FINAL SPECIAL PROVISIONS FOR
JONES DOUGLAS 91-N RELIEF

PROJECT NO. ES 2017-09
ENGINEERING SERVICES DEPARTMENT
CITY OF TULSA, OKLAHOMA

ENGINEER:
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SPECIAL PROVISIONS

SP-1 Corrosion Protection of Concrete Wastewater Structures 3
SP-2 CCFRPM Pipe for Direct Bury Installation – Gravity Service 10
SP-3 Abandonment of Sewers and Structures 13
SP-4 Pipe Transitions 14
SP-5 Fiberglass Reinforced Polyester Manholes Water Tight Type 15
SP-6 Composite Manhole Frame & Cover 20
SP-7 Large Diameter Polyvinyl Chloride (PVC) Gravity Sewer Pipe Fittings 21
SP-8 Modification to City of Tulsa Standard Specification 301 Right-of-Way Clearing and Restoring 24
SP-9 Owner Allowance 25
SP-10 Sanitary Sewer Construction Form 26
SP-11 Alternative Manhole and Catch Basin Grade Adjusting Ring Specification 27
SP-12 Sanitary Sewer Bypass Pumping Notification 30
SP-13 Construction Traffic Control 31
PART 1  GENERAL

1.1 SUMMARY
A. This specification covers all labor, materials, equipment and services necessary to complete the installation of interior corrosion protection for new concrete wastewater structures and rehabilitation of existing concrete structures as herein specified. The entire interior surface exposed to hydrogen sulfide gas and wastewater flow shall be coated.

1.2 REFERENCES
A. ASTM D4258 – Surface Cleaning Concrete for Coating
B. ASTM D4259 – Abrading Concrete
C. ASTM D638 - Tensile Properties of Plastics.
E. ASTM D695 - Compressive Properties of Rigid Plastics.
F. ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.
G. ASTM D2584 - Volatile Matter Content.
J. ACI 506.2-77 - Specifications for Materials, Proportioning, and Application of Shotcrete.
K. ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.
L. SSPC SP-13/NACE No. 6 – Surface Preparation of Concrete.
M. ASTM - The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
N. NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.
O. SSPC - The published standards of the Society of Protective Coatings, Pittsburgh, PA.
P. Los Angeles County Sanitation District – Evaluation of Protective Coatings for Concrete.
Q. SSPWC 210-2.3.3 - Chemical resistance testing published in the Standard Specifications for Public Works Construction (otherwise known as “The Greenbook”).

1.3 SUBMITTALS
A. Product Data:
   1. Technical data sheet on each product used.
   2. Material Safety Data Sheet (MSDS) for each product used.
   3. Technical data sheet and project specific data for construction and repair materials to be topcoated with the coating product(s)
including compatibility with the specified coating product(s), application, cure time and surface preparation procedures.

B. Contractor Data:
1. Current documentation from coating product manufacturer certifying Contractor’s training and equipment complies with the Quality Assurance requirements specified herein.
2. Five (5) recent references of Contractor indicating successful application of coating product(s) of the same material type as specified herein, applied by spray application within the municipal wastewater environment.
3. Letter from the coating product manufacturer providing the name and qualification(s) of the Technical Representative to be on-site in accordance with this specification.
4. All testing conditions and results.

C. Technical Representative Data:
1. The coating manufacturer’s Technical Representative shall approve surfaces for application of coating at each stage.
   a. Letter providing the surface preparation method shall be submitted to the Engineer ten (10) days before work is to begin.
   b. Letter approving the completion of surface prep shall be submitted to the Engineer prior to concrete repair.
   c. Letter providing the concrete repair method recommended shall be submitted to the Engineer prior to the start of the repair.
   d. Letter approving the completion of concrete repair shall be submitted to the Engineer prior to coating.

1.4 QUALITY ASSURANCE
A. Coating product(s) shall be capable of being installed and curing properly within the specified environment(s). Coating product(s) shall be resistant to all forms of chemical or bacteriological attack found in municipal sanitary sewer systems; and, capable of adhering to the substrates and repair product(s).
B. Repair product(s) shall be fully compatible with coating product(s) including ability to bond effectively to the host substrate and coating product(s) forming a composite system.
C. Contractor shall utilize equipment for the spray application of the coating product(s) which has been approved by the coating product manufacturer; and, Contractor shall have received training on the operation and maintenance of said equipment from the coating product manufacturer.
D. Contractor shall be trained by, or have their training approved and certified by, the coating product manufacturer for the handling, mixing, application and inspection of the coating product(s) to be used as specified herein.
E. Contractor shall utilize the services of the coating product(s) manufacturer’s technical representative to provide on-site inspection at the following checkpoints during the project:
   1. Completion of Section 3.2 - Surface Preparation
   2. During installation of Repair Product(s) – Section 3.3
   3. During installation of Coating Product(s) – Section 3.4
4. During Holiday Detection inspection – Section 3.5 B
F. Inspectors, including Contractor and coating product(s) manufacturer personnel performing inspection, shall be trained in the use of testing or inspection instrumentation and knowledgeable of the proper use, preparation and installation of the coating product(s) to be used as specified herein.
G. Contractor shall initiate and enforce quality control procedures consistent with the coating product(s) manufacturer recommendations and applicable NACE or SSPC standards as referenced herein.
H. Pre-construction meeting shall take place no less than two (2) weeks prior to Contractor mobilization. All parties to have physical presence on the project during construction shall be present. At this meeting responsibilities and authorities during construction shall be discerned; comments and questions regarding materials and execution of these specifications shall be presented and addressed.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Coating product(s) are to be kept dry, protected from weather and stored under cover.
B. Coating product(s) are to be stored between 50 deg F and 90 deg F.
   Do not store near flame, heat or strong oxidants.
C. Coating products(s) are to be handled according to their material safety data sheets.

1.6 SITE CONDITIONS
A. Contractor shall conform to all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
B. Confined space entry, flow diversion and/or bypass plans shall be presented by Contractor to Authority as necessary to perform the specified work.

1.7 SPECIAL WARRANTY
A. Contractor shall warrant all work against defects in materials and workmanship for a period of one (1) year, unless otherwise noted, from the date of final acceptance of the project. Contractor shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said one (1) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Authority.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS
Materials, regardless of type or quantity, used to fill voids, anchor attachments or otherwise alter the surface material of concrete structures scheduled to receive coating product(s) shall be compatible with the specified coating product(s). Prior to use, technical data, material safety data sheets and proof of compatibility with the specified coating product(s) of all such materials shall be submitted to the Engineer for approval. Any materials used without prior written approval shall be
removed and replaced with approved materials by Contractor without cost to Authority.

A. Standard Portland cement or new concrete (not quick setting high strength cement) shall be cured a minimum of 28 days prior to application of the coating product(s).
B. Remove existing coatings prior to application of the coating product(s) which may affect the performance and adhesion of the coating product(s).
C. Thoroughly clean and prepare existing products to effect a seal with the coating product(s).

2.2 REPAIR PRODUCTS
A. Repair products shall be used to fill voids, bugholes, concrete surface anomalies, and/or smooth transitions between components prior to the installation of the coating product(s). Repair materials must be compatible with the specified coating product(s) and shall be used and applied in accordance with the manufacturer’s recommendations.

2.3 COATING PRODUCTS
A. Manufacturers: Raven Lining Systems, Broken Arrow, Oklahoma 800-324-2810, 918-615-0020 or FAX 918-615-0140; A.W. Chesterton, Pasadena, Texas, H&H Restoration, 817-572-2266 or FAX 817-563-5448; Tnemec, Oklahoma City, Oklahoma, Eagle Rock Coatings, 405-842-8366 or FAX 405-751-8379; Citadel, Tulsa, Oklahoma, 918-584-2220 or FAX 918-584-2221; Belzona, Oklahoma City, Oklahoma 918-636-2942 or FAX 866-695-8559; Warren Epoxy Coating, Tulsa, Oklahoma, 918-697-3245 or FAX 918-248-5354.
B. Epoxy Coating System. Epoxy coating system shall be Raven 405, Chesterton S1HB, Tnemec Series 435 Perma-Shield, Citadel SLS-30, Belzona 5811 Immersion Grade, or Warren S-301-14.
C. Primer Product(s): Primer must be compatible with the specified coating product(s) and shall be used and applied in accordance with manufacturer’s recommendations.

2.4 COATING APPLICATION EQUIPMENT
A. Manufacturer approved heated plural component spray equipment.
B. Hard to reach areas, primer application and touch-up may be performed using hand tools.

PART 3 EXECUTION

3.1 EXAMINATION
A. Appropriate actions shall be taken by Contractor to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety during work.
B. All structures to be coated shall be readily accessible to Contractor.
C. New Portland cement concrete structures shall have cured a minimum of 28 days since manufacture prior to commencing coating installation.
D. Any active flows shall be dammed, plugged or diverted as required to ensure all liquids are maintained below or away from the surfaces to be coated.
E. Coating product(s) application shall not occur unless the temperature of the surface to be coated is between 40 and 120 deg F.
F. Specified surfaces should be shielded to avoid exposure of direct sunlight or other intense heat source.
G. Surface temperature logs shall be maintained by Contractor and used to identify when temperatures vary greater than 5°F. Coating product(s) application shall be scheduled when the temperature is falling versus rising.
H. Prior to commencing surface preparation, Contractor shall inspect all surfaces specified to receive the coating and notify Authority, in writing, of any noticeable disparity in the site, structure or surfaces which may interfere with the work, use of materials or procedures as specified herein.

3.2 SURFACE PREPARATION
A. Concrete surfaces to receive coating shall be inspected prior to surface preparation to determine the condition of the surfaces specified to receive the coating product(s) and the appropriate method or combination of methods to be used for surface preparation to meet the requirements of the coating system(s) to be applied.
B. The Manufacturer’s Representative shall approve surfaces for application of coating at each stage. Any material that is coated prior to the Authority’s approval shall be stripped back and recoated.
C. Oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants which may affect the performance and adhesion of the coating to the substrate shall be removed per ASTM D-4258.
D. Concrete fins, protrusions, burrs, sharp edges and concrete spatter shall be corrected by grinding or scraping.
E. Unless otherwise submitted and approved by the Engineer, surfaces to receive coating shall be abrasive blasted per ASTM D-4259 to remove laitance and weak concrete to expose subsurface voids, open honeycomb and air pockets. After blasting, surfaces shall be cleaned of all loose blast grit, dust and other debris by sweeping, vacuuming, air blasting and washing as necessary.
F. Surface preparation method(s) used shall be performed in a manner that provides a uniform, sound clean neutralized surface suitable for the specified coating product(s).
G. Infiltration shall be stopped by using a material which is compatible with the repair products and is suitable for topcoating with the coating product(s).

3.3 APPLICATION OF REPAIR PRODUCTS
A. Repair products shall be used to fill all voids, honeycombs, bug holes, spalls, cracks and other surface anomalies which may affect the performance or adhesion of the coating product(s) including their use to smooth or rebuild surfaces with rough profiles to provide a minimum profile of coarse (60) abrasive paper comparative to ICRI Replicas 4-6 (ICRI Guideline 03732) and suitable for the coating product(s) to be applied.
B. Repair products shall be handled, mixed, installed and cured in accordance with manufacturer guidelines.
C. All repaired surfaces shall be inspected for cleanliness and suitability to receive the coating product(s). Additional surface preparation may be required prior to coating application.

3.4 APPLICATION OF COATING PRODUCT(S)
A. Application procedures shall conform to the recommendations of the coating product(s) manufacturer, including environmental controls, product handling, mixing, application equipment and methods.
B. Spray equipment shall be specifically designed to accurately ratio and apply the coating product(s) and shall be in proper working order.
C. Contractors qualified in accordance with Section 1.4 of these specifications shall perform all aspects of coating product(s) installation.
D. Prepared surfaces shall be primed by application of the waterborne epoxy primer described herein at an application rate of 200 square feet per gallon (8 mils wet film thickness). The primer shall be allowed to dry to a tack free state. The solvent-free epoxy topcoat described herein shall then be spray applied to a minimum wet film thickness of 80-100 mils.
E. No more than 12 hours shall be permitted to pass between each application of the waterborne epoxy, the solvent-free epoxy primer and the epoxy topcoat. Subsequent topcoating or additional coats of the coating product(s) shall occur within the product’s recoat window as adjusted for temperature extremes. Additional surface preparation procedures will be required if this recoat window is exceeded.
F. Coating product(s) shall interface with adjoining construction materials throughout the structure to effectively seal and protect concrete substrates from infiltration and attack by corrosive elements. Procedures and materials necessary to effect this interface shall be as recommended by the coating product(s) manufacturer.
G. The coating shall be terminated at a saw cut key-in with minimum dimensions of ¼” x ¼”. Surfaces not to receive the coating shall be masked or otherwise protected to prevent overspray or feathering of the coating termination. Termination points of the coating product(s) shall be made at joints and a minimum of 1” interfacing with each pipe penetration, and/or as shown within Project Drawings and Specifications.

3.5 TESTING AND INSPECTION
A. During application a wet film thickness gauge, meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used. Measurements shall be taken, documented and attested to by Contractor for submission to Authority.
B. After the coating product(s) have set in accordance with manufacturer instructions, all surfaces shall be inspected for holidays with high-voltage holiday detection equipment. Reference NACE RPO 188-99 for performing holiday detection. All detected holidays as indicated by the audible or visual signal of the test apparatus shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional coating can be hand applied to the repair area. All touch-up/repair procedures shall follow the coating manufacturer’s recommendations.
Documentation on areas tested, results and repairs made shall be provided to Authority by Contractor.

C. A minimum of three (3) 20-mm test dollies shall be placed and pulled to evaluate adhesion/bond of the coating to the substrate for every one (1) out of five (5) manholes. Testing shall be conducted in accordance with ASTM D4541 as modified herein. Authority’s representative shall select the location of the dolly placement including at least one (1) test in each rehabilitated manhole. The adhesive used to attach the dollies to the coating shall be rapid setting with tensile strengths in excess of the coating product and permitted to cure in accordance with manufacturer recommendations. The coating and dollies shall be adequately prepared to receive the adhesive. Failure of the dolly adhesive shall be deemed a non-test and require retesting. Prior to performing the pull test, the coating shall be scored through approximately 90% of the coating thickness by mechanical means without disturbing the dolly or bond within the test area. Two (2) of the three (3) adhesion pulls shall exceed 200 psi or concrete failure with more than 50% of the subsurface adhered to the coating. Should a structure fail to achieve two (2) successful pulls as described above, additional testing shall be performed at the discretion of the Authority or Engineer. Any areas detected to have inadequate bond strength shall be evaluated by the Engineer. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Contractor.

D. Before final cleanup, a final inspection of the project shall be made of the project for deviations in specifications. Deficient work should be corrected in accordance with repair procedures as approved by the Authority’s Representative. The following is a list of qualities or properties that are defined and agreed upon prior to installation and should be inspected in the course of application and after completion:

- Uniform color
- Straightness and neatness of termination lines
- Depressions or humps which could affect liquid flow
- Smooth transitions at cove radii, internal and external corners, intersections and terminations
- Spatter of cured and uncured resinous materials on surfaces not being coated
- Complete coverage

E. The municipal sewer system may be returned to full operational service as soon as final repairs have set dry to the touch and the final inspection has taken place.

END OF SECTION
SP-2 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

CCFRPM PIPE FOR DIRECT BURY INSTALLATION – GRAVITY SERVICE

PART 1    GENERAL

1.1    Section Includes
A.    Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe. (CCFRPM)

1.2    References

PART 2    PRODUCTS

2.1    MATERIALS
A.    Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
B.    Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
C.    Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
D.    Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the product.
E.    Elastomeric Gaskets: Gaskets shall meet ASTM F477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.

2.2    MANUFACTURE AND CONSTRUCTION
A.    Pipes: Manufacture pipe by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall be manufactured using a resin with a 50% elongation (minimum) when tested in accordance with D638. The interior surface shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of a sand and resin layer which provides UV protection to the exterior.
B. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.

C. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings may also be used.

D. Acceptable Manufacturer: HOBAS Pipe USA.

2.3 DIMENSIONS
A. Diameters: The actual outside diameter of standard pipe (nominal 18” to 48”) shall be in accordance with ASTM D3262. For other diameters, OD’s shall be per manufacturer’s literature.

B. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

C. Wall Thickness: The minimum wall thickness shall be the stated design thickness.

D. End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8”.

2.4 TESTING
A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM D3262.

B. Joints: Coupling joints shall meet the requirements of ASTM D4161.

C. Stiffness: Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 72 psi.

D. Strain Corrosion: The extrapolated 50-year strain corrosion value shall not be less than 0.9% as determined in accordance with ASTM D3681 and ASTM D3262.

2.5 CUSTOMER INSPECTION
A. The Owner or other designated representative shall be entitled to inspect pipes or witness the pipe manufacturing.

B. Manufacturer’s Notification to Customer: Should the Owner request to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the Owner with adequate advance notice of when and where the production of those pipes will take place.

2.6 PACKAGING, HANDLING, SHIPPING
A. Packaging, handling, and shipping shall be done in accordance with the manufacturer’s instructions.
PART 3  EXECUTION

3.1  INSTALLATION

A.  Burial:
   2.1  The bedding and burial of CCFRPM pipe and fittings in non-paved areas outside of City right-of-way shall be in accordance with the Drawings.
   2.2  The bedding and burial of CCFRPM pipe and fittings and pavement restoration within City right-of-way, or under existing pavement, shall be in accordance with City of Tulsa Standard Detail No. 713.

B.  Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cables is not recommended.

C.  Jointing:
   2.1  Clean ends of pipe and coupling components.
   2.2  Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
   2.3  Use suitable equipment and end protection to push or pull the pipes together.
   2.4  Do not exceed forces recommended by the manufacturer for coupling pipe.
   2.5  Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer.
   2.6  Bell holes shall be provided at each joint to permit proper joint assembly and alignment. After joint assembly, fill the bell holes with bedding material and compact as required.
   2.7  When using movable trench supports, care should be exercised not to disturb the pipe location, jointing or its embedment.

D.  Field Tests:
   2.1  Low Pressure Air Test: After installation of the pipe, each reach shall be tested with the method as outlined in City of Tulsa Standard Specification Section 408.11.
   2.2  Deflection: Perform deflection tests on all pipe after the final backfill has been in place at least 30 days. Maximum allowable long-term deflection shall not exceed 5% of the average initial diameter. Tests shall be performed using a rigid ball or mandrel with a diameter equal to 95% of the average inside diameter of the pipe taking into consideration manufacturing tolerances. Tests shall be performed without mechanical pulling devices.
   2.3  CCTV Inspection: After installation of the pipe, Contractor shall contact Field Engineering staff to request scheduling for Sewer Operations & Maintenance to TV inspect the line as specified in City of Tulsa Standard Specifications.
   2.4  All field tests shall be scheduled and coordinated with the Engineer.

END OF SECTION
PART 1 ABANDONMENT OF SEWERS AND STRUCTURES

1.1 GENERAL
A. Sewers and manholes to be abandoned shall be securely blocked at any points of intake or discharge with a bulkhead or preformed plug and shall be completely filled with cellular concrete. The proposed method for filling and blocking the sewer shall be submitted for approval to the Engineer.

1.2 FRAMES AND COVERS
A. Frames and covers from any structures scheduled for abandonment shall be returned to the City at the specified location.
B. At a minimum all structures shall be completely removed to a point three (3) feet below the final grade, or the depth noted on the drawings. Cellular concrete shall be used to fill the structure.
C. When located in paved areas, the backfill above the filled structure shall be completed using compacted granular fill.

1.3 MEASUREMENT AND PAYMENT
A. Payment for plugging and abandoning sanitary sewer lines shall be in accordance with City of Tulsa Standard Specification Paragraph 404.4.1.

END OF SECTION
PART 1  GENERAL

1.1   Each reach of sewer shall be constructed using the same type of pipe between the structures at each end of the reach. Transitions between pipe types may only be made at the manholes.

END OF SECTION
PART 1  GENERAL

1.1  Section Includes:
A.  Fiberglass Reinforced Polyester (FRP) Manholes.

PART 2  PRODUCTS

2.1  MATERIALS
A.  Fiberglass reinforced polyester manhole shall be manufactured from commercial grade polyester resin or other suitable polyester or vinyl ester resins with fiberglass reinforcements. Manhole shall be a one-piece unit manufactured to meet or exceed all specifications of A.S.T.M. D-3753 latest edition as manufactured by L.F. Manufacturing, Inc., Giddings, Texas, 1-800-237-5791, or an approved equal.
B.  Resin: The resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.
C.  Reinforcing Materials: The reinforcing materials shall be commercial Grade "E" type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.
D.  Interior Surfacing Material: The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020 inch thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two (2) passes of chopped roving of minimum length 0.5 inch (13 mm) to maximum length of 2.0 inch (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz/ft. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch (2.5 mm).
E.  Wall Construction Procedure: After the inner layer has been applied the manhole wall shall be constructed with chop and continuous strand filament wound manufacturing process, which insures continuous reinforcement and uniform strength and composition. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one-piece unit. Seams shall be fiberglassed on the inside and the outside using the same glass-resin jointing procedure. Field joints shall not be acceptable by anyone other than L.F. Manufacturing, Inc. Giddings, Texas or an approved equal.
F.  Exterior Surface: For a UV inhibitor the resin on the exterior surface of the manhole shall have gray pigment added to a minimum thickness of 0.125 inches.
G.  Stubouts and Connections: Upon request stubouts may be installed. Installation of CCFRPM, PVC, or other sewer pipe material must be performed by sanding, priming, and using resin fiber-reinforced hand lay-
up. The resin and fiberglass shall be the same type and grade as used in the fabrication of the fiberglass manhole. Inserta-Tee fittings may be requested and installed per manufacturer’s instructions. Kor-N-Seal boots may be installed by the manhole manufacturer using fiberglass reinforced pipe stubouts for the Kor-N-Seal boot sealing surface.

H. Manhole Bottom: Fiberglass manholes will be required to have resin fiber-reinforced bottom. Deeper manholes may require a minimum of two (2) fiberglass channel stiffening supports. All fiberglass manholes manufactured with a fiberglass bottom will have a minimum 3-inch wide anti-flotation ring. The manhole bottom shall be a minimum of ½ inch thick.

I. Fiberglass enclosed invert and bench area: A fiberglass enclosed invert and bench area shall be installed in the manhole by the manufacturer. The invert will be formed using a non-corrosive material and completely enclosed in a minimum 1/4-inch layer of fiberglass chop.

J. Height Adjustment: Fiberglass manholes must have the ability to be height adjustable with the use of a height adjustment ring. Height adjustment can be made as a field operation without the use of uncured resins or fiberglass lay-ups. Fiberglass manholes must maintain all load and soundness characteristics required by A.S.T.M. D-3753 after height adjustment has occurred.

K. Fillers and Additives: Fillers, when used, shall be inert to the environment and manhole construction. Sand shall not be accepted as an approved filler. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of the A.S.T.M. D-3753 standard. The resulting reinforced-plastic material must meet the requirements of this specification.

2.2 MANUFACTURE AND CONSTRUCTION

A. Manhole cylinders, manway reducers, and connectors shall be produced from fiberglass-reinforced polyester resin using a combination of chop and continuous filament wound process.

B. Interior Access: All manholes shall be designed so that a ladder or step system can be supported by the installed manhole.

C. Manway Reducer: Manway reducers will be concentric with respect to the larger portion of the manhole diameters through 60 inches. Larger manholes may have concentric or eccentric manway reducer openings.

D. Cover and Ring Support: The manhole shall provide an area from which a grade ring or brick can be installed to accept a typical metal ring and cover and have the strength to support a traffic load without damage to the manhole.

E. Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 0.5 inch in diameter, de-lamination or fiber show.

F. Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, de-lamination, blisters larger than 0.5 inch in diameter, and wrinkles of 0.125 inch or greater in depth. Surface pits shall be permitted if they are less than 0.75 inch in diameter and less than 0.0625 inch deep. Voids that cannot be broken with finger pressure and are entirely below the resin surface shall be permitted if they are less than 0.5 inch in diameter and less than 0.0625 inch thick.
G. Wall Thickness: Fiberglass manholes 48” in diameter and up to 20 feet in depth will have a minimum wall thickness of 0.3125 inches. Fiberglass manholes 48 inches in diameter and 20 feet to 30 feet in depth will have a minimum wall thickness of 0.5 inches.

H. Repairs: Any manhole repairs are subject to meet all requirements of this specification.

I. Manhole Length: Manhole lengths shall be in 6-inch increments +/- 2 inches.

J. Diameter Tolerance: Tolerance of inside diameter shall be +/- 1% of required manhole diameter.

K. Load Rating: The complete manhole shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with A.S.T.M. 3753, 8.4 (note 1). To establish this rating the complete manhole shall not leak, crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 inch at the point of load application when loaded to 24,000 lbs.

L. Stiffness: The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with A.S.T.M. 3753, 8.5 (note 1).

<table>
<thead>
<tr>
<th>LENGTH - FT.</th>
<th>F/AY - PSI</th>
</tr>
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<tbody>
<tr>
<td>3 - 6.5</td>
<td>0.75</td>
</tr>
<tr>
<td>7 - 12.5</td>
<td>1.26</td>
</tr>
<tr>
<td>13 - 20.5</td>
<td>2.01</td>
</tr>
<tr>
<td>21 - 25.5</td>
<td>3.02</td>
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<td>26 - 35</td>
<td>5.24</td>
</tr>
</tbody>
</table>

M. Soundness: In order to determine soundness, the manufacturer shall apply an air or water pressure test to the manhole test sample. Test pressure shall not be less than 3 psig or greater than 5 psig. While holding at the established pressure, inspect the entire manhole for leaks. Any leakage through the laminate is cause for failure of the test. Refer to A.S.T.M. D-3753, 8.6.

N. Chemical Resistance: The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection system.

2.3 PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th></th>
<th>Hoop Direction</th>
<th>Axial Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Tensile Strength (psi)</td>
<td>18,000</td>
<td>5,000</td>
</tr>
<tr>
<td>b. Tensile Modules (psi)</td>
<td>$0.6 \times 10^6$</td>
<td>$0.7 \times 10^6$</td>
</tr>
<tr>
<td>c. Flexural Strength (psi)</td>
<td>26,000</td>
<td>4,500</td>
</tr>
<tr>
<td>d. Flexural Modules (psi)</td>
<td>$1.4 \times 10^6$</td>
<td>$0.7 \times 10^6$</td>
</tr>
<tr>
<td>e. Compressive (psi)</td>
<td>18,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

2.4 TESTING

A. All tests shall be performed as specified in A.S.T.M. D-3753 latest edition, Section 8, test method D-790 (See Note 5) and test method D-695.
2.5 QUALITY CONTROL
A. Each completed manhole shall be examined by the manufacturer for dimensional requirements, hardness, and workmanship. All required A.S.T.M. D-3753 testing shall be completed and records of all testing shall be kept and copies of test records shall be presented to customer upon formal written request within a reasonable time period.

2.6 CERTIFICATIONS
A. As a basis of acceptance the manufacturer shall provide an independent certification which consists of a copy of the manufacturer's test report and accompanied by a copy of the test results stating the manhole has been sampled, tested, and inspected in accordance with the provisions of this specification and meets all requirements.

2.7 SHIPPING & HANDLING
A. Do not drop or impact the fiberglass manhole. Fiberglass manhole may be lifted by inserting a 4"x4"x30" timber into the top of manhole with cable attached or by a sling or "choker" connection around the center of manhole, lift as required. Use of chains or cables in contact with the manhole surface is prohibited.

2.8 MARKING & IDENTIFICATION
A. Each manhole shall be marked on the inside and outside with the following information:
   1. Manufacturer's name or trademark
   2. Manufacturer's factory location
   3. Manufacturer's serial number
   4. Total manhole depth.

PART 3 EXECUTION

3.1 INSTALLATION
A. Closed Bottom Manhole Installation: Bottom of excavation should be compacted to 95% Standard Proctor Density. Manholes with diameters less than 60 inches and depths less than 12 feet require a base of 6 inches of crushed stone. Manholes with depths of 10 feet and greater, and diameters of at least 48 inches should have a poured reinforced concrete base at least one (1) foot deep and at least two (2) feet larger than fiberglass manhole outside diameter. The fiberglass manhole shall be lowered into the wet concrete and brought to plumb. Pour reinforced concrete over the anti-flotation flange. The concrete shall be a minimum of one (1) foot deep and two (2) feet from outside wall of the manhole. More concrete may be required in high water table areas. In high water table areas consult the Engineer for backfill requirements.
B. Backfill Material: Unless shown otherwise on drawings and approved by the Engineer, sand, crushed stone, or pea gravel shall be used for backfill around the manhole for a minimum distance of one (1) foot from the outside surface and extending from the bottom of the excavation to the top of the reducer section. Suitable material chosen from the excavation may be used for the remainder of the backfill. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by the Engineer.
C. Backfill Procedure: Backfill shall be placed in layers of not more than 12 loose measure inches and mechanically tamped to 95% Standard Proctor Density, unless otherwise approved by the Engineer. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the fiberglass manhole structure.

END OF SECTION
SP-6 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

COMPOSITE MANHOLE FRAME & COVER

PART 1 GENERAL

1.1 MATERIAL
   A. Composite manhole frame and cover shall be made of a fiber reinforced polymer using at least 45% fiber reinforcement and thermoset resin matrix.

1.2 USABILITY
   A. Composite unit must facilitate easy removal of the cover by one person, have a 750:1 strength to weight ratio and possess no possibility of corrosion welding between the frame and cover.
   B. Composite unit shall have an integrated gasket system to reduce traffic shock, noise, and odors.
   C. Composite unit shall have Stainless Steel quarter turn paddle lock.

1.3 PEDESTRIAN SAFETY
   A. Composite unit shall be heat insulating, non-conductive, and provide skid slip performance of 0.6 according to ASTM C1028.

1.4 LOAD CARRYING CAPACITY
   A. AASHTO M306-10 H-20 & H-25 traffic requirements of 50,000 lbs., with 100,000lb ultimate load bearing.

1.5 FATIGUE PERFORMANCE
   A. Must pass 2 million cycles at 16,000 lbs. and then proof load requirements U.S. AASHTO M306-10 H-20 & H-25 or EN 124 Class A-D.

1.6 MARKINGS
   A. AASHTO M306-10
   B. Country of origin

1.7 QUALITY & WARRANTY STATEMENT
   A. Manufacturer must provide a warranty for the composite unit for 5 years.
   B. Composite manhole frame and cover must be made in the USA.

1.8 ACCEPTABLE MANUFACTURERS
   A. GMI Composites - Model 2600 & 3200 / Muskegon, MI / 1-800-653-0093 or Pre-Approved Equivalent

END OF SECTION
SP-7 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

LARGE DIAMETER POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE AND FITTINGS

PART 1 GENERAL

1.1 SECTIONS INCLUDES
   B. Polyvinyl chloride (PVC) sewer pipe and fittings for gravity sanitary sewers in nominal diameters 18 inches through 36 inches.

1.2 REFERENCES
   B. ASTM D 2321 - Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
   C. ASTM D 2444 - Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

PART 2 PRODUCTS

2.1 MATERIALS
   A. Use PVC compounds in the manufacture of pipe that contain no ingredient in an amount that has been demonstrated to migrate into water in quantities considered to be toxic.
   B. Gravity Sanitary Sewer Pipe:
      1. Pipe shall conform to ASTM F 679 with wall thickness as required for SDR 26 and pipe strength of 115 psi.
   C. Joints:
      1. Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. The manufacturer shall test a sample from each batch conforming to requirements ASTM D 2444.
   D. Gaskets:
      1. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
      2. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.
E. Fittings:
   1. Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

2.2 CUSTOMER INSPECTION
   A. The Owner or other designated representative shall be entitled to inspect pipes or witness the pipe manufacturing.
   B. Should the Owner request to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the Owner with adequate advance notice of when and where the production of those pipes will take place.

2.3 PACKAGING, HANDLING, SHIPPING
   A. Packaging, handling, and shipping shall be done in accordance with the manufacturer's instructions.

PART 3 EXECUTION

3.1 PROTECTION
   A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with the manufacturer's recommendations.

3.2 INSTALLATION
   A. Install PVC pipe in accordance with ASTM D 2321 and manufacturer's recommendations.
   B. Avoid imposing strains that will overstress or buckle the pipe when lowering pipe into trench.
   C. Hand shovel pipe bedding under the pipe haunches and along the sides of the pipe barrel and compact to eliminate voids and ensure side support.
   D. Burial: The bedding and burial of PVC pipe and fittings in non-paved areas outside of City right-of-way shall be in accordance with the Drawings.
   E. Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cables is not recommended.

3.3 FIELD TESTS
   A. Low Pressure Air Test: After installation of the pipe, each reach shall be tested with the method as outlined in City of Tulsa Standard Specification Section 408.11.
   B. Deflection: Perform deflection tests on all pipe after the final backfill has been in place at least 30 days. Maximum allowable long-term deflection shall not exceed 5% of the average initial diameter. Tests shall be performed using a rigid ball or mandrel with a diameter equal to 95% of the average inside diameter of the pipe taking into consideration manufacturing tolerances. Tests shall be performed without mechanical pulling devices.
C. CCTV Inspection: After installation of the pipe, Contractor shall contact Field Engineering staff to request scheduling for Sewer Operations & Maintenance to TV inspect the line as specified in City of Tulsa Standard Specifications.
D. All field tests shall be scheduled and coordinated with the Engineer.

END OF SECTION
PART 301 - RIGHT-OF-WAY CLEARING AND RESTORING

The following modification(s) shall replace the referenced specification section located in the City of Tulsa Standard Specifications and Standard Details, Dated October 2013.

301.4 PAYMENT: Payment for this item shall be made at the unit price bid per square yard. Area shall be computed as follows: total length of pipe, not including bores, fittings, or specials, as included in other items; and standard width of right-of-way clearing and restoring of a maximum pay limit width of twenty (20) linear feet. No additional payment shall be made for alterations of utility mains, service lines, or appurtenances, unless specifically provided for elsewhere in the Contract Documents.

END OF SECTION
PART 1 GENERAL

1. Work covered by allowance:

A. Allowances have been provided in the contract for various work not identified in other bid items. Descriptions and dollar amounts are identified in Form of Bid.

B. The allowance shall be used for cost of materials, labor installation and overhead and profit for additional work that is not identified in the Construction Documents/Plans, and not included in the base bid lump sum.

C. The allowance shall be used only at the discretion of the City of Tulsa. Any allowance balance remaining at the completion of the project will be credited back to the City of Tulsa on the final Application for Payment submitted by the contractor.

D. The Contractor shall provide, to the City of Tulsa Representative, a written request for the use of the allowance, with a schedule of values, and all associated backup information, including any time extension required to perform the work.

E. Contractor shall proceed with work included in the allowance only after receiving a written order, from the City of Tulsa Representative, authorizing such work. Proceeding with work in the allowance without a written order from the City of Tulsa Representative will be at the Contractor’s cost.

END OF SECTION
PART 1  GENERAL

1. Contractor shall complete one (1) Sanitary Sewer Construction Form for each sanitary sewer line that has been rehabilitated or constructed on this project. Sample forms may be obtained from City of Tulsa Sewer Operations.

2. Contractor shall submit forms for all sanitary sewer lines completed with each monthly payment request.

3. Sanitary Sewer Construction Form shall contain at minimum the follow information.
   a. Project number
   b. Project name
   c. Contractor name
   d. Pay Application number
   e. Upstream manhole number
   f. Downstream manhole number
   g. Footage of pipe measured from manhole to manhole
   h. Type of rehabilitation or construction method
   i. New pipe size and material
   j. Date completed
   k. Service connection information as follows for each connection
      i. Property address served
      ii. Measurement from downstream manhole
      iii. Clock position of connection
      iv. Active service or capped for future service
      v. Type of service connection at main
      vi. Footage of service pipe installed by contractor from sewer main
      vii. Size and material of service pipe
      viii. Type of coupling utilized to connect to customer’s existing service pipe
      ix. Size and material of customer’s existing service pipe
      x. Depth of contractor’s connection to customer’s existing service pipe.

4. No additional payment will be made for completion of Sanitary Sewer Construction Form.

END OF SECTION
SP-11 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

ALTERNATIVE MANHOLE AND CATCH BASIN GRADE ADJUSTING RING SPECIFICATION

PART 1          GENERAL

1.1            SCOPE
This specification defines the materials required for the adjustment of all manholes, catch basins or other underground utility structures to final elevation as shown on the project drawings.

1.2            WORK REQUIRED
Grade adjustment rings meeting the requirements of this section shall be used to adjust and support the frame and cover or grate to the specified final elevation on all manholes, catch basin or other utility structures.

a.            SYSTEM DESCRIPTION
A. Design Requirements – The grade adjustment rings shall be designed to allow final adjustment of the frame and cover or grate to the grade established by the ENGINEER on the project drawings. The rings shall also be designed to accommodate flat or sloping surfaces to within approximately ¼” (one quarter inch) to ½” (one half inch) of the specified final elevation. The grade adjustment system shall have a minimum 50 (fifty) year design life.

B. Performance Requirements – The grade adjustment rings shall be capable of supporting the minimum requirements of AASHTO M-306, H-25 and HS-25, be UV stable and be resistant to chemicals and corrosion commonly associated with the sanitary and storm sewer environments.

b.            SUBMITTALS
A. Test Report – A test report from an approved third party testing agency showing the grade adjustment rings meets the minimum requirements of AASHTO M-306, H-20 and HS-25.

B. Certification – The manufacturer of the grade adjustment rings shall provide certification to the ENGINEER stating that the product meets the design life and material requirements of this specification.

PART 2          PRODUCTS

2.1            MANHOLE AND CATCH BASIN GRADE ADJUSTMENT RING
Manhole and catch basin grade adjustment rings shall consist of a variety of heights (thicknesses), diameters and shapes all conforming to the following requirements:

A. Grade Adjustment Rings – The grade adjustment rings shall be manufactured from ARPRO® Expanded Polypropylene (EPP), black.
5000 series meeting ASTM D3575 and ASTM D4819-13; B6D7G4L3M24S2T7W7. The rings shall be manufactured using a high compression molding process to produce a finished density of 120 g/l (7.5 pcf).

B. “Grade” adjustment rings may contain either an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside with a flat top.

C. “Finish” or “Flat” rings may either have a keyway (groove) on the underside for vertical alignment and/or an adhesive trench with a flat upper surface. These rings shall be available in heights (thicknesses) which will allow final adjustment of the frame and cover or grate to within ¼” (one quarter inch) to ½” (one half inch) of the specified final elevation.

“Finish” rings may also have a keyway on the upper surface of the inner diameter to facilitate installation of an “Angle” ring.

D. “Angle” rings may either have an upper and lower keyway (tongue and groove) for vertical alignment and/or an adhesive trench on the underside. When required, the “Angle” ring or rings shall allow final adjustment of the frame and cover or grate to within ¼” (one quarter inch) to ½” (one half inch) of the specified final elevation.

E. Acceptable Manufacturer – PRO-RING™ by Cretex Specialty Products

2.2 EQUIPMENT
The contractor shall have the required tools and equipment necessary to facilitate proper installation of the grade adjustment rings.

2.3 ADHESIVE/SEALANT
A. Any adhesive or sealant used for watertight installation of the manhole grade adjustment rings shall be M-1 Structural Adhesive/Sealant or equal meeting the following specifications:

ASTM C-920, Type S, Grade NS, Class 25, Uses NT, T, M, G, A and O
Federal Specification TT-S-00230-C Type II, Class A
Corps of Engineers CRD-C-541, Type II, Class A
Canadian Standards Board CAN 19, 13-M82
AAMA 802.3-08 Type II, AAMA 803.3-08 Type I and AAMA 805.2-08 Group C

B. Other adhesives or sealants may only be used with engineer or owner’s written authorization.

2.4 REPAIR MORTAR
A. Repair mortar shall be a one component, quick set, high strength, non-shrink; polymer modified cementitious patching mortar, which has been formulated for vertical or overhead use meeting the requirements of ASTM C-109 for Compressive Strength, C-348 and C-78 for Flexural Strength and C-882 for Slant Shear Bond Strength.
Repair mortar shall not contain any chlorides, gypsums, plasters, iron particles, aluminum powder or gas-forming agents nor shall it promote the corrosion of any steel that it may come in contact with.

B. Acceptable Manufacturers

1. Octocrete by IPA Systems
2. Pre-Approved Equal

2.5 CEMENTITIOUS GROUT
A. Cementitious grout shall be a premixed, non-metallic, high strength, non-shrink grout which meets the requirements of ASTM C-191 and C-827 as well as CRD-C-588 and C-621. When mixed to a mortar or "plastic" consistency, it shall have minimum one day and 28 day compressive strength of 6,000 and 9,000 psi, respectively.

B. Acceptable Manufacturers

1. PennGrout by IPA Systems
2. Pre-Approved Equal

PART 3 EXECUTION

3.1 INSTALLATION
Installation and surface preparation shall be in accordance with the manufacturer's instructions.

The joint between the first grade ring and top of the manhole, catch basin or utility structure shall be sealed using an adhesive/sealant meeting the requirements of Section 2.03.

If the top of the manhole, catch basin or utility structure is not level or is irregular, then a non-shrink repair mortar meeting the requirements of Section 2.04 or non-shrink cementitious grout meeting the requirements of Section 2.05 shall be used. A bed the specified mortar or grout shall be placed on the top surface of the utility structure and then the first grade ring shall be embedded and leveled into the bed of material.

The remaining joints between all manhole adjustment rings and the frame and cover or grate shall be sealed using an adhesive/sealant meeting the requirements of Section 2.03.

No other materials shall be used in the construction of the grade adjustment area beyond those specified above. Prohibited materials include, but are not limited to wood or wood shims of any kind, concrete, brick, block, stones, etc.

The use of any heat shrinkable chimney seals shall only be permitted with engineer or owner’s written authorization.

END OF SECTION
SP-12 TECHNICAL REQUIREMENTS AND SPECIFICATIONS
SANITARY SEWER BYPASS PUMPING NOTIFICATION

PART 1  GENERAL

1.1  SCOPE
Contractor is required to submit a written bypass pumping notification form to Sewer Operations and Maintenance at least one week prior to bypass pumping. The notification form is to be submitted via email to SOMDispatch@cityoftulsa.org.
Contractor: ___________________________ Project: ___________________________
Inspector: ___________________________ Inspector Phone: _______________________
City Engineer _________________________ City Eng Phone: _______________________
By-Pass Pumping Start Date ___________ Expected End Date: _________________
Address: ______________________________
Pump will be installed in manhole #: _______ Pump will discharge to manhole #: _______

**Plan for pump operation to prevent sewage overflows:**
How will pump be monitored after hours to ensure no pumping disruption?

**After-hour contact information for Contractor:**
Primary
Name: ___________________________ Number(s): ___________________________

Secondary
Name: ___________________________ Number(s): ___________________________

1. Form should be emailed to the Sewer Operations personnel at SOMDispatch@cityoftulsa.org, **1-week prior to by-pass pumping event**.
2. Attach to this notification any approved by-pass pumping submittals.
3. If advanced notice cannot be given, form should be emailed immediately after beginning by-pass pumping and Emergency Sewer Response at 918-586-6999 should be contacted.

In the event of sewage overflow or any other emergency while by-pass pumping, **call Emergency Sewer Response at 918-586-6999 for 24-Hour Service.**
SP-13 TECHNICAL REQUIREMENTS AND SPECIFICATIONS

MODIFICATION TO CITY OF TULSA STANDARD SPECIFICATION 327
TRAFFIC CONTROL DEVICES

PART 327 - TRAFFIC CONTROL DEVICES

The following modification(s) shall replace the referenced specification section located in the City of Tulsa Standard Specifications and Standard Details, Dated October 2013.

PART 1  GENERAL

1.1  SCOPE
This specification defines the materials required for Construction Traffic Control and the payment schedule.

PART 2  TRAFFIC CONTROL DEVICES

2.1  MATERIALS
Traffic control devices shall include safety fencing, barricades, signs, barrels, tube channelizers, warning lights, arrow panels, flagmen and all other relevant devices to perform Construction Traffic Control. All devices shall conform to the latest edition of the Manual on Uniform Traffic Control Devices and ODOT Standard Specifications Section 800.02.

PART 3  PAYMENT

3.1  BASIS OF PAYMENT
Payment shall be full compensation for performing the required traffic control for the construction project. The furnishing, installation, and removal of all traffic control devices are to be included in the lump sum for Construction Traffic Control.

3.2  PAYMENT SCHEDULE
Payment for this item will be made in two installments, unless the first estimate submitted is also the final estimate, in which case the total will be paid. The first payment of fifty percent of the Construction Traffic Control lump sum price will be included in the pay estimate which reflects fifty percent completion of the work.

The remaining value of the Construction Traffic Control lump sum will be included on the final pay estimate.

3.3  ADDITIONAL TRAFFIC CONTROL REQUIRED
If additional construction work is added to the original contract, additional payment for Construction Traffic Control will be awarded accordingly. The additional payment will be figured by calculating a daily rate based off the original lump sum value. The daily rate will be calculated by dividing the Construction Traffic Control lump sum value by the number of calendar days in the original contract time.
The additional compensation will be calculated by multiplying the daily rate by the number of additional days required. The additional traffic control payment will be included on the final pay estimate.

END OF SECTION