

BIDDING REQUIREMENTS
ADDENDUM NO. 3

May 3rd, 2019

FRANKLIN COUNTY, MISSOURI
PURCHASING DEPARTMENT
400 EAST LOCUST
UNION, MISSOURI 63084

FGM ARCHITECTS INC.
10 SOUTH BROADWAY, SUITE 1150
ST. LOUIS, MISSOURI 63102

TO: PROSPECTIVE BIDDERS

SUBJECT: FRANKLIN COUNTY PUBLIC SAFETY FACILITY
FGM Project No.: 18-2562.01

This addendum forms a part of the Bidding and Contract Documents and modifies the original bidding documents dated March 29th, 2019, Addendum 1 Dated April 12th, 2019 & Addendum 2 Dated April 25th 2019. Acknowledge receipt of this addendum in space provided on Bid Form. Failure to do so may subject bidders to disqualification.

CLARIFICATIONS

1. Concrete floor slab shall be the finished product. Protect floor as required during all phases of construction. Contractor shall coordinate installation of all items at exposed floor locations. Contractor shall provide any temporary cribbing, plates or other materials needed for construction. Damages to floor slab as a result of construction means and methods shall be repaired at the expense of the responsible prime contractor. Prime contractors will be held responsible for damages caused by their subcontractors.
2. Upon review of the bids received on May 9, 2019, at a minimum, the apparent low bidder will be required to participate in a pre-award meeting on May 13, 2019. At this meeting the apparent low bidder will be requested to review the scope of work, site logistics, project schedule, project staffing, potential key subcontractors list, and company profile information (such as work load, financial information, litigation, licenses, etc.).
3. All Prime Contractors will be required to submit to the Construction Manager, their current Change Order Request log on a monthly basis, by the 20th of each month at the latest.
4. All MEPFP Prime Contractors are to haul-off utility spoils unless coordinated with Prime Contractor during construction.
5. Custom metal trim at laundry equipment opening to be furnished and installed by the General Works Contractor and coordinated with the Construction Manager.
6. To clarify, Specification Section 01 77 00 Electronic Closeout Document Management, this specification/process is being bid as an alternate to the General Works package and the price is to include the cost to provide the scope of the Electronic Closeout Document Management of the scopes for ALL of the prime contractors. This alternate may or may not be accepted. As such, all Prime Contractors shall include the standard closeout process in their scopes of work, ie: as-builts, approved submittals, video-recorded owner training sessions, O&M manuals, etc. In the event that the alternate is accepted, all Prime Contractors will still be required to provide the closeout information but also to coordinate with the DRMC and provide to them all approved submittals and as-built drawings.

7. The following is copied for this bidder's convenience from the 2019-A3 Detention & Security Scope of Work that was issued with this bid package for this bidder's reference. Exclusions of the Detention Package that are to be provided under the current bid packages are as follows:
- Installation of detention hollow metal frames and borrow lights.
 - Security caulking
 - Grouting hollow metal
 - Skylight enclosures
 - Finish paint of cell fronts and inside/outside of cell door
 - Evidence pass-thru lockers
 - HVAC Dampers/Louvers.
 - All noted fire ratings.
 - Caulking of security glazing at borrowed lights and doors.
 - Mezzanine walkway, stairs, stair handrails, or walkway handrails/screen wall at mezzanine level modules (see alternates)
 - Supply and/or installation of module sprinkler piping or heads.
 - Installation of plumbing devices (Valves or manifolds)
 - Interim protection of the steel detention modules after installation and during the construction of the project.
 - Protection from the weather.
 - Protection from vandalism and abuse or misuse by the other trades.
 - Final cleaning of the modules including but not limited to glazing, painted surfaces, furniture, and/or equipment.
 - Damage to the modules during or after installation and/or on-site storage including but not limited to damage to the module paint coatings and/or equipment.
 - Damaged or missing installation and/or plumbing and electrical parts.
 - Security sealants needed to fill the gap between the bottom of each module and the module floor.
 - Finish paint of module fronts, module doors (interior and exterior) and cover-plates. • Lower module floor sealers or coatings.
 - Division 26 electrical contractor shall supply and install a complete raceway system to connect modular control cabinets located in rear chase to head end equipment rack in the associated equipment room.
 - The electrical contractor shall be responsible for all 120/208/240 VAC branch circuits including conduit, wiring and connections from power distribution panels through UPS systems, terminal strips and/or receptacles in electronic control panels and/or electronic system devices.
 - Cost to provide and install a complete raceway system. The raceway system shall include but not be limited to conduit, wire troughs and flex conduit.
 - Installation of equipment racks and cabinets, with connections to raceway system.
 - Fiber optic cable patch panels.
 - Fiber "end" termination and testing.
 - Video visitation System, Video arraignment systems, video teleconferencing systems, A/V systems and tele/data systems.
 - UPS systems, by-pass switches or distribution panels
8. Coordination of the Electrical Contractor, General Works Contractor, and Ameren is critical for the relocation of the existing electrical meter, removal of the existing generator/fuel tank, and removal/replacement of the existing Ameren transformer. The anticipated sequence of work for this effort is as follows. This will need to be the first order of business on the project in order to begin mass excavation.
- a. The sequence would start with Ameren getting the poles set so your contractor will know where they need to trench the conduit to.
 - b. Then the Electrical Contractor will need to install the conduit from the pole to the new transformer locations and they will need to set the pads that the transformers will sit on.

- c. Once the pads are set, Ameren can bring out the transformer and set it on the pad. Due to the size and weight of the new transformer for the jail we will need to bring it straight from St. Louis and deliver it on site and unload it directly onto the pad.
 - d. Once the transformer is set, the Electrical Contractor will need to pull in the service conductors and install the new MSB, C.T and P.T cabinets and get them inspected from the City of Union/Franklin County.
 - e. Upon final acceptance from the AHJ, Ameren will get their meter department out to install the new meter so it will be all ready for the switchover from the old service.
 - f. Coordination switchover with Ameren. Schedule with Construction Manager and give client minimum 1 week notice of shut down.
 - g. Anticipated shut down is maximum 4 hours.
 - h. Coordinate with EMA/911 for maintaining power to the Radio Tower during the shutdown.
9. The Woven Rod Security Screen shown in front of Overhead Coiling doors E112C and E116, Shown on S1,H9,J7/A2.3.2, E1,K1/A3.1.1, and A13,A17/A3.3.3 are to be included in the base bid of the General Works package. It is to match the specification section 11 19 90.
10. For Bid Alternates 1-4, the installation of these items can be by local qualified ironworkers and does not have to be by the detention contractor.
11. Bid Alternates 1-4 should NOT be included in the base bid. They should be priced as add alternates to the General Works package.
12. The flooring material at the detention dayroom showers and just outside the showers is included in the DEC package. ALL other poly-urea flooring is to be by the General Works contractor.

SPECIFICATIONS

1. SECTION 09-67-00– EPOXY FLOOR COATING
 - a. Paragraph 2.1, A.6: **ADD** – DESCO COATINGS
 - b. Paragraph 2.1,A.7: **ADD** – MISSOURI TERRAZZO
2. SECTION 09-84-33 – SOUND ABSORBING WALL UNITS
 - a. Paragraph 2.2, A.1.J: **REVISED**– to read "Mounting: Z-Clips with tamper resistant fasteners in OUTDOOR REC. ROOMS mount Bottom of Panel 12'-0 A.F.F."
3. SECTION 21 00 00 – Fire Protection General Conditions
 - a. Paragraph 1.2.B: **REVISE** – Building Code to IBC 2018 and Fire Code to IFC 2018.
4. SECTION 21 05 11 – Clean Agent Extinguishing System
 - a. Paragraph 1.1.A: **CLARIFY** – Specification scope to address two separate clean agent extinguishing systems with different fire alarm/suppression arrangements.
 - b. Paragraph 1.1.C: **CLARIFY** – Clarified description for two separate releasing panels.
 - c. Paragraph 2.3.A,B: **CLARIFY** – Added reference to Specifications 260721 for New Call Center Fire Alarm Control Panel (to also be listed for and used as clean agent releasing panel)
 - d. Paragraph 3.2: **CLARIFY** – Clarified that system control and wiring to apply to Server E203. New Call Center fire alarm system control and wiring is covered under 260721.
5. SECTION 22 00 00 – Plumbing General Conditions
 - a. Paragraph 1.2.B: **REVISE** – International Codes to 2018 versions and ASHRAE 90.1 to 2016.
6. SECTION 220400 – Plumbing Systems
 - a. Paragraph 3.2.D: **ADD** – 17. Wrap all pipe routed though concrete with Polyethylene pipe guard before pour.
7. SECTION 221113 – WATER SYSTEM SPECIFICATIONS:
 - A. **REVISED** – Water Main Specifications from SDR 21 Class 200 PVC to C900 DR 14 PVC.
8. SECTION 23 09 65 – BACnet Direct Digital Temperature Control System

- a. Paragraph 2.1.A.9: **ADD** – “Schneider Electric” to list of approved temperature control manufacturers.
9. SECTION 26 00 00– Basic Electrical Requirements
- a. Paragraph 1.2.B: **REVISE** – Building Code to IBC 2018, NEC to 2017 and IECC to 2018.
10. SECTION 26 07 21 – Fire Alarm Systems - Addressable
- a. Paragraph 1.3.B.4: **CLARIFY** – Fire Marshal requires fire alarm plans to be signed and sealed by fire alarm contractor to obtain a permit. Contractor shall include this in their bid.
 - b. Paragraph 2.1.D: **ADD** – “Fire alarm control panel shall be listed for use with the releasing devices for the clean agent suppression system. Coordinate with fire protection contractor.”
11. SECTION 323113 – CHAIN LINK FENCES AND GATES:
- a. **REVISED** – Chain Link Fence and Gate from 2" mesh to 1" mesh

DRAWINGS VOL. 1 OF 2

1. SHEET C2 – OVERALL SITE PLAN:
- A. **REMOVED** – Generator Pad and bollards south of communication building.
 - B. **REVISED** – Generator Pad, Transformer Pad, and bollard location at north side of building to match Electrical Site Plan.
2. C3 – GRADING PLAN:
- A. **REVISED** – Downspout collector and drain tile connection at southeast corner of addition.
3. C4 – UTILITY PLAN:
- A. **REVISED** – Water Main from SDR 21 Class 200 PVC to C900 DR 14 PVC.
 - B. **REMOVED** – Generator Pad south of communication building.
 - C. **REVISED** – Generator Pad, Transformer Pad, and bollard location at north side of building to match Electrical Site Plan.
4. C10 – STORM SEWER LINE #6 & #7:
- A. **REVISED** – Downspout collector connection at southeast corner of addition.
5. D2 – DETAIL SHEET:
- A. **REMOVED** – Water Main pipe classification from all details.
 - B. **ADDED** – Location of Rolling Gate Detail.
 - C. **REVISED** – Chain Link Fences and Gates will have 1" mesh.
6. SHEET A1.1.1 FIRST FLOOR NOTATION PLAN – AREA ‘A’
- A. **REVISE** – Keynote A31 shall be revised to read “Existing windows to remain. Provide 3/16" thick A60 Galvanized Steel plate to the exterior window frame. Contractor to paint and prime steel plate to match adjacent existing veneer color. Contractor to field verify existing conditions of windows for new dimensions needed for new plate to be welded to the exterior frame of window. Provide continuous sealant joint around window. Contractor to take care in preserving existing glazing system to remain during installation.
 - B. **ADD** – Keynote A31 shall apply to the existing windows in A142, A143, A144, A146, A147, A202, A203, A204, A206, A207, A212, A213, A214, A216, A217 in addition to the locations previously identified on the plans.
7. SHEET A1.1.23 FIRST FLOOR EQUIPMENT PLAN – AREA ‘D’
- A. **REVISE** – OMIT EQ-11 in its entirety.

12. SHEET A2.3.0 DOOR AND FRAME SCHEDULE TYPES AND NOTES
- C. **REVISE** – Doors D112A, D121, D123.1, D125, D126, E103B, E105 Door Material shall be revised to be HM in lieu of SHM.
 - D. **REVISE** – Doors D123.1, D125, D126, E103B, E105 Door Frame Material shall be revised to be HM in lieu of SHM.
 - E. **REVISE** – Door E102 Door Frame and Door Material Shall be revised to SHM in lieu of HM. This will be apart of the BP-2019-A3 Detention and Security Scope.
 - F. **REVISE** – Door 126 shall be revised to Door Leaf Type (F) in lieu of V.FP.
 - G. **REVISE** – Door D121 shall be revised to Door Lead Type (N) in lieu of V.FP.
13. SHEET A1.2.2 ENLARGED ROOF PLAN AREA 'D'
- A. **ADD** – Supply additional Roof Access Ladder SIM to Detail H1/A1.2.5 from Lower roof of Medical intake and the Adjacent Sally port Roof. Provide 4'-0" of Walk pads at both the upper landing and lower landing of the ladder on adjacent roofs.
14. SHEET A5.1.2 ENLARGED PLANS AND INTERIOR ELEVATIONS
- A. **CLARIFY** – Detail O8 Keynote E1 shall refer to Signage type 8.A, 8.B/A8.5.1
 - B. **CLARIFY** – Detail M17 – Graphic logo shall refer to Signage type 9.A/A8.5.1
15. SHEET A8.1.0 OVERALL FIRST FLOOR FINISH PLAN
- A. **ADD** – General note to read "Provide 3/8" expandable joint filler between concrete slab and CMU walls with security sealant provided at joint for tight seal. This condition is to be provided at all CMU walls below slab in Detention Areas. See Specification Section 07-92-00.
16. SHEET A8.5.1 INTERIOR SIGNAGE
- C. **ADD** – Addition of (6) Address Signs that shall read "1 Bruns Drive" in 6" tall Letters. Location and Final Address text to be Determined and provided by Architect. Signage shall match Type 11 Dimensional Letters.
 - D. **ADD** – Addition of (1) Code Required Signage that shall read "FDC" in Reflective Red Text and White Background. Text Shall be 6" Tall, Location and Final text to be Determined by Fire Inspector. Refer to Accessible Parking Sign Detail (Grass-Areas)/ D1 for similar detail.
17. SHEET A8.5.5 INTERIOR SIGNAGE PLAN – AREA 'A'
- A. **ADD** – Addition of interior signage types 'L' at rooms A126, A109.
 - B. **REVISE** – Signage at rooms A108 and A102 shall be type 'I' in lieu of J.2.

DRAWINGS VOL. 2 OF 2

1. SHEET FPD1.1.2
- H. **ADD** – Existing fire department connection to be demolished and the exterior wall penetration is to be patched and repaired.
2. SHEET M0.0.2
- A. **REVISE** – ERU schedule revised to energy wheel unit.
 - B. **CLARIFY** – Denlar hood model # clarified.
3. SHEET E0.0.3
- A. **REVISE** – Keyed Note 15 to add "Jail generator pad shall be approximately 328" x 110" x 8" thick and 12" larger in overall length and width than generator set enclosure with tank. Provide isolation joint with 3/4" expansion strip. Top of pad to be 2" higher than surrounding concrete surface. Refer to concrete paving section on D1 (Civil). 911/Dispatch generator pad shall be approximately 136" x 44" x 8" thick and 12" larger in overall length and width than fuel tank. Refer to isolation pad detail with isolation joint detail 10/S1.1.5."
4. SHEET E2.1.4
- A. **ADD** – A Wireless Access Point (WAP) and duplex receptacle in room E103. Connect to branch circuit LI-38. WAP shall be on ceiling and receptacle shall be on east wall.

5. SHEET E2.1.5
 - A. **REVISE** – The two (2) switched duplex receptacles in each dayroom to Cat 6 data drops for powering PoE kiosks.
 - B. **ADD** – A Wireless Access Point (WAP) and duplex receptacle in room E101. Connect to branch circuit LJ-43. WAP shall be on ceiling and receptacle shall be on west wall.

6. SHEET P1.0.5
 - A. **ADJUST** – Move sewer at east cell block to 18" away from footing. Angle vertical pipe located in maintenance access behind cells shall be 12"max from back wall of cell. Coordinate pipe route through thickened slab with detail on structural drawings.
 - B. **ADJUST** – North sewer invert from 645.69' to 644.14' and encase in lean concrete.

7. SHEET P1.2.5
 - C. **CLARIFY** – All vertical pipe located in maintenance access behind cells shall be 12"max from back wall of cell. Coordinate pipe route through thickened slab with detail on structural drawings.

Respectfully,



Joshua N. Mandell, AIA, NCARB, LEED® AP BD+C

This addendum consists of 28 pages

Attachments: 22113 Water System Specifications, 32113 – Chain Link Fence and Gates

Drawings: C2 Overall Site Plan, C3 Grading Plan, C4 Utility Plan, C10 Storm Sewer Line #6 & #7, D2 Detail Sheet, FPD1.1.2 Fire Protection Demo Plan – Area 'B', M0.0.2 Mechanical Schedules.

SECTION 323113 - CHAIN LINK FENCES AND GATES**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes
1. Chain link fences and gates associated with sitework.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
1. ASTM A 392 - Zinc-Coated Steel Chain-Link Fence Fabric
 2. ASTM C 94 - Ready-Mixed Concrete
- B. Chain Link Fence Manufacturers Institute (CLFMI) latest edition Product Manual

1.3 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.4 QUALITY ASSURANCE

- A. Chain link fabric, posts, and components, and installation shall conform to the requirements of the CLFMI Product Manual unless otherwise shown or specified.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Steel Posts: Type I or II or roll formed "C" Section steel conforming to CLFMI and as specified hereinafter.
- B. Fabric: No. 9 gage (0.148 nominal) galvanized steel wire in 1 inch mesh; ASTM A 392, top and bottom selvages knuckled, height as shown. Furnish 1-piece fabric widths.
- C. End, Corner, and Pull Posts: Galvanized steel, minimum sizes and weights as follows:
1. Up to 6'-0" Fabric height: 3-inch OD pipe, 3.65-pounds per linear foot, or 3.5-inch x 3.5-inch roll formed section, 4.85-pounds per linear foot.
 2. Over 6'-0" Fabric Height: 4-inch OD pipe, 5.79-pounds per linear foot, Or 3.5-inch x 3.5 inch roll-formed section, 4.85-pounds per linear foot.
- D. Line Posts: Galvanized steel, minimum sizes and weights as follows:
1. Up to 6'-0" Fabric Height: 1.90-inch OD steel pipe, 2.70-ounds per linear foot or 1.875-inch x 1.625-inch "C"-section, 2.28 -pounds per linear foot.
 2. Over 6'-0" Fabric Height: 2.375-inch OD steel pipe, 3.65-pounds per linear foot or 2.25-inch x 1.875-inch H-section, 2.64 pounds per linear foot.
- E. Gate Posts: Galvanized steel posts for supporting single gate leaf or 1 leaf of double gate installation, for nominal gate widths as follows:
1. Up to 6'-0": 2.875-inch OD pipe, 5.79-pounds per linear foot, or 3.5-inch x 3.5-inch roll-formed section, 4.85-pounds per linear foot.
 2. 6'-0" to 13'-0": 4.00 inch OD pipe, 9.11-pounds per linear foot.

- F. Top Rail: 1.66-inch OD pipe, 2.27-pounds per linear foot or 1.625-inch x 1.25-inch roll-formed sections, 1.35-pounds per linear foot; galvanized steel.
 - 1. Manufacturer's longest lengths.
 - 2. Couplings: Expansion type, approximately 6 inches long.
 - 3. Attaching Devices: Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - 4. Fence between backstop and dugouts shall have bottom and mid rail with same properties as top rail.
- G. Sleeves: Galvanized steel pipe not less than 6-inches long with inside diameter not less than $\frac{1}{2}$ inch greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than 1 inch greater than outside diameter of sleeve.
- H. Tension Wire: 7 gage galvanized steel conforming to CLFMI, Marcellled, located at bottom of fabric.
- I. Wire Ties: 11 gauge galvanized steel.
- J. Post Brace Assembly: Manufacturer's standard adjustable brace at end of gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375-inch diameter rod and adjustable tightener.
- K. Post Tops: Galvanized steel, weather tight closure cap. Furnish caps with openings to permit passage of top rail.
- L. Stretcher Bars: Galvanized steel, 1 piece lengths equal to full height of fabric, with minimum cross-section of 3/16-inch x 3/4-inch. Provide one stretch bar for each gate and end post, and two for each corner and pull post.
- M. Stretch Bar Bands: Manufacturer's standard
- N. Gate Cross-bracing: 3/8-inch diameter galvanized steel adjustable length truss rods.
- O. Cast-In-Place Concrete: ASTM C94, mix design as follows:
 - 1. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following:
 - a. Compressive Strength: 2,500 psi, minimum at 28 days, unless otherwise indicated on Construction Drawings.
 - b. Slump Range: 1-3 inches at time of placement
 - c. Air Entrainment: 5 to 8 percent
- P. Water: Clean
- Q. Rolling Gate Hardware: Gate to be installed per manufacturers gate installation instructions. Gate shall be installed in compliance with ASTM F2200.
- R. Non-shrink, non-metallic grout: pre-mixed factory-packaged, non-corrosive, non-staining, non-gascoes, exterior grout complying with ASTM C1107

2.2 GATE FABRICATION

- A. Fabricate rolling gate perimeter frames of 1.90-inch OD pipe, galvanized steel. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8'-0" apart.
- B. Assemble gate frames by welding or special fittings and rivets, for rigid connections. Install same fabric as for fence with stretcher bars at vertical edges. Install diagonal cross-bracing on gates as required ensuring rigid frame without sag or twist. Bars may be used at top and bottom edges. Attach stretchers to gate frame at 15 inches o.c. maximum.
- C. Attach hardware to provide security against removal or breakage.

2.3 FINISH

- A. Fabric Finish: Galvanized, ASTM A 392, Class I, with not less than 1.2 ounces of zinc per square foot of surface area.
- B. Framing: Galvanized steel, ASTM A 120 or A 123, with not less than 1.8 ounces of zinc per square foot of surface area.
- C. Hardware and Accessories: Galvanized, ASTM A 153 with zinc weights in accordance with Table 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install chain link fence in accordance with CLFMI Product Manual unless otherwise specified herein.
- B. Comply with recommended procedures and instructions of fencing manufacturer. Provide secure, aligned installation with line posts spaced at 10'-0" o.c. maximum.
- C. Methods for Setting Posts:
 - 1. Grade-Set Posts:
 - a. Drill or hand excavate to a depth approximately 3 inches lower than post bottom. Set post bottom not less than 36 inches below finish grade.
 - b. Excavate each post hole to 12 inch diameter, or not less than four times diameter of post.
 - c. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Extend concrete footing 2-inches above grade and trowel crown to shed water.
 - d. Post shall be set plumb within 1/4" in 10 feet.
 - 2. Sleeve Set Posts: Anchor posts by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.
- D. Top Rails: Run rail continuously, bending to form radius for curved runs. Provide expansion couplings as recommended by manufacturer.
- E. Center Rails: Provide center rails where indicated. Install in 1 piece between posts and flush with post on fabric side, using special offset fittings where necessary.
- F. Brace Assemblies: Install braces so posts are plumb when diagonal rods are under proper tension.
- G. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gauge galvanized wire. Fasten fabric to tension wire using 11 gauge galvanized steel hog rings spaced 24-inches o.c.
- H. Fabric: Leave approximately 2 inches between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- I. Stretcher Bars: Secure at end, corner, pull, and gateposts by threading through or clamping to fabric at 4 inches o.c. and secure to posts with metal bands spaced at 15 inches o.c.
- J. Tie Wires:
 - 1. Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly when ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
 - 2. Tie fabric to line posts with wire ties spaced 12 inches o.c. Tie fabric to rails and braces with wire ties spaced 24 inches o.c. Tie fabric to tension wires with hog rings spaced 24-inches o.c.
 - 3. Manufacturer's standard procedure will be accepted if of equal strength and durability.

- K. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- L. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubrication.
- M. Repair coatings damaged in the field with methods and techniques as recommended by the manufacturer.

END OF SECTION 323113

SECTION 221113 – WATER SYSTEM SPECIFICATIONS**SECTION 1 – WATER DISTRIBUTION SYSTEM MATERIALS****ARTICLE 1 - GENERAL**

Materials for use at any location in the water distribution system (extensions or existing) shall meet the requirements as set forth in the following Articles under this Section.

ARTICLE 2 – PIPE, PIPE JOINTS AND FITTINGS

2.1 **Ductile Iron Pipe, Joints & Fittings:** Pipe for use under this heading shall consist of durable, solid, ductile iron materials with the matrix being predominately ferrite. This material shall meet the following minimum physical strength requirements of: 60,000 psi, tensile, 42,000 psi, yield, and ten (10) percent maximum elongation. Each piece of pipe shall have the: weight, thickness, class manufacturer's mark, the year of manufacture, and the letters DJ or word "DUCTILE" clearly stamped on the pipe. The pipe materials and construction shall be in accordance with all the requirements of A.S.A. Standard A21.51 (A.W.W.A. C-151). Minimum thickness class shall be Class 52 (Class 53 for flanged pipe). The pipe may be furnished with mechanical, push on, or flange joint ends as required.

- A. **Mechanical Joint Pipe & Fittings:** Pipe and fittings of this joint type shall be furnished complete with all glands, gaskets, tee head bolts, hex nuts, etc., all properly sized and manufactured for the required pipe and fitting sizes. All fittings and bends shall be constructed of ductile iron. Materials for this service shall consist of durable, solid, ductile iron meeting the minimum physical requirements of 18,000 psi. tensile strength of 40,000 psi. modulus of rupture. Fittings and bend items shall be designed and tested to permit a minimum working pressure of 250 psi. prior to being shipped from the factory. All mechanical joint fittings, bends, and joint accessory materials shall conform to A.S.A. Standard A21.10 and A21.11.
- B. **Slip Joint Pipe & Fittings:** Slip joint pipe shall be made of ductile iron as previously specified. The plain end of the pipe shall be tapered to permit easy assembly. The pipe joint gasket shall meet all applicable requirements of A.S.A. Standard A21.10 with joints in accordance with Section 11-2.3 of A.S.A. Standard A21.11. Fittings and bends for use with slip joint piping shall be mechanical joint as previously specified.
- C. **Flanged Pipe & Fittings:** Pipe for use with flanged ends shall be ductile iron as previously specified. Threads for the screwed-on flanges shall be designed in accordance with A.S.A. Standard B2.1 Flanges for use shall be faced and drilled in accordance with A.S.A. Standard B16.1, 125 lb. All joint and joint materials shall be designed and tested for a minimum working pressure of 250 psi. Flanged branch fittings and bends shall meet or exceed the pipe and joint materials requirements. The flange joint bolt circle and drilled holes shall match those of A.S.A. Standard B16.1, 125 lb. All pipe and fittings shall be furnished with the properly sized; bolts, nuts, and best quality, 1/8-inch thick rubber gaskets.

The pipe and fittings shall be cement-lined and seal-coated in conformance with A.S.A. Standard A21.4 (A.W.W.A. C-104).

2.2 **Rigid Plastic Pipe, Joints & Fittings** – Pipe for use under this heading shall be approved and accepted by Underwriter' Laboratories, Inc.

- A. **C900 PVC WATER MAINS (4-inch and larger).** Water mains shall conform to AWWA C900 DR 14. Pipe must bear the seal of approval of the National Sanitation Foundation. Net laying lengths must be 20 feet. Joints shall be integral bell position joints with single rubber gasket, making a pressure tight seal, as listed in the C900 Standard.
- B. **FITTINGS.** Mechanical joint and or flanged ductile iron fittings for PVC pipe shall be used and shall meet the requirements of ANSI A21.11 (AWWA C111). Fittings shall include appropriate transition gaskets.

2.3 **Restrained Joint PVC Pipe**

- A. **Restrained joint PVC pipe** shall meet the performance requirements of AWWA C900-16. The PVC compound shall meet cell classification 12454 per ASTM D1784. All joints shall meet the requirements

of ASTM D3139. O-rings shall meet the requirements of ASTM F477 "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.)

- B. Restrained joint PVC shall be installed using a "permanent" joint system. Joint system shall provide a noncorrosive restrained joint by using machined grooves on the pipe and in the coupling which, when aligned, allow a spline to be inserted locking the pipe and coupling together. Provide an o-ring in the coupling to create a hydraulic seal.

- 2.4 Copper Pipe & Fittings: Copper pipe for all underground use as service or main lines, shall be "Type K". All copper pipe produced for this service shall be in accordance with A.W.W.A. Specifications 75-CR. Fittings for use with the copper pipe material shall be constructed of brass or bronze, of the joint type as required for the specific connections and are subject to district approval.

ARTICLE 3 – VALVES AND VALVE BOXES

3.1 Gate Valves:

- A. All gate valves shall be non-rising stem, ductile iron body and wedge, bronze trim and stem, resilient seat gate valves conforming to AWWA C515, unless otherwise indicated. The disc shall have a resilient rubber seat ring mounted securely with stainless steel screws. All internal parts shall be epoxy coated. The valve stem seal shall be double "O"-ring and shall contain an anti-friction washer. The valve shall be as supplied by Mueller, Clow, American or approved equal.
- B. Valve ends shall be compatible with the pipe in which they are installed. Tapping valves shall be flanged by mechanical joint and shall be compatible with the specified tapping sleeve.
- C. All valves shall open left (counterclockwise) and have an operating nut capable of being turned by a standard gate valve key for buried valves and a handwheel for exposed valves.
- D. Each buried valve located within a paved area shall have a cast-iron (bituminous coated) valve box. Valve box shall be Tyler Pipe 564-S or approved equal.
- E. Each buried valve, which is not located within pavement, shall have a valve box consisting of a length of six inch PVC pipe topped with a Clay and Bailey Model 2194 cast iron valve box cover with a carsonite glass fiber/resin reinforced composite utility stake with the words "Water Valve". The utility stake shall be "white" in color with "blue" lettering.

ARTICLE 4 – CONCRETE FOR THRUST BLOCKING AND PIPE ENCASEMENT

Concrete to be used for thrust blocking with various bends, tees, valves, fire hydrants, etc. shall consist of ingredients designed to produce a mixture having a 3,500 psi. compressive strength of 28 days curing item. The mix shall be a "dry" as possible using only sufficient water to permit mixing and placement. Excessive water will not be permitted. Cement for use shall be the "high early" type to provide initial set as soon as possible. Concrete may be placed and covered with earth fill to prevent freezing during periods of cold weather. However, frozen ingredients will not be permitted for use. All concrete used and placed for this purpose shall be given at least three (3) days curing time before being placed under stress. Installation shall be in strict accordance with the applicable Articles under the following Section of these specifications.

Concrete for pipe encasement shall be of similar mix and design. Placement of the concrete shall be performed in such a manner so as to insure provision of a bed or cradle under the entire pipe length.

Where joints are to be encased, the piping shall be tested prior to concrete placement to maintain a pressure 50 percent greater than normal working pressure for a period of 4 hours. The Contractor shall provide all necessary equipment for conducting the pressure test as directed by the owner. All necessary precautions shall be taken to prevent flotation of the piping during or following placement of the encasement materials.

ARTICLE 5 – PIPE BEDDING

Materials to be used for this purpose shall consist of fine, clean, durable particles of crushed stone. Crushed stone used for this purpose shall consist of materials passing a 1-inch sieve to dust.

ARTICLE 6 – WATER MAIN TRACER TAPE

Water main tracer tape shall be installed with all water main. The materials to be installed for this purpose shall consist of three (3) inch wide tape made of bonded layer plastic with a metallic foil core. Tape splices shall be knotted to prevent tensile pressure on the splice. The material to be used for this service shall be "Terra Tape D" as manufactured by the Griffolyn Company of Houston, Texas, or approved equal. The metallic tape shall be colored to contrast with the soil and shall bear an imprint identifying the line below, such as, "Caution, Water Main Buried Below".

Installation of the tracer tape shall be in accordance with applicable Articles of these specifications.

ARTICLE 7 – WATER MAIN LOCATOR WIRE

Water main locator wire shall be installed with all water main, fittings, and valve installation. The material to be installed for this purpose shall consist of standard electric service wire, a single No. 12 U.L. approved copper wire of the solid type with insulation for 600 volts. Insulated wire for this service shall be provided in standard rolls of not less than five hundred (500) foot lengths.

- 7.1 Splices: Splices shall only be allowed where accessible. Buried splices will not be allowed.
- 7.2 Wire Contact: In order to make use of the wire for water main location purposes, a splice point shall be placed adjacent to a valve box location. The wire shall be brought to the ground surface at these locations so a power source can be connected. The wire shall run outside up along side the valve box, then through a hole into the valve box 6-inches below ground level. The splice connector shall be left exposed at the top of the valve box at the wire contact locations. Wire contact points shall be provided at not more than 500-foot intervals. Wire shall also be run to allow for the location of water services. Wire shall be installed with service line from main to meter.

Water main locator wire installation shall be in accordance with applicable Articles of these specifications.

Prior to final acceptance by Owner, Contractor shall demonstrate that the locator wire works to the satisfaction of the Owner and/or his representative.

ARTICLE 8 – CONNECTION TO PRESENT SYSTEM

Materials to be used for connections to the present water distribution system shall be in accordance with the preceding Articles as applicable, under this Section of these specifications. Installation, testing and sterilization of all items shall be in strict accordance with the following Section of these specifications. Under all circumstances, extreme care must be exercised when connecting to the present system. Foreign materials of whatever nature, must not be permitted to enter the system. All direct connection fittings and valves shall be thoroughly rinsed or washed with a chlorine solution just prior to installation and connection. The chlorine solution to be used shall be mixed as stated in the following Section of the specifications.

If at all possible hot taps should be used to prevent system shut down.

Tapping sleeves for water lines shall be Smith-Blair Model 665, with stainless steel full circumference band and stainless steel flanged outlet as manufactured by the Smith-Blair Company or approved equal.

Tapping valves for water lines shall be Mueller flanged to mechanical joint Model T-2360-16, non-rising stem, resilient wedge seat, tapping valves or approved equal. Each valve shall include the required Mueller transition glands (A-3999). Said valves shall be of the size required in the approved plans. All valves shall be manufactured in accordance with AWWA Standards C-515.

The Contractor shall notify the owner when system shutdown is required so that proper notification to those affected by the shutdown can be provided. Where system segment shutdown is required, the actual shutdown is not to be done until all connection materials, equipment, and personnel are at the site, and the existing system point of connection has been exposed, thoroughly cleaned, and prepared for immediate installation of the connection materials. All personnel shall be thoroughly instructed as to the procedure to be followed and ready for work. All connections are then to be made in an efficient manner requiring the least amount of time and maximum amount of care.

ARTICLE 9 – ROAD CROSSING MATERIALS

NOT USED

ARTICLE 10 – FIRE HYDRANTS

Fire and flush hydrants permitted for use on all water system mains shall be the Mueller "Centurion", Kennedy Model No. K81D, or approved equal unless otherwise specified on drawings. Each hydrant shall be of the traffic model type and manufactured to withstand a working pressure of 150 psi. in full compliance with the A.W.W.A. standard specifications C-502 of the latest revision. Three-way hydrants shall have two (2) hose nozzle connections and one (1) pumper nozzle. Three-way hydrants shall be the Mueller Model A-423 or approved equal. All hydrants shall have 5 ¼ -inch valve openings for mechanical joint connection to minimum six (6) inch water main unless otherwise noted. All hydrants shall be "red" in color.

- 10.1 Auxiliary Valves: Fire hydrants are to be installed with auxiliary valves. Valves to be used for this purpose shall meet the requirements as stated in these specifications, and shall be sized as detailed on the approved plans. If the auxiliary valve is not directly connected to the main tee branch and hydrant, anchor couplings shall be used to secure the connection. Each valve shall be furnished with a valve box, lid and all joint accessories as required.

All fire hydrants and auxiliary valves shall be furnished and installed in accordance with the plan details, the detail notations, and applicable Articles of these specifications.

ARTICLE 11 – POLYETHYLENE ENCASUREMENT FOR DUCTILE IRON PIPE

This Article covers materials for polyethylene encasement to be applied to underground installations of ductile iron pipe, fittings, valves, and other appurtenances.

Polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of A.S.T.M. Standard Specifications D-1248-78 for Polyethylene Plastics Molding and Extrusion Materials:

- 11.1 Raw material used to manufacture polyethylene film:

Type: 1
 Class: A (natural) or B (black)
 Grade: E-1
 Flow rate: 0.4 maximum
 Dielectric strength: Volume resistivity, minimum $\text{ohm-cm}^3=10^{15}$

- 11.2 Polyethylene film:

Tensile strength: 1200 psi (8.3 Mpa) minimum
 Elongation: 300 percent minimum
 Dielectric strength: 800 V/mil. (31.5 um) thickness minimum

- 11.3 Thickness:

Polyethylene film shall have a minimum thickness of 0.008-in. (8 mil. or 200 um). The minus tolerance on thickness shall not exceed 10 percent of the nominal thickness.

- 11.4: Tube size or sheet width: Tube size or sheet width for each pipe diameter shall be as listed below.

Nominal Pipe Diameter (in.)	Minimum Polyethylene Width	
	Flat Tube	Sheet
4	16 (41)	32 (82)
6	20 (51)	40 (102)
8	24 (61)	48 (122)
10	27 (69)	54 (137)
12	30 (76)	60 (152)
14	34 (86)	68 (172)
16	37 (94)	74 (188)
24	41 (104)	82 (208)

SECTION 2 – WATER DISTRIBUTION SYSTEM INSTALLATION

ARTICLE 1 - GENERAL

The work covered by this Section of the specifications, shall consist of furnishing all previously specified materials with all necessary equipment, machinery, tools, and labor, and performing all work required to install and/or construct the water system extensions or changes with all connections and appurtenances as required; in accordance with all directives or modifications and these specifications, all to be complete, in place, accepted and ready for use.

ARTICLE 2 -- SITE AND WORK PREPARATION

Prior to starting the various water main route installations, connections, and/or changes as required, the Contractor shall notify the Owner a minimum of forty-eight (48) hours prior to the start of construction. After so doing, the Contractor shall clear the route of all trees, shrubs, and other objects or materials, which may directly interfere with the construction. All other utility companies or organizations shall be notified for location of their respective facilities prior to starting any work. All trees, shrubs, bushes, etc., which will not interfere with the construction shall be protected from damage. Work preparations shall include having all necessary material items, equipment, and an adequate labor force at the site in working condition, and completely instructed and prepared to perform the work to completion as required.

ARTICLE 3 - DRAINAGE

The Contractor shall control the grading in the vicinity of the pipe trenches so that the surface of the ground will be properly sloped to prevent water from running into the excavated areas. Any water or other liquid wastes which accumulate in the excavated areas shall be promptly removed.

ARTICLE 4 -- TRENCH EXCAVATION

- 4.1: General: The Contractor shall perform all excavation necessary for or incidental to the proper installation and construction of the work shown and detailed on the drawings, or as described by the Owner. Excavation shall include the removal of trees, shrubs, paving, and undesirable materials. Excavation shall be done along the lines as indicated on the plans and shall be continuous without improper bends or kinks. Trenches shall be of sufficient width to provide a working space on each side of the materials being installed. During excavation, materials to be used for backfill shall be stock piled, in an orderly manner, a sufficient distance from the edge of the excavation to avoid overloading which might cause slides or cave-ins, and in such manner so as not to interfere with public travel whenever possible. The Contractor shall provide all barricades, lights, temporary crossing, warning signs, etc., that may be necessary to protect the public and the work from injury or damage.
- 4.2: Depth: Trenches for water main and appurtenances shall be excavated to a sufficient depth to obtain a minimum of forty-two (42) inches of cover over the top of the pipe, except as otherwise required to make taps and connections to existing mains. All excavation shall be made so as to provide a continuous bearing for the barrel of the pipe. Holes of sufficient size shall be excavated to permit ample room for making joints. The bottom of trenches shall be free from rocks, clods, debris, and all other unsuitable materials, and shall consist of properly shaped earth, or tamped granular material as specified in the previous Section of these specifications. The Contractor shall take care not to excavate below grade except to remove undesirable material, or as directed by the Owner.
- 4.3: Rock Excavation: Where rock is encountered in the trenching operation, the excavation shall be carried to a depth of four (4) inches below the pipe bottom depth assuming proper cover as specified under the preceding paragraph.

Excess materials resulting from the rock excavations shall be spread over or adjacent to the trench area where acceptable, or shall be picked up and removed from the site for disposal at a suitable location. It may also be necessary to place a thin layer of earth over the rock backfill areas. This may be hauled in from a stockpile location. This earth layer must be of sufficient depth to support the growth of vegetation. All loose rock and debris shall be thoroughly cleaned up and disposed of. The excavated areas shall be left in a neat, clean, acceptable condition.

ARTICLE 5 -- HANDLING OF MATERIALS

All pipe, fittings, valves, and other accessories, shall be unloaded, stored re-handled, and installed by methods in such a manner as to insure their final location in a sound and undamaged condition, conforming in all respects to specified requirements. Under no circumstances shall pipe, fittings, valves, or other accessories, be dropped to the ground, or otherwise subjected to possible damage from impact or shock. Such materials shall be loaded by lifting with machine or hoist, or by skidding. Pipe handled on skidways shall not be skidded or rolled against other pipe.

Under all circumstances, all materials for use shall be handled in a workman-like manner, using the necessary manpower and equipment to perform the task in accordance with the manufacturer's recommendations.

- 5:1 Protection of Materials, Coatings, and/or Linings: All materials shall be handled in such manner that neither the coatings nor the linings are damaged. Hooks for insertion into the ends of the pipes, fittings, valves, and other accessories, shall have broad, well-padded contact surfaces, and shall be of such design and size that uniform support will be provided. Under most circumstances, damage to outside coatings are repairable, and the necessary repairs shall be properly made prior to installation. Damage to interior linings is not considered repairable, and therefore, the damaged items shall be replaced at the Contractor's expense.
- 5:2: Handling Materials Into Trench: Proper equipment, tools, facilities, and methods satisfactory to the Owner, shall be provided and used by the Contractor for the safe handling, of all materials. Fittings, valves, and other accessories shall be carefully lowered into the trench or excavation, piece by piece to protect coatings and linings. Under no circumstances shall any materials be dropped or dumped into the trench.

ARTICLE 6 – PIPE LAYING

Laying of the pipe shall commence immediately after the excavation is started, and the Contractor shall use every possible means to keep the completed pipe installation closely behind the trenching. The Owner may stop the trenching if it appears that the trench is open too far in advance of the pipe laying operation. The Contractor may lay pipe in the best manner adapted to securing speed and good results.

- 6:1 Pipe Joints: The Contractor shall have the necessary equipment and tools available for making the joints for the specific materials being used. In accordance with applicable items under the previous Section of these specifications, acceptable joints for the various pipeline and fitting materials are listed as follows:

Cast or Ductile Iron Pipe: Ring or fluid-tite joint with mechanical joint for fittings, valves, and adapters.

P.V.C. Pipe: Ring-tite joint with necessary transition gaskets for connection to mechanical joint fittings, valves, and adapters.

- A. Pipe Joint Adapters: The Contractor shall provide the necessary adapters for all connection changes from ring-tite, slip, or mechanical joint to flanged joint as and where required.

All pipe spigot ends shall be visibly marked to fully "make-up" the joint. With exception of field cut pipe, all "make-up" marks shall be placed on the pipe at the factory. Field cut pipe shall be marked for full joint depth prior to insertion.

- 6:2: Pipe Cutting: Cutting of pipe for closure pieces with installation of valves or fittings, or for any other reason, shall be done in a neat and workman-like manner without damage to the pipe or linings. The cutting operation shall leave a smooth cut end at right angles to the longitudinal axis of the pipe. The exterior surface of the cut end shall be beveled, and the interior surface shall be reamed or filed free of all rough edges and protrusions. All pipe cutting shall be done by saw or mechanical pipe cutters of an approved type. Upon completion of the cutting and trimming operation, the pipe end or ends shall be marked for "make-up" depth. Prior to insertion, the pipe shall be thoroughly cleaned of all foreign materials, including filing and cutting debris.
- 6:3: Pipe Alignment: Pipelines intended to be straight shall be laid straight. Deflections from a straight line shall not exceed the manufacturer's recommendations for joint deflections. Pipe shall be deflected at the joints only. Pipe barrel shall not be deflected. Should the planned or specified alignment require deflections in excess of the maximum recommended for the type of pipe being installed, when using a standard pipe length within the limits of available space, then either shorter pipe sections, or additional bends shall be installed. Under no circumstances shall PVC pipe be deflected except at the joint. PVC pipe shall not be placed under strain.

- 6:4: Thrust Blocking: All mechanical or push-on (ring-tite) joint water main and connection installations, shall be thrust blocked for all bends of 22 ½ degree or more. All bends, tees, crosses, valves, tapping sleeve, and fire hydrant locations shall be thrust blocked in accordance with district requirements. Bearing areas are determined on the basis of bearing against solid undisturbed earth. Concrete to be used for this purpose shall be designed for compressive strength as described in the previous Section of these specifications. All joint and fitting bolts shall remain accessible. Forming for thrust blocks to obtain the necessary bearing area shall be provided as required. All accessible form materials shall be removed from the trench prior to backfill.
- 6:5: Existing Utilities: Existing utilities shall be protected during the construction period. Where necessary, the existing utility shall be removed or temporarily relocated, and replaced upon completion of that phase of the work creating this requirement. Under all circumstances, the utility involved and the parties being affected by the disrupted service shall be notified in advance of the proposed operation. All changes and work shall be subject to the approval and acceptance of the utility involved and the Owner.
- 6:6: Quality: Damaged or unsound pipe, fittings, and accessories of whatever nature shall be rejected and removed from the work. All joints shall be made as previously specified. Each piece of pipe and all fittings, valves, etc., shall be checked and cleared of debris prior to being put in place. All gaskets shall be checked and cleaned of oil, grease, dirt, etc., before being inserted. All bolted joints shall be rechecked for operation and bolt tightness prior to installation. All open ends of pipe, fittings, etc., shall be carefully plugged or sealed at the end of each days work to prevent entrance of animals, water, and other foreign matter. All excavation shall be made to neat line and grade.

All personnel involved in any way with the work must be made aware of the fact that the work shall result in a first-class, professional job.

ARTICLE 7 – POLYETHYLENE ENCASUREMENT INSTALLATION

The Contractor shall furnish all materials and install the polyethylene encasement as specified in the previous section of these specifications. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight and watertight enclosure. Overlaps shall be secured by the use of adhesive tape, plastic string, or any other material capable of holding the polyethylene encasement in place until backfilling operations are completed.

This Article includes three different methods of installation of polyethylene encasement on pipe. Methods A and B are for use with polyethylene tubes and method C is for use with polyethylene sheets.

- 7.1: Method A – One length of polyethylene tube for each length of pipe: The Contractor shall cut the polyethylene tube to a length of approximately two (2) foot longer than that of the pipe section. The tube shall then be placed around the pipe, centered to provide one (1) foot of overlap on each adjacent pipe section, and bunched accordion-fashion lengthwise until it clears the pipe ends.

The pipe shall be lowered into the trench and the joint made up with the preceding section of pipe. A shallow bell hole shall be made at joints to facilitate installation of the polyethylene tube.

After assembling the pipe joint, the bunched polyethylene shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place. The end of the polyethylene from the new pipe section shall be placed over the end of the first wrap until it overlaps the joint at the preceding length of pipe. The overlap shall next be secured in place by taking up slack width to make a snug, but not tight, fit along the barrel of the pipe and securing the fold at quarter points.

All rips, punctures, or other damage to the polyethylene shall be repaired with adhesive tape or with a short length of polyethylene tube cut open, wrapped around the pipe, and secured in place. Proceed with installation of the next section of pipe in the same manner.

- 7.2: Method B – Separate pieces of polyethylene tube for barrel of pipe and for joints: The Contractor shall cut the polyethylene tube to a length of approximately one (1) foot longer than that of the pipe, centered to provide six (6) inches of bare pipe at each end. Make polyethylene snug, but not tight; secure ends as described for Method A.

Prior to making up a joint, a three (3) foot length of polyethylene tube shall be placed over the end of the preceding pipe section, bunched accordion-fashion lengthwise. After completion of the joint, the three (3)

foot length of polyethylene shall be pulled over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least one (1) foot, made snug and secure at each end as described for Method A.

All rips, punctures, or other damage to the polyethylene shall be repaired as described in Method A. Proceed with installation of the next section of pipe in the same manner.

- 7.3: Method C – Flat polyethylene sheet encasement: Contractor shall cut polyethylene sheet to a length of approximately two (2) foot longer than that of the pipe section. The cut length shall be centered to provide a one (1) foot overlap on each adjacent pipe section, bunching it until it clears the pipe ends. The polyethylene shall be wrapped around the pipe so that it circumferentially overlaps the top quadrant of the pipe. The cut edge of the polyethylene shall be secured at intervals of approximately three (3) foot.

The wrapped pipe shall be placed into the trench and the pipe joint made up with the preceding section of pipe. A shallow bell hole shall be made at the joints to facilitate installation of the polyethylene. After completion of the joint, the overlap shall be described for Method A.

All rips, punctures, or other damage to the polyethylene shall be repaired as described for Method A. Proceed with installation of the next section of pipe in the same manner.

Bends, reducers, offsets, and other pipe-shaped appurtenances shall be covered with polyethylene in the same manner as the pipe. When valves, tees, crosses, and other odd-shaped pieces cannot be wrapped practically in a tube, they shall be wrapped with a flat sheet or split length of polyethylene tube by passing the sheet under the appurtenance and bring it up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Width and overlaps at joints shall be handled as described for Method A. Polyethylene shall be taped securely in place at valve stem and other penetrations,

Where encountered, the Contractor shall provide openings for branches, service taps, blow-offs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, the slack shall be securely taped at the appurtenance and the cut repaired, as well as any other damaged areas in the polyethylene, with tape.

Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, the Contractor shall extend the polyethylene wrap to cover the adjacent pipe for a distance of at least two (2) foot. The end shall be secured with circumferential turns of tape.

The Contractor shall use the same backfill material as that specified for pipe without polyethylene wrapping, exercising care to prevent damage to the polyethylene wrapping when replacing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other materials that could damage the polyethylene.

ARTICLE 8 – WATER MAIN TRACER TAPE INSTALLATION

The Contractor shall furnish all materials and install the water main tracer tape as specified in the previous Section of these specifications. The three (3) inch wide detectable tape shall be installed directly above the water main locations as the trench backfill progresses, to permit an earth cover of 12 to 18 inches over the tape. The tape material shall be installed in accordance with the manufacturer's recommendations. The tape is to be placed in a manner such that trench backfill settlement will not place an excessive tensile stress on the material.

ARTICLE 9 – WATER MAIN LOCATOR WIRE INSTALLATION

The Contractor shall furnish all materials and install the water main and service locator wire as specified under the previous Section of these specifications. The No. 12 insulated wire shall be placed on top of the water main and secured with tap at 8 foot intervals. The wire shall be brought up along the outside of a valve box and brought through a hole drilled in the side of the box, 6-inches below finish grade. The wire shall be spliced at these locations using a standard plastic or rubberized wire connector. This will permit placing a power source on the wire for both directions in order to use same for locating the water main. Intermediate splices are not allowed. The wire shall be

laid slack in the trench so same will not be subject tensile stress as the trench is being backfilled. A sufficient length of wire shall be coiled in meter pit to bring wire to grade.

Prior to final acceptance by Owner, Contractor shall demonstrate that the locator wire works to the satisfaction of the Owner and/or his representative.

ARTICLE 10 – VALVE INSTALLATION

Prior to installation, all valves shall be checked for bolt tightness and operation. All foreign matter, dirt, and debris, shall be removed from inside the valve body. The valve gate and guide shall be cleaned free of grease and dirt. After thoroughly cleaning and checking the valve for operation, the valve gate shall be closed, and the valve shall be installed in place. Following placement and connection to both sides of the valve, excavation for the valve bearing thrust block shall be made. The thrust block shall then be poured of concrete, in accordance with the previous Section of these specifications. The valve holding clamps, No. 4 reinforcing bars, shall then be placed over the valve with embedment in the concrete thrust block.

Following initial set of the concrete, the valve box as specified under the previous Section of these specifications shall be place over the valve body. The valve box shall be set plumb and earth shall be thoroughly tamped around the box to maintain the plumb position. The top of the valve box shall be adjusted for height to the level of the adjacent pavement if in a paved area, or shall be adjusted to stand four (4) inches above ground level, if located in an unpaved area. The lid or cover shall then be placed on the valve box. The valve box may require vertical adjustment from time to time as trench settling occurs. It is intended that upon final project completion, all valve boxes shall be left in a vertical plumb, usable position.

ARTICLE 11 – WORK ADJACENT TO-STATE OR COUNTY HIGHWAYS, OR CROSSING GAS MAINS

NOT USED

ARTICLE 12 – TESTING WATER LINES

All newly laid water lines shall be tested prior to flushing and sterilization. Trenches may be backfilled as the pipe and accessories are installed, or where practicable and at the option of the Contractor. Trenches over the joint locations may be left open for visual inspection during tests. Prior to making tests, all air shall be expelled from the lines. If hydrants or blow-offs are not available, suitable taps shall be provided by the Contractor for this purpose at or near the end points of the installation.

- 12.1 Hydrostatic Tests: A two (2) hour test shall be made on each segment of the water lines between end points at a test pressure of at least 50% in excess of normal maximum operating pressure, not to exceed 200 psi. The test pressure shall be determined by the Owner and suitable gauges for checking same shall be supplied and connected by the Contractor. A gate valve or pressure relief valves shall be supplied and connected by the Contractor. A gate valve or pressure relief fitting shall be placed at each end of the segment being tested unless otherwise directed. Allowable pressure drop during the two (2) hour test shall be limited to 3% of the test pressure.

Any leaks evident at the surface shall be uncovered, repaired, and/or replaced. All leaking joints shall be tightened, or remade, or replaced, and re-tested. All pipe, fittings, valves, or other accessories found defective under this test shall be removed and replaced at the Contractors expense.

- 12.2 Leakage Test: In the event that the pressure test indicates leakage, a leakage test shall be conducted as follows:

The Contractor shall furnish the gauge and measuring device for the leakage test, as well as the pump, pipe, connections and all other necessary apparatus, and shall furnish all necessary labor to conduct the test. The duration of each leakage test shall be one hour, and during the test, the piping shall be subjected to a hydrostatic pressure of 1.5 times the working pressure or rated pressure of the pipe, whichever of is greater. No pipe installation will be accepted until the leakage is less than ten (10) gallons per mile of pipe per inch diameter per 24 hours. Should any tests of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

ARTICLE 13 – FLUSHING AND STERILIZING WATER LINES

After an acceptable hydrostatic test, the lines shall again be flushed. After flushing the lines, the pressure valves shall be closed, and enough water drained from segment to permit replacement of a chlorine solution. The chlorine solution shall consist of a powdered chlorine compound such as H.T.H. (calcium hypochlorite 65% available chlorine) thoroughly mixed with water. The chlorine solution shall be poured into the upstream test connection point. The amount of the chlorine compound to be used shall be determined by the Owner if the Contractor so desires. The chlorine solution shall yield 50 p.p.m. available chlorine. After pumping the required amount of solution into the water line segment with a positive displacement type pump, the connection shall be plugged, and the pressure valve opened. Water shall be flushed through the line until chlorine odor is detected at the opposite end of the installation. At this time, the pressure valve shall be closed and the segment shall be allowed to stand for a period of 24 hours.

Following the 24 hour period, a chlorine residual level of a minimum of 10 p.p.m. must remain in the segment. If an acceptable residual level is determined, the pressure valve shall again be opened and the segment flushed until all traces of chlorine over and above normal line levels have been eliminated.

Should a leak occur during the sterilization procedure, it will be repaired and the sterilization and flushing will be repeated.

Upon successful completion of the testing and sterilization of each water main segment, and prior to placing same in service, the Contractor shall collect and submit two (2) separate standard bacteriological samples, taken a minimum of 24 hours apart, for analysis to a State of Missouri certified laboratory. Upon receipt of satisfactory test results, the water main segment may be placed in permanent service.

ARTICLE 14 – TRENCH BACKFILL

After placing the piping in the trench, the Contractor shall backfill under and around the pipe simultaneously filling and tamping on both sides with sufficient earth to firmly hold the pipe in position. Extreme care must be exercised with the backfill operations to insure that no sizable stones or rocks come into contact with the pipe surfaces. After carefully placing and tamping the initial backfill in place to at least six (6) inches over the top of the pipe barrel, the remaining materials may be pushed into the trench. No boulders, broken pavement, or large pieces of blasted rock shall be used in the trench backfill. Any trench improperly bedded or backfilled shall be excavated, examined, and replaced at the Contractor's expense. All non-usable materials shall be picked up and removed from the site to an acceptable disposal location. Upon completion of the initial backfill, the backfill surface shall be either "jetted" with water or neatly mounded to allow for settlement. As the work progresses and settlement occurs, the trenching surface shall continue to be graded and shaped so as to secure a final condition where no further settlement shall occur.

In areas where pavement or permanent surfacing is removed and is to be replaced, the entire backfill shall be made using minus crushed stone in accordance with the previous Section of these specifications. Same shall be placed in six (6) inch layers and compacted to maximum density.

Initial clean-up, in accordance with this Section of these specifications shall occur as the trench backfill operation proceeds. Before final acceptance of the work is made, the Contractor shall travel the lines with the district, and any settlement or unsightly areas shall be repaired or corrected as directed. Upon acceptance, the Contractor shall proceed with the final clean-up, grading, and seeding operation, in accordance with this Section of these specifications.

ARTICLE 15 – FIRE HYDRANT AND AUXILIARY VALVE INSTALLATION

The fire hydrants, valves, and all connection items shall be furnished and installed by the Contractor. All materials used for this purpose shall be as specified under the previous Section of these specifications. The installation shall include all; excavation as required, installation of the water main tee fitting, auxiliary valve, connection pipe, hydrant, gravel fill, thrust or kick block, backfill, and surface replacement as required. The fire hydrants shall be installed to the proper "bury" depth, to stand in an exactly "plumb" position. Hydrant extension pieces may be used to adjust to proper grade as required. Clean gravel fill as specified and detailed, shall be placed to the proper depth and dimension to provide the necessary "weep" volume for water contained in the hydrant thrust or kick block, to assure that cement paste does not plug or block the hydrant weep hole or the gravel fill under and around the weep hole.

The earth backfill shall be hand tamped around the hydrant base and barrel to assure the plumb position. The hydrants may be braced or wired in place until sufficient settlement has occurred to retain the plumb position. Upon completion, all bracing and debris shall be removed from the site. Each site shall then be thoroughly cleaned-up and restored equal to or better than its original condition. All installation sites shall be left in a neat, clean, acceptable condition.

ARTICLE 16 – SURFACE WATER CROSSINGS – NOT USED

ARTICLE 17 – SEPARATION OF WATER MAINS, SANITARY SEWERS AND COMBINED SEWERS

- 17.1 Parallel installation (Horizontal Separation): Water mains shall be laid at least ten feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten-foot separation, the department may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer and in either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. In areas where the recommended separations cannot be obtained, either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.
- 17.2 Crossings (Vertical Separation): Water mains crossing sewers shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, the full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than ten (10) feet. Special structural support for the water and sewer pipes may be required. In areas where the recommended separations cannot be obtained either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than ten feet on both sides of the crossing.
- 17.3 Force mains: There shall be at least a ten-foot horizontal separation between water mains and sanitary sewer force mains and they shall be in separate trenches. In areas where these separations cannot be obtained, either the waterline or the sewer line shall be cased in a continuous casing.
- 17.4 Sewer manholes: No waterline shall be located closer than ten feet to any part of a sanitary or combined sewer manhole.
- 17.5 Disposal facilities: No waterline shall be located closer than 25 feet to any on-site wastewater disposal facility, agricultural waste disposal facility, or landfill.

ARTICLE 18 – INITIAL CLEAN UP, GRADING, AND REPLACEMENT

The Contractor shall provide the necessary labor and equipment to permit initial clean-up as the water main is being installed. Immediately following trench backfill, all areas disturbed by excavation shall be graded to conform to the adjacent ground levels. Earth shall be neatly mounded over the trench location. All debris, of whatever nature, due to the water main and service installation, shall be picked up and disposed of. All walks, driveways, roads, streets, etc., shall be replaced to original condition.

ARTICLE 19 – FINAL CLEAN-UP, FINISH GRADING, SEEDING AND STRAW

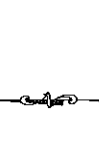
Following completion of the various routes and initial trench settlement, the Contractor shall go over the routes and clean-up all remaining debris. Following completion of the final clean-up, all areas in any way disturbed by the installation, shall be graded to conform to the adjacent ground areas. After final grading, the graded areas shall be sodded or seeded and covered with straw. In areas of rock excavation, it may be necessary to place a four-inch layer of earth over the exposed areas to form a seed bed for vegetation. The earth shall be applied as part of the final grading operation.

Upon completion of the final grading and seeding, the Contractor shall locate and paint the tops of all valve boxes the color "blue", and other accessories having covers, so that they are plainly visible for use.

All service boxes for valves, future connection items, etc., be firmly in place in a plumb position, ready and usable for the intended service. Following final completion of all items, the Contractor and Owner shall again go over the various routes to determine final acceptance.

END OF SECTION 221113

NEW JAIL EXPANSION FRANKLIN COUNTY SHERIFF FRANKLIN COUNTY, MISSOURI



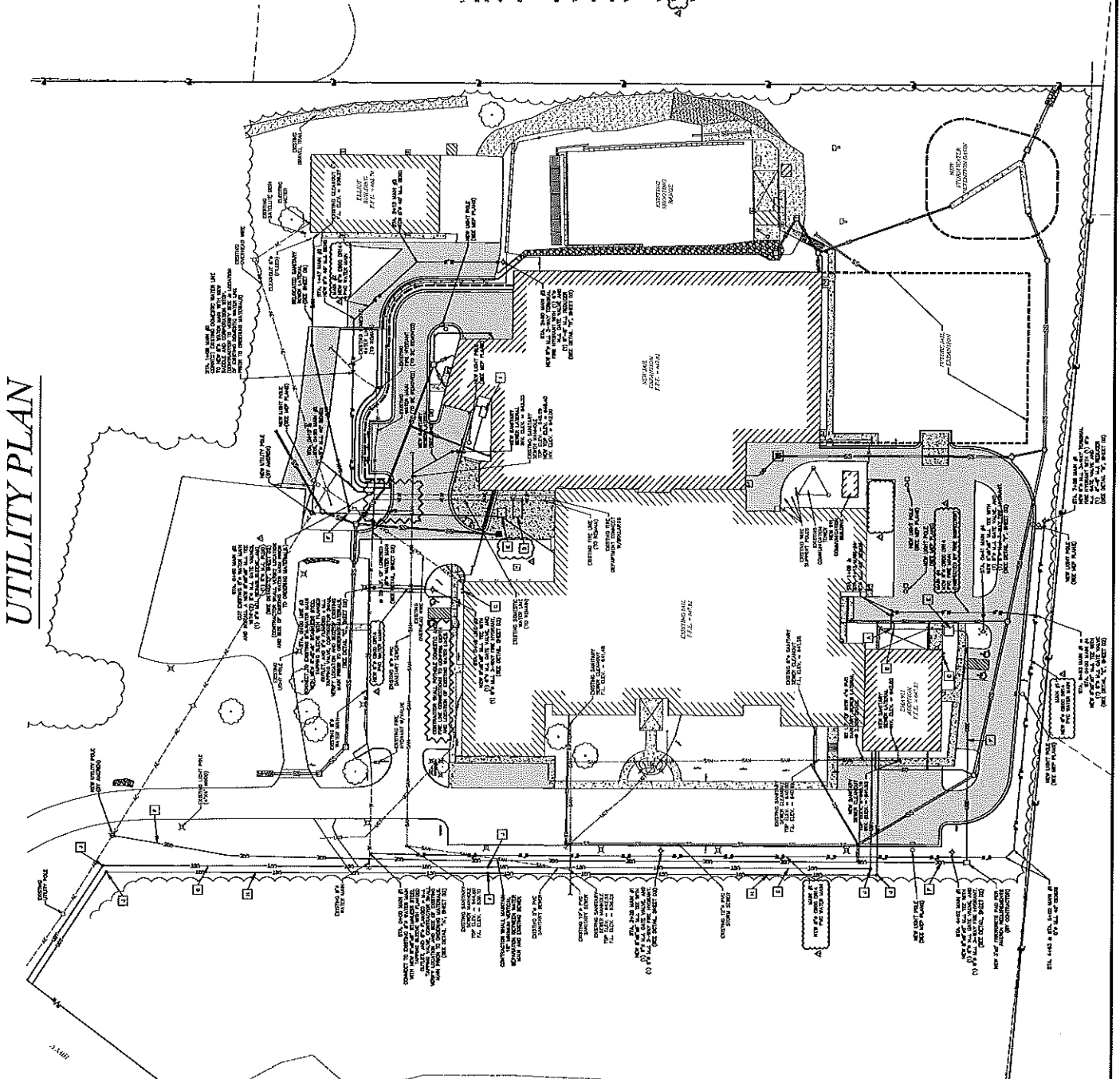
LEGEND

EXISTING	PROPOSED
1' POLYETHYLENE GLYCOL (PE) PIPE	4" POLYETHYLENE GLYCOL (PE) PIPE
4" RIBBON DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" CORRUGATED METAL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE
4" GALVANNED STEEL DUCT	4" POLYETHYLENE GLYCOL (PE) PIPE

UTILITY PLAN NOTES

1. The Engineer is not responsible for the design of any utility lines not shown on this plan.
2. The Engineer is not responsible for the design of any utility lines not shown on this plan.
3. The Engineer is not responsible for the design of any utility lines not shown on this plan.
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10. The Engineer is not responsible for the design of any utility lines not shown on this plan.
11. The Engineer is not responsible for the design of any utility lines not shown on this plan.
12. The Engineer is not responsible for the design of any utility lines not shown on this plan.

- #### UTILITY LEGEND
- NEW 4" PE LINE (SEE SLEEVES, PLAN)
 - NEW 4" RIBBON DUCT (SEE SLEEVES, PLAN)
 - NEW 4" CORRUGATED METAL DUCT (SEE SLEEVES, PLAN)
 - NEW 4" GALVANNED STEEL DUCT (SEE SLEEVES, PLAN)
 - NEW 4" GALVANNED STEEL DUCT (SEE SLEEVES, PLAN)
 - NEW 4" GALVANNED STEEL DUCT (SEE SLEEVES, PLAN)
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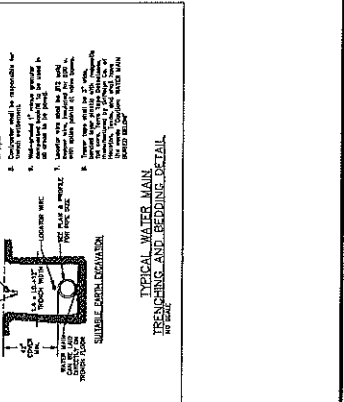
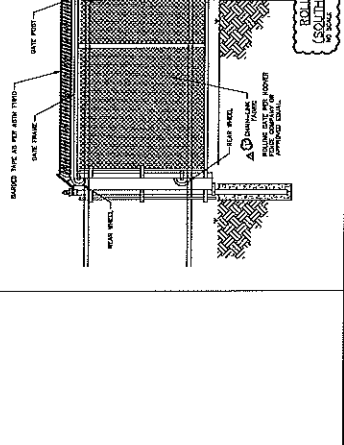
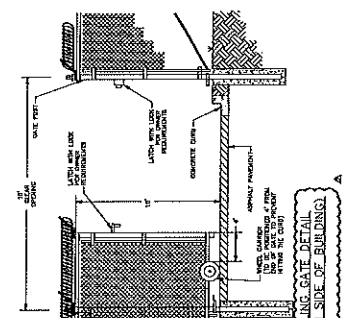
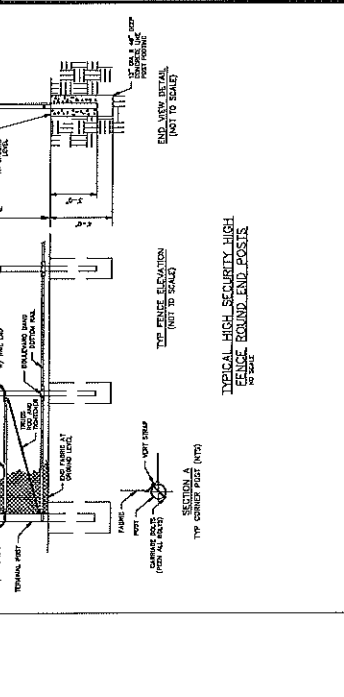
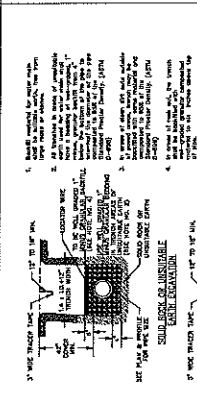
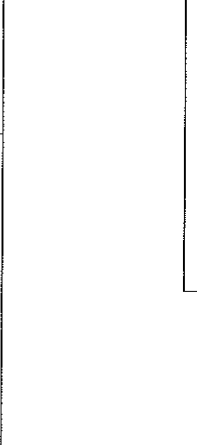
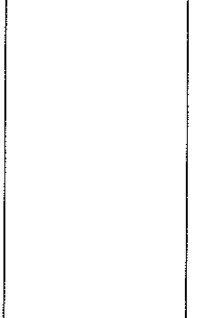
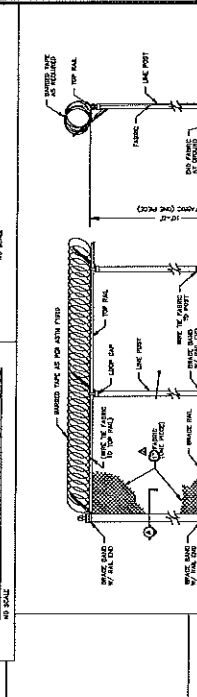
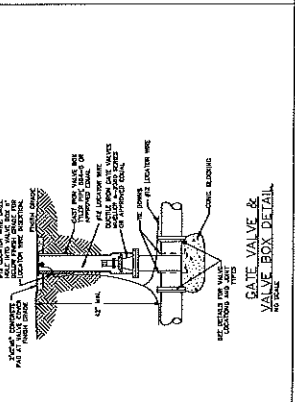
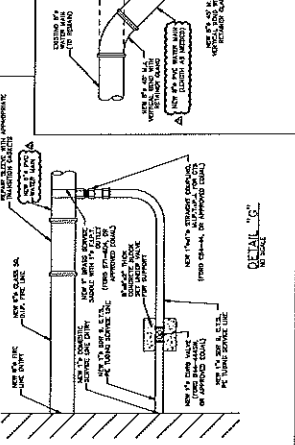
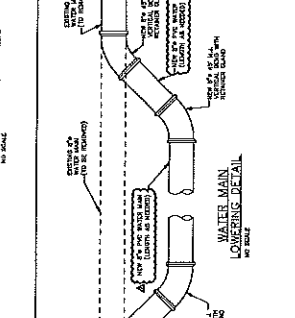
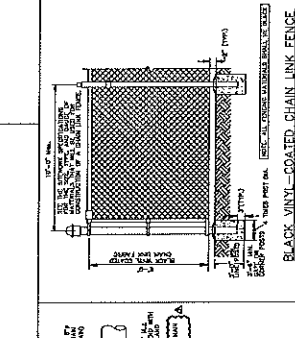
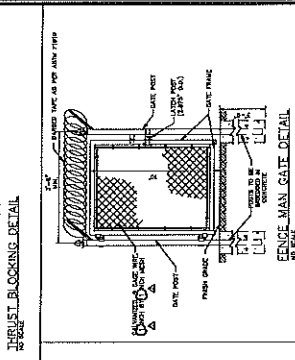
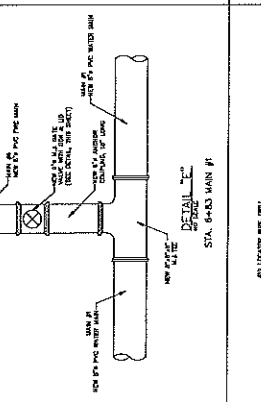
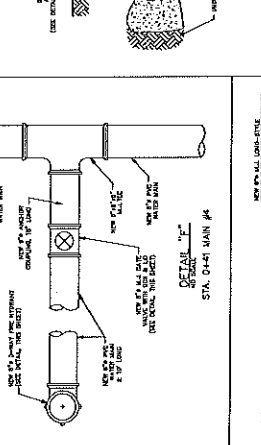
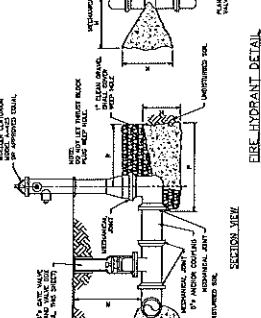
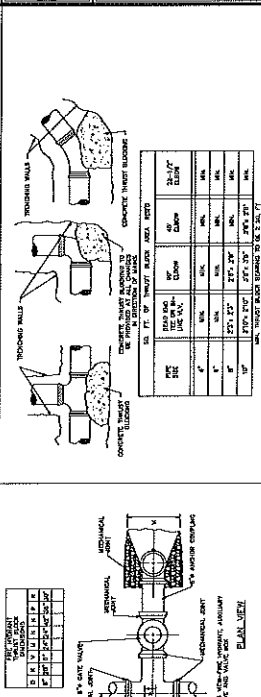
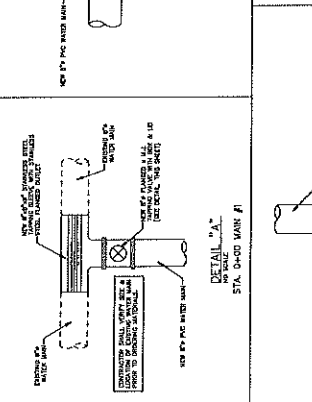
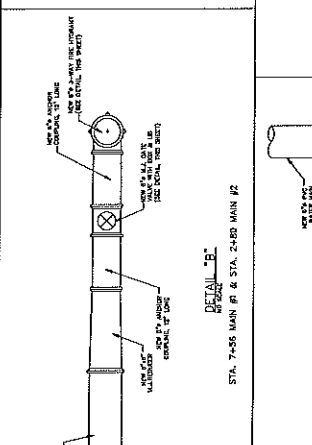
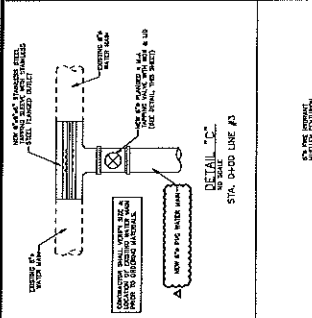
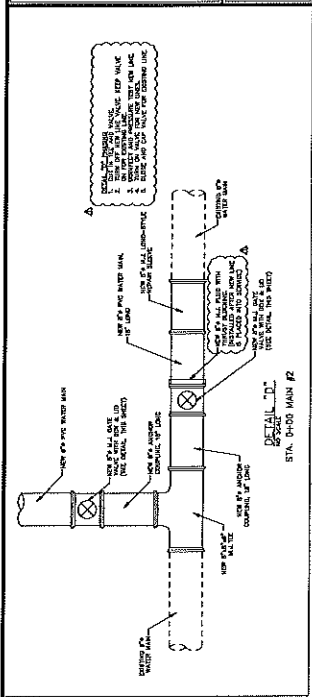


NEW TAIL EXPANSION FRANKLIN COUNTY SHERIFF FRANKLIN COUNTY, MISSOURI

DATE	NO.	BY	REVISION

DATE: MAY 29, 2018
 NO. SCALE: 1" = 10'-0"
 17-7020
 D2

OCHANN
 SOLE ENGINEERING & ARCHITECTURE
 1000 S. W. 10th Street, Suite 100
 Ft. Lauderdale, FL 33304
 Phone: (954) 576-1100
 Fax: (954) 576-1101
 Email: info@ochann.com



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MECHANICAL SCHEDULES
FRANKLIN COUNTY PUBLIC SAFETY FACILITY
R-2019-A3 DEFENSE & SECURITY
PROJECT NO. 18-00000000000000000000
DATE: 12/13/2018
DRAWN: J. HARRIS
CHECKED: J. HARRIS
APPROVED: J. HARRIS

FGM ARCHITECTS
2000 W. STATE ST. SUITE 100
PO BOX 7388
DES MOINES, IA 50316
PHONE: 515.261.8800
WWW.FGMARCHITECTS.COM

SSS Engineering Inc.
1000 E. 10TH ST. SUITE 100
DES MOINES, IA 50319
PHONE: 515.261.8800
WWW.SSSENGINEERING.COM

CGI Civil Engineering
1000 E. 10TH ST. SUITE 100
DES MOINES, IA 50319
PHONE: 515.261.8800
WWW.CGICIVIL.COM

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