	<input type="checkbox"/>	<input type="checkbox"/>	Retrieval Harness
<input type="checkbox"/>	<input type="checkbox"/>	Safety Boots	<input type="checkbox"/>	<input type="checkbox"/>	Respirator

## **SECTION 1025 TRENCH EXCAVATION SAFETY SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

This item governs trench excavation safety systems to be used in conjunction with the installation of utility lines and underground structures. Trench excavation safety systems shall be employed to protect personnel in an excavation from cave-ins, except when excavations are made entirely in stable rock, or when excavations are less than five (5) feet in depth and examination of the ground by a competent person provides no indications of a potential cave-in.

### **PART 2 – PRODUCTS**

#### **2.1 DESCRIPTION**

- A. CONTRACTOR shall develop, design, and implement the trench excavation safety system, and shall bear the sole responsibility for the adequacy of the trench excavation safety system and providing “a safe place to work” for the workman.
- B. Trench excavation safety protection system shall be as prescribed in the current Occupational Safety and Health Standards — Excavations (29 CFR Part 1926, Subpart P). This shall be the minimum governing requirement of the item, and is hereby made a part of this item.
- C. There are no special shoring requirements of the CITY OF FARMERSVILLE that are over and above the requirements as prescribed in the current Occupational Safety and Health Standards — Excavations (29 CFR Part 1926, Subpart P).
- D. CONTRACTOR shall, in addition, comply with all other applicable federal, state and local rules, regulations, and ordinances.
- E. CONTRACTOR shall indemnify and hold harmless the CITY OF FARMERSVILLE, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches or excavations constructed under this Contract.
- F. A copy of the geotechnical information obtained by the CITY OF FARMERSVILLE for use on the Project is included with the Contract Documents, if information was developed.

### **PART 3 – EXECUTION**

#### **3.1 MEASUREMENT**

Measurement trench excavation safety system as per applicable bid item.

**END OF SECTION**

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**SECTION 1026  
ASBESTOS CEMENT PIPE REMOVAL**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. All work necessary for the removal and disposal of any material or equipment as required to remove asbestos cement pipe.
- B. Carry out remediation so that adjacent structures, which are to remain, are not endangered. Schedule the work so as not to interfere with the day-to-day operation of the existing facilities.
- C. Provide dust control and make provisions for safety.

**1.2 SUBMITTALS**

- A. Provide all submittals, including the following, as specified in the General Conditions.
- B. Visit the site and inspect all existing structures. Observe and record any defects that may exist in buildings or structures adjacent to but not directly affected by the remediation work. Provide the CITY OF FARMERSVILLE and the ENGINEER with a copy of this inspection record and obtain the CITY OF FARMERSVILLE's and the ENGINEER's approval prior to commencing the remediation.
- C. The contractor must submit the following items with the bid:
  - 1. Name and license number of the Asbestos-Abatement contractor that will be responsible for the work described above.
  - 2. References (including the City of Farmersville's name, address and phone number) for at least five comparable projects performed by the Asbestos-Abatement contractor.
  - 3. A work plan describing work procedures, equipment to be used, transportation procedures and final disposal facility for asbestos material.
  - 4. A health and safety plan which includes air-monitoring procedures as required by OSHA.

**1.3 QUALITY ASSURANCE**

- A. Exercise care to break asbestos cement pipe for removal in reasonably small masses. Where only parts of a pipe are to be removed, cut the asbestos cement pipe along limiting lines with a suitable saw so that damage to the remaining line is held to a minimum.
- B. The contractor shall comply with all applicable Federal, State, Local, EPA, OSHA and Texas Department of Transportation regulations pertaining to exposure to and handling, containment, transport, and disposal of asbestos material. If the bidding contractor is not licensed in the State of Texas to perform these services, the contractor shall retain the services of a licensed Asbestos Abatement sub-contractor to perform said services. Further, the contractor/sub-contractor must utilize the services of a commercial hauler registered to transport asbestos with the Texas Commission on Environmental Quality (TCEQ). The contractor/sub-contractor must dispose of any asbestos waste material generated at a solid waste facility authorized for asbestos waste disposal. The contractor per OSHA requirements must train field personnel in the identification of asbestos containing material.
- C. Unplanned Asbestos Cement Pipe Removal for damaged or disturbed pipe- Asbestos Pipe removal shall be measured in linear feet along the centerline of the pipe, including fittings. Payment for asbestos cement pipe removal shall be at the contract unit price shown in the bid Schedule. This price shall be full compensation of furnishing all labor, equipment, materials and incidentals required for a complete removal and final clean-up. Payment for mobilization and demobilization for Unplanned Asbestos Cement Pipe Removal shall be at the contract unit price shown on the Bid Schedule for each incident, which shall be full compensation for transporting all labor, equipment, materials, and incidentals, required for removal of asbestos material including transporting asbestos waste material to an authorized disposal facility.



## PART 2 – PRODUCTS

Contractor must furnish all labor, materials, equipment, and subcontractors necessary for the removal and disposal of asbestos cement pipe in a manner consistent with these specifications.

## PART 3 – EXECUTION

### 3.1 EXAMINATION OF EXISTING DRAWINGS

Available drawings of existing pipe, structures and equipment will be available for inspection at the office of the ENGINEER or CITY OF FARMERSVILLE.

### 3.2 PROTECTION

- A. General Safety: Provide warning signs, protective barriers, and warning lights as necessary adjacent to the work as approved or required. Maintain these items during the remediation period.
- B. Existing Services: Undertake no remediation work until all mechanical and electrical services affected by the work have been properly disconnected. Cap, reroute or reconnect interconnecting piping or electrical services that are to remain in service either permanently or temporarily in a manner that will not interfere with the operation of the remaining facilities.
- C. Hazards: Perform testing and air purging where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, and eliminate the hazard before remediation is started.

### 3.3 REMEDIATION REQUIREMENTS

- A. Explosives: The use of explosives will not be permitted.
- B. Protection: Carefully protect all mechanical and electrical equipment against dust and debris.
- C. Removal: Remove all debris from the structures during remediation and do not allow debris to accumulate in piles.
- D. Access: Provide safe access to and egress from all working areas at all times with adequate protection from falling material.
- E. Protection: Provide adequate scaffolding, shoring, bracing railings, toe boards and protective covering during remediation to protect personnel and equipment against injury or damage. Cover floor openings not used for material drops with material substantial enough to support any loads placed on it. Properly secure the covers to prevent accidental movement.
- F. Lighting: Provide adequate lighting at all times during remediation.
- G. Closed Areas: Close areas below remediation work to anyone while removal is in progress.
- H. Material Drops: Do not drop any material to any point lying outside the exterior walls of the structure unless the area is effectively protected.
- I. Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer's instructions or government regulations as applicable.

### 3.4 ASBESTOS CEMENT (AC) PIPE

- A. When performing this work, observe and comply with all federal, state and local laws, ordinances and regulations regarding the management of asbestos containing materials. At the minimum, work involving AC pipe should be overseen by a person who has received asbestos training and is familiar with the National Emissions Standards for Hazardous Air Pollutants (NESHAP). If greater than 260 linear feet of pipe is to be removed, written notification to the Texas Department of Health (TDH) 10 days prior commencing with the removal of AC pipe is required.



- B. At each location shown in the plans and/or identified during construction to involve AC pipe, remove the AC pipe without creating any friable material and replace it with PVC waterlines or as may be shown on the plans having a pressure rating as required elsewhere in these specifications. Replace the AC pipe with PVC pipe for a distance of 10 feet each way from the centerline of the pipe under construction or 5 feet beyond the length of AC pipe exposed by trench excavation, whichever is greater. For tie-ins remove whole sections of AC pipe at the nearest joint. Prior to performing this work, notify the ENGINEER and the CITY OF FARMERSVILLE of the work schedule 48 hours in advance of beginning the work
- C. Coordinate the shutdown of the AC pipeline with the CITY OF FARMERSVILLE, including proper notice to the CITY OF FARMERSVILLE and any customers that may be affected by the shutdown as required by these specifications and/or current CITY OF FARMERSVILLE policy. In the event of an unanticipated encounter with AC pipe, immediately recover and protect the pipe and notify the CITY OF FARMERSVILLE and ENGINEER.
- D. Perform cutting of AC pipe by means of cutting wheels mounted in a chain wrapped around the pipe barrel. Do not use power driven saws with abrasive discs or any other means that produce concentrations of airborne asbestos dust.

### 3.5 DISPOSAL OF MATERIALS

Final Removal: Abandon or dispose of AC pipe in accordance with approved federal, state and local regulations and approved ENGINEER methods. Remove all non-AC pipe related debris, rubbish, scrap pieces, equipment, and materials resulting from the remediation. Take title to all demolished materials and remove such items from the site.

In instances where fixed features require, the cross section slopes may be varied to the extent determined/approved by the ENGINEER.

Maintain the right of way free of trash, construction debris and surplus materials as shown in the plans and/or as directed/approved by the ENGINEER.

Any materials removed and not reused on the project and determined to be salvageable by the ENGINEER, shall be retained by the CITY OF FARMERSVILLE and shall be stored within the project limits at an approved secure location or delivered undamaged to the salvage/storage yard as directed by the ENGINEER. Materials that are not determined to be salvageable by the ENGINEER shall become the property of the CONTRACTOR for proper management in accordance with local, state and/or federal requirements at their expense.

END OF SECTION

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## SECTION 1027 PAINTING OF WATER TANKS

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. The object of these specifications is to provide the materials and workmanship necessary to produce a first-class job for painting the interior and exterior, including all supports and appurtenances of steel water storage tanks. All painting shall be accomplished in strict accordance with NSF 61, Steel Structures Painting Council SSPC-PAL, and the paint manufacturer's instructions.
- B. The CONTRACTOR shall comply with the Texas Commission on Environmental Quality regulations.

#### 1.2 GENERAL

- A. Summary:
  - 1. Work under this section consists of surface preparation, priming and painting necessary to complete work.
  - 2. Use coating systems specified in this section to finish all water tank components, unless otherwise indicated. Without restricting volume or generality, work to be performed under this section may include, but is not limited to:
    - Exterior steel
    - Interior steel
    - Exterior concrete
    - Interior concrete
    - Piping, hangers, and supports
- B. References:

Publications listed herein are part of this specification to extent referenced.

  - ANSI/NSF 61 - *Drinking Water System Components - Health Effects*
  - International Concrete Repair Institute (ICRI) Guideline No. 03732 - *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.*

American Society for Testing and Materials:

  - ASTM D16 - *Terminology Relating to Paint, Varnish, Lacquer, and Related Products*
  - ASTM D3359 - *Test Method for Measuring Adhesion by Tape Test*
  - ASTM D4263 - *Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method*
  - ASTM D4541 - *Test Method for Pull Off Strength of Coatings Using Portable Adhesion-Testers*
  - ASTM D1005 - *Test for determining dry film thickness*
  - ASTM D4417 - *Test for determining surface profile*
  - ASTM F 1869 - *Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.*

American Water Works Association:

  - AWWA C 652 - *Disinfection of Water-Storage Facilities.*
  - AWWA D 102 - *Painting Steel Water Storage Tanks.*

The Society for Protective Coatings:

  - SSPC-PA1 - *Painting Application Specification*
  - SSPC-PA2 - *Measurement of Dry Paint Thickness with Magnetic Gages*
  - SSPC-PA Guide 5, *Guide to Maintenance Painting Programs*

- SSPC-SP1 - *Specification for Solvent Cleaning*
- SSPC-SP2 - *Specification for Hand Tool Cleaning*
- SSPC-SP3 - *Specification for Power Tool Cleaning*
- SSPC-SP5 - *Specification for White Metal Blast Cleaning*
- SSPC-SP6 - *Specification for Commercial Blast Cleaning*
- SSPC-SP7 - *Specification for Brush-Off Blast Cleaning*
- SSPC-SP10 - *Specification for Near White Metal Blast Cleaning*
- SSPC-SP11 - *Specification for Power Tool Cleaning to Bare Metal*
- SSPC-SP12 - *Water Jetting*
- SSPC-SP13/NACE 6 - *Surface Preparation of Concrete.*

C. Definitions:

Terms PAINT shall in a general sense have reference to, zinc primers, latex, polyurethane and epoxy type coatings and application of these materials.

Dry Film Thickness (DFT):

- Thickness, measured in mils (1/1000 inch), of a coat of paint in cured state.

D. Submittals:

1. Product Data:

Submit manufacturer's literature describing products to be provided, giving manufacturer's name, product name, and product line number for each material.

Submit technical data sheets for each coating, giving descriptive data, curing times, mixing, thinning and application requirements.

Submit color charts showing manufacturer's full range of standard colors.

2. Quality Assurance Submittals:

Certificates:

- Provide manufacturer's certification that products to be used comply with specified requirements and are suitable for intended application.
- Submit listing of not less than 5 of applicator's most recent applications representing similar scope and complexity to Project requirements. List shall include information as follows:
  - Project name and address
  - Name of City of Farmersville
  - Name of contractor
  - Name of engineer
  - Date of completion

Manufacturer's Instructions:

- Submit manufacturer's installation procedures, if not on product data sheets, which shall be basis for accepting or rejecting actual installation procedures.

E. Quality Assurance:

1. Qualifications:

Provide products from a company specializing in manufacture of coatings with a minimum of 10 years experience.

Applicator shall be trained in application techniques and procedures of coating materials and shall demonstrate a minimum of 2 years successful experience in such application.

- Maintain, throughout duration of application, a crew of painters who are fully qualified.

Single Source Responsibility:

- Materials shall be products of a single manufacturer.
- Provide secondary materials, which are produced or are specifically recommended by



Farmersville

coating system manufacturer to ensure compatibility of system.

2. Pre-Installation Meeting:

Schedule a meeting to be held on-site before field application of coating systems begins.

Meeting shall be attended by CONTRACTOR, CITY OF FARMERSVILLE'S representative, ENGINEER, Coating Applicators, and Manufacturer's representative, or as otherwise agreed upon by the CITY OF FARMERSVILLE and/or ENGINEER.

Topics to be discussed at meeting shall include:

- A review of Contract Documents shall be made and deviations or differences shall be resolved.
- Review items such as environmental conditions, surface conditions, surface preparation, application procedures, and protection following application.
- Establish which areas on-site will be available for use as storage areas and working area.

F. Delivery and Storage:

1. Packing and Shipping:

Deliver products in manufacturer's original unopened containers.

Each container shall have manufacturer's label, intact and legible.

Include on label for each container:

- Manufacturer's name
- Type of paint
- Manufacturer's stock number
- Color name and number
- Instructions for thinning, where applicable

2. Storage and Protection:

Store materials in a designated protected area, per manufacturer's printed data sheet instructions.

G. Project Conditions:

1. Environmental Requirements:

Apply coating materials per manufacturer's printed data sheet instructions:

- Refer to specific product data sheets for minimum surface temperature requirements. Surface temperatures shall be at least 5 degrees F (15 degrees C) above dew point and in a rising mode.
- Provide for proper ventilation using explosion proof equipment. Allow to run 72 hours after interior coating application.
- Adequate illumination shall be provided using explosion proof lights and equipment.
- Atmosphere shall be free of airborne dust.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. This specification lists specific products manufactured by Tnemec Company, Inc. of Kansas City, Missouri. Materials specified herein are cited as minimum standard of quality which will be acceptable.

B. Materials specified herein shall not preclude consideration of equivalent materials. Equivalent materials shall be submitted to ENGINEER for consideration and shall be made at least ten (10) days prior to the date of bids.

- Requests for substitution shall include evidence of satisfactory past performance on water tanks.
- Substitutions will not be considered that change number of coats or do not meet specified



total dry film thickness.

- CONTRACTOR shall state in the bid the amount of deduct to use equivalent materials to those specified.
- Paints for interior wet applications must be listed by NSF International as certified for potable water contact in accordance with ANSI/NSF Std. 61, Section 5, *Protective (Barrier) Materials*.

## 2.2 GENERAL SURFACE PREPARATION

### A. Interior:

1. All interior surfaces of the tank including the underside of the roof, roof support channels, and all appurtenances thereto shall be sandblasted to a Near White Metal blast in accordance with Steel Structures Painting Council Surface Preparation Specification No. 10. This is defined as a surface from which all oil, grease, dirt, mill scale rust, corrosion products, oxides, paint, or other foreign matter has been completely removed from the surface except for very light shadows, very slight streaks, or slight discolorations caused by rust stain, mill scale oxides, or slight tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all visible residues, and the remainder shall be limited to the light discoloration mentioned above. Photographic or other visual standards of surface preparation may be used to modify or further define the surface.
2. Blasting shall be done with a sharp silica sand of 16/35 grade mesh or finer. This sand shall be clean, dry, and free of clay particles and other extraneous matter. Sand must be approved by CITY OF FARMERSVILLE'S representative before blasting is begun.
3. The compressed air used for blasting shall be free of detrimental amounts of water and oil. Adequate traps and separators shall be provided at the compressor.

### B. Exterior:

1. All exterior surfaces shall be sand blasted to a commercial blast in accordance with SSPC-SP6. A Commercial Blast Cleaned Surface Finish is defined as one from which all oil, grease, dirt, rust scale, and foreign matter have been completely removed from the surface and all rust, mill scale, and oil paint have been completely removed except for slight shadows, streaks, or discolorations caused by rust stain, mill scale oxides, or slight, tight residues of rust or paint, may be found in the bottom of pits; at least two-thirds of each square inch of surface area shall be free of all visible residues and the remainder shall be limited to the light discoloration, slight staining or light residues mentioned above. Photographic or other visual standards may be used to modify or further define the surface.
2. Blasting shall be done with a sharp white silica sand of 16/35 grade mesh or finer. This sand shall be clean, dry, and free of clay particles and other extraneous matter. Sand must be approved by the ENGINEER or CITY OF FARMERSVILLE'S representative before blasting is begun.
3. The compressed air used for blasting shall be free of detrimental amounts of water and oil. Adequate traps and separators shall be provided at the compressor.

## 2.3 GENERAL APPLICATION OF PAINT

- A. The painter shall apply each coating at the rate and in the manner specified by the manufacturer. If material has thickness or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and for the particular purpose, shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions as well as with the full knowledge and approval of the ENGINEER.
- B. No paint shall be applied when the surroundings air temperature, as measured in the shade, is



below 50 degrees Fahrenheit. No paint shall be applied when the temperature of the surface to be painted is below 35 degrees Fahrenheit. Paint shall not be applied to wet or damp surfaces and shall not be applied in rain, snow, fog, or mist, or when the relative humidity exceeds 85%. No paint shall be applied when it is expected that the relative humidity will exceed 85% or that the air temperature will drop below 50 degrees Fahrenheit within 18 hours after the application of the paint. If dew or moisture is prevalent, painting shall be delayed until midmorning to be certain that the surfaces are dry. Further, the day's painting should be completed well in advance of the probable time of day when condensation will occur, in order to permit the film an appreciable drying time prior to the formation of moisture.

- C. Apply coating systems in compliance with manufacturer's instructions and using application method best suited for obtaining full, uniform coverage and hide of surfaces to be coated.
  - Work shall be implemented in compliance with applicable sections of AWWA D 102 and the latest revisions thereto.
- D. Apply primer, intermediate, and finish coats to comply with wet and dry film thickness and spreading rates for each type of material as recommended by manufacturer and in accordance with SSPC-PA2.
- E. Number of coats specified shall be minimum number acceptable. Apply additional coats as needed to provide a smooth, even application.
  - Closely adhere to re-coat times recommended by manufacturer. Allow each coat to dry thoroughly before applying next coat. Provide adequate ventilation for tank interior to carry off solvents during drying phase.
- F. Employ only application equipment that is clean, properly adjusted, and in good working order, and of type recommended by coating manufacturer.
- G. After surface preparation, spot primer on interior weld seams shall be brush applied.

## 2.4 STEEL TANK COATING SYSTEMS

### A. New Tank Project

#### 1. Interior Wet:

- System Type: Zinc/epoxy.
- AWWA D 102 Paint System: ICS-5.
- ANSI/NSF Std. 61 Certified: For use inside potable water storage tanks.
- Surface Preparation: SSPC-SP 10/NACE 2.
- Stripe Coat Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks of 40,000 gallons or greater). Applied into all weld seams, edges, corners, bolts, rivets, pits.
- Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons). DFT 2.5 to 3.5 mils.
- Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
- Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
- Total DFT: 12.5 to 15.5 mils.

#### 2. Interior Dry, Standard:

- System Type: Zinc/epoxy.
- AWWA D 102 Paint System: ICS-5.
- Surface Preparation: SSPC-SP 6/NACE 3.

- Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons). DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
3. Exterior Dry, Standard
- System Type: Zinc/Epoxy/Hybrid-Urethane.
  - AWWA D 102 Paint System: OCS-6.
  - Surface Preparation: SSPC-SP 6/NACE 3.
  - Primer: Series 91-H<sub>2</sub>O or 94-H<sub>2</sub>O Hydro-Zinc. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: N69 Hi-Build Epoxoline II, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 740 UVX-Color, *Color*. DFT 3.0 to 5.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 9.5 to 14.5 mils.
  - Finish Color: [As selected by Engineer from manufacturer's standard colors]
4. Exterior Dry, Alternate
- System Type: Zinc/urethane/fluoropolymer.
  - AWWA D 102 Paint System: OCS-4.
  - Surface Preparation: SSPC-SP 6/NACE 3.
  - Primer: Series 91-H<sub>2</sub>O or 94-H<sub>2</sub>O Hydro-Zinc. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series 73 Endura-Shield, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 700 Hydroflon, *Color* DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 6.5 to 9.5 mils.
- B. Existing Tank Recoat Project – Wet Near White, Dry Commercial Blast
1. Interior Wet:
- System Type: Zinc/epoxy.
  - AWWA D 102 Paint System: ICS-5.
  - ANSI/NSF 61 Certified: For use inside potable water storage tanks.
  - Surface Preparation: SSPC-SP 10/NACE 2.
  - Stripe Coat Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks of 40,000 gallons or greater). Applied into all weld seams, edges, corners, bolts, rivets, pits.
  - Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons). DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.

- Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
  - Apply NSF approved sealant (Sikaflex or equivalent) to all exterior joints that are not seal welded after the finish coat.
2. Interior Dry, Standard:
- System Type: Zinc/epoxy.
  - AWWA D 102 Paint System: ICS-5.
  - Surface Preparation: SSPC-SP 6/NACE 3.
  - Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks of 40,000 gallons or greater). DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
3. Exterior Dry, Standard
- System Type: Zinc/Epoxy/Hybrid-Urethane.
  - AWWA D 102 Paint System: OCS-6.
  - Surface Preparation: SSPC-SP 6/NACE 3.
  - Primer: Series 91-H<sub>2</sub>O or 94-H<sub>2</sub>O Hydro-Zinc. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N69 Hi-Build Epoxoline II, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 740 UVX, *Color*. DFT 3.0 to 4.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 9.5 to 13.5 mils.
4. Exterior Dry, Alternate
- System Type: Zinc/Urethane/Fluoropolymer
  - AWWA D 102 Paint System: OCS-4.
  - Surface Preparation: SSPC-SP 6/NACE 3.
  - Primer: Series 91-H<sub>2</sub>O or 94-H<sub>2</sub>O Hydro-Zinc. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series 73 Endura-Shield, *Color*. DFT 3.0 to 4.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 700 Hydroflon, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 7.5 to 10.5 mils.
- C. Existing Tank Recoat Project – Wet Near White, Dry Brush-Off Blast
1. Interior Wet:
- System Type: Zinc/epoxy.
  - AWWA D 102 Paint System: ICS-5.
  - ANSI/NSF Std. 61 Certified: For use inside potable water storage tanks.

- Surface Preparation: SSPC-SP 10/NACE 2.
  - Stripe Coat Primer: Series 91-H<sub>2</sub>O Hydro-Zinc. Applied into all weld seams, edges, corners, bolts, rivets, pits.
  - Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks of 40,000 gallons or greater). DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
  - Apply NSF approved sealant (Sikaflex or equivalent) to all joints that are not seal welded after the finish coat.
2. Interior Dry, Standard:
- System Type: Epoxy.
  - AWWA D 102 Paint System: ICS-1.
  - Surface Preparation: SSPC-SP 7/NACE 3.
  - Prime Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 8.0 to 12.0 mils.
3. Exterior Dry, Standard
- System Type: Epoxy/Hybrid-Urethane.
  - Surface Preparation: SSPC-SP 7/NACE 3. Test Patches are recommended.
  - Spot Prime: Series 27 W.B. Typoxy. DFT 4.0 to 6.0 mils.
  - Intermediate Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 740 UVX *Color*. DFT 3.0 to 5.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 7.0 to 11.0 mils.
4. Exterior Dry, Alternate
- System Type: Urethane/Fluoropolymer
  - Surface Preparation: SSPC-SP 7/NACE 3. Test Patches are recommended.
  - Spot Prime: Series 27 W.B. Typoxy. DFT 4.0 to 6.0 mils.
  - Intermediate Coat: Series 73 Endura-Shield, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 700 Hydroflon, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 4.0 to 6.0 mils.
- D. Existing Tank Recoat Project – Wet Near White, Dry Water Blast
1. Interior Wet:
- System Type: Zinc/epoxy.

- AWWA D 102 Paint System: ICS-5.
  - ANSI/NSF 61 Certified: For use inside potable water storage tanks.
  - Surface Preparation: SSPC-SP 10/NACE 2.
  - Stripe Coat Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons). Applied into all weld seams, edges, corners, bolts, rivets, pits.
  - Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons) DFT 2.5 to 3.5 mils. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
2. Interior Dry, Standard:
- System Type: Epoxy.
  - AWWA D 102 Paint System: ICS-1.
  - Surface Preparation: SSPC-SP 12/NACE 3. Test Patches are recommended.
  - Tie Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 8.0 to 12.0 mils.
3. Exterior Dry, Standard
- System Type: Epoxy/Hybrid-Urethane
  - Surface Preparation: SSPC-SP 12/NACE 3. Test Patches are recommended.
  - Spot Prime: Series 27 W.B. Typoxy. DFT 4.0 to 6.0 mils.
  - Intermediate Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 740 UVX *Color*. DFT 3.0 to 5.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 7.0 to 11.0 mils.
4. Exterior Dry, Alternate
- System Type: Urethane/Fluoropolymer.
  - Surface Preparation: SSPC-SP 12/NACE 3. Test Patches are recommended.
  - Spot Prime: Series 27 W.B. Typoxy. DFT 4.0 to 6.0 mils.
  - Intermediate Coat: Series 73 Endura-Shield, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 700 Hydroflon, *Color*. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 4.0 to 6.0 mils.
- E. Existing Tank Recoat Project – Exterior Overcoat System for Aged Coatings – Wet Near White/Dry Commercial Blast, Pressure Wash

1. Interior Wet:
  - System Type: Zinc/epoxy.
  - AWWA D 102 Paint System: ICS-5.
  - ANSI/NSF 61 Certified: For use inside potable water storage tanks.
  - Surface Preparation: SSPC-SP 10/NACE 2.
  - Stripe Coat Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons). Applied into all weld seams, edges, corners, bolts, rivets, pits.
  - Primer: Series 91-H<sub>2</sub>O or (approved alternate 94-H<sub>2</sub>O Hydro-Zinc for tanks greater than 40,000 gallons) DFT 2.5 to 3.5 mils. DFT 2.5 to 3.5 mils.
  - Intermediate Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series N140 Pota-Pox Plus, *Color*. DFT 5.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total DFT: 12.5 to 15.5 mils.
2. Interior Dry, Standard:
  - System Type: Epoxy.
  - AWWA D 102 Paint System: ICS-1.
  - Surface Preparation: SSPC-SP 12/NACE 3. Test Patches are recommended.
  - Tie Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Series 27 W.B. Typoxy, *Color*. DFT 4.0 to 6.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 8.0 to 12.0 mils.
3. Exterior Dry, Standard
  - System Type: Waterborne Acrylic
  - Surface Preparation: Pressure wash all surfaces to be coated using a solution of hot water and detergent at a minimum of 3500 psi and a minimum flow rate of 3.0 gallons per minute with a zero-degree tip to remove all oil, grease, chalk, dust, dirt and other contaminants. For mildewed surfaces, add chlorine bleach and allow solution to dry on the surface. Rinse all surfaces with clean water. Clean all failed and rusting areas as per SSPC-SP3 Power Tool Cleaning, taking care to not burnish the surface. Feather all edges smooth. Spot prime with Tnemec Series 27WB applied at 4.0 to 6.0 dry mils. Test Patches are recommended.
  - Intermediate Coat: Tnemec Series 30 Spra-Saf EN, *Color*. DFT 2.0 to 4.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Finish Coat: Tnemec Series 30 Spra-Saf EN or Series 1028 Enduratone. DFT 2.0 to 3.0 mils. *Color* selected by Engineer from manufacturer's standard colors, contrasting with previous finish color.
  - Total Overcoat DFT: 4.0 to 7.0 mils.

## 2.5 ACCESSORIES

### A. Coating Application Accessories:



1. Provide application accessories as indicated in coating manufacturer's application instructions, including but not limited to cleaning agents, etching agents, cleaning cloths, sanding materials, and clean-up materials.
2. Material not specifically identified, but needed for proper application shall be of a quality not less than specified products.

## 2.6 MIXING INSTRUCTIONS

- A. Specific product mixing and thinning instructions are to be found in the manufacturer's printed data sheets.

## PART 3 - EXECUTION

### 3.0 EXECUTION

#### A. Examination:

##### 1. Site Verification of Conditions:

Examine areas and conditions under which application of coating systems shall be performed for conditions that will adversely affect execution, permanence, or quality of coating system application.

*ASTM D4263 Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.*

Correct conditions detrimental to timely and proper execution of Work.

Do not proceed until unsatisfactory conditions have been corrected.

Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

#### B. Preparation:

##### 1. Protection:

Take precautionary measures to prevent fire hazards and spontaneous combustion. Remove empty containers from site at completion of each days work.

Provide drop cloths, shields, and other protective equipment.

Protect elements surrounding work from damage or disfiguration.

As Work proceeds, promptly remove spilled, splashed, or splattered materials from surfaces. Leave storage area neat and clean at all times.

#### C. Surface Preparation:

##### 1. General Requirements:

- Prior to application of primer, surfaces shall be prepared to receive specified paintings system in compliance with manufacturer's recommendations and specifications of The Society of Protective Coatings as indicated in Schedule below.
- Surfaces to be coated shall be clean, dry and free from dust and any foreign matter which might adversely affect adhesion or appearance.

##### 2. Ferrous Metal Surfaces:

- For shop primed surfaces feather edges to make touch-up areas inconspicuous. Field welds and touch-ups shall be prepared to conform to original surface preparation standards.
- Shop applied prime coatings which are damaged during transportation, construction or installation shall be thoroughly cleaned and touched up in field. Use repair procedures which insure complete protection of adjacent primer.
- For surfaces not shop primed, surfaces shall be cleaned in compliance with specifications of The Society for Protective Coatings as indicated in Schedule of Coating Systems of this specification.

##### 3. Galvanized Steel Surfaces:

- Solvent clean metal to remove contamination and oils in compliance with SSPC-SP1.



- Brush Blast to abrade the surface.
- 4. **Cast-In-Place and/or Precast Concrete Surfaces:**
  - Allow loose to cure for not less than 28 days prior to painting.
  - Remove loose particles with stiff brush.
  - Remove dirt, scale, efflorescence, powders, laitance, parting compounds, and other foreign matter. Brush off blast clean all concrete in immersion.
  - Wash stains caused by weathering or corroding metals with a sodium metasilicate solution. After thoroughly rinsing with clean, clear water, allow surface to thoroughly dry.
  - Fill surface voids and air holes with Tnemec Series 215 Surfacing Epoxy.
- 3.1 **TANK PAINTING**
  1. Adequate illumination shall be provided while work is in progress, including explosion proof lights and electrical equipment. Temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected to facilitate inspection and moved by the Contractor as required.
- 3.2 **DISINFECTION OF TANKS**
  - A. All cleaning, disinfection, and testing shall be the responsibility of the CONTRACTOR. This work shall be done in full compliance with the following:
    - AWWA C653 "Disinfection of Water Treatment Plants"
    - AWWA C652 "Disinfection of Water Storage Facilities"
  - B. All units shall be disinfected and tested as called for above. Any unit which fails the bacteriological testing shall be disinfected again. This procedure will be repeated until the unit passes the bacteriological testing.
- 3.3 **EQUIPMENT PROTECTION AND CLEANUP**
  - A. The CONTRACTOR shall protect all structures, equipment, motors, and gears from the sandblasting and painting operations.
  - B. The CONTRACTOR shall remove all sand, equipment, trash, etc. from the work area. He shall leave the tank in a ready to use condition for potable water.
  - C. Protect painted areas against damage until paint system is fully cured.
- 3.4 **SAFETY EQUIPMENT**
  - A. The CONTRACTOR shall at all times conduct all phases of this work in accordance with the requirement of the safety codes of the State of Texas and in accordance with the applicable provisions of the Occupational Safety and Health Act of 1970 and the Texas Occupational Safety Law.
- 3.5 **REPAIR/RESTORATION**
  - A. At completion of Work, touch-up and restore finishes where damaged.
  - B. Defects in Finished Surfaces:
    1. When stain, dirt, or undercoats show through final coat, correct defects and cover with additional coats until coating is of uniform finish, color, appearance and coverage.
  - C. Touch-up of minor damage shall be acceptable where result is not visibly different from surrounding surfaces. Where result is visibly different, either in color, sheen, or texture, re-coat entire surface.
- 3.6 **MANUFACTURE'S SERVICE**
  - A. A representative of the paint manufacturer shall be available to provide on-site technical assistance, and guidance for application of the paint system as needed.
- 3.7 **WASTE MANAGEMENT**

- A. General Requirements:
  - 1. Place materials defined as hazardous or toxic waste in designated containers.
  - 2. Return solvent and oil soaked rags for contaminant recovery and laundering or for proper disposal.
  - 3. Do not dispose of paints or solvents by pouring on ground. Place in designated containers for proper disposal.
- B. Containment/Disposal Requirements:
  - 1. Surface Preparation Debris Containment:
    - When required by federal, state or local regulation, entire tank and structure shall be enclosed and surface preparation debris contained.
    - Refer to SSPC-61 *Guide for Containing Debris Generated during Paint Removal Operations*.
  - 2. Disposal of Surface Preparation Debris:
    - Refer to SSPC-71 *Guide for the Disposal of Lead-Contaminated Surface Preparation Debris*.
    - Surface preparation debris shall be disposed of in compliance with applicable federal, state and local regulations.
  - 3. Containment/Disposal Costs:
    - Painter shall be responsible for costs associated with containment and waste disposal that may result from execution of this Project.

### 3.8 FIRST ANNIVERSARY INSPECTION

- A. The inside and outside surfaces of the tank shall be inspected by representatives of the CITY OF FARMERSVILLE and the CONTRACTOR at approximately one year's time after painting work has been completed to determine whether any repair work is necessary.
- B. The CITY OF FARMERSVILLE shall establish the date for the inspection and shall notify the CONTRACTOR.
- C. The CITY OF FARMERSVILLE shall drain the tank and provide suitable interior lighting and ventilation for the tank inspection as may be required.
- D. Any location where coats of paint have peeled off, bubbled, or cracked, and any location where rusting is evident shall be considered to be a failure of the paint system. The CONTRACTOR shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, and recoating with the same paint system. If the area of failures exceeds 25% of the area of a portion of the tank surface, then for that portion, the entire paint system shall be removed and repainted. For purposes of determining the need for complete repainting, the inside roof, shell, and floor and the outside roof, shell, and floor shall each be considered separately.
- E. The CONTRACTOR shall prepare and deliver to the CITY OF FARMERSVILLE an inspection report covering the first anniversary inspection, setting forth the number and type of failures observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspection. Color photographs illustrating each type of failure shall be included in the report.

### 3.9 QUALITY ASSURANCE

- A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Engineer.
- B. Surface Preparation: Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces: SSPC-VIS 1-89", ASTM Designation D2200-95, "Pictorial Surface Preparation Standards for Painting Steel Surfaces",



ASTM D 4417-91, Method A and/or Method C "Field Measurement of Surface Profile of Blast Cleaned Steel" or NACE Standard RP0287-87 "Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape". In all cases the written standard shall take precedence over the visual standard. In addition, NACE Standard SP0178-91, "Fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service", along with the Visual Comparator, shall be used to verify the surface preparation of welds..

- C. Coating Thickness: Thickness of coatings and paint shall be measured checked according to the procedures outlined in SSPC-PA 2 "Measurement of Dry Film Thickness with Magnetic Gages" with particular attention to section(s) 4.0, 7.8, 7.9, 7.11, 7.13, 7.14, with a non-destructive, magnetic-type thickness gauge that has been calibrated according to the procedures outlined in SSPC-PA 2 "Measurement of Dry Film Thickness with Magnetic Gages" with particular attention to section(s) 3.0, 7.4, 7.5, 7.15. Pass/fail criteria shall require that ninety (90) percent of the spot measurements (average of 3 gauge readings within a 1.5 inch diameter area) be at or above the minimum specified dry film thickness. Of the remaining ten (10) percent of the spot measurements (average of 3 gauge readings within a 1.5 inch diameter area) that are below the minimum specified dry film thickness, they shall be no less than ninety (90) percent of the minimum specified dry film thickness. Areas that fail to meet these criteria shall be corrected at no expense to the City of Farmersville. Use of an instrument such as a Tooke Gauge, precision groove grinder, etc. is permitted if a destructive test is deemed necessary by the Engineer and the total DFT is less than 50 mils.
- D. Holiday (Pinhole) Testing: The integrity of interior coated surfaces shall be tested for holidays in accordance with NACE Standard SP0188. For dry films less than 20 mils, a non-destructive holiday detector shall not exceed 67.5 volts, nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system. A solution of 1 ounce non-sudsing type wetting agent, such as Kodak Photo-Flo, and 1 gallon of tap water shall be used to perform the holiday testing. For coating thickness at 20 mils and greater, a high voltage Tinker & Rasor AP/W holiday tester shall be used. Contact coating manufacturer for voltage recommendations and curing parameters. All pinholes and/or holidays shall be marked and repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities will be permitted in the final coating.
- E. Inspection Devices: The contractor shall furnish, until final acceptance of coating and painting is accepted, inspection devices in good working condition for detection of holidays and measurement of dry film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates and/or plastic shims, depending upon the thickness gauge used, to test the accuracy of dry film thickness gauges and certified instrumentation to test the accuracy of holiday detectors. Dry film gauges and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the Engineer.
- F. Inspection: Inspection for this project shall consist of 'hold point' inspections. The Engineer or his representative shall inspect the surface prior to abrasive blasting, after abrasive blasting but prior to application of coating materials, and between subsequent coats of material. Final inspection shall take place after all coatings are applied, but prior to placing the tank in service. Contractor will insure that sufficient rigging is in place so that the Engineer or his representative shall be able to conduct the required inspections.

END OF SECTION

## **SECTION 1028 DISINFECTION OF WATER TANKS**

### **PART 1 – GENERAL**

#### **1.1 SCOPE OF WORK**

- A. This section specifies the procedure for disinfection of potable water tanks, and overall conforms to C652-11, Disinfection of Water-Storage Facilities.
- B. During the construction operations, workers shall be required to use utmost care to see that parts of the structures, inside pipes, fittings, jointing materials, valves, etc., the surface of which contact potable water, are maintained in a sanitary condition.
- C. Every effort must be made to keep the inside of the pipe, fittings, and valves free of all foreign matter, sticks, dirt, rocks, etc. As each joint of pipe is being laid, it must be effectively swabbed so that all foreign matter is removed. Placing dry powdered chlorine in the pipeline will not be permitted. All fittings and exposed open ends of pipe must be blocked or capped until the line is completed.
- D. Disinfection of the tank or any portion thereof shall not be commenced until ENGINEER review of the method, apparatus, disinfecting agent and the tank has been obtained.
- E. In the event of a conflict between this specification and project plans (drawings) then the plans will take precedence.

### **PART 2 - PRODUCT**

#### **2.1 CHLORINE**

There are three forms of chlorine acceptable for use in tank disinfection: liquid chlorine, sodium hypochlorite, which is also a liquid and calcium hypochlorite, which is available in tablets or small granules.

### **PART 3 - EXECUTION**

#### **3.1 DISINFECTION PROCEDURE**

When the entire tank has been completed, tested, free of all debris and made ready for turning over to the CITY OF FARMERSVILLE and ready for use, the tank shall be thoroughly disinfected according to one of the following procedures:

##### **Method 1**

The water storage tank is filled to the point of overflow with potable water to which chlorine is added. The amount of chlorine in the water should reach a minimum of 10 milligrams per liter (mg/L) and left for a period of 6 to 24 hours.

##### **Method 2**

A solution containing 200 mg/L of chlorine is applied to all surfaces of the tank that will come into contact with water when the tank is filled to the point of overflowing. The solution must stay on for a minimum of 30 minutes. All drainpipes must be filled with a 10-mg/L chlorine solution for the same amount of time. The tank should then be cleaned with potable water and the drainpipes should be cleared.

##### **Method 3**

A 50 mg/L chlorine solution should be used to fill 5 percent of the tank. After waiting a minimum of 6 hours, the tank should then be filled to its overflow point with potable water. After another 24 hours, the tank is then drained.

**END OF SECTION**



Agenda Section	Reading of Ordinance
Section Number	V.B
Subject	Consider, discuss, and act upon the first reading of Ordinance # O-2016-1129-002 regarding standard construction details
To	Mayor and Council Members
From	Ben White, City Manager
Date	November 8, 2016
Attachment(s)	Ordinance # O-2016-1129-002
Related Link(s)	<a href="http://www.farmersvilletx.com/government/agendas_and_minutes/city_council_meetings.php">http://www.farmersvilletx.com/government/agendas_and_minutes/city_council_meetings.php</a>
Consideration and Discussion	City Council discussion as required.
Action	<ul style="list-style-type: none"> <li>• Motion/second/vote <ul style="list-style-type: none"> <li><input type="checkbox"/> Approve</li> <li><input type="checkbox"/> Approve with Updates</li> <li><input type="checkbox"/> Disapprove</li> </ul> </li> <li>• Motion/second/vote to continue to a later date. _____ <ul style="list-style-type: none"> <li><input type="checkbox"/> Approve</li> <li><input type="checkbox"/> Disapprove</li> </ul> </li> <li>• Move item to another agenda. _____</li> <li>• No motion, no action</li> </ul>

**CITY OF FARMERSVILLE  
ORDINANCE #2016-1129-002**

**AN ORDINANCE OF THE CITY OF FARMERSVILLE, TEXAS ADOPTING THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS, OCTOBER 2016 EDITION, TO UPDATE AND REPLACE THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS, DECEMBER, 2005 EDITION AND JULY 2016 EDITION; AMENDING THE CODE OF ORDINANCES OF THE CITY OF FARMERSVILLE, TEXAS, AS HERETOFORE AMENDED, THROUGH THE AMENDMENT OF CHAPTER 65, "SUBDIVISIONS," BY THE AMENDMENT OF SECTION 65-5, ENTITLED "ADOPTION OF PLANS AND DESIGN MANUALS," TO REFLECT THE ADOPTION OF THE OCTOBER 2016 EDITION OF THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS; REPEALING ORDINANCES IN CONFLICT HERewith; PROVIDING FOR SEVERABILITY; PROVIDING FOR GOVERNMENTAL IMMUNITY; PROVIDING FOR INJUNCTIONS; PROVIDING FOR NOTICE AND IMPLEMENTATION; AND PROVIDING AN EFFECTIVE DATE.**

**WHEREAS**, the City of Farmersville, Texas Standard Construction Details ("Standard Construction Details") were last updated in December, 2005 and amended, in part at least, by the Standard Construction Details, July 2016 Edition and are out of date; and

**WHEREAS**, the City desires to update and replace the existing Standard Construction Details; and

**WHEREAS**, the new Standard Construction Details will comply with the latest federal and state levels of design, and are more consistent with standards currently utilized throughout the Dallas/Ft. Worth metroplex; and

**WHEREAS**, the new Standard Construction Details will be a better source of information for engineers and consultants; and

**WHEREAS**, the new Standard Construction Details should reduce the time City staff spends with engineers and developers in the design review process; and

**WHEREAS**, the City Council of the City of Farmersville, Texas finds that all prerequisites to the adoption of this Ordinance have been met; and

**WHEREAS**, the City Council of the City of Farmersville, Texas finds that it is in the best interest of the public health, safety and welfare to update and replace the existing Standard Construction Details.

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF FARMERSVILLE, TEXAS, THAT:**

**SECTION 1. INCORPORATION OF FINDINGS**

All of the above premises are hereby found to be true and correct legislative and factual determinations of the City of Farmersville and they are hereby approved and incorporated into the body of this Ordinance as if copied in their entirety.

**SECTION 2. ADOPTION OF THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS, OCTOBER 2016 EDITION**

The City Council of the City of Farmersville hereby adopts The City of Farmersville, Texas Standard Construction Details, October 2016 Edition, a true copy of which is on file with the City Secretary's Office and incorporated herein by reference for all purposes allowed by law the same as if fully copied herein.

**SECTION 3. DEVELOPMENT TO CONFORM TO THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS, OCTOBER 2016 EDITION**

From and after the effective date of this Ordinance, The City of Farmersville, Texas Standard Construction Details, October 2016 Edition, establishes the minimum standards which shall be complied with by any developer or property owner filing an application to develop land within the City or its extraterritorial jurisdiction.

**SECTION 4. AMENDING THE CODE OF ORDINANCES OF THE CITY OF FARMERSVILLE, TEXAS, AS HERETOFORE AMENDED, THROUGH THE AMENDMENT OF CHAPTER 65, "SUBDIVISIONS," BY THE AMENDMENT OF SECTION 65-5, ENTITLED "ADOPTION OF PLANS AND DESIGN MANUALS," TO REFLECT THE ADOPTION OF THE OCTOBER 2016 EDITION OF THE CITY OF FARMERSVILLE, TEXAS STANDARD CONSTRUCTION DETAILS**

From and after the effective date of this Ordinance, Section 65-5 of the Farmersville Code is hereby amended to read as follows:

**"Sec. 65-5. - Adoption of plans and design manuals.**

**A. The city has adopted the:**

- (1) Future Land Use Plan dated November 8, 2005;
- (2) Future Infrastructure Plan dated November 8, 2005;
- (3) City of Farmersville, Texas Manual for the Design of Storm Drainage Systems dated February 13, 2007;
- (4) City of Farmersville, Texas Manual for the Design of Water and Sanitary Sewer Lines dated February 13, 2007;
- (5) City of Farmersville, Texas Standard Construction Details, October 2016 Edition ("Standard Construction Details"); and
- (6) City of Farmersville, Texas Thoroughfare Standards Design Manual dated July 13, 2004 and amended June 12, 2007; and
- (7) Master Thoroughfare Plan Adopted September 12, 2006.

The designs and manuals referenced above in subparagraph nos. (3), (4) and (6) are referred to collectively as Design Manuals. True copies of the foregoing Design Manuals, Standard Construction Details and various Plans are incorporated herein by reference for all purposes allowed by law, the same as if fully copied herein.

- B. Notwithstanding the provisions of Section 65-9, "Pending applications," of this Code, all applications for plat approval, including final plats and record plats, shall conform to the foregoing Design Manuals, Standard Construction Details and/or Plans save and except only to the extent that the application of such regulations are not exempt under Section 245.004 of the Texas Local Government Code. If the applications for plat approval, including final plats and record plats, for a particular project have not lapsed or are not dormant and qualify for consideration under Sections 245.002 and 245.003 of the Texas Local Government Code, such plat applications shall be reviewed under the regulations in effect immediately preceding the effective date of the ordinance from which the individually referenced

Design Manuals, Standard Construction Details or Plans is derived. However, a property owner may opt, at the owner's sole discretion, that such a plat instead be reviewed under the then current Design Manuals, Standard Construction Details and/or Plans referenced."

## **SECTION 5. CUMULATIVE REPEALER**

This Ordinance shall be cumulative of all other Ordinances and shall not repeal any of the provisions of such Ordinances except for those instances where there are direct conflicts with the provisions of this Ordinance. Ordinances or parts thereof in force at the time this Ordinance shall take effect and that are inconsistent with this Ordinance are hereby repealed to the extent that they are inconsistent with this Ordinance. Provided however, that any complaint, action, claim or lawsuit which has been initiated shall continue to be governed by the provisions of such Ordinance and for that purpose the Ordinance shall remain in full force and effect.

## **SECTION 6. SAVINGS**

All rights and remedies of the City of Farmersville are expressly saved as to any and all violations of the provisions of any Ordinances which have accrued at the time of the effective date of this Ordinance; and, as to such accrued violations and all pending litigation, both civil and criminal, whether pending in court or not, under such Ordinances, same shall not be affected by this Ordinance but may be prosecuted until final disposition by the courts.

## **SECTION 7. SEVERABILITY**

It is hereby declared to be the intention of the City Council of the City of Farmersville that the phrases, clauses, sentences, paragraphs, and sections of this Ordinance are severable, and if any phrase, clause, sentence, paragraph, or section of this Ordinance should be declared unconstitutional by valid judgment or final decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, or sections of this Ordinance, since the same would have been enacted by the City Council without incorporation in this Ordinance of any such unconstitutional phrase, clause, sentence, paragraph, or section.

## **SECTION 8. GOVERNMENTAL IMMUNITY**

All of the regulations provided in this ordinance are hereby declared to be governmental and for the health, safety and welfare of the general public. Any member of the City Council or any City official or employee charged with the

enforcement of this ordinance, acting for the City of Farmersville in the discharge of his/her duties, shall not thereby render himself/herself personally liable; and he/she is hereby relieved from all personal liability for any damage that might accrue to persons or property as a result of any act required or permitted in the discharge of his/her said duties.

#### **SECTION 9. INJUNCTIONS**

Any violation of this ordinance can be enjoined by a suit filed in the name of the City of Farmersville in a court of competent jurisdiction, and this remedy shall be in addition to any penal provision in this ordinance or in the Code of the City of Farmersville.

#### **SECTION 10. ENGROSSMENT AND ENROLLMENT**

The City Secretary of the City of Farmersville is hereby directed to engross and enroll this Ordinance by copying the exact Caption and the Effective Date clause in the minutes of the City Council of the City of Farmersville and by filing this Ordinance in the Ordinance records of the City.

#### **SECTION 11. EFFECTIVE DATE**

This Ordinance shall take effect immediately from and after its passage and publication of the caption as required by law.

**PASSED** on first reading on the \_\_\_\_\_ day of July, 2016, and the second reading on the \_\_\_\_\_ day of \_\_\_\_\_, 2016, at properly scheduled meetings of the City Council of the City of Farmersville, Texas, there being a quorum present, and approved by the Mayor on the date set out below.

**APPROVED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 2016.**

**APPROVED:**

\_\_\_\_\_  
Diane Piwko, Mayor

**ATTEST:**

\_\_\_\_\_  
Paula Jackson, Interim City Secretary

# CITY OF FARMERSVILLE, TEXAS

## STANDARD CONSTRUCTION DETAILS

### OCTOBER 2016

APPROVED FOR USE: \_\_\_\_\_

BENJAMIN L. WHITE P.E.  
PUBLIC WORKS DIRECTOR

DATE \_\_\_\_\_



# Farmersville

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**NOTE:**  
IF CONFLICT EXISTS BETWEEN HARD COPY AND  
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**STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS**



**INDEX**

DESIGNED: E.W.D.  
DRAWN: M.K.W. - DBI

DATE: 10-27-16  
REVISION: N/C

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**NOTE:**  
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**STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS**



**INDEX**

DESIGNED: E.W.D.      DATE: 10-27-18  
DRAWN: M.K.W. - DBI      REVISION: N/C

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STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

INDEX

DESIGNED E.W.D.  
DRAWN M.K.W. / DSI

DATE 10-27-16  
REVISION N/C

**GENERAL:**

1. A VARIANCE TO THESE STANDARDS AND SPECIFICATIONS MAY ONLY BE ALLOWED UPON WRITTEN REQUEST BY THE INSTALLER TO THE CITY OF FARMERSVILLE AND FORMAL WRITTEN APPROVAL BY THE PUBLIC WORKS DIRECTOR AND THE CITY OF FARMERSVILLE'S ENGINEER, UNLESS PROVIDED OTHERWISE BY THE FARMERSVILLE CODE.
2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF FARMERSVILLE CODE AND THE CITY OF FARMERSVILLE STANDARD CONSTRUCTION DETAILS, AS THEY MAY BE AMENDED. THE OCTOBER 2004 EDITION OF THE PUBLIC WORKS CONSTRUCTIONS STANDARDS - NORTH CENTRAL TEXAS AS PUBLISHED BY NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS NCTCOG SPECIFICATIONS, AS AMENDED, AND THE TEXAS DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR THE PUBLIC WORKS CONSTRUCTION.
3. ALL RULES AND REGULATIONS OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ("EPA"), UNITED STATES ARMY CORPS OF ENGINEERS ("CORPS"), TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) AND TEXAS DEPARTMENT OF LICENSING AND REGULATIONS (TDLR) SHALL BE MET.
4. IN THE EVENT OF A CONFLICT OR INCONSISTENCY BETWEEN ONE OR MORE OF THE STATUTES, ORDINANCES, RULES AND REGULATIONS SET FORTH IN PARAGRAPH NOS. 2 AND 3, ABOVE, SUCH CONFLICT OR INCONSISTENCY WILL USUALLY BE RESOLVED BY GIVING PRECEDENCE TO FEDERAL REGULATIONS AND REQUIREMENTS FOLLOWED BY, STATE REGULATIONS AND REQUIREMENTS FOLLOWED BY THE CITY OF FARMERSVILLE REQUIREMENTS AND THEN THE NCTCOG SPECIFICATIONS. NOTWITHSTANDING THE FOREGOING SUGGESTED ORDER OF PRECEDENCE, THE INSTALLER SHALL SEEK CLARIFICATION AS TO WHICH REQUIREMENTS OR PROVISIONS CONTROL BEFORE UNDERTAKING ANY WORK ON THAT COMPONENT OF THE PROJECT. SHOULD THE INSTALLER FAIL OR REFUSE TO SEEK A CLARIFICATION OF SUCH CONFLICTING OR INCONSISTENT REQUIREMENTS OR PROVISIONS PRIOR TO ANY WORK ON THAT COMPONENT OF THE PROJECT, THE INSTALLER SHALL BE SOLELY RESPONSIBLE FOR THE COSTS AND EXPENSES - INCLUDING ADDITIONAL TIME - NECESSARY TO CURE, REPAIR AND/OR CORRECT THAT COMPONENT OF THE PROJECT.
5. EXISTING UTILITIES SHALL BE LOCATED, IDENTIFIED, AND PROTECTED DURING THE INSTALLATION. CONFLICTS BETWEEN EXISTING UTILITIES AND PROPOSED UTILITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
6. MATERIALS AND INSTALLATION SHALL BE GUARANTEED BY THE INSTALLER FOR A MINIMUM PERIOD OF TWO YEARS FROM THE DATE OF FINAL ACCEPTANCE WITH A MAINTENANCE BOND.
7. THE CITY OF FARMERSVILLE SHALL BE HELD HARMLESS FROM ANY DAMAGES OCCURRING DURING THE CONSTRUCTION OR WARRANTY PERIOD. ALL DAMAGES AS A RESULT OF THE CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE INSTALLER.
8. ALL THIRD PARTY TEST FACILITIES, USED IN CONNECTION WITH THE PROJECT, SHALL BE APPROVED BY CITY OF FARMERSVILLE OR CITY OF FARMERSVILLE'S REPRESENTATIVE BEFORE THEY ARE UTILIZED.
9. ALL WATER, USED BY THE INSTALLER FOR ANY PURPOSE, SHALL BE METERED AND PAID FOR BY THE INSTALLER UNLESS OTHERWISE SPECIFIED. METER SHALL BE OBTAINED BY INSTALLER FROM THE CITY OF FARMERSVILLE AT COST. AN APPROVED DOUBLE CHECK DEVICE BACKFLOW PREVENTION ASSEMBLY (DCD) OR REDUCED PRESSURE DETECTOR ASSEMBLIES (RPDA) SHALL BE REQUIRED AS THE MINIMUM PROTECTION FOR FIRE HYDRANT WATER METERS. NONAPPROVED METERS FOUND TO BE USED WITHIN THE CITY WILL BE CONFISCATED AND ENFORCEMENT ACTION PURSUED.
10. THE INSTALLER SHALL SECURE A COPY OF AN EXECUTED PERMIT AND BE FULLY AWARE OF THE REQUIREMENTS CONTAINED HEREIN BEFORE A JOB IS STARTED. A COPY OF THE FULLY EXECUTED PERMIT SHALL BE LOCATED AT ALL TIMES ON THE JOB, UNTIL FINAL COMPLETION.
11. INSTALLER SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REPAIR OR REPLACEMENT OF ANY PAVEMENT (STREETS, ROADWAYS, DRIVEWAYS, SIDEWALKS) AND UNDERGROUND OR OVERHEAD UTILITIES AND ALL RELATED APPURTENANCES TO SUCH EXISTING IMPROVEMENTS DAMAGED AS A RESULT OF CONSTRUCTION OPERATIONS.
12. THE CITY OF FARMERSVILLE OR THE CITY OF FARMERSVILLE'S REPRESENTATIVE SHALL HAVE THE OPTION TO WITNESS ANY TESTS DONE IN CONNECTION WITH ANY PROJECT.
13. FOR ALL APPLICABLE PROJECTS, THE INSTALLER SHALL IMPLEMENT A STORM WATER POLLUTION PREVENTION PROGRAM IN ACCORDANCE WITH THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) GENERAL PERMIT NUMBER TXR150000.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



GENERAL NOTES

DESIGNED E.W.D.  
DRAWN M.K.W. / DBI

DATE 10-27-16  
REVISION NC

001

**SPECIFICATIONS:**

1. THIS PROJECT SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING CITY OF FARMERSVILLE SPECIFICATIONS. IN THE EVENT OF A CONFLICT BETWEEN THE SPECIFICATIONS BELOW AND THE STANDARD CONSTRUCTION DETAILS THEN THE STANDARD CONSTRUCTION DETAILS WILL PRESIDE.
  - NUMBER 1001: EARTHWORK
  - NUMBER 1002: ROCK RIP-RAP
  - NUMBER 1003: SEEDING
  - NUMBER 1004: WATERLINE INSTALLATION
  - NUMBER 1005: STRUCTURAL EXCAVATING, BACKFILLING, AND COMPACTING
  - NUMBER 1006: CHAIN LINK FENCES AND GATES
  - NUMBER 1007: FLEXIBLE BASE
  - NUMBER 1008: SANITARY SEWER FORCE MAIN PIPES AND FITTINGS
  - NUMBER 1009: SEWER LINE CONSTRUCTION
  - NUMBER 1010: CONCRETE
  - NUMBER 1011: PRECAST CONCRETE VAULTS
  - NUMBER 1012: INSTRUMENTATION AND TELEMTRY
  - NUMBER 1013: SCADA SYSTEM
  - NUMBER 1014: STANDBY GENERATOR SET
  - NUMBER 1015: GAS CHLORINATION
  - NUMBER 1016: BUTTERFLY VALVES
  - NUMBER 1017: GATE VALVES
  - NUMBER 1018: AIR AND VACUUM RELEASE VALVES
  - NUMBER 1019: GRATING AND FLOOR PLATES
  - NUMBER 1020: MANUFACTURED CHLORINATION BUILDINGS
  - NUMBER 1021: LIQUID CHLORINATION
  - NUMBER 1022: AIR COMPRESSOR FOR HYDROPNEUMATIC
  - NUMBER 1023: RADIO READ METER SYSTEM
  - NUMBER 1024: CONFINED SPACE ENTRY PROCEDURE
  - NUMBER 1025: TRENCH EXCAVATION SAFETY SYSTEMS
  - NUMBER 1026: ASBESTOS CEMENT PIPE REMOVAL
  - NUMBER 1027: PAINTING OF WATER TANKS-HYDRO ZINC SYSTEM
  - NUMBER 1028: DISINFECTION OF WATER TANKS
2. CONSTRUCTION STANDARDS SHALL MEET THE FOLLOWING CODES:
  - INTERNATIONAL FIRE CODE, 2009 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL BUILDING CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL PLUMBING CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - NATIONAL ELECTRICAL CODE, 2008 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL ENERGY CONSERVATION CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL FUEL GAS CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL MECHANICAL CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL EXISTING BUILDING CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)
  - INTERNATIONAL RESIDENTIAL CODE, 2006 EDITION, AS AMENDED, OR AS SUCH EDITION MAY HEREAFTER BE UPDATED BY THE INTERNATIONAL CODE COUNCIL AND ADOPTED BY THE CITY OF FARMERSVILLE, TEXAS (AND INCLUDING ANY LOCAL AMENDMENTS THERETO ADOPTED BY THE CITY)

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



SPECIFICATIONS

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DB

DATE: 10-27-18  
REVISION: N/C

002

**PARTS AND MATERIALS:**

1. ALL PARTS AND MATERIALS USED ON ANY PROJECT SHALL BE MANUFACTURED IN THE USA UNLESS OTHERWISE APPROVED BY THE CITY OF FARMERSVILLE.
2. CORPORATION STOPS, SADDLES, TAPPING SLEEVES, CURB STOPS, METER STOPS, METER COUPLINGS, & PIPE COUPLINGS SHALL BE FORD.
3. GATES VALVES SHALL BE MUELLER.
4. FIRE HYDRANTS SHALL BE MUELLER.
5. SAMPLING STATIONS SHALL BE KUPFERLE ECLIPSE 88.
6. DUCTILE IRON AND CAST IRON FITTINGS, VALVE STACK EXTENSIONS SHALL BE TYLER DOMESTIC.
7. PIPE COUPLINGS SHALL BE SMITH BLAIR.
8. ENDPOINTS SHALL BE ADVANCE METERING INFRASTRUCTURE .
9. AMI NETWORKING SHALL BE TANTALUS.
10. LOCKS FOR GATES AND BUILDINGS SHALL BE INCLUDED. LOCK TYPE SHALL BE SPECIFIED BY CITY OF FARMERSVILLE. LOCKS SHALL BE KEYED IN ACCORDANCE WITH CITY OF FARMERSVILLE SPECIFICATIONS.

N-03

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



**PART AND MATERIALS NOTES**

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

**003**

**WATERLINES AND FITTINGS:**

1. DUCTILE IRON PIPE (DIP), MEETING AWWA C151 CLASS 50 SPECIFICATIONS, MAY BE USED WHEN ALLOWED BY THE CITY OF FARMERSVILLE OR CITY OF FARMERSVILLE'S ENGINEER. DIP SHALL BE WRAPPED WITH A POLYETHYLENE LINER.
2. WATER LINE SHALL MEET THE REQUIREMENTS SPECIFIED IN THE TABLE "CITY OF FARMERSVILLE WATER LINE SPECIFICATIONS".
3. ALL HORIZONTAL AND VERTICAL BENDS SHALL BE BLOCKED.
4. ALL VALVES AND FITTINGS SHALL BE PROPERLY RESTRAINED WITH MEGA-LUGS OR APPROVED EQUIVALENT AND RETAINER GLANDS
5. ALL WATER LINES SHALL BE SWABBED IN THE PRESENCE OF THE INSPECTOR PRIOR TO BACKFILLING.
6. WATER LINES SHALL BE INSTALLED WITH A MINIMUM OF 42 INCHES AND A MAXIMUM OF 60" OF COVER, UNLESS OTHERWISE SHOWN. USE NCTCOG B+ BURY AND EMBEDMENT DETAILS FOR STANDARD APPLICATIONS.
7. EXISTING WATER LINES SHALL REMAIN IN SERVICE DURING CONSTRUCTION OF NEW WATER LINES.
8. NO COVERING OF WATERLINES ALLOWED UNTIL INSPECTED AND APPROVED BY A CITY OF FARMERSVILLE REPRESENTATIVE.
9. NEW WATER LINES SHALL BE TESTED, DISINFECTED, AND FLUSHED IN ACCORDANCE WITH TCEQ REQUIREMENTS INCLUDING TAKING THE REQUIRED NUMBER OF BACTERIOLOGICAL SAMPLES WHICH INDICATE PROPER DISINFECTION BEFORE THE WATER LINE CAN BE PLACED INTO SERVICE.
10. WATER LINES SHALL BE PRESSURE TESTED IN ACCORDANCE WITH NCTCOG ITEM 506.
11. ALL WATER LINE CROSSINGS OF SANITARY SEWER LINES SHALL BE AS SHOWN IN THE DETAILS AND MEET CURRENT TCEQ REQUIREMENTS.
12. DURING INSTALLATION A MINIMUM SEPARATION DISTANCE OF NINE FEET SHALL BE MAINTAINED IN ALL DIRECTIONS BETWEEN THE PROPOSED WATERLINE AND WASTE WATER COLLECTION FACILITIES, INCLUDING MANHOLES AND SEPTIC TANK DRAIN FIELDS. IF THIS DISTANCE CANNOT BE MAINTAINED, THE INSTALLER SHALL IMMEDIATELY NOTIFY THE CITY OF FARMERSVILLE'S ENGINEER FOR FURTHER DIRECTION. SEPARATION DISTANCES, INSTALLATION METHODS, AND MATERIALS UTILIZED SHALL MEET 290.44 OF THE TCEQ RULES.
13. WATERLINE ENCASEMENT FOR THE PURPOSES OF A GAS LINE CROSSING SHALL BE IN ACCORDANCE WITH GAS LINE SPECIFICATIONS.
14. UNLESS OTHERWISE SPECIFIED, WATER METERS SHALL NOT BE PLACED ON ROADWAY RIGHT-OF-WAY.
15. ABATEMENT AND REMEDIATION, OF ASBESTOS CONCRETE WATER LINES, SHALL BE DONE IN ACCORDANCE WITH SPECIFICATION #1026: ASBESTOS CEMENT PIPE REMOVAL
16. THE INSTALLER SHALL SUPPLY ALL EQUIPMENT NECESSARY TO SUCCESSFULLY CONDUCT ALL WATER TESTS, INCLUDING BUT NOT LIMITED TO, TEST PORTS, SAMPLE CONTAINERS, PUMPS, EXTERNAL WATER LINE, EXTERNAL HOSES, ETC.
17. NO FLARE JOINT CONNECTIONS ARE ALLOWED.
18. ALL TAPPING SLEEVES SHALL BE STAINLESS STEEL FULL WRAP.
19. ALL TAPPING SADDLES SHALL BE DOUBLE STRAP BRONZE.
20. WATER LINES SHALL BE INSTALLED IN ACCORDANCE WITH TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) WATER DISTRIBUTION SYSTEM GENERAL CONSTRUCTION NOTES.
21. WATER LINES AND/OR ROAD CROSSINGS INSTALLED ON PUBLIC RIGHT OF WAYS SHALL BE SUBJECT TO APPLICABLE STATE, COUNTY OR CITY REGULATIONS.
22. ALL EXPOSED PIPING AND FITTINGS SHALL BE COVERED WITH 1-1/2" THICK MINIMUM ALUMINUM BACKED INSULATION.
23. INSTALLER SHALL FINISH GRADE TRENCH LINE TO MATCH EXISTING TERRAIN.
24. TYPICAL OFFSET FOR LONGITUDINAL LINES, OUTSIDE R.O.W., IS 7.5 FEET UNLESS OTHERWISE SHOWN.
25. TYPICAL OFFSET FOR LONGITUDINAL LINES, INSIDE R.O.W., IS 7.5 FEET UNLESS OTHERWISE SHOWN.
26. CASING SPACERS AND MOLDED RUBBER END CAPS ARE REQUIRED FOR ENCASEMENT. CASING SPACERS SHALL BE INSTALLED AT LEAST EVERY 5 FEET. CASING SPACERS ARE RACI OR APPROVED EQUIVALENT.
27. ALL PIPE DEEPER THAN 60" SHALL BE HDPE. NO FITTINGS DEEPER THAN 60" COVER.
28. INSTALLER SHALL APPLY AND PAY FOR NECESSARY BUILDING PERMITS AND COORDINATE ALL INSPECTIONS, AS NECESSARY.
29. LOCATION OF SAMPLING STATION, FIRE HYDRANT, AND METER SERVICE SHALL BE APPROVED BY CITY OF FARMERSVILLE OR CITY OF FARMERSVILLE'S REPRESENTATIVE PRIOR TO INSTALLATION.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



WATERLINE AND FITTINGS NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

004

**VALVES:**

1. ALL VALVES ON PIPES 12" AND SMALLER SHALL BE RESILIENT SEALED WEDGE VALVES (AWWA C515).
2. ALL VALVES ON PIPES LARGER THAN 12" BUT SMALLER THAN 30" SHALL BE RESILIENT SEALED WEDGE VALVES (AWWA C515).
3. ALL VALVES ON PIPES 30" AND LARGER SHALL BE BUTTERFLY VALVES (AWWA C504).
4. ALL VALVES SHALL BE MJ RW SQUARE HEAD UNLESS OTHERWISE NOTED.

N-05

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



VALVE NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-18  
REVISION: N/C

005

**FIRE HYDRANTS:**

1. ALL FIRE HYDRANTS SHALL BE INSTALLED WITH A 24"x24" SQUARE REINFORCED CONCRETE PAD.
2. FIRE HYDRANTS SHALL BE PAINTED. COLOR SELECTION AND PAINT TYPE SHALL BE IN ACCORDANCE WITH DETAILS.
3. FIRE HYDRANT STREET REFLECTORS SHALL BE INSTALLED AS APPROPRIATE WITH ASSOCIATED FIRE HYDRANT ASSEMBLIES.

90-N

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

FIRE HYDRANT NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: NIC

006

**BORINGS:**

1. ROAD CROSSINGS SHALL BE ENCASED ACCORDING TO STATE, COUNTY OR CITY REGULATIONS.
2. A ROAD BORE PERMIT MUST BE DISPLAYED AND AVAILABLE FOR INSPECTION AS REQUIRED.
3. 8" AND LARGER ROAD BORES SHALL BE DRY BORE.
4. ALL BORE PITS OR OPEN EXCAVATION SHALL BE CLOSED THE SAME DAY THEY ARE OPENED IF AT ALL POSSIBLE. ANY PIT OR EXCAVATION LEFT OPEN OVERNIGHT SHALL BE BARRICADED. TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) RULES AND REGULATIONS SHALL APPLY FOR STATE RIGHT OF WAY APPLICATIONS.
5. WATER LINES, CROSSING BENEATH THE PROPOSED ROADWAY SURFACE, SHALL MAINTAIN A MINIMUM CLEARANCE OF 18 INCHES BETWEEN THE BOTTOM OF THE PAVEMENT STRUCTURE AND THE WATER LINE/ENCASEMENT.
6. BORE PIT EDGES SHALL BE AT LEAST 1-FT HORIZONTAL PER 1-FT VERTICAL DEPTH AWAY FROM THE EXISTING ROADWAY SHOULDER'S EDGE.
7. BORINGS SHALL HAVE A MINIMUM COVER OF 2-FT VERTICALLY BELOW THE EXISTING DITCH FLOW LINE.
8. RAILROAD BORES SHALL BE DRY BORE UNLESS OTHERWISE SPECIFIED.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



BORING NOTES

DESIGNED E.W.D. DATE 10-27-18  
DRAWN M.K.W. / DBI REVISION N/C

007

**METERS AND VAULTS:**

1. NOTIFY THE CITY OF FARMERSVILLE PRIOR TO CONSTRUCTION OF METER VAULT OR BY-PASS ASSEMBLY.
2. VAULT SHALL NOT BE INSTALLED IN ANY RIGHT-OF-WAY, DRIVE OR PARKING AREA & MUST BE LOCATED IN A UTILITY EASEMENT DEDICATED TO THE CITY OF FARMERSVILLE, UNLESS OTHERWISE SPECIFICIED BY THE CITY OF FARMERSVILLE.
3. ALL PIPING INSIDE THE VAULT & THE VAULT ITSELF MUST BE INSPECTED & APPROVED BY THE CITY OF FARMERSVILLE.
4. ALL PIPING INSIDE THE VAULT SHALL BE DUCTILE IRON PIPE WITH FLANGED FITTINGS.
5. THERE SHALL BE A SUPPORT UNDER EACH GATE VALVE.
6. INSTALLER SHALL PROVIDE ALL METER SETTINGS. CITY OF FARMERSVILLE SHALL PROVIDE WATER METERS ALONG WITH ANY RADIO FREQUENCY DEVICES.
7. VAULT DESIGNS SHALL BE APPROVED BY CITY OF FARMERSVILLE PRIOR TO CONSTRUCTION.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



METERS AND VAULTS NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

008

**SITE PREPARATION:**

1. SITE SHALL BE GRADED TO DRAIN WITH NO PUDDLING.
2. ALL GRADED AREAS SHALL BE HYDROMULCHED SEEDED BERMUDA OR OTHER SEASONAL GRASSES IN ACCORDANCE WITH SPECIFICATION #1003: SEEDING, UPON COMPLETION OF FINAL GRADING.
3. GRASS SOD CONSISTENT WITH SURROUNDING EXISTING GRASS SHALL BE INSTALLED IN GRADED AREAS ADJACENT TO EXISTING ESTABLISHED GRASS PART OF AN EXISTING COMMERCIAL OR RESIDENTIAL STRUCTURE.
4. EXCAVATION MATERIAL MAY BE SPREAD OUT ON SITE AS DIRECTED BY THE CITY OF FARMERSVILLE OR ENGINEER.
5. PROPER EROSION CONTROL MEASURES SHALL CONSIST OF THE INSTALLATION, MAINTENANCE, AND REMOVAL OF THE SILT FENCING, STRAW BALES, INLET SEDIMENT BARRIERS, ETC., INCLUDING ANY SEEDING (CELLULOSE FIBER MULCH) OF DISTURBED GRASS; SUCH MEASURES SHALL REMAIN IN PLACE AND WATERED SUFFICIENTLY UNTIL 70% RE-VEGETATION OF AN DISTURBED AREAS HAS BEEN ESTABLISHED.
6. FOR TXDOT PROJECTS, ANY EXCAVATION IN CLOSE PROXIMITY TO THE CURB AND GUTTER SHALL NOT BE PERFORMED UNTIL THE TEXAS DEPARTMENT OF TRANSPORTATION MAINTENANCE SUPERVISOR HAS BEEN CONTACTED TO DETERMINE IF SHORING IS REQUIRED.
7. FOR TXDOT PROJECTS, WHERE EXCAVATION OR BACKFILLING OPERATIONS DISTURB SOIL OR SODDING, SUCH AREAS SHALL BE RESTORED TO THE ORIGINAL STATE, IF NOT A BETTER CONDITION. AFTER BACK FILLING, MULCH SODDING, BLOCK SODDING, OR THE ESTABLISHMENT OF VEGETATION THROUGH SEEDING SHALL OCCUR ON ALL SLOPES OF 3 TO 1 OR FLATTER. BROADCAST SEEDING SHOULD BE LIMITED TO FLAT AREAS, WHICH HAVE CLAY OR TIGHT SOIL TEXTURE ONLY. THIS APPLICATION METHOD IS NOT RECOMMENDED FOR ANY SLOPED AREA OR ANY AREA WHOSE PREDOMINANT SOIL TEXTURE IS LOOSE OR SANDY. WHERE SLOPES ARE GREATER THAN 3 TO 1, BLOCK SODDING OR USE OF A SOIL RETENTION BLANKET IS RECOMMENDED. IF A SOIL RETENTION BLANKET IS USED, THE APPLICATION OF SEED UNDER SPECIFICATION ITEM 164 OF THE TEXAS STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS, AND BRIDGES BY THE BROADCAST METHOD IS RECOMMENDED.
8. INSTALLER SHALL BE RESPONSIBLE FOR PROVIDING ALL ASSOCIATED FORMS, PERMITS, MATERIALS, AND REVIEWS ASSOCIATED WITH A STORM WATER POLLUTION PREVENTION PROGRAM (SW3P) THAT IS COMPLIANT WITH THE LOCAL CITY, COUNTY AND/OR STATE REQUIREMENTS.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



SITE PREPARATION NOTES

DESIGNED E.W.D  
DRAWN: M.K.W / DB

DATE: 10-27-16  
REVISION: N/C

009

**ELEVATED WATER TANK RECOAT:**

1. RECOAT INTERIOR AND EXTERIOR TANK SURFACES IN ACCORDANCE WITH SPECIFICATION #1027: PAINTING OF WATER TANKS - HYDRO ZINC SYSTEM, FOR AN EXISTING TANK RECOAT PROJECT - WET NEAR WHITE, DRY INTERIOR AND EXTERIOR COMMERCIAL BLAST. COLOR AND LOGO DESIGN SELECTED BY CITY OF FARMERSVILLE REPRESENTATIVE. LOGO ON 2 SIDES OF THE TANK, LIKE THE CURRENT DESIGN.
2. INSTALLER SHALL DISINFECT THE TANK PRIOR TO PLACING IN SERVICE IN ACCORDANCE WITH SPECIFICATION #1028: DISINFECTION OF WATER TANKS.
3. PAINT CONTAINMENT PRACTICES FOR ENVIRONMENTAL AND PROPERTY CONCERNS SHALL BE AT THE DISCRETION OF THE PAINT INSTALLER.
4. THE CITY OF FARMERSVILLE SHALL BE HELD HARMLESS FROM ANY DAMAGES OCCURRING DURING THE RECOATING PROCESS AND ANY RELATED WARRANTY PERIOD. ALL DAMAGES AS A RESULT OF THE RECOATING SHALL BE THE RESPONSIBILITY OF THE PAINT INSTALLER.

N-10

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



**ELEVATED WATER TANK RECOAT NOTES**

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

**010**

**ELECTRICAL:**

- 1. ABOVE GROUND CONDUIT SHALL BE GALVANIZED RIGID.
- 2. BELOW GROUND CONDUIT SHALL BE WATER TIGHT SCHEDULE 80 PVC GLUED WITH PULL STRING.

N-11

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



**ELECTRICAL NOTES**

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

**011**

**TRAFFIC CONTROL:**

1. TRAFFIC CONTROL SIGNAGE, BARRICADES, ETC., PER THE LATEST EDITION TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES SHALL REMAIN IN PLACE DURING CONSTRUCTION.
2. PROPER TRAFFIC CONTROL MEASURES SHALL BE MAINTAINED FOR DURATION OF CONSTRUCTION AS PRESCRIBED BY THE TEXAS DEPARTMENT OF TRANSPORTATION PERSONNEL. (REF. TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES) THE INSTALLER OR CITY OF FARMERSVILLE SHALL PROVIDE BARRICADES, WARNING SIGNS, AND FLAGGERS WHEN APPLICABLE.
3. OPERATIONS ALONG HIGHWAYS SHALL BE PERFORMED IN SUCH MANNER THAT ALL EXCAVATED MATERIAL, ALL OPERATING EQUIPMENT, AS WELL AS PARKED VEHICLES, ARE KEPT OFF THE PAVEMENT AT ALL TIMES. ANY VEHICLES REQUIRED TO REMAIN ON THE ROADWAY, INCLUDING SHOULDERS, ARE TO BE PROPERLY BARRICADED ACCORDING TO THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
4. CONSTRUCTION OPERATIONS SHALL BE SUSPENDED DURING WET CONDITIONS, WHEN IN THE CITY, COUNTY, OR STATE'S OPINION, DAMAGE TO THE RIGHT-OF-WAY COULD OCCUR OR WHEN SAFETY TO THE TRAVELING PUBLIC IS AN ISSUE.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



TRAFFIC CONTROL NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

012

**PAVING NOTES:**

1. CONCRETE FOR ALL STREETS SHALL BE IN ACCORDANCE WITH NCTCOG CLASS "C" CONCRETE (3,600 P.S.I. COMPRESSIVE @ 28 DAYS).
2. REINFORCING STEEL SHALL BE DEFORMED BARS NO. 3 ON 18 INCH CENTERS OR NO. 4 BARS ON 24 INCH CENTERS. REINFORCING SHALL BE IN BOTH DIRECTIONS ON CENTER. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM 615, 616 AND 617.
3. ALL REINFORCING STEEL SHALL BE TIED (100%). REINFORCING STEEL SHALL BE SET ON PLASTIC CHAIRS. BAR LAPS BE MINIMUM 30 DIAMETERS.
4. EXPANSION JOINTS SHALL BE SPACED EVERY 200 FEET AND AT ALL INTERSECTIONS. ALLEYS SHALL HAVE A MINIMUM OF TWO EXPANSION JOINTS.
5. SAWED TRANSVERSE DUMMY JOINTS SHALL BE SPACED EVERY 15 OR 1.25 TIMES LONGITUDINAL BUTT JOINT SPACING WHICHEVER IS LESS. SAWING SHALL OCCUR WITHIN 5 TO 12 HOURS AFTER THE POUR INCLUDING SEALING. OTHERWISE THE SECTION SHALL BE REMOVED AND LONGITUDINAL BUTT JOINT CONSTRUCTED.
6. SUBGRADE UNDER PAVEMENTS SHALL BE A MINIMUM OF 7 INCHES OF LIME TREATED SUBGRADE. ONLY HYDRATED LIME SHALL BE UTILIZED. OPTIMUM LIME SHALL BE APPLIED. OPTIMUM LIME CONTENT SHALL BE DETERMINED DURING THE EXCAVATION BY THE USE OF A LIME SERIES TEST. LIME SERIES TEST SHALL BE TAKEN ALONG THE EXCAVATION AT ALL CHANGES IN SOIL AND A MINIMUM OF 300 FEET. LIME SERIES SHALL BE COMPLETED BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY OF FARMERSVILLE.
7. LIME TREATED SUBGRADE SHALL BE COMPACTED TO A DENSITY OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D 698. MOISTURE CONTENT SHALL BE WITHIN -2 TO +4 OF OPTIMUM. DENSITY TEST RESULTS SHALL BE COMPLETED BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY OF FARMERSVILLE. ALL RESULTS SHALL BE PROVIDED TO THE CITY OF FARMERSVILLE.
8. LIME TRIMMINGS ARE NOT ACCEPTABLE FOR ANY USE.
9. ALL FILL SHALL BE COMPACTED BY MECHANICAL METHODS. MAXIMUM LOOSE LIFT FOR COMPACTION SHALL BE 8 INCHES. ALL LIFTS SHALL BE TESTED FOR DENSITY BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY OF FARMERSVILLE. DENSITY REQUIREMENT SHALL BE AS SHOWN ON THE PLANS FOR THE TYPE OF MATERIAL CALLED FOR IN THE PLANS.
10. ALL DISTURBED AREAS OF ROADWAY WORK SHALL HAVE GRASS ESTABLISHED IMMEDIATELY. GRASS SHALL MEET THE REQUIREMENTS OF ITEM 3.8, 3.9, 3.10 & 3.11 OF NCTCOG.
11. ALL AREAS TO BE EXCAVATED OR FILLED SHALL HAVE EROSION CONTROL PLACED PRIOR TO COMMENCING EARTHWORK. EROSION CONTROL DEVICES SHALL BE MAINTAINED THROUGHOUT THE PROJECT IN ACCORDANCE WITH NCTCOG ITEM 3.12.
12. ALL SIDEWALKS SHALL INCLUDE BARRIER FREE RAMPS AT INTERSECTING STREETS, ALLEYS, DRIVEWAYS, ETC. BARRIER FREE RAMPS SHALL MEET CURRENT ADA REQUIREMENTS AND BE APPROVED BY THE TEXAS LICENSING BOARD.
13. SIDEWALKS SHALL BE DOWELED INTO PAVEMENT WHERE IT ABUTS DRIVEWAYS. EXPANSION JOINT MATERIAL SHALL BE USED AT THESE LOCATIONS.
14. NO VEHICLES SHALL BE PERMITTED ON CONCRETE PAVEMENT WITHOUT APPROVAL FROM THE CITY OF FARMERSVILLE. THE CITY OF FARMERSVILLE WILL MAKE DETERMINATION BASED ON CONCRETE BREAK REPORT.
15. CONCRETE MIX DESIGN SHALL BE SUBMITTED FOR REVIEW.
16. ALL PAVING FOR PARKING SHALL BE MIN. 5" THICK 3,600 P.S.I. CONCRETE SUBJECT TO CITY OF FARMERSVILLE ENGINEER APPROVAL.
17. ALL AREAS NOT UNDER PAVING SHALL BE COMPACTED TO A DENSITY OF NOT LESS THAN 92 PERCENT OF THE MAXIMUM DENSITY.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

PAVING NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

013

### LINED CHANNELS

1. CONSTRUCTION JOINT SHOWN IN DETAILS FOR CONVENIENCE ONLY, MONOLITHIC CONSTRUCTION MAY BE USED.
2. ALL VISIBLE SURFACES SHALL BE A TROWEL FINISH.
3. ALL REINFORCING STEEL SHALL BE 3/8" DIAMETER AND SPACED 12" CENTER TO CENTER BOTH WAYS UNLESS OTHERWISE SPECIFIED.
4. IF WOOD FORMS ARE USED WITH CONSTRUCTION JOINT, THEY SHALL BE TWO, 2"x4", AND SHALL NOT BE REMOVED UNTIL CONCRETE ON SLOPES IS READY.
5. ALL CONCRETE IN LINED CHANNEL SHALL BE NCTCOG CLASS "A" (MINIMUM 3,000 P.S.I.) CONCRETE.
6. FLAT BOTTOM TO BE CONSTRUCTED WHEN CHANNEL WIDTH IS LESS THAN 12 FOOT.
7. 3/4" CHAMFER ON ALL CONCRETE CORNERS.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

LINED CHANNEL NOTES

DESIGNED: E.W.D.  
DRAWN: M.K.W. / OBI

DATE: 10-27-16  
REVISION: N/C

014

### **STORM WATER**

1. THE FLOOR OF THE EXCAVATION FOR INLET BOX MUST PROVIDE A FIRM, LEVEL BED FOR THE BASE SECTION TO REST UPON.
2. A MINIMUM OF 6 INCHES OF 1" DIAMETER (MAXIMUM) ROCK OR GRAVEL SHALL BE USED TO PREPARE THE BEDDING TO FINAL GRADE OR IN LIEU OF THIS, AT LEAST 6 INCHES OF 2-SACK CEMENT STABILIZED SAND SHALL BE USED TO PREPARE THE BEDDING TO GRADE. CEMENT STABILIZED-SAND SHALL BE ALLOWED TO SET BY KEEPING HOLE PUMPED DRY.
3. AFTER PIPE HAS BEEN LAID ON PROPER BEDDING, BACKFILLING TO COMMENCE WITH 8" MAXIMUM LOOSE LIFTS MECHANICALLY COMPACTED TO 95% STANDARD PROCTOR UNDER ROADWAY OR 12" MAXIMUM LOOSE LIFT BEHIND CURB. MAXIMUM SIZE ROCK IN BACKFILL SHALL NOT EXCEED 4 INCHES IN DIAMETER.
4. PRECAST INLETS SHALL BE APPROVED BY THE CITY OF FARMERSVILLE.
5. CONCRETE SHALL BE MINIMUM 4,200 P.S.I.
6. LOCKING DEVICE IS REQUIRED ON ALL STORM WATER LIDS.
7. CONCRETE CAST-IN-PLACE INLETS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,200 P.S.I. @ 28 DAYS.
8. STORM DRAIN TILE SHALL BE PLACED IN THE CENTER OF THE INLET, 2 INCHES FROM THE EDGE OF OPENING AS SHOWN IN THE DRAWING. USE PL-200 CONSTRUCTION ADHESIVE FOR APPLICATION. TILES CAN BE ORDERED FROM: CENTERLINE SUPPLY, INC., 425 JESSE STREET, GRAND PRAIRIE, TEXAS 75061-1141. 1-800-321-1731, METRO: 214-647-8300, FAX: 214-641-1221.
9. EXISTING STORM WATER PIPE AND/ OR LATERALS SHALL BE LOCATED PRIOR TO SETTING OF CONSTRUCTING INLET BOXES. IF ADJUSTMENT IN GRADE OF LATERAL IS REQUIRED, A REVISED DESIGN BY THE ENGINEER OF RECORD SHALL BE SUBMITTED TO THE CITY OF FARMERSVILLE FOR APPROVAL.
10. REINFORCED CONCRETE PIPE CLASS III IS APPROVED WITHIN THE CITY OF FARMERSVILLE.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

STORM WATER NOTES

DESIGNED: E.W.D. DATE 10-27-16  
DRAWN: M.K.W. / DBI REVISION: N/C

015

**WASTE WATER:**

1. MANHOLES SHALL BE PRECAST. ALL MANHOLES SHALL BE WATER TIGHT. PRECAST MANHOLES SHALL HAVE JOINTS SEALED WITH NON-SHRINKABLE GROUT. ALL RING AND COVERS SHALL INCLUDE AN INTERNAL CHIMNEY SEAL.
2. ALL PIPE OPENINGS IN MANHOLES SHALL INCLUDE COUPLINGS WITH "O" RING RUBBER GASKETS.
3. STUBOUTS OUT OF MANHOLES SHALL BE FITTED WITH A STOPPER AND CAP. STUBOUTS SHALL BE A MINIMUM OF 5 FEET FROM MANHOLE AND BE SUPPORTED BY A CONCRETE CRADLE.
4. MANHOLES SHALL BE VENTED IN ACCORDANCE WITH TCEQ REQUIREMENTS.
5. ALL SANITARY SEWER PIPE SHALL BE TESTED (NCTCOG ITEM 6.7.2) AFTER CONSTRUCTION. TESTING SHALL INCLUDE PRESSURE TESTING, MANDREL TEST (TNRCC REQUIRED) AND COLOR TV INSPECTION. COLOR TV INSPECTION SHALL BE COMPLETED IN PRESENCE OF CITY OF FARMERSVILLE REPRESENTATIVE AND THE ORIGINAL DATA SHALL BE GIVEN TO THE CITY OF FARMERSVILLE AT THE COMPLETION OF THE INSPECTION.
6. NEW OR REFURBISHED MANHOLES SHALL BE VACUUM TESTED IN THE PRESENCE OF THE CITY OF FARMERSVILLE REPRESENTATIVE.
7. NO END-OF-LINE CLEANOUTS WILL BE ALLOWED. TERMINATE SEWER LINES WITH A MANHOLE.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



Farmersville

**WASTE WATER NOTES**

DESIGNED E.W.D.  
DRAWN M.K.W. / DBI

DATE 10-27-18  
REVISION N/C

016

# CITY OF FARMERSVILLE WATER LINE SPECIFICATIONS

APPLICATION	MATERIAL	DIAMETER	STANDARD	DIMENSION RATIO	PRESSURE RATING	NOTES
Standard Carrier Pipe	PVC	4" to 12"	AWWA Standard C900	DR 18	150 psi	
Standard Carrier Pipe	PVC	14" to 48"	AWWA Standard C905	DR 25	165 psi	
Restrained Joint Carrier Pipe	PVC	4" to 12"	AWWA Standard C900	DR 18	150 psi	Certa-Lok or Eagle Loc 900
Restrained Joint Carrier Pipe	PVC	16"	AWWA Standard C905	DR 25	165 psi	Certa-Lok
Restrained Joint Carrier Pipe, UV Protected and High Impact Strength	Yelomine	4" to 12"	AWWA Standard C900	DR 18	150 psi	Certa-Lok, permanent use joints
State Roadway Crossing Encasement, Open Cut	Steel	4" to 24"	ASTM A252 Grade 2, Wall Thickness Schedule 40 or 0.375" whichever is less	N/A	N/A	
City/County Roadway Crossing Encasement, Open Cut	PVC	14" to 48"	AWWA Standard C905	DR 25	165 psi	
City/County Roadway Crossing Encasement, Open Cut	PVC	4" to 12"	AWWA Standard C900	DR 25	150 psi	
City/County Roadway Crossing Encasement, Open Cut	PVC	2" to 3.5"	ASTM D 2241 I.P.S. - O.D.	DR 21 Schedule 40	160 psi	
State Roadway Bore Encasement	Steel	4" to 24"	ASTM A252 Grade 2, Wall Thickness Schedule 40 or 0.375" whichever is less	N/A	N/A	Dry bore $\geq 8"$ , Minimum wall thickness is 0.25 inch
State Roadway Bore Encasement	Steel	2" to 3"	ASTM A 53 Grade A Schedule 40 Black Pipe with Merchant Coupling (Threaded Ends)	N/A	N/A	
City/County Roadway Bore Encasement	HDPE	4" to 63"	AWWA Standard C906 I.P.S.	DR 11	160 psi	Dry bore $\geq 8"$
City/County Roadway Bore Encasement	PVC	2" to 3"	ASTM D 2241 I.P.S. - O.D.	DR 21 Schedule 40	160 psi	
Railroad Crossing Encasement	Steel	4" to 24"	Use railroad specifications	N/A	N/A	
Creek Crossing Encasement	HDPE	4" to 63"	AWWA Standard C906 I.P.S.	DR 11	160 psi	
Service Line	PE	1" to 3"	AWWA Standard C901	SDR 9	200 psi	

**NOTE:**

1 CARRIER PIPE SHALL BE JOINT RESTRAINED IF ENCASED.

STANDARD CONSTRUCTION DETAILS  
FOR  
CITY OF FARMERSVILLE  
COLLIN COUNTY, TEXAS



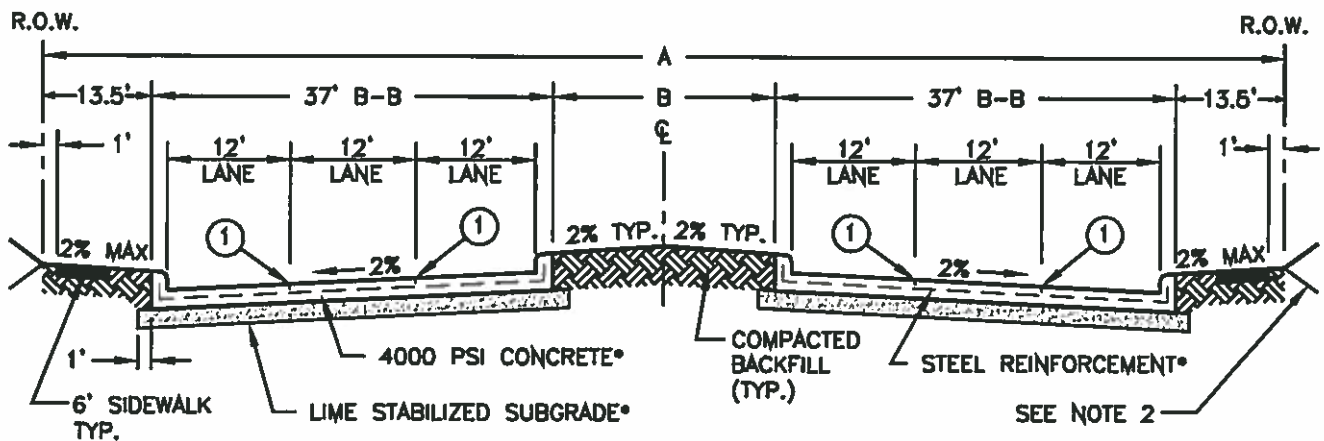
Farmersville

**WATERLINE SPECIFICATIONS**

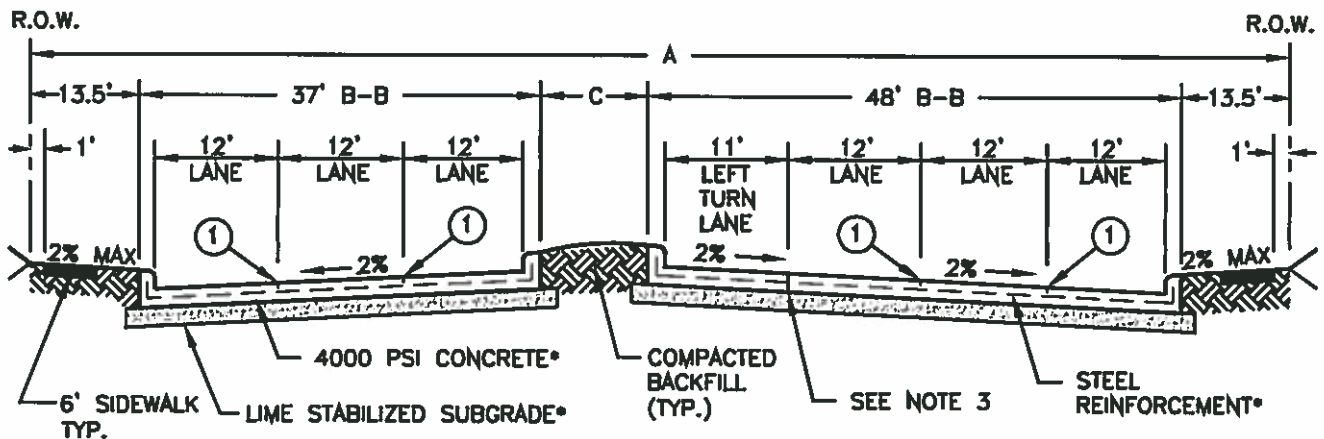
DESIGNED: E.W.D.  
DRAWN: M.K.W. / DBI

DATE: 10-27-16  
REVISION: N/C

**017**



**SIX LANE DIVIDED  
STANDARD SECTION (P6D-M6D)**  
N.T.S.



**LEFT TURN LANE SECTION**  
MID-BLOCK  
N.T.S.

① SAWED LONGITUDINAL CONTRACTION JOINT OR CONSTRUCTION JOINT

ROAD TYPE	R.O.W. @ MID-BLOCK (A)	MEDIAN WIDTH (B)	MEDIAN WIDTH (C)
P6D	120'	19'	8'
M6D	120'	19'	8'

REFERENCE STREET DESIGN MANUAL FOR INTERSECTION LAYOUT INFORMATION

**NOTES:**

1. REINFORCED CURB HEIGHT AND WIDTH SHALL BE 6".
2. SLOPES ADJACENT TO THE R.O.W. SHALL BE NO STEEPER THAN 4:1.
3. KEYWAY JOINT REQ'D FOR NEW ROADWAY CONSTRUCTION. LONGITUDINAL BUTT JOINT REQ'D ON EXISTING SECTION.
4. TOP 4" OF MEDIAN AND PARKWAY BACKFILL SHALL BE TOPSOIL MATERIAL.

\* A GEOTECHNICAL EVALUATION AND DESIGN SHALL BE CONDUCTED TO DETERMINE AN ADEQUATE PAVEMENT SECTION BASED ON A MINIMUM 20 YEAR DESIGN LIFE FOR ALL PAVING PROJECTS. THE MINIMUM ALLOWABLE PAVEMENT DESIGN SHALL BE NO LESS THAN 8"-4000 PSI CONCRETE WITH #4 BARS AT 24" CENTERS ON A 8" LIME STABILIZED SUBGRADE COMPACTED TO 98% STANDARD PROCTOR DENSITY. THE PLASTICITY INDEX SHALL NOT EXCEED 12.

STANDARD CONSTRUCTION DETAILS  
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COLLIN COUNTY, TEXAS



Farmersville