SECTION 32 17 23.13 - PAINTED PAVEMENT MARKINGS (cont.)

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared. B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation

3.2 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Obliteration of existing markings using paint is acceptable in lieu of removal; apply the black paint in as many coats as necessary to completely obliterate the existing markings. D. Clean surfaces thoroughly prior to installation.

1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods 2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the

pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals. 3. Sandblasting: Use equipment of size and capacity necessary, providing not less than 150 cfm (0.08 cu m per second) of air at pressure not less than 90 psi (625 kPa) at each nozzle used. E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate

solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint. F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals. G. Temporary Pavement Markings: When required or directed by Architect, apply temporary markings of the

1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.

2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking;

remove unsatisfactory tape and replace with painted markings at no additional cost to owner.

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried. B.Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F (10

degrees C) or more than 95 degrees F (35 degrees C). C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown. E. Apply markings in locations determined by measurement from survey control points; preserve control points

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.

1. Apply paint in one coat only. 2. Wet Film Thickness: 0.015 inch (0.4 mm), minimum.

until after markings have been accepted.

3. Length Tolerance: Plus or minus 3 inches (75 mm).

4. Width Tolerance: Plus or minus 1/8 inch (3 mm).

color(s), width(s) and length(s) as indicated or directed.

G. Roadway Traffic Lanes: Use suitable mobile mechanical equipment that provides constant agitation of paint and travels at controlled speeds.

1. Conduct operations in such a manner that necessary traffic can move without hindrance. 2. Place warning signs at the beginning of the wet line, and at points well in advance of the markina equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by

3. If paint does not dry within expected time, discontinue paint operations until cause of slow drying is determined and corrected.

4. Skip Markings: Synchronize one or more paint "guns" to automatically begin and cut off paint flow; make length of intervals as indicated.

5. Use hand application by pneumatic spray for application of paint in areas where a mobile paint applicator cannot be used.

6. Distribute glass beads uniformly on the paint lines within ten seconds without any waste, applied at rate of 6 pounds per gallon (720 g per L) of paint; if the marking equipment does not have a glass bead dispenser, use a separate piece of equipment adjusted and synchronized with the paint applicator; remove and replace markings having faulty distribution of beads.

H.Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings. 1. Mark the International Handicapped Symbol at indicated parking spaces.

2. Hand application by pneumatic spray is acceptable. I. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.4 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked. B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings. C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method. F. Replace removed markings at no additional cost to the owner.

END OF SECTION 32 17 23.13

SECTION 33 30 00 - SITE SANITARY UTILITY **SEWERAGE PIPING**

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes gravity—flow, non—pressure sanitary sewerage outside the building, with the following Cleanouts.

2. Pre-cast concrete manholes. B. Related Sections: The following sections contain requirements that relate to this Section.

1. Division 2 Section "Excavation and Fill" for excavating, backfilling and compacting operations required for sanitary sewer work.

1.2 SUBMITTALS

A. Product Data: Submit complete materials list of items proposed for the work. Submit piping and sewer structures product data B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

C. Sanitary Sewer Record Drawings: Legibly mark drawings to record actual construction. Indicate horizontal

and vertical locations, referenced to permanent surface improvements. Identify field changes of dimension

and detail and changes made by change order. D. Certification: For all materials specified to comply with reference standards, submit Certificate of

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of sanitary sewage system's products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for

not less than 5 years B. Materials and methods of construction shall comply with the following standards.

1. American Water Works Association, (AWWA).

2. American Society for Testing and Materials, (ASTM).

3. American Association of State Highway and Transportation Officials, (AASHTO).

4. American Concrete Pipe Association, (ACPA).

5. City of O'Fallon Standard Construction Specifications 6. Comply with all rules, regulations, or ordinances having jurisdiction over this work. In absence of local codes, comply with the Uniform Plumbing Code.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle piping and accessories to prevent damage and deterioration. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Gasket materials and plastic materials shall be protected from exposure to the direct sunlight. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA No. 704 with classification as indicated in NFPA No. 49 and NFPA No. 325M.

A. Coordinate locations and inverts of sanitary sewer lines at 5' outside building as noted on the plans.

C.Barricade open excavations and post warning lights at work adjacent to public streets and walks.

A. Known underground and surface utility lines are indicated on the drawings. Contractor is responsible for verifying all utility locations shown or not shown. B. Protect existing trees, plant, lawns, and other features designated to remain as part of the landscape work.

D. Promptly repair damage to adjacent facilities caused by sanitary sewer earthwork operations. Cost of repair

at Contractor's expense. E. Promptly notify the owner's representative of unexpected sub-surface conditions.

1.7 COOPERATION

A. Examine Drawings and Specifications for all Contracts to determine the nature of proposed construction. Perform work to conform with construction called for in such a manner as not to interfere or delay work of other Contractors.

PART 2 PRODUCTS

2.1 PIPES AND PIPE FITTINGS:

A. General: Provide pipes of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicate. B. Gravity Sewer Piping:

1. Polyvinyl Chloride (PVC) Pipe: ASTM D3034, Type PSM, SDR 35 (unless otherwise indicated) C. Joints for Gravity Sewer Pipings: 1. PVC Pipe: Elastomeric joints complying with ASTM D3212 using elastomeric seals complying with ASTM

D. Manholes and Cleanouts E. Frames and Covers: ASTM A48 gray cast—iron, asphalt coated, with lettering cast into top reading

"SANITARY SEWER". 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include, but are not limited to, the following: a. Neenah Foundry Co., Neenah, W

b. McKinley Iron Works, Fort Worth, TX

c. Flockhart Foundry Co., Newark, NJ 2. Concrete Masonry Units: ASTM C139.

3. Precast Concrete Manhole Barrels and Cones: ASTM C478, 5" wall thickness with ASTM C443 "O" -

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include, but are not limited to the following: (1) Kienstra, Inc., Woodriver, IL

(2) Kistner Septic Tank Co., Inc. Cheektowaga, NY (3) Warren Concrete Products, Inc., Warren, PA

(4) United States Concrete Pipe Company, Cleveland, Ohio.

4. Manhole Rungs: cast-iron steps. 5. Manhole Drop Assembly: The vertical drop pipe and sweep shall be made from polyvinyl chloride (PVC) sewer pipe and fittings as specified herein. The fitting required for this work shall be molded PVC tees, plugs, and adapters. To the inside end of the tee, a threaded adapter shall be solvent

welded, utilizing fresh solvent cement, made by the fittings manufacturer, containing at least 15 percent by weight of the same PVC compound used in making the fittings. Outside drop assemblies shall be encased in concrete as indicated on drawings. 6. Bedding Material: Clean, natural sand conforming to requirements in Section 02200 or minus—fraction

7. Backfill Material: Backfill material shall adhere to the requirements of the local governing agency(s). 8. Pipe Connections: The precast reinforced concrete manhole sections shall be provided with circular openings at the locations and elevations for the proper connection of all pipes. Unless otherwise indicated, all PVC pipe connections shall be sealed with a flexible manhole seal assembly, per ASTM

C-923. Flexible manhole seal assemblies shall permit at least an eight (8) degrees deflection from

PART 3 EXECUTION

A. Permits and Inspections: File all drawings and obtain all necessary permits, licenses, and inspections required by authorities having jurisdiction over the work.

B. Layout sanitary sewer work and establish extent of excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels and elevations. C. Do not cover or enclose work of this Section before obtaining required inspections, test approvals and location recording.

the centerline of the opening in any direction while maintaining a watertight connection.

3.2 EXISTING UTILITIES

A. Before starting excavation, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as work progresses. B. Protect active utility services uncovered by excavation.

A. Pipe and accessories shall be handled so as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. No other pipe or material of any kind shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Owner. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

3.4 CUTTING OF PIPE:

A. Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Copper tubing shall be cut square and all burrs shall be removed. Squeeze type mechanical cutters shall not be used for ductile iron.

3.5 LOCATING SEWER LINES NEAR WATER LINES:

A. Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be laid closer horizontally than 10 feet from the water pipe except where the bottom of the water pipe will be at least 18" above the top of the sewer pipe, in which case the sewer shall not be laid closer horizontally than 6 feet from the water pipe. Where gravity—flow sewers cross above water lines, the sewer pipe for a distance of at least 10 feet on each side of the crossing shall be fully encased in concrete or shall be made of pressure pipe. The minimum cover of the concrete encasement, including that at the pipe joints, shall not be less than 6" unless otherwise indicated on the drawings. Water and sanitary line crossings shall be at the mid points of full lengths of both pipes.

3.6 SEWER LINES AT STRUCTURES

A. Where shown on the drawings, the sewer pipe shall be sleeved as required. Care shall be exercised and proper precautions taken during installation of the sewer pipe and sleeve to assure that there will be no damage to such structures and no settlement or movement of foundations or footings. Any damage occurring as a result of the Contractor's operation shall be corrected and all costs connected there with shall be borne by the Contractor. When the sewer pipe location is within 3 feet of a proposed building, retaining wall, or structural foundation as stated above, the pipe shall be sleeved as required for an existing structure.

3.7 TRENCHING

A. Perform excavating and backfilling as required to install sanitary sewer work. Excavation and backfill operations shall comply with the requirements of the local governing agency(s).

B. Provide trench wall support and pumping of surface and ground water as required to provide suitable conditions for performing the work. C. Excavate trenches to accommodate indicated bedding conditions and material. Trim and shape trench bottoms to proper line and grade, free of irregularities. Remove unstable material and replace with

3.8 PLACING AND LAYING OF PIPE

A. Pipe shall be protected during handling against impact shocks and free fall and the pipe interior shall be free of B. Gravity Sewer Piping

1. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the drawing by use of a laser projector in the downstream manhole. Lay and fit pipe with sealed joints and full bearing in bedding material. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior

2. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, and primers, shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted so as to obtain the degree of water tightness required.

3. Installation of PVC pipe shall be installed in accordance with ASTM D2321 and ASTM F402, and all required precautions shall be taken to assure adequate trench ventilation and protection for workers installing the pipe. C. Trenches shall be kept free of water and as dry as possible during bedding, laying, and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that

no trench water or other material will enter the pipe or fittings. D. Install pipe joint gaskets in accordance with manufacturer's recommendations.

I. Fill, compact, and restore to subgrade level and condition all settlement.

passage where space permits

E. Cut pipe ends entering structures flush with inner face of structures. F. Extend sanitary sewer system as shown on drawings and make required connection.

G. Backfill trenches to subgrade with suitable materials and per the compaction requirements as specified per the 1. Backfill evenly on both sides of piping for its full depth. Provide thorough compaction of fill under pipe

2. Provide granular backfill of 3/4" minus crushed limestone and compacted to a minimum 95% of standard density (ASTM D-698 or AASHO T-99-57). Use of clean rock will not be permitted

H. Mechanically compact backfill in accordance with the requirements of the geotechnical report. Water settling, puddling, and jetting as a compaction method are not acceptable.

3.9 TESTING A. General:

1. The Contractor shall maintain his work site in a manner that will be fully accessible by the Owner's Representative for observation of the work. 2. The Contractor shall conduct the leakage test promptly following installation of waste water pipe.

This test shall include services that have been constructed 3. The Contractor shall notify the Owner's Representative 48 hours before conducting the leakage test so that the Owner's Representative can schedule inspection and observation of the test.

4. The Contractor shall provide all equipment and conduct the test. B. Plastic Pipe Deformation: In addition to leakage tests, a deformation test will be done as follows: 1. The test shall be conducted not less than one month (30 days) after backfill has been properly

2. The maximum allowable deflection shall not exceed 5% of the pipe's internal diameter. 3. Mandrel testing shall be performed on 100% of the pipeline. 4. Mandrels shall be "Wortco 9-Arm Mandrel" (5% deflection) for flexible or semi-rigid pipe or approved

5. Gauge shall be pulled through the pipe by hand. Mechanical pulling assistance is not permitted. 6. If any section of pipe does not conform to this requirement, it shall be replaced by the Contractor at no cost to the Owner. Leakage re-testing and mandrel re-testing shall take place 30 days after

C. Leakage:

1. General: e. Contractor shall clean pipe of excess mortar, joint sealant, and other dirt and debris prior to f. Sewer will be inspected by flashing a light (lamping) between manholes and/or by physical

a. For water tests, the allowable exfiltration shall be less than 0.15 gallons per inch of internal

diameter per hour per 100' of pipe length (200 gallons per inch of ID per day per mile) per 24

g. The Owner's Representative will determine from illumination and/or physical inspection the presence of visible infiltration or other defects. h. Defects shall be corrected prior to conducting leakage tests. 2. Leakage test shall be done either by a water exfiltration test or air exfiltration test.

b. For air exfiltration tests, the holding time shall not be less than that listed below:

MINIMUM TIME REQUIRED FOR A 1.0 psig PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015 (CFM/SF INTERNAL SURFACE AREA)

eter	Minimum Time, (min:sec)	Length for Minimum Time, (ft)	Time for Longer Length, (sec)	Specification Time for Length (L) Shown, (min:sec)							
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
	5:40	398	0.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48

c. The Contractor may use air exfiltration testing for pipes of all sizes. d. The Contractor shall perform water exfiltration tests on manholes and may perform water

exfiltration tests on sewer pipe larger than 18" ID. 3. Any sections of pipe not meeting the test requirements shall be repaired and the test shall be repeated until work is acceptable.

a. The Contractor is encouraged to pretest the pipes prior to notifying the Owner's Representative and formal testina. b. For any section of pipe not passing the test when requested by the Contractor, the Contractor shall be responsible for the total cost of re-inspection. The Owner reserves the right to deduct

D. Exfiltration Test (Water)

1. The Contractor shall furnish all labor, equipment, tools, and materials required including bulkheads, water, and all miscellaneous items required to perform the test

the cost of re-inspection from the Contractor's payment for the work.

2. Perform all tests for lines at a minimum water depth 2' above the high point of the system or 2' above ground water elevation, whichever is higher. perform tests at a minimum water depth of 2' above casting elevation for manholes. 3. Tests shall be maintained to locate all leaks, but not less than two hours. Measurement of

exfiltration amounts shall be confirmed by the Owner's Representative. 4. Tests shall be repeated after repair of leaks and defects, until leakage meets the requirements of this

5. Manholes and other structures shall be protected by means of bulkheads to prevent bursting pressure from being applied inside the structure. 6. Pipe shall be de-watered upon completion of the successful test.

E. Exfiltration Test (Air)

1. In the areas where ground water is known to exist, the Contractor shall install a 1/2" diameter capped pipe nipple approximately 10" long through the manhole wall on top of one of the sewer lines entering the manhole.

a. Install at the time the sewer line is installed b. Immediately prior to performance of the line acceptance test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground to clear it, and then connecting a clear plastic tube to pipe nipple. c. The hose shall be held vertically and measurement of height of water, in feet, shall be taken after the water stops rising in this plastic tube.

d. The height shall be divided by 2.3 to establish the pounds of pressure that will be added to all

2. Contractor shall furnish all facilities required including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulators to avoid over—pressurization, and all miscellaneous

a. The pipe plug for introducing air to the sewer pipe shall be equipped with two taps. One tap will be used to introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. An additional valve and fitting will be incorporated on the tap used to check internal pressures so that a second test aguae may be attached to the internal pressure tap. Pressure test gauge will also be used to ndicate loss of air pressure due to leaks in the sewer line.

Subdivisions -- 0.05 ps; pressure Tube Bourdon 2 or diaphragm; Accuracy -- +/- 0.25% of maximum scale reading; Dial white coated aluminum with black lettering, 2700 arc and mirror edge; Pipe Connection - low male, 1/2" NPT. c. Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will

(diameter)-4-1/2"; Pressure Range -- 0 to 15 psi; Figure Intervals 1 psi increments; Minor

b. The pressure test gauge shall meet the following minimum specifications: Size

be available to the Owner's Representative whenever air tests are performed 3. Test each reach of sewer pipe between manholes at the completion of the installation of pipe and appurtenances and the backfill of the sewer trench. 4. Plug ends of line, cap or plug all connections to withstand internal pressure. One of the plugs

provided must have two taps for connecting equipment. a. After connecting air control equipment to air hose, monitor air pressure so that the internal pressure does not exceed 5 psiq. b. After reaching 4 psig, throttle the air supply to maintain between 4 and 3.5 psig for at least

two minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. c. If plugs are found to leak, bleed off air, tighten plugs, and re—pressurize. After the temperature has stabilized, the pressure is allowed to decrease to 3.5 psig. d. At 3.5 psig. begin timing to determine the time required for the gir pressure to drop to 2.5

psig. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is

greater than the time shown in Table 1 in this section, the pipe shall be presumed free of

F. If the air test fails to meet the above requirements, repeat test as necessary after all leaks and defects have been repaired. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the low

3.10 REPAIRS TO BROKEN PIPE:

pressure air test or the exfiltration test.

A. Where cracks or ruptures develop in the pipe after installation, the entire length of pipe to a distance of at least 3 feet beyond the pipe joint on each side of the damage area shall be re—excavated. The pipe shall be replaced, or if approved by the Architect, shall be repaired in a suitable manner. Details of repairs shall be submitted for record. If the Contractor utilizes concrete cradle or encasement in his repair, he shall take precautions to guard against shear breaks at the limits of the concrete. Repaired sections shall be reinspected approximately 6 months after completion of the repair. Should additional failures be noted, they shall be promptly repaired and later reinspected as approved and at no additional cost to the Owner.

3.11 MANHOLE STRUCTURES

A. Precast Concrete Manholes 1. Place precast concrete manhole sections as indicated. Where manholes occur in pavements, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3" above finish surface, unless

otherwise indicated. a. Install in accordance with ASTM C891.

b. Provide rubber joint gasket complying with ASTM C443 at joints of sections. c. Apply bituminous mastic coating at joints of sections. B. Construct flow channels with concrete, conforming to the inside diameter of connecting lines. Make changes in grade gradually and make changes in line with true curves.

C. Set frames and covers to required grade and bed in place with mortar. D. Cold weather protection: Provide all necessary means for heating concrete, masonry materials, and mortar to protect concrete and masonry work during and after installation from damage by frost and freezing. E. Perform no work when the temperature is below 25 degrees F. (ambient)

A. Furnish and install where shown on Drawings all exterior cleanouts extended to finished grade, with solid cover, of size indicated on Drawings. Where cleanouts occur in lawn area, provide concrete collar per detail.

3.13 CONNECTIONS TO EXISTING MANHOLES: A. Pipe connections to existing manholes shall be made in such manner that the finished work will conform as nearly as practicable to the essential applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping.

3.14 BUILDING CONNECTIONS:

A. Shall include the lines to and connection with the building waste drainage piping at a point approximately 5 feet outside the building, unless otherwise indicated. Where building drain piping is not installed, the contractor shall terminate the building connections approximately 5 feet from the site of the building at a point as shown on the plans.

3.15 TAP CONNECTIONS:

A. Make connections to existing piping and underground structures, so that finished work will conform as nearly

as practicable to requirements specified for new work. B. For branch connections from side into existing 24" or larger pipe or to underground structures, cut opening into unit sufficiently large to allow 3" of concrete to be placed around entering connection. Cut ends of connection passing through pipe or structure wall to conform to shape of, and be flush with, inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6" of concrete for a minimum length of 12 to provide additional support or collar from connection to undisturbed

1. Provide concrete which will attain minimum 28—day compressive strength of 3,000 psi unless otherwise 2. Use epoxy bonding compound as interface between new and existing concrete and piping materials. C. Take care while making tap connections to prevent concrete or debris from entering existing piping or

structure. Remove debris, concrete, or other extraneous material which may accumulate. 3.16 CLOSING ABANDONED UTILITIES:

A. Close open ends of abandoned underground utilities which are indicated to remain in place. Provide sufficiently strong closures to withstand hydro-static or earth pressure which may result after ends of 1. Close open ends of concrete or masonry utilities with not less than 8" thick brick masonry bulkheads.

2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods for

size and type material being closed. Wood plugs are not acceptable.

3.17 DISPOSAL OF WASTE MATERIALS A. Stockpile, haul from site and legally dispose of waste materials, including excess excavated materials, rock, trash, and debris. B. Maintain disposal route clear, clean, and free of debris.

3.18 CLEANING

A. Maintain sanitary sewer piping and structures in a clean workable condition during construction operations. B. Flush sanitary sewer system with water in sufficient volume to obtain free flow through each line. Remove all silt, trash, and debris just prior to acceptance of work by Owner. C. Upon completion of sanitary sewer work, remove tools and equipment. Provide site clear, clean, free of

debris, and suitable for site work operations. END OF SECTION 33 31 11

SECTION 33 41 11 - SITE STORM UTILITY DRAINAGE **PIPING**

PART 1 GENERAL

1.1 SUMMARY A. Extent of storm sewage systems work is indicated on drawings and schedules, and by requirements of this

D. Division 3 Sections for cast—in—place concrete work as required for storm sewage systems.

B. Related Sections: The following sections contain requirements that relate to this Section: C. Division 2 Section "Earthwork" for excavation and backfill work as required for storm sewage systems.

A. Product Data: Submit manufacturer's technical product data and installation instructions for storm sewage system materials and products. B. Shop Drawings: Submit shop drawings for storm sewage systems, showing piping materials, size, locations, inverts, and reinforcement. Include details of underground structures, connections, and manholes. Show interface and spatial relationship between piping and proximate structures.

C. Record Drawings: At project close-out, submit record drawings of installed storm sewage piping and D. Maintenance Data: Submit maintenance data and parts lists for storm sewage system materials and

products. Include this data, product data, shop drawings, and record drawings in maintenance manual.

pertaining to storm sewage systems.

1.3 QUALITY ASSURANCE: A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of storm sewage system's products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not

B.Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with storm sewage work similar to that required for project. C. Codes and Standards:

D. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of storm sewage system's materials and products. E. Comply with the latest edition of the City of O'Fallon Standard Construction Specifications F. Environmental Compliance: Comply with applicable portions of local Environmental Agency regulations

PART 2 PRODUCTS

2.1 PIPES AND PIPE FITTINGS:

A. General: Provide pipes of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated. B. Storm Lines 10 inch diameter or less; Contractor's option, except where specifically indicated otherwise:

C. Storm Lines 12 inch diameter or larger; Contractor's option, except where specifically indicated otherwise. 1. Concrete Pipe: ASTM C 76, Class III, reinforced concrete pipe unless otherwise indicated. 2. Corrugated Metal: Materials shall conform with AASHTO M218 (ASTM A 444) with 2.0 oz. of zinc per sq. ft. Fabrication shall comply with AASHTO M36, Type 1 round and/or Type 2 other shapes as indicated. Provide flared end sections on all exposed ends, unless skewed or beveled ends are indicated or unless pipe terminates at a concrete headwall.

a. Minimum metal thickness for round pipe. (1)Up to and including 24" dia. 14 gauge. (2) 27" to 36" dia. 12 gauge.

(3) 42" to 72" dia. 10 gauge. 3. Polyvinyl Chloride(PVC) Pipe: ASTM D-3034, Type PSM, SDR 35.

1. Polyvinyl Chloride (PVC) Pipe: ASTM D 3034, Type PSM, SDR 35.

D. Pipe Fittings 1. Concrete Pipe: Reinforced or non-reinforced concrete fittings to match type and strength of concrete pipe being joined. Tongue—and—groove gasketed joints complying with ASTM C 443. 2. PVC Pipe: Bell and spigot elastomeric joints shall conform to ASTM D3212 and shall be assembled with gaskets conforming to ASTM F477. Assembly shall be per manufacturer's specifications. 3. Corrugated Metal Pipe: Comply with the requirements of AASHTO M36 and in addition include neoprene gaskets as indicated in the technical manual of the National Corrugated Steel Pipe Association. Design to provide strength to preserve pipe alignment, to prevent separation of pipe to prevent filtration of fill material and penetration of roots into pipe, and to prevent seepage of storm

E. Precast Concrete Manholes and Catch Basins 1. Units shall be manufactured in accordance with ASTM C478, Specifications for Precast Reinforced Concrete Manhole Risers and Tops.

2. Concrete to be minimum 3000 psi at 28 days. 3. Joints between units shall be made using flexible watertight rubber gaskets, Portland Cement mortar or approved jointing compound, at Contractor's option and to meet local regulations. 4. Include cast iron steps and traps where indicated, at all required openings.

5. Available Manufacturers: Subject to compliance with requirements, products which may be incorporated include but are not limited to the following: a. Kienstra, Inc. — Woodriver, IL

accordance with manufacturer's written recommendations.

b. Kistner Septic Tank Co., Inc., Cheektowaga N.Y.

c. Warren Concrete Products, Inc., Warren, Pennsylvania

d. United States Concrete Pipe Company, Cleveland, Ohio

water out of pipe.

2.2 DRAINAGE STRUCTURE CASTINGS A. Material: Gray iron castings, ASTM A-48-76 Class 30B. B. Finish: One coat of high grade bituminous asphalt paint, Federal Spec. MIL-C-4508, on all castings except where field painting is indicated. Surface preparation for shop priming and field painting shall be SSPC—SP10 near—white blast cleaning and prime paint shall be equivalent to TNEMEC 66-1211 Epoxoline Primer applied in

C. Manufacturer: The products of the Neenah Foundry Company, Neenah, Wisconsin, have been indicated on the

Drawings by catalog number to establish the types and quality of products expected. Submit other equivalent product manufacturer for review and approval by the architect.

A. Cleanout pipe and fittings shall be cast—iron soil pipe conforming to ASTM A74—69, extra heavy, table 1.

Each cleanout shall have a brass ferrule and a cast—brass screw jointed plug with socket for wrench.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE AND PIPE FITTINGS: A. General: Install pipeline in accordance with governing authorities having jurisdiction, except where more stringent requirements are indicated. B. Bedding: Round trench bottom so that pipe has firm bearing on well compacted soil or on undisturbed soil. Provide minimum of 4" of minus crushed stone where bed rock or broken rock exists on trench bottom.

C. Inspect piping before installation to detect apparent defects. Mark defective materials with white paint and D. Lay pipe true to line and grades. Set grade boards maximum of 30 ft. on center. Begin at low end. Place spigot ends facing downstream. Center spigot in bells with inverts smooth and uniform. Protect

Excavate bell hole by hand. Do not lay pipe in Wet trench. Do not permit water in trench until joints are

Install rubber aasket or caulked joints per manufacturer's recommendations. Install oakum or jute in place. Ram mortar into joint with wooden caulking tool. Over—fill joint and finish to smooth 45 degrees bevel. E. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. F. Concrete Pipe: Install in accordance with applicable provisions of ACPA "Concrete Pipe Installation Manual".

G. Plastic Pipe: Install in accordance with manufacturer's installation recommendations, and in accordance with

exposed ends against impact, dirt, cement, and debris. A perfect circle shall be evident when "lamped".

H. Cleaning Piping: Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning. 2. Place plugs in ends of uncompleted conduit at end of day or whenever work stops. 3. Flush lines between manholes if required to remove collected debris. I. Joint Adaptors: Make joints between different types of pipe with standard manufactured adapters and

fittings intended for that purpose. J. Closing Abandoned Utilities: Close open ends of abandoned underground utilities which are indicated to remain in place. Provide sufficiently strong closures to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed 1. Close open ends of concrete or masonry utilities with not less than 8" thick brick masonry bulkheads.

2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such

2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Wood plugs are not acceptable. K. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred. 1. Make inspections after lines between manholes, or manhole locations, have been installed and approximately 2' of backfill is in place, and again at completion of project.

A. Manholes, Catch Basins & Trench Drains 1. Precast structure: Place on prepared subgrade per detail and manufacturer's recommendations and

as practicable to requirements specified for new work.

B. Headwall: Construct as detailed. Finish as specified for Formed Surfaces in Division 3.

defects, and re-inspect.

3.2 DRAINAGE STRUCTURES

A. Cleanouts shall be provided and installed in location indicated. Rim of cleanout flush with finished grade.

opening into unit sufficiently large to allow 3" of concrete to be packed around entering connection. Cut ends of connection passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure all, encase entering connection in 6" of concrete for minimum length of 12" to provide additional support or collar from connection to undisturbed 1. Provide concrete which will attain minimum 28-day compressive strength of 3000 psi, unless otherwise

2. Use epoxy bonding compound as interface between new and existing concrete and piping materials.

C. Take care while makina tap connections to prevent concrete or debris from entering existing piping or

A. Make connections to existing piping and underground structures, so that finished work will conform as nearly

B. For branch connections from side into existing 24" or larger piping, or to underground structures, cut

structure. Remove debris, concrete, or other extraneous material which may accumulate.

A. General: Conduct backfill operations of open—cut trenches closely following laying, jointing, and bedding of pipe, and after initial inspection and testing are completed. Backfill material and requirements shall adhere to the requirements of the local governing agency(s). 1. To minimize local area traffic interruptions, allow no more than 100' between pipe laying and point of complete backfilling.

3.6 FIELD QUALITY CONTROL: A. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

END OF SECTION 33 41 11



ARCHITECT:

Mitchell and Hugeback Architects, Inc. D.B.A. M+H Architects 2150 Schuetz Road, Suite 200 St. Louis, Missouri 63146 314-878-3500

Corporate License No.: 000614

CONSULTANTS:

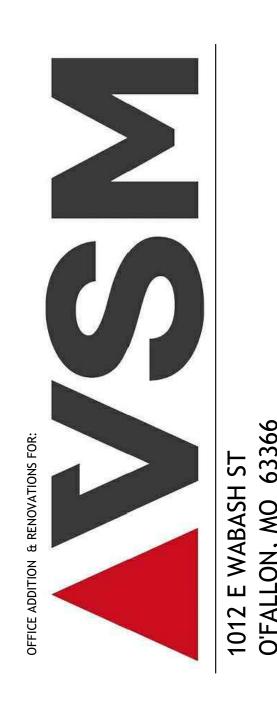
Structural:

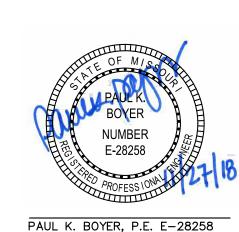
(Design - Build)

www.mha.us.com

Civil Engineering Design Consultants, Inc. 10820 Sunset Office Drive, Suite 200 St. Louis, MO 63127 314-729-1400 Corporate License No.:2003004674

SSC Engineering, Inc. 18207 Edison Ave. St. Louis, MO 63005 636-530-7770 Corporate License No.: 001244





CIVIL ENGINEER CEDC LICENSE NO.: 2003004674

8-31-18

10-5-18

10-30-18

11-27-18

PROGRESS SET

CITY SUBMITTAL

CITY RESUBMITTAL

PERMIT SET

DESCRIPTION:

Checked By:

Drawing Title:

10-5-18 Issue Date: Job Number: 1823 Drawn Bv: PKB

PKB

Specification