THE METROPOLITAN SEWER DISTRICT
OF GREATER CINCINNATI, OHIO
PROPOSED PROJECT ID. 10142950
EAST BRANCH OHIO RIVER INTERCEPTOR (EBORI) EXTENSION – CSOs 432 AND 489 SEPARATION

VOLUME TWO SPECIFICATIONS (DETAILED PROVISIONS)

THIS PAGE INTENTIONALLY LEFT BLANK

THE METROPOLITAN SEWER DISTRICT
OF GREATER CINCINNATI, OHIO
PROPOSED PROJECT ID. 10142950
EAST BRANCH OHIO RIVER INTERCEPTOR (EBORI) EXTENSION
CSOs 432 AND 489 SEPARATION

VOLUME TWO SPECIFICATIONS (DETAILED PROVISIONS)
TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 2 – EXISTING CONDITIONS

DIVISION 3 – CONCRETE

DIVISION 31 – EARTHWORK

DIVISION 33 – UTILITIES

SECTION 01 11 00

SUMMARY OF PROJECT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Summary.

B. Reference Specifications/General.

C. Sequence Of Work.

D. Contractor's Use Of Site.

E. Construction Procedure.

F. Requests For Supplementary Information.

G. Permits/Agreements.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.03 PROJECT SUMMARY

A. Work of the Project includes construction of Sewer Separation of combined sewers associated with CSO 432 and CSO 489. The Work shall be performed for the CITY in accordance with the Contract Documents. The Work includes, but is not limited to, demolition, removal, replacement, installation of new infrastructure and/or modifications to existing infrastructure; the furnishing of all materials, equipment and tools; and performing all necessary labor and supervision, for the complete construction of the Work and all other work appurtenant thereto, as described in Divisions 1 through 48 of these Specifications in the following areas:

1. Sewer Separation work shall include the installation of approximately 4,400 LF of storm and sanitary sewers ranging in size from 12-inch to 48- inch diameter by open-cut; approximately 330 LF of 42-inch storm sewer by trenchless installation; install, modify, or remove and replace approximately 50 manholes, one with outside drop connection and one with an inside drop connection to existing manhole; remodel bottom or remove and replace inlets; and relocation of various local utilities.

B. Test borings that were drilled for this project have been indicated on the plans. A Geotechnical Data Report is provided as part of the Contract Documents.

1.04 REFERENCE SPECIFICATIONS/GENERAL

A. To the extent the Technical Specifications and Construction Drawings in the Contract Documents reference the State of Ohio, Department of Transportation, Construction and Material Specifications (the "ODOT Specifications"), the Work shall be performed in accordance with the requirements of the applicable ODOT Specifications, unless the applicable ODOT Specifications are modified by and more stringent than the City of Cincinnati, Supplement to the State of Ohio, Department of Transportation, Construction and Material Specifications (the "City Supplement"). If the ODOT Specifications are modified by and more stringent than the City Supplement, the Work shall be performed in accordance with the City Supplement. Division 00 of the Contract Documents replaces Section 100 of ODOT Specifications. Finally, to the extent that either the ODOT Specifications or the City Supplement is inconsistent with the Contract Documents, the Work shall be performed in accordance with the most stringent requirements.

1.05 SEQUENCE OF WORK

A. The CONTRACTOR shall schedule the Work to conform to the general construction sequencing requirements described in Section 01 12 16 - Construction Sequence.

1.06 CONTRACTOR’S USE OF SITE

A. The CONTRACTOR shall locate field offices, store materials and equipment and confine his construction activities to areas so indicated on the Drawings or as directed by the CITY. It is believed that areas available within construction boundaries for locating field offices, storing materials and equipment may be insufficient for construction activities; therefore, CONTRACTOR will need to establish storage and staging areas outside of the project limits on their own accord. The CONTRACTOR shall also comply with all applicable Special Right-of-Way provisions in Section 01 14 00 – Control of Work.

B. Though not anticipated to be required, any access and work on or adjacent to the Norfolk Southern and CSX railroad property must have the proper right-of-entry and railroad oversight, and level of oversight required is dependent on construction activities. Norfolk Southern and/or CSX may require railroad oversight for construction activities beneath or directly adjacent to railroad infrastructure. NOTE: The railroad may have long lead times for oversight personnel and activities on railroad site will need to be scheduled accordingly.

C. EMERGENCY CONTACT for Norfolk Southern is 1-800-453-2530. This number should be used to contact the railroad in the event there are any emergencies on Norfolk Southern property. Other Contacts will be provided during Protection Services Scheduling after CONTRACTOR has applied for the construction permit.

1.07 CONSTRUCTION PROCEDURE

A. It shall be the CONTRACTOR'S responsibility during the construction of the Project to work equipment around poles, trees, or other obstructions which permit the passage of the bucket and boom but prevent passage of other portions of the equipment and, if necessary, to excavate from both sides of the poles, trees, or other obstruction, and to remove materials by hand labor, tunneling, or by other means, all at no additional cost to the CITY.

1.08 REQUESTS FOR SUPPLEMENTARY INFORMATION

A. It shall be the responsibility of the CONTRACTOR to make timely requests of the CITY for any additional information not already in the CONTRACTOR'S possession and which should be furnished by the CITY under the terms of the Contract Documents, and which will be required in the planning and execution of the Work. Such requests may be submitted from time to time as the need approaches, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

B. Each request shall be in writing, and list the various items and the latest day by which each will be required by the CONTRACTOR. The first list shall be submitted within 2 weeks after contract award and shall be as complete as possible at that time. The CONTRACTOR shall, if required, furnish promptly any assistance and information the CITY may require in responding to these requests of the CONTRACTOR. The CONTRACTOR shall be fully responsible for any delay in Work, or to the work of others, arising from failure to comply with the provisions of this section.

1.09 PERMITS

A. The CONTRACTOR shall be responsible to obtain and incur the cost of all required permits unless otherwise noted, including but not limited to, a cut/fill permit, roadway permits, MSDGC special wastewater discharge permit, and any permit required for local governments. The CITY shall be responsible to obtain and incur the cost of the following permits:

1. Ohio EPA Permit to Install.
2. Norfolk Southern Railroad Agreements.
3. CSX Railroad Agreements.

B. Although the CITY may obtain and incur the cost of a permit, the CONTRACTOR shall comply with provisions of all permits and make any necessary submittals as detailed in Section 01 14 00 – Control of Work.

C. All CONTRACTORS and Subcontractors of any tier, shall comply with all applicable standards, orders, regulations and permits, including but not limited to the Clean Water Act of 1970 (42 U.S.C. 1857, et seq.), the Federal Water Pollution Control Act (33 U.S.C. 1251, et seq.) as amended, Permits to Install, and NPDES 401 and 404 Permit requirements.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 11 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 12 16

CONSTRUCTION SEQUENCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site Conditions.

B. Construction Constraints.

C. Suggested Construction Sequence.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. See Section 01 14 00 - Control of Work for Maintenance of Flow requirements.

1.03 SITE CONDITIONS

A. Pre- and Post-Construction Survey of Adjacent Facilities and Properties:

1. After Effective Date of the Agreement and before Work at Site is started, CONTRACTOR and his engineer, OWNER'S REPRESENTATIVE, CITY, CITY'S public relations representative, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, bridges (from street level), utilities, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
2. The CONTRACTOR shall perform both pre-construction and post-construction surveys of all properties along West 7th Street in the vicinity of the sewer separation work.
3. CONTRACTOR engineer shall be an Ohio Licensed Engineer familiar with construction work and practices to document examination of pre-construction conditions.
   a. Gain permission from the property owner for access to private property to document pre-construction conditions.
   b. Send a certified, return receipt requested introductory letter (wording to be reviewed by CITY) to inform the property owner of the survey and to request permission to survey the existing conditions.
   c. Notify CITY and log all contacts with all property owners, including property owners that refuse access.
   d. Use the CITY'S public relations representative to coordinate pre- and post-construction survey with each property owner.
4. Periodic re-examination shall be jointly performed to include, but not be limited to, cracks in structures, settlement, leakage, and similar conditions.

5. Document and video record the existing conditions for each property and utility surveyed, clearly and precisely showing and describing existing damage:
    a. Provide continuous footage of the entire duration spent on private property. Describe the lengths and widths of existing cracks in the video recording. Survey at least the following on each property:
        1) Foundations.
        2) Exterior walls, interior walls and ceilings of buildings.
        3) Retaining walls.
        4) Driveways, sidewalks, signage, parking lots.
        5) Other auxiliary structures and features that may be at risk of damage due to construction activities.
    b. Provide continuous footage of the utilities and vaults survey along the alignment. Describe conditions in accordance with National Association of Sewer Service Companies (NASSCO) standards.
    c. Record and submit documentation of observations made on examination inspections in accordance with Item Construction Photographs, and Item Audio-Video Recordings.
    d. Upon receipt, CITY will review, sign, and return one record copy of documentation to CONTRACTOR to be kept on file in field office.
    e. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of CONTRACTOR’S operations, and is for the protection of adjacent property owners, CONTRACTOR, and CITY.
6. Construction Photographs:
    a. Photographically document all phases of the Project including pre-construction, construction progress, and post-construction.
    b. CITY shall have right to select subject matter and vantage point from which photographs are to be taken.
    c. Digital Images:
        1) No post-session electronic editing of images is allowed without approval from the CITY.
        2) Stored image shall be actual image as captured without cropping or other edits.
        3) Minimum Resolution: 1832 pixels by 3264 pixels and 24-bit, millions of color so that viewed resolution is high quality. The production of higher resolution images is encouraged.
    d. Pre-construction and Post-construction:
        1) After effective date of the agreement and before Work at site is started, and again upon issuance of Substantial Completion, take sufficient photographs to document the Site and perimeter of the Site.
        2) Emphasis shall be directed to structures both inside and outside the Site.
    e. Construction Progress Photos: Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
    f. Documentation:
        1) Electronic file shall have date taken embedded into image.
        2) Archive using a commercially available photo management system that provides listing of photographs including date, keyword description, and direction of photograph.

7. Audio Video Recordings:
   a. In the case of pre-construction recording, no work shall begin in the area prior to OWNER'S REPRESENTATIVES'S review and approval of content and quality of video for that area.
   b. Emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within work limits and areas adjacent to and within the right-of-way or easement, and on CONTRACTOR storage and staging areas.
   c. OWNER'S REPRESENTATIVE shall have right to select subject matter and vantage point from which videos are to be taken.
8. Video Format and Quality:
   a. Digital format, with sound.
   b. Video:
      1) Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.
      2) Electronically, and accurately display the month, day, year, and time of day of the recording.
   c. Audio:
      1) Audio documentation shall be done clearly, precisely, and at a moderate pace.
      2) Indicate date, project name, and a brief description of the location of recording, including:
         a) Facility name.
         b) Street names or easements.
         c) Addresses of private property.
         d) Direction of coverage, including engineering stationing, if applicable.
9. Documentation:
   a. Project Video Log: Maintain an ongoing log that incorporates above noted label information for videos on Project.
10. For the remainder of the project area (other than West 7th Street), at the discretion of the CITY, the CITY will videotape the construction limits along the proposed alignment or work areas as detailed on the plans, within the Right-of-Way or easements, as well as potentially impacted properties adjacent to the work zone. The videotape will document pre-construction (existing) and/or post construction conditions. The CONTRACTOR shall make himself available at the project site during the videotaping, when requested by the CITY.

B. The CONTRACTOR may be allowed to use, if available, non-potable plant water after express approval from the CITY at no charge. The CITY reserves the right to restrict access or charge for plant water service if CONTRACTOR abuses his right of use, including water wastage or excessive use.

C. During Start-Up Testing, make available the manpower, equipment and manufacturer's representatives required to make any necessary adjustments and training.

1.04 CONSTRUCTION CONSTRAINTS

A. The following is a list of constraints to consider in developing the overall plan of construction. This list is not intended to release the CONTRACTOR from the responsibility to coordinate the Work in any manner which will ensure Project completion within the time allowed.

1. Tree removal must occur between October 1 and March 31.
2. Though not anticipated to be required, any access and work on or adjacent to the Norfolk Southern or CSX railroad property must have the proper right-of-entry and railroad oversight, and level of oversight required is dependent on construction activities. Norfolk Southern and/or CSX may require railroad oversight for construction activities beneath or directly adjacent to railroad infrastructure. Coordination with the railroad should commence immediately after the Notice-to-Proceed to gain access to the site for the various construction activities. NOTE: The railroad may have long lead times for oversight personnel, and activities on railroad site will need to be scheduled accordingly.
3. Water level in the McLean Avenue sewer varies throughout the year in conjunction with wet weather events and the water surface elevation of the Ohio River. Work within the McLean Avenue sewer will need to be conducted during dry weather and may require dewatering of the sewer depending on seasonal variation of the Ohio River water surface elevation. See requirements for Maintenance of Flow under specification Section 01 14 00 – Control of Work for historical information on the timing of dry and wet weather and Ohio River water elevations.

1.05 SUGGESTED CONSTRUCTION SEQUENCE

A. Before starting any work, the CONTRACTOR shall attend a Pre-Construction Meeting with the CITY, as detailed in Section 01 31 19 – Project Meetings. The CONTRACTOR will be notified of the date and the time of the meeting and shall submit a construction schedule meeting the requirements of Section 01 32 16 - Construction Progress Schedule.

B. Apply for Norfolk Southern and CSX railroad oversight immediately after the Notice-to-Proceed, as the railroad has historically had long lead times for oversight personnel, and work beneath or directly adjacent to the Norfolk Southern property or CSX property may require railroad oversight.

C. The following areas are not necessarily listed in their required sequence of construction. A suggested sequence within each area, where necessary, is included. This sequence is not intended to release the CONTRACTOR from the responsibility to coordinate the Work in any manner which will ensure Project completion within the time allowed or as shown on the Project Documents. The CONTRACTOR is ultimately responsible for the sequence and execution of Work.

1. CSO 432 and 489 Sewer Separation:
    a. Prior to any sewer installation, relocate existing gas, telecommunication, and water utilities as shown on plans.
    b. Install overflow connection on Budd Street from Proposed Manhole 20A to EBORI sewer.
    c. Install new lateral for 1330 West 7th Street to existing 8-inch sewer. Disconnect and abandon existing lateral.
    d. Set-up dewatering system to begin excavation. Consult Geotechnical Data Report for specifics.
    e. Setup by-pass pumping system to construct proposed sewer and manholes.

f. Install section of sewer on West 7th Street to be installed via trenchless installation.
g. Excavate McLean Structure on West 7th Street and complete core-in installation for the new sewer.
h. Construct proposed storm sewer and manholes, removing and remodeling existing sewer structures as noted on the plans for CSO 489 project area. Replace inlets and new sewers to maintain service.
i. Excavate connection to CSO 432 on McLean Avenue and complete connection to existing sewer.
j. Construct proposed storm sewer and manholes, removing and remodeling existing sewer structures as noted on the plans for CSO 432 project area. Replace inlets and new sewers to maintain service.
k. Fill, seal, and abandon existing sewers as shown on plans.
l. Perform all site cleanup/cleaning.
m. Perform all necessary final restorations.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 12 16

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 14 00

CONTROL OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Use of Premises.

C. Railroad Property Access.

D. City of Cincinnati Right-of-Way Permit.

E. Easements.

F. Special Conditions for Easements.

G. Pipe and Channel Locations.

H. Lines and Grades.

I. Protection of Trees.

J. Open Excavations.

K. Maintenance of Traffic.

L. Care and Protection of Property.

M. Protection and Relocation of Existing Structures and Utilities.

N. Water for Construction Purposes.

O. Dust Control.

P. Pollution Control.

Q. Maintenance of Flow.

R. Cooperation within this Contract.

S. Cleanup and Disposal of Excess Material.

T. Noise Control.

U. Stormwater Pollution Prevention Plan; SWPPP, NOI and NOT.

V. Erosion Control Plan.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. Submittals are included in Section 01 33 00 - Submittals.

1.03 SCOPE

A. The CONTRACTOR shall furnish equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the Time for Completion required by the Contract Documents. If at any time such equipment appears to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, the CITY may order the CONTRACTOR to increase the efficiency, change the character or increase the equipment and the CONTRACTOR shall conform to such order at no cost to the CITY. Failure of the CITY to give such order shall in no way relieve the CONTRACTOR of his obligations to secure the quality of the work and rate of progress required by the Contract Documents.

1.04 USE OF PREMISES

A. The CONTRACTOR shall not trespass upon or in any way disturb property outside the street right-of-way, or outside the limits of construction, without first obtaining written permission from the property owner to do so. A copy of such written permission shall be furnished to the CITY.

B. If the CONTRACTOR finds it necessary to obtain additional working area, it shall be the CONTRACTOR'S responsibility for its acquisition. All requirements listed under the "Use of Premises" shall apply if additional area is obtained.

C. The CONTRACTOR shall, at no additional cost to the CITY, restore such property to the full satisfaction of the property owner, and shall obtain from the property owner a written release stating that restoration has been satisfactorily made. A copy of the written release shall be furnished to the CITY.

D. The CONTRACTOR shall not waste any excess earth, stone, or other excavated material on any property without first obtaining written permission from the owner of the property. Along with written approval from the property owner, the CONTRACTOR shall apply, pay, and obtain all required permits, including cut and fill permits, and secure the approval of the CITY. One copy of the property owner's written permission stating that the work has been completed satisfactorily, and one copy of any necessary permits shall be furnished to the CITY. Materials deposited off-site without the required approvals may be ordered removed and properly disposed of without additional compensation.

E. All items within the construction limits and the street right-of-way shall be removed, or removed and replaced, or restored as required by the Contract Documents, including the Drawings and Specifications and as directed by the CITY.

1.05 RAILROAD OVERSIGHT

A. The CONTRACTOR should not require access to railroad property, but work beneath and directly adjacent to railroad property may require oversight. Railroad coordination regarding oversight during construction should be scheduled by the CONTRACTOR by way of the respective application portal for Norfolk Southern and CSX railroads. NOTE: The railroad may have long lead times for oversight personnel and activities on railroad site will need to be scheduled accordingly. EMERGENCY CONTACT for Norfolk Southern is 1-800-453-2530. Other Contacts will be provided during Protection Services Scheduling.

1.06 CITY OF CINCINNATI RIGHT-OF-WAY PERMIT

A. CONTRACTOR will obtain the City of Cincinnati Right-of-Way Permit. As a condition of that permit, the CONTRACTOR shall be required to comply with permit requirements and make any necessary submittals. City requirements can also be found in the CITY'S Street Restoration Manual.

B. For cuts deeper than 4 feet below the surface, the CONTRACTOR shall supply details of bracing to be installed to protect the excavation. In those instances where cuts will be deeper than 8 feet, the CONTRACTOR shall submit calculations prepared and sealed by a Professional Engineer registered to practice in the State of Ohio and experienced in designs of this type. Calculations and/or details shall be submitted to CITY, and CITY will forward the calculations and/or details to the City of Cincinnati Department of Transportation Engineering (DOTE) for acceptance prior to the start of any construction activities. The design shall be sufficient for worker protection and to prevent structural failure of the road excavation during construction, to the satisfaction of the City Engineer.

C. Any delay in obtaining the City of Cincinnati approval of bracing details shall not be reason to extend the construction time. All costs to prepare and coordinate the bracing detail approval, including additional soil borings as deemed necessary by the CONTRACTOR'S Engineer shall be included in various contract items.

D. The CONTRACTOR shall supply Traffic Management Plans following the City DOTE guidelines and comply with all requirements of the plan.

E. Plans accepted by the City of Cincinnati DOTE, as well as bracing details and calculations, shall be available at the construction site at all times.

1.07 EASEMENTS

A. All permanent and temporary easements have been acquired for this Project and are designated on the Drawings as "Construction Limits", "Limits of Construction" or "Limits of Contractor Work Area" for work outside of the public Right-of-Way. Copies of signed easement drawings and agreements are on file at the Department of Sewers, 1035 Woodrow Street, Cincinnati, OH 45204.

B. When a sewer lateral or appurtenance, such as a cleanout, is proposed directly on a public Right-of-Way line, the CITY will attempt to acquire a "Permission to Enter Upon Property" from the property owner. If the CITY is successful in acquiring a "Permission to Enter Upon Property," the CITY will notify the CONTRACTOR by providing a copy of the executed "Permission to Enter Upon Property" allowing the CONTRACTOR to enter upon that property for the sole purpose of installing a sewer lateral and/or appurtenance. If the CITY is not successful in acquiring a "Permission to Enter Upon Property", the CONTRACTOR shall install the sewer lateral and/or appurtenance as close to the Right-of-Way line as feasible and as directed by the CITY, without entering upon private property.

1.08 SPECIAL CONDITIONS FOR EASEMENTS

A. Easement documents provide information on special Right-of-Way requirements, including the conditions and covenants on easements and right of entry for each specific parcel and owner.

B. Construction limits have been acquired for a 24 to 36 month period. As part of the acquisition, the following special conditions have been made part of the agreement with each of the following property owners and shall be adhered to by the CONTRACTOR.

1.09 PIPE LOCATIONS

A. The CONTRACTOR shall locate pipelines substantially as indicated in the Contract Documents. The CITY reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the CONTRACTOR'S convenience and does not relieve him from laying and jointing different or additional items where required.

1.10 LINES AND GRADES

A. All Work shall be done to the lines, grades, and elevations indicated on the Drawings.

B. The CITY will perform all necessary construction layout. It is the CONTRACTOR'S responsibility to give the CITY sufficient notice of the times and places he wishes to do Work, in order to minimize inconvenience and delay to the CONTRACTOR. No time extensions will be granted for failing to give the CITY a reasonable amount of time to perform layout.

C. CONTRACTOR shall remove and reconstruct work which is improperly located.

1.11 PROTECTION OF TREES

A. Two days prior to clearing and grubbing, the construction limits shall be marked and the CONTRACTOR shall walk the project with the CITY personnel to locate trees to be saved and trees to be removed.

B. The CONTRACTOR shall take extra measures to protect trees designated to be saved, such as erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other Work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment within the dripline of the tree, which would be cause for CONTRACTOR removal of tree.

C. The CONTRACTOR shall take precautions to avoid any unnecessary damage to trees. Branches which overhang the construction limits and which interfere with the operation of equipment shall be tied back to avoid damage, if possible. Where injury to branches is unavoidable, the branches shall be sawed off neatly at the trunk or main branch. Any trees damaged beyond saving as solely determined by the CITY shall be removed by the CONTRACTOR at no additional cost to the CITY, and in the case of trees located on private property, the CONTRACTOR shall make restitution to the property owner.

D. Tree removal is limited to occur between October 1 and March 31.

E. When working within the City of Cincinnati right-of-way, if any digging or excavation is done within a distance of seven times the tree diameter, the Urban Forestry department of the City of Cincinnati will need to be contacted to find out if a tree permit will be required. Additionally, that tree (including stump) will need to be removed by a certified arborist. If the CONTRACTOR needs a tree removed, the CONTRACTOR shall give the CITY at least 3 working days' notice so that the CITY can contact Davey Tree Expert Company at (513) 216-1179 and schedule the tree and stump removal. Tree and stump removal is paid directly to Davey Tree Expert Company by the CITY and will not be measured for payment to the CONTRACTOR. Any delays caused by the failure of the CONTRACTOR to meet these requirements are considered incidental to the contract and will not be measured for payment or a reason to extend construction time.

1.12 OPEN EXCAVATIONS

A. The CONTRACTOR shall adequately safeguard all open excavations by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. Provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Remove bridges provided for access during construction when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the CITY or the authority having jurisdiction of any rights-of-way being occupied by the construction. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the CITY may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.

B. The CONTRACTOR shall take precautions to prevent injury to the public due to open trenches. Provide adequate light at all trenches, excavated material, equipment, or other obstacles which could be dangerous to the public at night.

1.13 MAINTENANCE OF TRAFFIC

A. See the Construction Drawings for all Maintenance of Traffic requirements.

1.14 CARE AND PROTECTION OF PROPERTY

A. The CONTRACTOR will be responsible for the preservation of all public and private property and use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the CONTRACTOR, restore such property to a condition similar or equal to that existing before the damage was done, or make good on the damage in other manners acceptable to the CITY.

B. Where CONTRACTOR contemplates removal of small structures such as mailboxes, signposts, fencing, guardrails, and culverts that interfere with CONTRACTOR'S operations, the CONTRACTOR shall obtain approval of property owner and the CITY. Move mailboxes to temporary locations accessible to postal service. Replace items removed in their original location and a condition equal to or better than original. This shall be considered as part of the sewer installation and replacement shall be done immediately after the installation and backfilling of the sewer. The costs for the removal, relocation, and replacement shall be included with the price bid for various contract items.

1.15 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The CONTRACTOR shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables, whether or not they are shown on the Drawings. Carefully support and protect all such structures and utilities from injury of any kind. Immediately repair any damage resulting from the construction operations, at no additional cost to the CITY. The CONTRACTOR shall assume that there is at least one water, gas, underground electric, telephone, etc., branch serving each building.

B. The CONTRACTOR shall notify the Ohio Utilities Protection Service at least 48 hours prior to start of excavating in any public way and also notify in writing all nonparticipating utility companies (non-OUPS) in writing at least 48 hours (excluding Saturdays, Sundays and Legal holidays) before excavating in any public way.

C. If, in the opinion of the CITY, permanent relocation of a utility owned by the CITY is required, the CITY may direct the CONTRACTOR, in accordance with Article 10 of the General Conditions, to perform the Work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work under Article 11 of the General Conditions. If relocation of a privately owned utility is required, the CITY will notify the Utility to perform the work as expeditiously as possible. The CONTRACTOR shall fully cooperate with the CITY and other utilities. No claim for delay will be allowed due to such relocation.

D. The CONTRACTOR shall coordinate the removal, replacement, and resetting and/or updating the timing of traffic loops and signals, if required for the performance of the work, at no additional cost to the CITY.

1.16 WATER FOR CONSTRUCTION PURPOSES

A. The CONTRACTOR may be allowed to use, if available, non-potable plant water after express approval from the CITY at no charge. The CITY reserves the right to restrict access or charge for plant water service if CONTRACTOR abuses his right of use, including water wastage or excessive use.

B. Waste of water shall be sufficient cause for withdrawing the privilege of use. Hydrants shall only be operated with proper approval from the CITY and water utility. It is the

CONTRACTOR'S responsibility to obtain approval from the water utility and comply with all requirements provided by the water utility.

1.17 DUST CONTROL

A. CONTRACTOR shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practical, dusty materials in piles or in transit shall be covered to prevent blowing dust.

B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

1.18 POLLUTION CONTROL

A. CONTRACTOR shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes shall be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance shall be permitted to enter sanitary sewers, and reasonable measures shall be taken to prevent such materials from entering any drain or watercourse.

1.19 MAINTENANCE OF FLOW

A. The CONTRACTOR shall maintain sewage flow within the existing sewers at all times during construction by by-pass pumping or diverting sewage flow into temporarily installed conduit in accordance with Section 01 57 28 - Temporary Flow Control.

B. The existing 144-inch diameter McLean Avenue Sewer is a combined sewer pipe and conveys dry weather flow and wet weather flows during rain events. The existing 72-inch diameter EBORI is a sanitary sewer interceptor and conveys dry weather flow and wet weather flows during rain events.

1. Dry weather flow shall be maintained:
   a. Within the existing 144 inch diameter McLean Avenue Sewer at all times. A minimum of 2,600 gallons per minute (5.8 cubic feet per second) peak dry weather shall be maintained.
   b. Within the existing 72 inch diameter EBORI sewer at all times. A minimum of 6,500 gallons per minute (14.6 cubic feet per second) peak dry weather flow shall be maintained.
2. Pumps, gravity conduit, or other methods used to maintain wet weather flow must be of adequate size to handle a minimum of 253,000 gallons per minute (564 cubic feet per second) wet weather flow based on a 10 year, 24-hour SCS Type II storm.
3. The existing sluice gates in the McLean Avenue sewer bulkhead chamber at the Ohio River flood wall are normally in the closed position, but do not provide a complete watertight seal to isolate the McLean Avenue Sewer from the Ohio River. Therefore, the McLean Avenue Sewer is hydraulically connected to the Ohio River and Mill Creek, and depending on the seasonal water surface elevation

(WSE) of either water body, there may be backwater into the McLean Avenue sewer at relatively the same hydraulic elevation.

4. There are many sources and predictive and forecasting information for both local weather and Ohio River surface water elevations. Local weather websites including television, radio, or public agency-based, such as https://55krc.iheart.com/weather/, https://www.wlwt.com/weather, or www.weather.gov and Ohio River surface water elevations such as https://water.noaa.gov/gauges/ccno1 for Cincinnati, Ohio. CITY is not responsible for the accuracy of these or other sources of predictive and forecasting information, but are listed as a means to illustrate the availability of information resources.

C. The CONTRACTOR shall prepare a Temporary Bypass Plan (CTBP) and submit to the CITY for review and approval 60 business days prior to a proposed CTBP installation. The description, design, calculations, equipment list and equipment layout, standard operating procedures and equipment maintenance plans, emergency operating procedures, notification and response in the event of unforeseen by-passing discharges into adjacent areas, and record-keeping methods for the management of maintaining flows and by-passing is to be defined in the CTBP. This plan shall list the CONTRACTOR'S single point of contact, with phone numbers during the workday and the off-hours, who is responsible for the maintenance of flow. Alternate contact and phone numbers are also required. See Section 01 57 28 – Temporary Flow Control for specific details.

D. The cost of this Work shall be included in the price bid for the respective contract items.

1.20 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under the Contract Documents shall cooperate with CONTRACTORS and Subcontractors or trades and assist in incorporating the Work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the CITY.

1.21 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the Work, the CONTRACTOR shall keep the site of operations as clean and neat as possible. Dispose of all residues resulting from the construction Work and, at the conclusion of the Work, remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and leave the entire site of the Work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of the Work under the Contract Documents, the CONTRACTOR and Subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and in other related Sections.

C. Disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the CONTRACTOR or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. The CONTRACTOR will be required to remove the fill and restore the area impacted at no increase in the Contract Sum.

D. The CITY reserves the right to instruct specific cleanup, relocation of equipment, or disposal of material at any time.

1.22 NOISE CONTROL

A. CONTRACTOR shall take reasonable measures to prevent unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

B. CONTRACTOR shall provide acoustical barriers effective in reducing noise so noise emanating from tools or equipment will not exceed legal noise levels.

C. During construction activities on or adjacent to occupied buildings, and when appropriate, CONTRACTOR shall erect screens or barriers effective in reducing noise in the building and shall conduct operations to avoid unnecessary noise which might interfere with the activities of building occupants.

1.23 STORMWATER POLLUTION PREVENTION PLAN; SWPPP, NOI AND NOT

A. Notice of Intent (NOI) and Notice of Termination (NOT):

1. The CONTRACTOR shall submit a complete and accurate NOI application form and the applicable fee to the Ohio EPA at least **21 days** prior to the start of any construction activity. The NOI application form must be accompanied by an 8-1/2 inch by 11 inch site map that clearly shows the location of the project with its disturbed ground perimeter outlined and the adjacent roads identified.
2. The CONTRACTOR shall submit the NOT to the Ohio EPA as the final punch list item and provide the CITY with a copy of the submitted NOT.
3. The forms and instructions for the above filings can be found on the internet at the Ohio EPA webpage: http://www.epa.state.oh.us/dsw/storm/stormform.aspx Contact the CITY for required permit numbers.
4. A copy of the above submittals and their approvals shall be maintained at the construction site throughout the life of the project.

B. Stormwater Pollution Prevention Plan (SWPPP):

1. A SWPPP containing all the elements identified in Part III of the Ohio EPA Permit OHC000006 (copy of the permit can be found at https://dam.assets.ohio.gov/image/upload/epa.ohio.gov/Portals/35/permits/Construction_Stormwater/OHC000006.pdf) shall be developed. The CONTRACTOR shall prepare the SWPPP. The SWPPP shall be a comprehensive, stand-alone

document. A required SWPPP template is available at http://www.epa.gov/npdes/npdes-applications-and-forms

2. The SWPPP shall be prepared in accordance with sound engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment controls and stormwater management practices addressing all phases of construction. The preservation of the existing natural conditions, to the maximum extent possible, is to be considered as the best practice to prevent erosion. Minimizing the amount of disturbed land at any one time is a very valuable and effective non-structural best management practice (BMP).
3. The CONTRACTOR shall comply with the Stabilization requirements listed on Page 9 of 61 of Ohio EPA Permit OHC000006, which for convenience, are copied in Tables 1 and 2 below:

TABLE 1: PERMANENT STABILIZATION

AREA REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
Any areas that will lie dormant for one year or more	Within seven days of the most recent disturbance
Any areas within 50 feet of a surface water of the State and at final grade	Within two days of reaching final grade
Any other areas at final grade	Within seven days of reaching final grade within that area

TABLE 2: TEMPORARY STABILIZATION

AREA REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
Any disturbed areas within 50 feet of a surface water of the State and not at final grade	Within two days of the most recent disturbance if the area will remain idle for more than 14 days
For all construction activities, any disturbed areas that will be dormant for more than 14 days but less than one year, and not within 50 feet of a surface water of the State	Within seven days of the most recent disturbance within the area For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot(s)
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

4. The SWPPP shall identify potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharges associated with construction activities. The SWPPP shall describe and ensure the implementation of BMP's that reduce the pollutants in stormwater discharges during construction (all projects) and pollutants associated with post-construction activities (for nonlinear projects) to ensure compliance with Ohio Revised Code (ORC) Section 6111.04, Ohio Administrative Code (OAC) Chapter 3745-1 and the terms and conditions of the general permit. At a minimum, all erosion control and sediment control practices included in the SWPPP shall conform to the Latest Edition of the Rainwater and Land Development Manual published by the Ohio Department of Natural Resources (ODNR). The payment for BMP's utilized, which are not listed as separate bid items, shall be included under various Contract items of this project.
5. The SWPPP shall be submitted to the CITY for review within 2 weeks following Notice of Award of the Contract. Once approved by the CITY, the SWPPP shall be kept on site and used by the CONTRACTOR throughout the life of the project. Ohio EPA has the right to view a copy of the SWPPP maintained at the site, should the Ohio EPA director, the director's authorized representative, and any local agency approving sediment and erosion control plans request while on-site. Ohio EPA has the right to receive a copy of the SWPPP within 10 days if they submit a written request. The CONTRACTOR shall also maintain a written document containing the signatures of all contractors and subcontractors involved in the implementation of the SWPPP as proof they reviewed and understand the conditions and responsibilities of the SWPPP.
6. Deviations from the plan shall be submitted to CITY 3 weeks prior to the change for CITY consideration.

1.24 EROSION CONTROL PLAN

A. The CONTRACTOR will be responsible for submitting an Erosion Control Plan to the CITY prior to the initiation of any construction work. The plan shall be submitted within 2 weeks following the Notice of Award of the Contract. Once approved, the plan shall be used by the CONTRACTOR throughout the project. Deviations from the approved plan shall be submitted to the CITY 3 weeks prior to the change for the CITY'S consideration. The Erosion Control Plan is integral to the Stormwater Pollution Prevention Plan (SWPPP). A separate Erosion Control Plan submittal is not necessary, but the requirements listed below shall be included on the plan submitted with the SWPPP.

B. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practical. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

C. The CONTRACTOR shall inspect the erosion and sediment controls once every 7 days; or once every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater. Rainfall events can be found at http://msdgc.org/radar/ A written log of these inspections shall be included as an appendix to the SWPPP and must be provided to the CITY upon request. The CONTRACTOR shall be responsible for correcting any deficiencies found and identified by their own inspection or by inspection performed by the CITY throughout the entire project.

D. The plan shall be used to address the environmental concerns shown on the Contract Drawings and the Mitigative Measures of these specifications. It shall also include sound creek crossing techniques, location of access/haul roads, location of staging and stockpile sites, type and location of erosion control devices, as well as to specify a person responsible for overseeing the implementation of the Erosion Control Plan.

E. The following shall be used as a guide to develop the Erosion Control Plan:

1. Access/Haul Roads: Identify ingress and egress points along sewer alignment; location of haul roads within construction limits along riparian areas; method of haul road creek crossing (culvert, temporary bridge, etc.); proposed access points on private property.
2. Staging/Stockpile Sites: Identify location of potential site.
3. Erosion Control Devices: Identify type of erosion control device (silt fence, stream bates, rock check dams, etc.); show location of devices (stream crossings, sloping areas, etc.); timing and method of permanent stabilization and re-vegetation.

F. The cost of this Work shall be included in the price bid for the applicable Environmental Compliance bid item.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01 14 00

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Partial Payments.

C. Bid Items by the Ohio Department of Transportation Construction and Material Specifications, Reference Number (Ref. No.), and item description.

D. Final Payment Considerations.

1.02 RELATED DOCUMENTS

A. Retainage to be held is in Section 00 52 01 - City-Contractor Agreement.

B. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

C. Section 01 14 00 - Control of Work.

1.03 SCOPE

A. CONTRACTOR shall furnish all labor, materials, tools, equipment, appurtenances and services, including operation and maintenance manuals and training and start-up services necessary to perform all work required, at the lump sum or unit prices for the items listed herein and such lump sum and unit prices shall represent full compensation for such work.

B. The bid items listed herein constitute all of the Items under which payment will be made. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, layout surveys, sanitary requirements, testing safety devices, approval and record drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, bonds (except Performance Bond), insurance, project coordination and all other requirements of the Contract Documents. Compensation for all such services and materials shall be included in the prices stipulated for the lump sum and unit price Items listed herein.

C. Furthermore, all Work shown on the Drawings shall be a part of the Documents whether specifically noted elsewhere in Contract Documents or not.

D. The CITY will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. The CITY will review with CONTRACTOR the CITY'S preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). The CITY'S written decision thereon will be final and binding (except as modified by the CITY to reflect changed factual conditions or more accurate data) upon the CITY and CONTRACTOR, subject to the provisions of Article 10, Paragraph 10.05 Changes In The Work; Claims of Section 00 72 00 - General Conditions.

1.04 PARTIAL PAYMENTS

A. Partial payments shall be made by the CITY in accordance with the following schedule:

1. Eighty percent (80%) of the unit price bid for trenchless and Type “I” Conduit shall be paid for pipe installed as per plans.
2. Seventy percent (70%) of the unit price bid for Type “B”, Type “C”, and Type “G” Conduit shall be paid for pipe installed, including initial backfill.
3. An additional ten percent (10%) of the unit price bid for trenchless, Type “B”, Type “C”, and Type “G” Conduit shall be paid when the pipe passes the leakage test, and the deflection test when plastic pipe is installed.
4. The remaining portion of the unit price bid shall be paid when videotaping of the installed sewers and final restoration has been completed. Final restoration is defined as when seeding/mulching is in place in unpaved areas, and when pavement/roadway work is complete in paved areas.
5. Partial payments on lump sum items will be based on the percentage of work completed, as determined by the OWNER’S REPRESENTATIVE. The percentage shall be calculated by evaluating the actual progress of the work in relation to the total scope of the lump sum item, including installation, testing, CCTV’ing, commissioning and/or site restoration as required.

1.05 BID ITEMS BY THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS, REFERENCE NUMBER (REF. NO.) AND ITEM DESCRIPTION

A. 201 (Ref. No. 1-1) – CLEARING AND GRUBBING: Clearing and grubbing shall be performed in accordance with Ohio Department of Transportation (ODOT) Construction and Materials Specification (CMS) Item 201 and the City of Cincinnati Supplement to the ODOT CMS, Item 201, except as otherwise noted herein.

1. The construction limits shall be marked and the CONTRACTOR shall walk the project with CITY personnel to locate trees to be saved and trees to be removed. Note that tree removal is only permitted between October 1 and March 31.
2. The CITY requires the CONTRACTOR to perform the clearing and grubbing in stages. The stages are limited to cover the next 3 months of construction progress.
3. Payment for all labor, materials, and equipment necessary to complete the Work shall be at the lump sum bid price.

B. 202 (Ref. No. 1-2) – FILL, SEAL AND ABANDON EXISTING SEWERS (12 INCHES AND LARGER): This item shall be constructed as shown on the plans and as directed by the CITY. Fill, seal and abandon existing sewers 12-inches and larger in accordance with the method described in Section 202.041 of the Cincinnati Supplement to the ODOT CMS.

1. The material used for filling the existing sewers shall be Controlled Low Strength Material (CLSM) or a mixture of Fly Ash and water at a rate of 1,900 pounds of Fly Ash to 950 pounds of water. Mixture may be varied as approved by the CITY.

2. This item will be used in other areas only when directed by the CITY. Payment will be based on the unit price bid per cubic yard.

C. 202 (Ref. No. 1-3) – SEAL AND ABANDON EXISTING SEWERS: Sewers that are to be abandoned shall be plugged or sealed where they join manholes, catch basins, inlets, or other structures. All existing sewers encountered in construction operations that are inactive, or are to be abandoned as determined by the CITY, shall be plugged or sealed at both ends where broken into, before proceeding with backfilling.

1. Where plugging or sealing is required, pipe less than 12-inches in diameter shall be sealed by the installation of a suitable precast concrete or vitrified clay stopper, properly cemented into place.
2. Payment will be lump sum payment at the unit price bid.

D. 202 (Ref. No. 1-4) – MANHOLES ABANDONED: Manholes shall be abandoned in accordance with Item 202.12 of ODOT CMS. All castings shall be disposed of at the CONTRACTOR'S expense. This item shall include all sanitary manholes to be abandoned as shown on the Drawings or as directed by the CITY.

1. The material used for filling the existing manholes shall be Controlled Low Strength Material (CLSM), or a mixture of Fly Ash and water at a rate of 1,900 pounds of Fly Ash to 950 pounds of water. A sand and water mixture is also acceptable when abandoning manholes outside of the right-of-way. Mixture may be varied as approved by the CITY.
2. For manholes abandoned within the City of Cincinnati, the structure shall be removed to a depth of at least 6 feet below grade.
3. Restoration of pavement, concrete, and sod/grass shall be included in this item.
4. Payment will be made for each manhole abandoned.

E. 210 (Ref. No. 1-5) – SPECIAL EXCAVATION: This is a CONTINGENCY item. This item shall be in accordance with Item 210 of the City Supplement to the ODOT CMS. Payment will be based on the unit price bid per cubic yard and will be used only when directed by the CITY.

F. 211 (Ref. No. 1-6) – SPECIAL FILL MATERIAL (BANK RUN GRAVEL): This is a CONTINGENCY item. This item shall be in accordance with Item 211 of the City Supplement to the ODOT CMS and shall be furnished by the CONTRACTOR when this type of material is required in the Work. Only special fill material (Bank Run Gravel) not included in other pay items shall be measured for payment. Payment will be made at the unit price bid per ton and shall be used only when directed by the CITY.

G. 211 (Ref. No. 1-7) – SPECIAL FILL MATERIAL (NO. 2 GRAVEL BEDDING): This is a CONTINGENCY item. This item shall be in accordance with Item 703 of the ODOT CMS and shall be furnished by the CONTRACTOR when this type of material is required in the Work. Only special fill material (No. 2 Gravel Bedding) not included in other pay items shall be measured for payment. Payment will be made at the unit price bid per ton and shall be used only when directed by the CITY.

H. 602 (Ref. No. 1-8) – CONCRETE MASONRY, CLASS "C": This is a CONTINGENCY item. This item shall be in accordance with Item 602 of the ODOT CMS. Only special Class "C" Concrete Masonry not included in other pay items shall be measured for payment. Payment will be made at the unit price bid per cubic yard and shall be used only when directed by the CITY.

I. 602 (Ref. No. 1-9) – CONCRETE MASONRY, CLASS “C” (ENCASEMENTS, CRADLES, KEY BLOCKS AND COLLARS): This is a CONTINGENCY item. This item shall be in accordance with Item 602 of the ODOT CMS. Only special Class “C” Concrete Masonry used for encasement, cradles, key blocks, and collars, in addition to those items called for on the Drawings, shall be measured for payment, as directed by the CITY. Payment will be made based on the unit price bid per cubic yard.

J. 603 (Ref. No. 1-10) – 6” CONDUIT, TYPE “I” SANITARY LATERAL: This is a CONTINGENCY item for replacing existing laterals and will be used only when shown on the Drawings or as directed by the CITY. CONTRACTOR shall supply pipe in accordance with Item 603.02 of the City Supplement to ODOT CMS and Section 33 31 00 - Sewer Pipe, Article 2.03. Payment will be made at the unit price bid per linear foot of pipe installed.

1. The price bid for this item shall be complete and include (but not be limited to) all necessary site preparation, excavation, embankment, dewatering, maintenance of flow, sheeting, preparation of trench bottom, granular bedding and initial backfill, pipe, joint material, backfill, testing, disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, dust control, lights, odor control, signs and barricades, noise control, cleaning up, saw cutting, maintenance of traffic, and restoration.

K. 603 (Ref. No. 1-11) – 6” CONDUIT, TYPE “I” WITH COMPRESSION JOINTS – STACKS: This is a CONTINGENCY item for replacing existing stacks and will be used only when directed by the CITY. CONTRACTOR shall supply pipe in accordance with Item 603.02 of the City Supplement to ODOT CMS and Section 33 31 00 - Sewer Pipe, Article 2.03. Installation shall be in accordance with Standard Drawing Acc. No. 49033. The unit bid price for this item shall be complete and include (but not be limited to) all necessary bends and will be paid per foot of pipe installed.

L. 603 (Ref. No. 1-12, 13, 14, 15, 16, 17, 18, 20, 21, 22 & 23)– 12”, 15”, 18”, 21”, 24”, 27”, 30”, 36”, 42”, and 48” SEWER CONDUIT, TYPE “B”: This item includes all Work required to complete the pipe sewers in accordance with applicable sections of these specifications and Standard Drawing Acc. No. 49032. CONTRACTOR shall supply pipe in accordance with Item 603.02 of the City Supplement to ODOT CMS and Section 33 31 00 - Sewer Pipe, as specified on the Drawings. Payment will be made at the unit price bid per linear foot.

1. The price bid for this item shall be complete and include (but not be limited to) all necessary site preparation, excavation, embankment, dewatering, maintenance of flow, sheeting, preparation of trench bottom, granular bedding and initial backfill, pipe, joint material, backfill, testing, disposal of excess non-contaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, dust control, lights, odor control, signs and barricades, noise control, cleaning up, saw cutting, maintenance of traffic, and restoration.

M. Spec. (Ref. No. 24) – 7th STREET TUNNELED STORM SEWER: This item includes all materials, labor, and equipment, to install approximately 280 feet of 42 inch ID Reinforced Concrete Jacking Pipe (RCP) by means of Open Face Rotary Wheeled TBM. The Work includes coordination with the OWNER'S REPRESENTATIVE and the railroad; traffic control, excavation of pits (entry and exit), sheeting, shoring, bracing, bedding, temporary support and protection of existing utilities, dewatering of groundwater, removal of pavement; furnishing and installing reinforced concrete jacking pipe, disposal of surplus excavated non-contaminated or contaminated, non-hazardous material (muck) in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater; furnishing, installing, monitoring, and removal of geotechnical instrumentation; contact grouting of the 42 inch ID RCP; restoration, clean up, and all other work incidental to the installation. Payment for all labor, materials, and equipment necessary to complete the work shall be at the lump sum bid price.

N. 603 (Ref. No. 1-25) – STANDARD TWO-WAY CLEANOUT: This item shall be in accordance with Standard Drawing Acc. No. 61979 & 61979-A. This is a CONTINGENCY item for replacement of two-way cleanouts and will be used only when directed by the CITY. Payment will be at the unit price bid for each two-way cleanout.

O. SPEC (Ref. No. 1-26) – REMOVE EXISTING SEWER: Sewers that are designated to be removed as shown on the Drawings shall be excavated and removed, and sealed where they join manholes, catch basins, inlets, or other structures. Payment will be made at the unit price bid per linear foot of sewer removed. The price bid for this item shall include (but not be limited to) all necessary excavation, groundwater dewatering, maintenance of flow, sheeting, backfill, disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, cleaning up, saw cutting, maintenance of traffic, and restoration.

P. SPEC (Ref. No. 1-27) – REMOVE EXISTING MANHOLES: Existing manholes that are designated to be removed as shown on the Drawings shall be excavated and removed to foundation and backfilled with material suitable to meet respective backfill requirements. Payment will be unit price bid for each manhole removed. The price bid for this item shall include (but not be limited to) all necessary excavation, groundwater dewatering, maintenance of flow, sheeting, backfill, disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, cleaning up, saw cutting, maintenance of traffic, and restoration.

Q. 603.059 (Ref. No. 1-28) – VIDEO TAPING OF INSTALLED SEWERS: This item shall be in accordance with 603.059 of the City Supplement to ODOT CMS and Section 33 31 00 – Sewer Pipe. Payment will be lump sum at the unit price bid, provided that the CONTRACTOR submits all required information, has the correct format, and that CAGIS manhole numbers are included.

R. 604 (Ref. No. 1-29) – CATCH BASINS: This item shall be constructed in accordance with the applicable Standard Drawing, as noted on the Drawings or in Section 33 44 13 - Catch Basins. Payment will be made at the unit price bid for each catch basin.

S. 604 (Ref. No. 1-30) – COMBINATION INLET MANHOLE: This item shall be constructed in accordance with Standard Drawing Acc. No. 49067 except as otherwise noted on the Drawings. Payment will be made at the unit price bid for each manhole and shall include (but not be limited to) the cost for all proposed and existing connections/reconnections, as necessary to install the manhole.

T. 604 (Ref. No. 1-31, 32, 33 & 34) – STANDARD MANHOLE ON STORM CONDUIT 42" AND UNDER (STORM): This item shall be constructed in accordance with SMU Standard Drawing No. 120354, Standard Drawing Acc. No. 49001 & 49037, except as otherwise noted on the Drawings or in Section 33 39 00 - Sewer Manholes. If PVC pipe is installed, the precast manhole base shall be used in accordance with Standard Drawing Acc. No. 49056. Payment will be made at the unit price bid for each manhole and shall include the cost for all proposed and existing connections/reconnections, as necessary to install the manhole.

U. 604 (Ref. No. 1-35) – STANDARD MANHOLE ON SANITARY CONDUITS 42" AND UNDER (TYPE "S"): This item shall be constructed in accordance with Standard Drawing Acc. No. 49037, except as otherwise noted on the Drawings or in Section 33 39 00 - Sewer Manholes. Payment will be made at the unit price bid for each manhole and shall include the cost for all proposed and existing connections/reconnections, as necessary to install the manhole.

V. 604 (Ref. No. 1-36) – STANDARD TYPE "S" DOGHOUSE MANHOLE: This item shall be constructed in accordance with Standard Drawing Acc. No. 120355, except as otherwise noted on the Drawings or in Section 33 39 00 - Sewer Manholes. Payment will be made at the unit price bid for each manhole and shall include the cost for all proposed and existing connections/reconnections, as necessary to install the manhole.

W. 604 (Ref. No. 1-37) – STANDARD TYPE "S" DROP MANHOLE: This item shall be constructed in accordance with Standard Drawing Acc. Nos. 49003, 49003A, except as otherwise noted on the Drawings or in Section 33 39 00 - Sewer Manholes. Payment will be made at the unit price bid for each manhole and shall include the cost for all proposed and existing connections/reconnections, as necessary to install the manhole.

X. 604 (Ref. No. 1-38) – STANDARD INSIDE DROP MANHOLE: This item shall be constructed in accordance with Standard Drawing Acc. No. 49061, except as otherwise noted on the Drawings or in Section 33 39 00 - Sewer Manholes. Payment will be made at the unit price bid for each manhole and shall include the cost for all proposed and existing connections/reconnections, as necessary to remodel the manhole.

Y. 604 (Ref. No. 1-39) – REMODEL BOTTOM OF EXISTING MANHOLE: This item shall be constructed as shown on the Drawings, in accordance with Standard Drawing Acc. No. 49004, and as directed by the CITY. Payment will be made at the unit price bid for each manhole bottom remodeled, and shall include the cost for all proposed connections, existing reconnections, and plugging/sealing existing connections as necessary to modify the manhole.

Z. 604 (Ref. No. 1-40, 41 & 42) – MODIFY/ REMOVE/REPLACE EXISTING INLETS: These items shall be constructed in accordance with SMU Standard Drawing Acc. Nos. 120283, 120340, 49010, 49011, 49012, 49013, 49014, 49016, 49017, 49023, 49024, and 49041, except as otherwise noted on the Drawings. Payment will be made at the unit price bid for each inlet and shall include the cost for all proposed and existing connections/reconnections, as necessary to modify, remove and/or replace the inlet.

AA. SPEC (Ref. No. 1-43) – CONNECTION TO EAST BRANCH OHIO RIVER INTERCEPTOR (EBORI) SEWER: This item includes all work necessary to connect to the existing EBORI as shown on the Drawings and specified herein, including but not limited to installation of excavation support system, dewatering, excavation and transporting and disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, removal of obstructions, pumping and discharging groundwater, water and sediment control, all required concrete and reinforcement placement, bypass pumping and/or flow diversion, connection to sewer, hatches, castings, panels, site restoration and improvements, labor, equipment, and all incidental Work required for complete connection construction. Payment will be made at the unit price bid for each connection.

BB. SPEC (Ref. No. 1-44) – CONNECTION TO MCLEAN AVENUE SEWER: This item includes all work necessary to connect to the existing McLean Avenue Sewer as shown on the Drawings and specified herein, including but not limited to installation of excavation support system, dewatering, excavation and transporting and disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, removal of obstructions, pumping and discharging groundwater, water and sediment control, all required concrete and reinforcement placement, bypass pumping and/or flow diversion, connection to sewer, hatches, castings, panels, site restoration and improvements, labor, equipment, and all incidental Work required for complete connection construction. Payment will be made based on the lump sum bid price.

CC. 1101 (Ref. No. 1-45) – FURNISH AND LAYING 8” DUCTILE IRON PIPE AND FITTINGS: This work shall be completed in accordance with Greater Cincinnati Water Works requirements and in accordance with the City supplement Item 1101, where shown on the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set and as specified herein, including but not limited to excavation, transporting and disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, pumping and discharging groundwater, sediment control, installation of excavation support system, removal of obstructions, trench backfill, site restoration and improvements, labor, equipment, and all incidental Work required for complete construction. Payment will be made at the unit price bid per linear foot.

DD. 1101 (Ref. No. 1-46) – FURNISH AND LAYING 12” DUCTILE IRON PIPE AND FITTINGS: This work shall be completed in accordance with Greater Cincinnati Water Works (GCWW) requirements and in accordance with the City supplement Item 1101, where shown on the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set and as specified herein, including but not limited to excavation, transporting and disposal of excess noncontaminated or contaminated, nonhazardous material in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater, pumping and discharging groundwater, sediment control, installation of excavation support system, removal of obstructions, trench backfill, site restoration and improvements, labor, equipment, and all incidental Work required for complete construction. Payment will be made at the unit price bid per linear foot.

EE. 1110 (Ref. No. 1-47) – CONCRETE, CLASS "C": This item shall be in accordance with Greater Cincinnati Water Works requirements and in accordance with the City supplement Item 1110, where shown on the GCWW EBORI Tunnel and Sewer Separation STIMP drawings appended to the plan set and as specified herein. Only special Class "C" Concrete not included in other pay items shall be measured for payment. Payment will be made at the unit price bid per cubic yard and shall be used only when directed by the CITY.

FF. 1116 (Ref, No. 1-48) – FURNISHING AND INSTALLING VALVE BOX COMPLETE: This item shall be in accordance with Greater Cincinnati Water Works requirements and in accordance with the City supplement. This item includes all work required to complete the valve box installation as shown on the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set and as specified herein. CONTRACTOR shall supply and install valve boxes in accordance with Item 1116 of the City Supplement to ODOT CMS. Payment will be at the unit price bid for each valve box complete.

GG. 1116 (Ref, No. 1-49) – FURNISHING AND INSTALLING VALVE BOX WITH 1" AIR RELEASE COMPLETE: This item shall be in accordance with Greater Cincinnati Water Works requirements and in accordance with the City supplement. This item includes all Work required to complete the valve box with 1 inch air release installation as shown on the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set and as specified herein. CONTRACTOR shall supply and install valve boxes with 1 inch air release in accordance with Item 1116 of the City Supplement to ODOT CMS. Payment will be at the unit price bid for each valve box with 1 inch air release complete.

HH. 1119 (Ref. No. 1-50) – ADDITIONAL EXCAVATION: This is a CONTINGENCY item for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set. This item shall be in accordance with Item 1119 of the City Supplement to the ODOT CMS. Payment will be based on the unit price bid per cubic yard and will be used only when directed by the CITY.

II. 1120 (Ref. No. 1-51) – EXPLORATORY EXCAVATION: This is a CONTINGENCY item for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set. This item shall be in accordance with Item 1120 of the City Supplement to the ODOT CMS. Payment will be based on the unit price bid per cubic yard and will be used only when directed by the CITY.

JJ. 1122 (Ref. No. 1-52) – REMOVING EXISTING MANHOLE CURB AND COVER: Existing manhole curbs and covers that are designated to be removed as shown on the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set shall be removed and restored with material suitable to match the surrounding area as directed by GCWW. Payment will be unit price bid for each manhole curb and cover combination removed. The price bid for this item shall be in accordance with Item 1122 of the City Supplement to the ODOT CMS.

KK. 1123 (Ref. No. 1-53) – CHANGING 8" AND UNDER PIPE SEWER: This is a CONTINGENCY item for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set. This item shall be in accordance with Item 1123 of the City Supplement to the ODOT CMS. This item covers furnishing all labor, material, tools, and equipment required to change the grade or alignment of pipe sewers 8” and under in diameter. Payment will be made at the unit price bid per linear foot.

LL. 1123 (Ref. No. 1-54) – CHANGING 10” THRU 24” PIPE SEWER: This is a CONTINGENCY item for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set. This item shall be in accordance with Item 1123 of the City Supplement to the ODOT CMS. This item covers furnishing all labor, material, tools, and equipment required to change the grade or alignment of pipe sewers 10 inches through 24 inches in diameter. Payment will be made at the unit price bid per linear foot.

MM. 509 (Ref. No. 1-55) – REINFORCING STEEL: This item is for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set and shall be in accordance with Item 509 of the City Supplement to the ODOT CMS. Payment will be made at the unit price bid per pound.

NN. 637 (Ref. No. 1-56) – SHEETING AND BRACING ORDERED LEFT IN PLACE: This is a CONTINGENCY item for the GCWW EBORI Tunnel and Sewer Separation STIMP Drawings appended to the plan set. This item shall be in accordance with Item 637 of the City Supplement to the ODOT CMS. This item provides for payment only for sheeting and bracing left in place if shown on the Plans or in compliance with a written order from the Engineer. Payment will be made at the unit price bid per 1,000-board foot measure (MBFM).

OO. SPEC (Ref. No. 1-57) – 4” GAS MAIN RELOCATION ALLOWANCE: Under this item, the CONTRACTOR shall provide an allowance of $400,000 lump sum cost for the relocation of the existing gas main(s) to be designed and installed by the utility owner and as authorized by the CITY.

1. The CONTRACTOR shall notify the CITY of any such work for approval prior to the performance of the Work to demonstrate the scope and necessity for completion of the adjacent work. Such notification shall be made in a timely fashion so as to allow approval and scheduling of said work without causing delay of the project.
2. Once approved, the CONTRACTOR shall contact the utility, schedule the Work if necessary, and make payment for work as billed by the affected utility.
3. Payment for any such Work will be made under this item for the actual cost billed by the utility(ies), including a markup not to exceed 5 percent for CONTRACTOR’S costs.

PP. SPEC (Ref. No. 1-58) – UTILITY AND INFRASTRUCTURE RELOCATION ALLOWANCE: Under this item, the CONTRACTOR shall provide an allowance of $400,000 lump sum cost for the relocation of utilities and/or infrastructure as authorized by the City.

1. The CONTRACTOR shall notify the CITY of any such work for approval prior to the performance of the work to demonstrate the scope and its necessity for completion of the adjacent work. Such notification shall be made in a timely fashion so as to allow approval and scheduling of said work without causing delay of the project.
2. Once approved, the CONTRACTOR shall contact the utility(ies), schedule the Work if necessary, and make payment for such work as billed by the affected

utility(ies), or as performed on a Time and Material basis by CONTRACTOR. This allowance may also be used for repairs to existing utilities due to existing utility trench backfill collapse as long as the new trenches are effectively supported.

3. Payment for any such work will be made under this item for the actual cost billed by the utility, including a markup not to exceed 5 percent for CONTRACTOR'S costs.

QQ. SPEC (Ref. No. 1-59) –RAILROAD OVERSIGHT ALLOWANCE: Under this item, the CONTRACTOR shall provide an allowance of $105,000 lump sum cost for railroad oversight as required for construction activities within the proximity of railroad infrastructure.

1. Payment will be made under this item for the actual cost billed by the railroad companies, including a markup not to exceed 5 percent for CONTRACTOR'S costs.

RR. SPEC (Ref No. 1-60) DEWATERED GROUNDWATER TREATMENT ALLOWANCE: Under this item, the CONTRACTOR shall provide an allowance of $300,000 lump sum cost for portable on-site treatment of contaminated dewatered groundwater from the sewer separation project area that contains PCBs or other contaminants that exceed the allowable concentrations for discharging to a sewer interceptor upstream of the Mill Creek Wastewater Treatment Plant.

1. The Work includes providing and operating an onsite groundwater treatment facility, treating the dewatered groundwater, additional groundwater and/or discharge water testing as necessary, disposing of spent materials in accordance with regulations, and removing the onsite treatment facility, in accordance with Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater.
2. Payment will be made on a Time and Material basis for implementing groundwater testing and treatment.

SS. SPEC (Ref. No 1-61) – HAULING AND DISPOSAL OF HAZARDOUS EXCAVATED MATERIAL ALLOWANCE: Under this item, the CONTRACTOR shall provide an allowance of $50,000 lump sum cost for the excavation, live loading, hauling, testing of suspect material, and disposal of material at a landfill that accepts hazardous materials. This item shall be in accordance with Specification Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater and will be used only when directed by the CITY.

1. Payment for any such Work will be made under this item for the actual cost for testing, hauling and dump fees as billed by the testing laboratory, hauler and landfill, including a markup not to exceed 5 percent for CONTRACTOR'S costs.

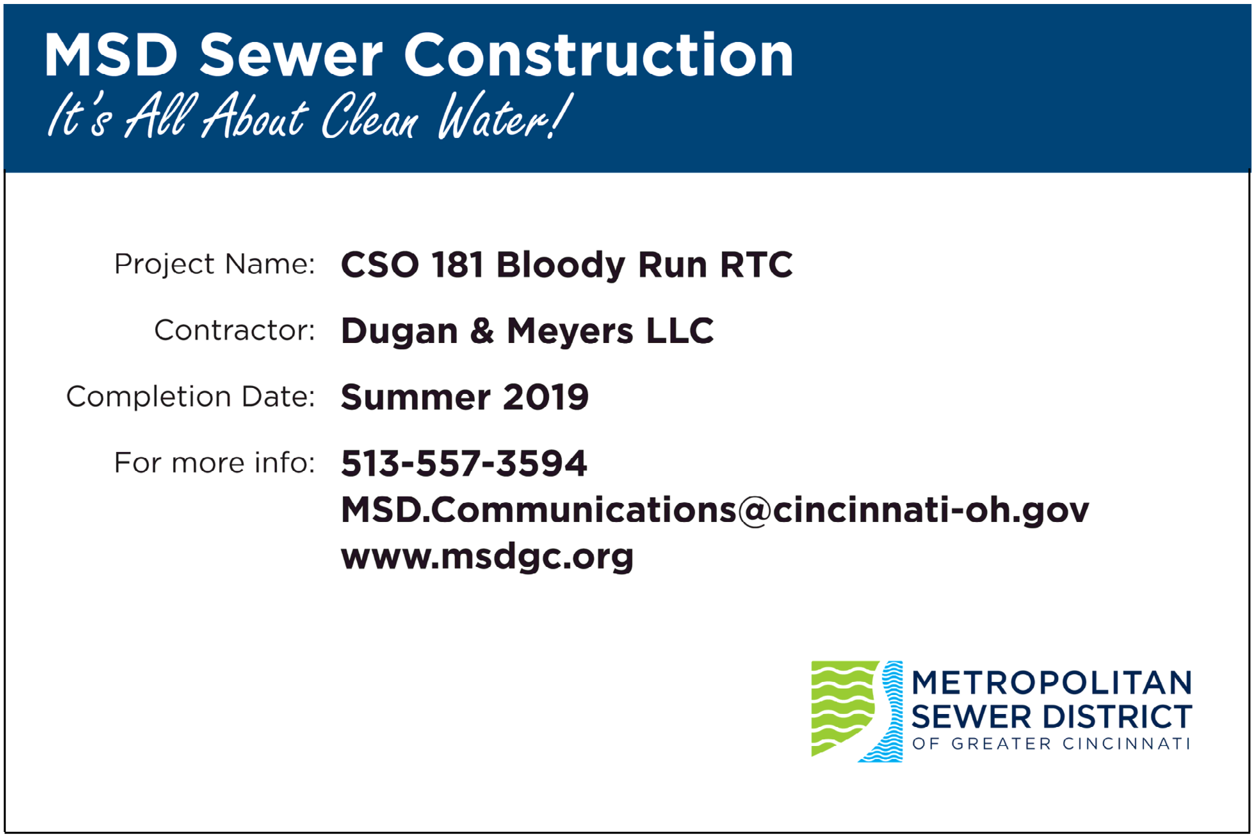
TT. SPEC (Ref. No. 1-62) – CUT AND REMOVE EXISTING ABANDONED STREET CAR RAIL: This is a CONTINGENCY item for cutting and removing existing street car rails when required to complete the adjacent work. The CONTRACTOR shall notify the CITY of any such work for approval prior to the performance of the work to demonstrate the necessity for completion of the adjacent work. Payment will be made at the unit price bid per linear foot and includes all labor, equipment and disposal costs associated with cutting and removal of street car rails.

UU. SPEC (Ref. No. 1-63) – REMOVE AND REPLACE EXISTING GUARDRAIL: Existing guardrail that is designated to be removed as shown on the Drawings shall be removed and replaced after installation of new sewer. Payment will be unit price bid for linear foot.

VV. SPEC (Ref. No. 1-64) – REMOVE AND REPLACE EXISTING FENCE: Existing fence that is designated to be removed as shown on the Drawings shall be removed and replaced after installation of new sewer. Payment will be unit price bid for linear foot.

WW. SPEC (Ref. No. 1-65) – PROJECT SIGN: The CONTRACTOR shall furnish, install, maintain, and subsequently remove project signs made by a professional signage company. Work shall include restoring sign area disturbed after sign removal. The sign shall be placed at the direction of the CITY, nevertheless, the CONTRACTOR may be directed to relocate the sign as Work progresses.

1. Sign(s) shall be constructed of new materials that are free from defects, are rigid, sturdy and weatherproof and can last without deterioration for the duration of the construction project. Signs should be 4 feet tall by 6 feet wide. Posts shall be securely anchored to minimize lateral movement.
2. Use 1/2-inch diameter galvanized steel button head carriage bolts and washers to attach sign to posts.
3. The top edge of the sign should be 8 feet above existing grade.
4. Provide sign in accordance with the prototype project sign shown below; including colors, fonts, and graphics. Add the project name, general contractor's name, and completion date to the sign. Completion date should read spring, summer, fall, or winter and year. Submit proposed signage drawing to CITY for approval at least 10 working days prior to start of construction. The sign shall be erected on or before the date construction starts.
   a. MSD Logo Size: 22-1/2 inches wide by 6.14 inches high.
   b. Logo Colors:
      1) Pantone: PMS 295 (dark blue), PMS Pro Cyan (bright blue), and PMS 157-8 (green).
      2) CMYK: C100, M57, Y0, K40 (dark blue), C100, M0, Y0, K0 (bright blue) and C48, M0, Y100, K0 (green).
   c. Headline Font:
      1) MSD Sewer Construction - Gotham Bold 250 pt. – C0, M0, Y0, K0 (white).
      2) It's all About Clean Water – Freestyle Script 284 pt. – C0, M0, Y0, K0 (white).
   d. Main Text Fonts:
      1) Gotham Book 120 pt., C0, M0, Y0, K100 (black).
      2) Gotham Bold 150 pt, C0, M0, Y0, K100 (black).
5. A zip file containing the Illustrator file and associated graphics and fonts, as well as a PDF, is available for download at http://msdgc.org/doing_business/capital_project_resource_library/index.html under Construction Phase, Construction Project Sign Graphics and Fonts.
6. Payment will be made at the unit bid price for each sign.



XX. SPEC (Ref. No. 1-66) – STORMWATER POLLUTION PREVENTION PLAN – SWPPP, NOI and NOT: Contractor shall develop and submit the SWPPP, NOI and NOT in accordance with Section 01 14 00 - Control of Work, for approval by the respective agencies. Each one of three CONTRACTOR submittals will be paid independently at the unit price bid per each submittal, upon agency approval of the SWPPP, NOI, and NOT.

YY. SPEC (Ref. No. 1-67) – ENVIRONMENTAL COMPLIANCE (EROSION CONTROL MEASURES): The CONTRACTOR shall install and maintain erosion control measures in the manner as approved in the SWPPP and as indicated on the Drawings and applicable Sections of 01 14 00 - Control of Work. Item will be paid monthly as a proration of the final completion schedule for erosion control measures, so long as they are installed and maintained until adjacent construction is complete, in accordance with the specifications and agency approval.

ZZ. SPEC (Ref. No. 1-68) – MAINTENANCE OF TRAFFIC: The CONTRACTOR shall install and maintain traffic control measures in accordance with the Drawings and applicable specifications. Costs for preparation and submittal of the Maintenance of Traffic Plan to the CITY shall be incidental to the Work. Item will be paid monthly as a proration of the final completion schedule for maintenance of traffic, so long as they are installed and maintained until adjacent construction is complete, in accordance with the specifications and agency approval.

AAA. SPEC (Ref. No. 1-69) – PERFORMANCE BOND: The CONTRACTOR shall include the cost of the performance bond in the proposal. The cost entered in the Proposal should not exceed 1 percent of the official bid price.

1. This item shall be included for payment on the first partial estimate.
2. In the event the cost entered in the Proposal exceeds 1 percent of the official bid price, the cost over 1 percent will be paid with the final payment.

1.06 FINAL PAYMENT

A. Comply with the requirements for Final Payment contained in the Contract Documents, including Article 14.07 of Section 00 72 00 - General Conditions and Section 01 77 00 - Contract Closeout.

B. Before final payment is made to the CONTRACTOR, the CONTRACTOR shall submit to the CITY a release, in writing, from all the property owners whose property has been used by the CONTRACTOR outside the limits of construction and/or Right-of-Way.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 20 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 26 00

CONTRACT CONSIDERATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of Values.

B. Application for Payment.

C. Contract Modification Procedures.

D. Change Order Procedures.

E. Project Management Communications Using E-Builder.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provision, and other Division 1 Specification Sections, apply to this Section.

B. Example submittal Forms located in Section 01 33 00 - Submittals.

1.03 SCHEDULE OF VALUES

A. SCOPE: The Schedule of Values is an itemized list that established the value or cost of each Pay Item that is part of the Work. The Schedule of Values shall be used as the basis for preparing Application for Payments and may be used as a basis of negotiations concerning additional work or credits which may arise during the construction. Quantities and unit prices shall be included in the schedule when approved by or required by the CITY.

B. PREPARATION: The Schedule of Values shall correspond to a WBS rollup from the approved cost loaded schedule. The Schedule of Values shall include the following:

1. Show breakdown of labor, materials equipment and other costs used by CONTRACTOR in preparation of the Bid for the Project.
2. Prepare Schedule of Values in 8-1/2 inch by 11 inch format.
3. Upon request by the CITY, CONTRACTOR shall provide data that will substantiate the amounts in the Schedule of Values.
4. The sum of the individual values shown on the Schedule of Values must equal the individual Pay Item included in the CONTRACTOR'S Bid.
5. The manner in which overhead and profit are shown shall be approved by the CITY.
6. The Schedule of Values shall show the purchase costs for materials and equipment to be stored on site prior to installation that the CONTRACTOR anticipates he shall request payment for prior to their installation.

C. SUBMISSION: Submit one copy of Schedule of Values to CITY for review at the Preconstruction Conference and before Work commences on the Project. After review by the CITY, revise and resubmit Schedule of Values as required until it is accepted.

1.04 APPLICATIONS FOR PAYMENT

A. CONTRACTOR shall submit Applications for Payment in accordance with the Contract Documents, including this Section and Paragraph 14.02 of Section 00 72 00 - Modified Standard General Conditions.

B. CONTRACTOR shall submit each Application for Payment on CITY's "Application and Certificate for Payment Summary Sheet" and "Continuation Sheet"; CONTRACTOR's electronic media printout containing similar information will be considered as a substitute for CITY'S "Continuation Sheet.

C. A current updated version of the CONTRACTOR'S Construction Schedule shall accompany each Application for Payment in accordance with specification Section 01 32 16 – Construction Progress Schedule.

D. Use approved Schedule of Values or Bid Item Quantities, including a list of approved Change Orders, with each Application for Payment.

E. Payment Period: In accordance with the requirements in Paragraph 14.02 of Section 00 72 00 - Modified Standard General Conditions.

1.05 CONTRACT INFORMATION/NOTIFICATION PROCEDURES

A. Request for Information (RFI): CONTRACTOR shall use CITY'S RFI form, filled out and submitted via e-Builder®, to request information, interpretations, clarifications, and changes in the Work. CONTRACTOR shall number RFI's consecutively and add a consecutive letter to RFI number on modified submittals of the same item (i.e., RFI-4A); CITY will respond on the same form in 10 calendar days.

B. Field Order: CITY will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Times with a Field Order as provided in Article 1, Paragraph 1.01.22 and Article 3, Paragraph 3.04.B.1 of Section 00 72 00 - Modified Standard General Conditions. CONTRACTOR shall use CITY'S Field Order Form filled out and submitted via e-Builder®.

C. Request for Proposal (RFP): CITY may request a written proposal from CONTRACTOR for changes in the Work. The CITY will issue an RFP describing the scope of the proposed change(s) and provide any back-up documentation required. The CONTRACTOR will respond to the RFP with 21 calendar days of the date the RFP was issued by the CITY with a detailed cost and schedule impact associated with the proposed change(s) in accordance with Articles 10, 11 and 12 of Section 00 72 00 - Modified Standard General Conditions.

1.06 CHANGE ORDER PROCEDURES

A. DEFINITIONS

1. Work Directive Change (WDC): When it is necessary that changes in the Work proceed before the change in Contract Price and Contract Times can be agreed upon, CITY will issue a WDC which will authorize and direct CONTRACTOR to proceed with the Work in accordance with Article 10 of Section 00 72 00 - Modified Standard General Conditions. When changes in Contract Price and Contract Times are to be based upon the cost of the Work, maintain and submit cost records in accordance with Article 11 of Section 00 72 00 - Modified Standard General Conditions.
2. Change Order (CO): The CITY will issue COs as needed which will authorize and direct CONTRACTOR to proceed with approved and negotiated changes in the Work. Proceed with such Work in accordance with Article 10 of Section 00 72 00 - Modified Standard General Conditions. Proposed Changes for which a WDC has been issued will be included in a Change Order after the Contract Price and Contract Times have been determined.

B. PRELIMINARY PROCEDURES

1. The CITY may initiate changes by submitting a Request for Proposal (RFP) to CONTRACTOR. The RFP will include:
   a. Detailed description of the change, Products and location of the change in the Project.
   b. Supplementary or revised Drawings and Specifications.
   c. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.
   d. A specific period of time during which the requested price will be considered valid.
2. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.
3. CONTRACTOR may request a change by submitting a written request to the CITY, containing:
   a. Description of the proposed change(s).
   b. Statement of the reason for requesting the change(s).
   c. Statement of the effect on the Contract Sum and the Contract Time.
   d. Statement of the effect on the Work of separate contractors.
   e. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.
4. Nothing in this section relieves the CONTRACTOR from its obligations under the claims procedure in the Contract Documents, including, but not limited to Paragraph 10.05 of Section 00 72 00 - Modified Standard General Conditions.

C. WORK DIRECTIVE CHANGE AUTHORIZATION

1. Work Directive Change (WDC): When it is necessary that work representing a potential change in the Contract proceed before the terms of a Change Order can be agreed upon, the CITY may issue a WDC. A WDC will not change the Contract Sum or Contract Time but is evidence that the parties expect that the change ordered or documented by the WDC will be incorporated in a subsequently issued

Change Order following negotiations by the parties as to its effect, if any, on the Contract Sum or Contract Times.

2. The Work Directive Change will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate the method of determining any change in the Contract Sum and any change in Contract Time. Work Directive Changes will be issued on the Work Directive Change Form included in e-Builder®.
3. A WDC must be issued and signed no later than 2 days after direction is given. Verbal or e-mail authorization cannot be used in place of a WDC. Reference of the initial direction (verbal or e-mail instruction) must be noted on the WDC.
4. The CITY will sign and date the Work Directive Change as authorization for the CONTRACTOR to proceed with the changes.
5. CONTRACTOR shall sign and date the Work Directive Change to indicate agreement with the terms therein.
6. The CONTRACTOR returns the completed WDC back to the CITY.

D. DOCUMENTATION OF RESPONSES TO REQUEST FOR PROPOSALS AND CLAIMS

1. The requirements of this section are in addition to the other requirements in the Contract Documents, including, but not limited to the requirements of Article 10 of Section 00 72 00 - Modified Standard General Conditions and the Statement of Claim Form in Section 00 63 64.
2. Support each lump sum proposal and each unit price proposal, which has not previously been established, with sufficient substantiating data to allow the CITY to evaluate the quotation.
3. On request by the CITY, CONTRACTOR shall provide additional data to support time and cost computations, including, but not limited to the following:
    a. Labor required.
    b. Equipment required.
    c. Products required.
        1) Recommended source of purchase and unit cost.
        2) Quantities required.
    d. Taxes, insurance and bonds.
    e. Credit for work deleted from Contract, similarly documented.
    f. Overhead and profit.
    g. Justification for any change in Contract Time should be based upon results of a Time Impact Analysis (TIA) as defined in Section 01 32 16 - Construction Progress Schedule.
4. Support each claim for additional costs and or additional time, with documentation as required for a lump sum proposal, plus additional information.
    a. Name of the CITY'S authorized representative who authorized the Work and date of the authorization.
    b. Dates and times Work was performed and by whom.
    c. Time record, summary of hours worked, and hourly rates paid.
    d. Receipts and invoices for:
        1) Equipment used, listing dates and times of use.
        2) Products used, listing of quantities.
        3) Subcontracts.

1.07 PROJECT MANAGEMENT COMMUNICATIONS USING e-BUILDER®

A. General: This project will utilize a web based project management tool called e-Builder®. This web based application is a collaboration tool, which will allow all project team members continuous access through the Internet to important project data as well as up to the minute decision and approval status information.

B. Project Management Communications: The CONTRACTOR shall use the Internet web based project management communications tool, e-Builder® ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of the Contractor. The sharing of user accounts is prohibited.

C. Training: e-Builder® training will be provided to the CONTRACTOR at a session scheduled by the CITY. Users are required to attend the scheduled training sessions.

D. Authorized Users: The CITY shall be responsible for procuring licensing, which allows access to the web site. Two user licenses will be allocated to the CONTRACTOR.

E. Communications: The use of fax, email and courier communication for this project is prohibited in favor of using e-Builder® to send messages. Documents to be submitted via e-Builder® include but are not limited to:

1. RFI: Request for Information.
2. Submittals (As identified in Section 01 33 00 - Submittals).
3. Transmittals, including record of documents and materials delivered in hard copy.
4. Payment Application.
5. Change Order/Change Request.
6. Punch List.
7. Request for Proposal.
8. Meeting Minutes.

F. Note: “MSD Document Control” if stated in the Contract Documents, the intent is that the use of e-Builder® supersedes the use of MSD Document Control.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 26 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pre-Construction Meeting.

B. Progress Meetings.

C. Sewer Cut-In Meetings.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.03 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be scheduled by the CITY after award of the Contract.

B. The standard agenda for the meeting includes the following items:

1. Introduction of responsible personnel and contact information:
   a. Construction Manager.
   b. Construction Inspector.
   c. Contractor Superintendent.
2. Contract Compliance:
   a. Signed Contracts.
   b. Equal Employment Opportunity (EEO).
   c. Subcontractors.
   d. Prevailing Wage Rates.
   e. Assignment of Contract (if applicable).
   f. Insurance.
   g. Pay estimates.
3. Safety Plan as specified in Section 01 31 21 - Site Safety Plan. CONTRACTOR to submit 3 days prior to the Preconstruction Meeting.
4. e-Builder® Submittals:
   a. Processing of Requests for Information (RFI) (this process will be unique to each project), Work Directive Change (WDC), and Change Requests (CR).
   b. Processing of Submittals (this process will be unique to each project).
   c. Refer to Section 01 26 00 - Contract Considerations for additional e-Builder® submittals and communication.
5. Invoicing.
6. Contractor's Performance Rating.
7. Contract Documents.

8. Baseline Construction Schedule: CONTRACTOR to submit prior to or at the Preconstruction Meeting as specified in section 01 32 16 - Construction Progress Schedule.
9. Schedule of Submittals: CONTRACTOR to submit 1 week after the notice of commencement as specified in Section 01 33 00 - Submittals.
10. Notice to Proceed (NTP) date determination.
11. Home Owner/Business Notification.
12. Schedule of Values (Bid Item Quantities from Section 01 20 00 – Measurement and Payment): In accordance with Paragraph 2.05(A)(3) of the General Conditions and Section 01 26 00 – Contract Considerations.
13. Coordination with local entities.
14. Coordination with existing utilities.
15. Permits (as applicable, see section 01 11 00 - Summary of Project and Section 01 14 00 - Control of Work).
    a. Erosion Control Plan.
    b. Storm Water Pollution Prevention Plan.
    c. City of Cincinnati Right-of-Way Permit
    d. MSDGC Special Wastewater Discharge Permit.
    e. Other.
16. Testing (both CQC and acceptance) – soil compaction, concrete, pipe deflection, manholes, pipe joint leakage, other.
17. Use of Premise.
18. Restoration.
19. CCTV of sewers (if applicable).
20. Record Drawings.

C. It is mandatory the CITY and CONTRACTOR attend this meeting. Other regulatory or financial personnel may be requested to attend, along with major subcontractors and suppliers.

D. This meeting will be chaired by the CITY, who will record and distribute meeting minutes.

1.04 PROGRESS MEETINGS

A. The CITY shall, at a prescribed time and place, hold project progress meetings each month, to coordinate the Work and discuss Work status, as well as problems that may arise concerning proper timing and execution of the Work.

1. Additional meetings may be requested and scheduled by the CITY or CONTRACTOR as the need arises.
2. Responsible representatives of the CONTRACTOR and the CITY shall attend each progress meeting. Subcontractors may occasionally be asked to attend.
3. The CITY shall preside and take minutes of each entire meeting, and subsequently reproduce and distribute such minutes to all parties concerned within 1 week following each meeting.
4. The only active audio or video recording device permitted will be that of the person presiding at the meeting. If used, the recording media shall be maintained as a Record Document, as outlined in Section 01 78 39 – Record Documents.

5. Suggested Progress Meeting Agenda:
   a. Review and approval of minutes of previous meeting.
   b. Review of Work progress since previous meeting.
   c. Site Safety.
   d. Field observations, problems, and conflicts.
   e. Problems which impede construction schedule.
   f. Review of off-site fabrication, delivery schedules.
   g. Corrective measures and procedures to regain projected schedule.
   h. Revisions to Construction Progress Schedule.
   i. Progress, schedule, during succeeding work period.
   j. Coordination of schedules.
   k. Review submittal schedules; expedite as required.
   l. Maintenance of quality standards.
   m. Pending changes and substitutions.
   n. Review proposed changes for:
      1) Effect on construction schedule and on completion date.
      2) Effect on other contracts of the Project.
   o. Other business.

B. Immediately prior to commencing Work on each new phase of Project construction, CONTRACTOR'S Project superintendent shall hold a coordination meeting with the trade foreman who will supervise or perform the new phase of work, to review Drawings and Specifications. CONTRACTOR shall advise the CITY of the date of such meetings and who will be in attendance. After the meeting is held, CONTRACTOR shall promptly submit a written report to the CITY.

C. CONTRACTOR shall schedule weekly job progress meetings between himself and major subcontractors. CONTRACTOR shall coordinate with the CITY on the time and place of the meeting, which shall be the same day and hour of the week for the duration of the work, except upon instructions of the CITY; the meetings may be increased or decreased as required by the progress of the Work.

D. CONTRACTOR shall be responsible for notifying all subcontractors of the time and place of job meetings, when the participation of the subcontractor is requested by the CONTRACTOR or by the CITY.

E. Conduct meetings in a manner that will best resolve coordination issues.

F. CONTRACTOR shall conduct the job meetings. The CONTRACTOR will take notes on discussions and conclusions and will distribute within 72 hours, excluding Saturdays, Sundays, and holidays, sufficient printed copies to those others concerned; two copies shall be furnished to the CITY.

1.05 SEWER CUT-IN MEETINGS

A. CONTRACTOR shall schedule and coordinate sewer cut-ins at least 2 weeks in advance with CITY.

B. CONTRACTOR shall submit for approval the Cut-In-Form at least 2 weeks in advance of scheduled Work. CTPB must already be approved by CITY prior to this submittal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 31 19

SECTION 01 31 21

SITE SAFETY PLAN

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. Project Meetings are included in Section 01 31 19 - Project Meetings.

C. Submittals included in Section 01 33 00 - Submittals.

1.03 SCOPE

A. Submit prior to start of Work a Site Specific Health and Safety Plan (HASP), which at a minimum:

1. Lists key personnel and alternates responsible for site safety along with means of contacting these personnel at all times.
2. Names one person as a Competent Person responsible for site safety activities and includes a resume of their qualifications to be a Competent Person.
3. Describes the risks associated with each operation conducted.
4. Confirms that personnel are adequately trained to perform their job responsibilities and operate necessary equipment, handle the specified hazardous situations they may encounter, and includes a resume of personnel qualifications and associated training certifications.
5. Describes the protective clothing and equipment personnel will wear during various site operations.
6. Describes any site-specific medical surveillance requirements (hazardous waste or material sites only).
7. Describes the program for periodic air monitoring, personnel monitoring, and environmental sampling, if needed (hazardous waste or material sites only).
8. Describes the actions to be taken to mitigate existing hazards (e.g., containment of contaminated materials) to render the work environment less hazardous, including assurance that contractor equipment utilized in the work conforms to the following:
    a. OSHA Part 1910 Subpart O, “Machinery and Machinery Guarding”.
    b. ANSI/ASME B15.1, “Safety Standard for Mechanical Power Transmission Apparatus”.
    c. ANSI/ASME B20.1, “Safety Standard for Conveyor and Related Equipment”.
9. Defines site control measures and includes a site map.
10. Establishes decontamination procedures for personnel and equipment.

11. Includes the Norfolk Southern emergency contact at 1-800-453-2530.

B. Sets forth a Contingency Plan for safe and effective response to emergencies.

C. Sets forth the site's Standard Operating Procedures (SOPS). SOPS are those standardized activities that use a checklist. The procedures should be:

1. Prepared in advance.
2. Based on the best available information, operational principles, and technical guidance.
3. Field-tested by qualified health and safety professionals and revised as appropriate.
4. Appropriate to the types of risk at that site.
5. Formulated to be easy to understand and practice.
6. Provided in writing to all site personnel who should be briefed on their use.
7. Included in training programs for site personnel.

D. Display a copy of the HASP at the work site at all times.

E. Provide a copy of the HASP to Norfolk Southern.

F. In addition, supply to the Engineer any safety information or documentation any state or federal agency requires under law.

G. A required Site Safety Plan template is available at: https://msdgc.org/doing-business-with-us/capital-project-resources/capital-project-resource-library/.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 31 21

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Software/Interface Requirements.

C. Quality Assurance.

D. Non-Compliance.

1.02 RELATED SECTIONS

A. General Conditions are included in Section 00 72 00, including Paragraph 6.04.

B. Suggested Construction Sequence is included in Section 01 12 16 – Construction Sequence, Paragraph 1.05.

C. Maintenance of Flow is included in Section 01 14 00 – Control of Work.

D. Contract Considerations are included in Section 01 26 00 – Contract Considerations, including Paragraph 1.03, Schedule of Values.

E. Submittals are included in Section 01 33 00 - Submittals.

F. Project Meetings are included in Section 01 31 19 – Project Meetings.

G. Substantial Completion as included in Section 01 77 19 – Substantial Completion.

1.03 SCOPE

A. A clear and complete Construction Progress Schedule (CPS) is required for the Project. Most importantly, the CPS shall be a tool which the CONTRACTOR and his agents will use to manage their Work and scope of the Project. The schedule must provide a tool that all parties involved in the Project can use to understand the status of and intended Project plan throughout the execution of the Project.

B. The CONTRACTOR shall manage the Work following the sequence defined by the CPS, and the schedule shall be the document from which Project progress is measured.

C. The schedule shall reflect the activities of the CONTRACTOR and all subcontractors.

1.04 SOFTWARE/INTERFACE REQUIREMENTS

A. The CONTRACTOR shall use modern Critical Path Methodology (CPM) scheduling software to produce the Project schedules, including the CPSs and reports as specified. This software shall run on the Microsoft Windows operating system and be able to produce electronic schedule files that are compatible with Primavera Project Manager Version P6 software.

1.05 QUALITY ASSURANCE

A. The CONTRACTOR shall employ a firm or individual to perform the Work covered by this section that shall have substantive experience in using computer based scheduling programs on construction projects (the "Scheduling Consultant"). The CONTRACTOR shall submit the following as a minimum:

1. Identification, qualifications, and experience of the members of the CONTRACTOR'S scheduling staff or any consultant's staff. The designated Scheduling Consultant shall have at least 5 years of experience in the computerized scheduling of public or industrial construction work. The CONTRACTOR shall provide a resume for the designated individual(s) that details all qualifications, experience, and references for the CITY'S approval.
2. The CITY may reject any member of the CONTRACTOR'S scheduling staff or any of Contractor's Scheduling Consultant's staff. The CONTRACTOR shall promptly replace rejected personnel and resubmit the above required qualifications for acceptable personnel at no additional cost to the CITY.

1.06 NONCOMPLIANCE

A. Pending an acceptable submission of the CPS, no partial payment will be made except in such amounts as may be approved by the CITY for materials received at the Project Site, plus any additional amounts that the CITY decides to release.

PART 2 - PRODUCTS

2.01 CONSTRUCTION PROGRESS SCHEDULES GENERAL CRITERIA

A. The CONTRACTOR shall submit all Project Schedules on 11 inches by 17 inches in format. In addition, the CONTRACTOR shall submit schedule in PDF format and the designated Primavera-compatible file format. The initial submittal shall be made at or before the pre-construction meeting.

B. The Project Schedules shall show the breakdown of Work into activities to the extent required to effectively manage the project. The CPS shall specify the progression of the Work from the Notice to Proceed (NTP) to the completion of the Work and shall be logically linked to include all milestones.

C. The CONTRACTOR'S CPS shall include all procurement related activities that lead to the delivery of permanent materials to the site. Procurement activities include, but are not limited to, preparation of Submittals, review and acceptance of Submittals, materials fabrication, and materials delivery and shall comply with the requirements of the Contract Documents.

2.02 CONSTRUCTION PROGRESS SCHEDULE BASELINE SUBMISSION

A. The CONTRACTOR shall prepare and submit a Baseline Construction Progress Schedule for review at or prior to the Pre-Construction Meeting.

B. The CONTRACTOR'S Baseline CPS shall consist of the following as a minimum:

1. A Gantt chart plot sorted by early start and early finish. The plot must clearly and legibly show all activities and predecessors and shall display each activity's identification number, description, original duration, remaining duration and total float value. The plot shall clearly show the critical path.
2. The CPS must clearly show the sequence and interdependence of activities required for complete performance of the work, beginning with the Contract Start Date (CSD) and concluding with the Contract Completion Date (CCD). The maximum duration of any physical work activity shall not exceed 20 working days (or one reporting cycle) unless approved by the CITY.
3. Tabular activity reports will be required as directed by the CITY and/or the CITY'S representative.

C. When the CONTRACTOR'S Baseline CPS is reviewed and approved by the CITY, it becomes the "Approved Baseline" CPS. Any changes to the Baseline CPS, other than status updates, require the approval of the CITY.

2.03 CONSTRUCTION PROGRESS SCHEDULE UPDATE

A. The Contractor shall provide an updated CPS on a monthly basis.

B. Updating the CPS shall consist of manually reflecting actual start, physical percent complete, remaining duration, actual finish, and data date. Updates shall also incorporate corrections or comments from the last submittal.

C. In the event that an update indicates negative float in excess of 20 working days, the CONTRACTOR will be required to submit a CPS Recovery Schedule reflecting changes in logic, duration, or sequencing required to recover lost time. Upon approval by the CITY of the CPS Recovery Schedule, that CPS becomes the new project Baseline CPS.

2.04 CONSTRUCTION PROGRESS SCHEDULE NARRATIVE

A. CPS Narrative shall accompany the initial submittal of the CONTRACTOR'S CPS. The CPS Narrative shall support and augment the CPM CPS. It shall include, but is not limited to the following:

1. An explanation of the general sequence of the Work.
2. An explanation of the Project critical path.
3. An explanation of physical constraints to completing the Work.

B. A CPS Narrative shall accompany each update to the CONTRACTOR'S CPS and shall, at a minimum, address the following:

1. Milestones Completed.
2. Any actual or anticipated problems with delivery of materials or equipment.
3. Any corrective action undertaken by the CONTRACTOR to address CPS problems.
4. Anything impacting critical path, milestones and contractual completion.

2.05 CONSTRUCTION PROGRESS SCHEDULE TIME IMPACT ANALYSIS

A. If the CONTRACTOR requests an extension of the Contract Time or any Contract Milestone, the CONTRACTOR shall provide a CPS Time Impact Analysis (TIA) to support the request. At a minimum, the CPS Time Impact Analysis must contain the following:

1. A detailed network analysis based on the current approved "Baseline" CPS.
2. The Contract milestones affected and the number of additional days requested for each milestone extension.
3. A listing of all activities and logic added, deleted or changed which encompass the impact of the change.
4. A complete submittal of "before and after" CPS as detailed in this specification.
5. The CONTRACTOR'S entitlement for the request of an extension of the Contract Time and or Contract Milestone shall clearly demonstrate that impact to the CPS Critical Path has occurred resulting from the TIA.
6. The recommended guidelines that govern the Time Impact Analysis process can be found within AACE International Recommended Practice No. 52R-06. "Time Impact Analysis – As Applied in Construction", latest version.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROGRESS SCHEDULE SUBMISSION AND REPORTING REQUIREMENTS TABLE:

A. The reports required by this section are to be prepared and submitted by the CONTRACTOR in accordance with Table 01 32 16-1 below.

Table 01 32 16-1: Table of Schedule Submittal Requirements

No.	DESCRIPTION	SUBMITTED AT PRE-CON	SUBMITTED MONTHLY	SUBMITTED AS SPECIFIED
1.	Identification Scheduling personnel	v		
2.	Baseline Construction Progress Schedule	v		
3.	Construction Progress Schedule Updates		v	
4.	Time Impact Analysis			v

5.	Revised Construction Schedules/ Recovery Schedules			v
6.	Schedule Narrative report	v	v	

END OF SECTION 01 32 16

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. CONTRACTOR'S Responsibilities.

C. Categories of Submittals.

D. Transmittal Procedure.

E. Review Procedure.

F. Effect of Review of CONTRACTOR'S Submittals.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. Project Meetings are included in Section 01 31 19 – Project Meetings.

1.03 SCOPE

A. Submittals covered by these requirements include manufacturers' information, shop drawings, test procedures, test results, samples, requests for substitutions, and miscellaneous work-related submittals.

B. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, and piping and conduit details.

C. The CONTRACTOR shall furnish all Drawings, Specifications, descriptive data, certificates, samples, tests, methods, schedules, and manufacturer's installation and other instructions as specifically required in the Contract Documents and as required by the CITY, to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the Contract Documents.

D. CSX and Norfolk Southern Railroads (Railroads) may require that some construction submittals be reviewed and approved by these railroad entities or their designated representatives prior to performance of work on, over, under, or adjacent to their property. These submittals may include but are not limited to proposed work plan, project schedule, means and methods, site access, dewatering, temporary excavation/shoring, soil disposition/management, track monitoring concrete placement work, structural lifting/rigging plans for hoisting operations, substructure construction plans, steel erection plans, roadwork, and other submittals noted herein. The specific construction submittals to each railroad will be determined through coordination with the railroad agencies.

E. All design and submittal elements requiring the stamp and seal of a Registered Professional Engineer shall be that of a Professional Engineer registered with the State of Ohio.

F. Where a Submittal is required by the Contract Documents, any related Work performed by CONTRACTOR prior to the CITY'S review of the Submittal shall be at the sole expense and responsibility of CONTRACTOR.

1.04 CONTRACTOR’S RESPONSIBILITIES

A. The CONTRACTOR shall be responsible for the accuracy and completeness of the information contained in each Submittal and shall assure that the material, equipment or method of work shall be as described in the Submittal. Data shown on the Submittal shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data. Samples shall be accompanied by sufficient information to identify the supplier and pertinent data such as catalog numbers.

B. As one of its initial submittals, to be provided 1 week after the notice of commencement, the CONTRACTOR shall completely review the specifications and prepare a Schedule of Submittals which provides a comprehensive list of required submittals, listing the required submittals by specification section. This list shall be submitted for approval, and once approved, will serve as the baseline for all ensuing submissions. The Schedule of Submittals shall be updated on a monthly basis with current status of each submittal and any proposed modifications to the submission schedule. Monthly updates shall be submitted along with the monthly schedule updates.

C. The following Preliminary Schedule of Submittals is a preliminary list of submittals that shall be reviewed and updated by the Contractor as applicable to this project and be submitted to the City in accordance with responsibilities of paragraph 1.04 B:

Preliminary Schedule of Submittals

SPECIFICATION REFERENCE	SUBMITTAL	DUE DATE
	PRE-CONSTRUCTION	
01 12 16	Introductory Letter	1 week after Notice of Award
01 12 16	Pre-Construction Survey of Adjacent Facilities and Properties	Prior to Start of construction
01 12 16	Existing Conditions Video (DVD)	Prior to Construction
01 12 16	Pre-Construction Photographs	Prior to Construction
01 14 00	Right-of-Way Permits	Prior to Construction
01 14 00	Written Permissions for "Use of Premises"	Prior to working outside construction limits and wasting of construction materials

01 14 00	Bracing Details/Calculations for Work in City of Cincinnati ROW	Prior to Construction
01 14 00	Survey Calculations/Cut Sheets	Prior to Construction
01 14 00	Ohio EPA Notice of Intent (NOI)	To OEPA - 21 days prior to work at the site
OTHER	Ohio EPA Co-Permittee Notice of Intent (NOI) "Submitted by MSD Project Manager"	To OEPA - 21 days prior to work at the site
01 14 00	Stormwater Pollution Prevention Plan (SWPPP)	2 weeks following Notice of Award
01 14 00	Erosion Control Plan	2 weeks following Notice of Award
01 14 00	Traffic Control Plan (Maintenance of Traffic Plan)	2 weeks following Notice of Award
01 20 00	Proposed Signage Drawing	Prior to Construction
01 26 00	Schedule of Values	At the Preconstruction Meeting and before work commences; to be used as basis for reviewing Contractor's applications for payment
01 31 21	Site Safety Plan	3 days prior to Preconstruction Meeting; Submit a copy to Norfolk Southern for 7th St.
01 32 16	Baseline Construction Progress Schedule and Narrative/Identification, Quals, Experience of Scheduling Personnel	Prior to or at the Preconstruction Meeting
01 33 00	Schedule of Submittals	1 week after Notice of Commencement
01 45 29	Identification and Qualification of Proposed Testing Laboratory	2 weeks following Notice of Award
	CONSTRUCTION	
01 12 16	Post-Construction Survey of Adjacent Facilities and Properties	At completion of construction
01 12 16	Post-Construction Video (DVD)	At completion of construction
01 12 16	Post-Construction Photographs	At completion of construction
01 12 16	Construction Progress Photographs	Weekly
01 14 00	Contractor's Temporary Bypass Plan	60 days prior to proposed installation
01 14 00	Ohio EPA Notice of Termination (NOT)	To OEPA – Submitted copy provided with final punch list
01 31 19	Contractor New Phase Coordination Meeting Report	72-hrs following meeting
01 31 19	Contractor Job Meeting Notes	72-hrs following meeting

01 31 19	Cut-in-Forms	2 weeks before proposed work
01 32 16	Construction Progress Schedule Updates and Narratives	Monthly
01 33 00	Monthly Schedule of Submittals Updates	Monthly
01 45 29	Certification of Material Compliance	With material submittals
01 45 29	Soil and Groundwater Investigations	Per 02 61 00
01 45 29	Test Report: Concrete Material and Mix Design (over 25 CY)	48-hrs following receipt
01 45 29	Test Report: Grout Material and Mix Designs (over 25 CY)	48-hrs following receipt
01 45 29	Test Report: Asphaltic Concrete Material and Mix Design (over 25 CY)	48-hrs following receipt
01 45 29	Test Report: Embedded, Fill and Backfill Materials (over 25 CY)	48-hrs following receipt
01 57 28	Temporary Flow Control Plan et al per 01 57 28	60 days prior to proposed installation
01 71 23	Contractor Daily Reports (Weekly)	Weekly
01 78 39	Record Documents	At completion of Project
02 40 00	Abandonment-Recovery Contingency Plan	60 days prior to proposed installation
02 41 13	Plan for Disposal of Demolition Debris and Materials	Prior to construction
02 41 13	Salvage Equipment Turnover Form	2 weeks before proposed work
02 61 00	Lead Safety Plan	3 days prior to Preconstruction Meeting;
02 61 00	Emergency Response Cleanup Procedure	3 days prior to Preconstruction Meeting;
02 61 00	Site Safety and Health Officer Qualifications, Work Plan, Soil Management Plan, HAZWOPER or Other Contractor Qualifications, Analytical Testing Laboratory Qualifications	3 days prior to Preconstruction Meeting;
02 61 00	Name and Address of Proposed Licensed Disposal Facility(s) and Waste Hauler(s), Copies of Permits and Licenses, Description of Proposed Disposal Site(s) including Pre-Approved Letter from Each Disposal Operator Indicating the Allowable Range of Contaminants that are Acceptable at Each Site	2 weeks before proposed work
02 61 00	Analytical Results and Laboratory Chain-of-Custody Records for All Samples, including Copy for Submittal to Norfolk Southern for Work Within Railroad Property	Within 48-hrs of receiving results; Submit a copy to Norfolk Southern
02 61 00	Records of Transportation and Disposal Including Weight Tickets, Manifests, Disposal Receipts, Etc.	Within 48-hrs of receiving results

03 30 00	Cast-In-Place Concrete Mix Designs, Product Data, Source and Quality	Prior to delivery to site
31 09 13	Geotechnical Instrumentation	Prior to delivery to site
31 09 13	Geotechnical Instrumentation Informational Submittals	Prior to construction
31 23 00	Materials	Prior to delivery to site
31 23 00	Protection System Design Certificates	Prior to construction
31 23 00	Testing	Within 48-hrs of receiving results
31 41 00	Excavation Support Plan for Open-Cut	60 days prior to construction
31 41 00	Shaft/Pit Excavation Support Plan	60 days prior to construction
31 79 19	Tunneling Work Plan	60 days prior to construction
31 79 19	Contingency Plan	60 days prior to construction
31 79 19	Contact Grout Work Plan and Methods	Prior to delivery to site
31 79 19	Qualifications, Quality Control Methods, Safety Plan, Schedule	60 days prior to construction
31 79 19	Daily Records	Daily
31 79 19	Contact Grout Reports and Records	Within 48-hrs of receiving results
33 31 00	Pipe Materials	Prior to delivery to site
33 31 00	Initial Survey Television Inspection	Prior to construction
33 31 00	Video Taping of Installed Sewers	Prior to substantial completion
33 31 00	Deflection Testing - Flexible Pipe	Prior to substantial completion
33 31 00	Leakage Test Sewer Pipe	Prior to substantial completion
33 39 00	Manholes	Prior to delivery to site
33 39 00	Manhole Castings	Prior to delivery to site
33 39 00	Manhole Vacuum Test	Prior to substantial completion
33 39 19	Lining System, Product Data, Application Plan, Instructions	Prior to delivery to site
33 44 13	Catch Basins and Associated Materials, Manufacturer's Name for Precast Structures	Prior to delivery to site
33 05 24	Design Documentation for Reinforced Concrete Jacking Pipe, Joints, Pipe Finishing and Repair, Manufacturer's Information, Qualifications	Prior to delivery to site

D.
D.
D.
D.
D.

D. The CONTRACTOR shall verify that all features of all products identified in Submittals conform to the specified requirements.

E. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review.

F. All extraneous materials shall be crossed out or otherwise obliterated from Submittals.

G. The CONTRACTOR shall ensure that there is no conflict with other Submittals and notify the CITY in each case where a Submittal may affect the Work of another CONTRACTOR or the CITY.

H. The CONTRACTOR shall coordinate Submittals with the Work so that the Work will not be delayed. CONTRACTOR shall coordinate and schedule different categories of Submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule Submittals.

I. The CONTRACTOR shall not proceed with Work related to a Submittal until the Submittal process is complete. This requires that Submittals for review and comment shall be returned from the CITY to the CONTRACTOR with a cover sheet indicating "No Exceptions Taken" or "Make Corrections Noted."

J. The CONTRACTOR shall certify on each Submittal document that CONTRACTOR has reviewed the Submittal, verified field conditions, and complied with the Contract Documents. CONTRACTOR shall also determine and verify:

1. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers and similar information;
2. The suitability of all materials with respect to the intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work; and
3. All information relative to CONTRACTOR's means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

K. The CONTRACTOR may authorize in writing a material or equipment supplier to deal directly with the CITY with regard to a Submittal. These dealings shall be limited to interpretations of the Contract Documents to clarify and expedite the Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CATEGORIES OF SUBMITTALS

A. GENERAL: Submittals fall into two general categories; submittals for review and comment, and submittals which are primarily for information only. Submittals which are for information only are generally specified as PRODUCT DATA in Part 2 of applicable specification sections.

B. SUBMITTALS FOR REVIEW AND COMMENT: All submittals except where specified to be submitted as product data for information only shall be submitted by the CONTRACTOR to the CITY or the CITY'S representative for review and comment utilizing the e-Builder® submittal process.

C. SUBMITTALS (PRODUCT DATA) FOR INFORMATION ONLY: Where specified, the CONTRACTOR shall furnish submittals (product data) to the CITY or the CITY'S representative for Information only.

3.02 TRANSMITTAL PROCEDURE

A. DOCUMENT SUBMISSION. All Submittals shall be transmitted to CITY using e-Builder®, which will log and distribute submittals.

B. GENERAL: A separate CONTRACTOR Submittal Cover Sheet form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the Submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

C. SUBMITTAL NUMBER: The submittal number shall be the spec section followed by a unique, sequentially assigned number, and shall be noted on the transmittal form accompanying each item submitted. Original Submittal numbers shall have the following format: "XX XX XX-Y"; where "Y" is the sequential number assigned by the CONTRACTOR. Resubmittals shall have the following format: "Y-Z"; where "Y" is the originally assigned Submittal number and "Z" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 33 31 00-1-B, for example, is the second resubmittal (hence the "B") of first submittal pertaining to Section 01 33 00 - Submittals. This shall be the naming structure required to follow for all file submittals provided in e-Builder® submittal process to allow for proper tracking of submittals.

D. DEVIATION FROM CONTRACT: If the CONTRACTOR proposes to provide material, equipment, or method of work which deviates from the Contract Documents, the CONTRACTOR shall indicate so under "deviations" on the transmittal form accompanying the Submittal copies.

E. SUBMITTAL COMPLETENESS: Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

3.03 REVIEW PROCEDURE

A. GENERAL: Submittals are specified for those features and characteristics of materials, equipment, and methods of operation which can be selected based on the CONTRACTOR'S judgment of their conformance to the specified requirements. Other features and characteristics are specified in a manner which enables the CONTRACTOR to determine acceptable options without Submittals. The review procedure is based on the CONTRACTOR'S guarantee that all features and characteristics not requiring

Submittals conform as specified. Review shall not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes (except where specifically indicated or required by the Contract Documents) or to safety precautions or programs incident thereto. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions. When the Contract Documents require a Submittal, the CONTRACTOR shall submit the specified information as follows:

1. One copy in electronic PDF format or an original copy shall be submitted to MSD. If requested by the CITY, the CONTRACTOR shall also submit one CD (or other approved electronic storage device) containing the "native files" of electronic software used to generate the submittal.

B. SUBMITTALS FOR REVIEW AND COMMENT: Unless otherwise specified, within 35 calendar days after receipt of a Submittal for review and comment, the CITY or OWNER'S REPRESENTATIVE shall review the Submittal and return electronic copies reflecting all review comments. The reproducible original will be retained by the CITY. The returned Submittal shall indicate one of the following actions:

1. If the review indicates that the material, equipment or work method complies with the Contract Documents, Submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the CONTRACTOR may begin to implement the Work method or incorporate the material or equipment covered by the Submittal.
2. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The CONTRACTOR may begin implementing the work method or incorporating the material and equipment covered by the Submittal in accordance with the noted corrections. Where Submittal information will be incorporated in O&M data, a corrected copy shall be provided.
3. If the review reveals that the Submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at his own risk, the CONTRACTOR shall not undertake Work covered by this Submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
4. If the review indicates that the material, equipment, or work method does not comply with the Contract Documents, copies of the Submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the CONTRACTOR shall not undertake the Work covered by such Submittals until a new Submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. SUBMITTALS (PRODUCT DATA) FOR INFORMATION ONLY: Shall be provided as part of the Work under the Contract Documents and its acceptability determined under normal inspection procedures.

D. RESUBMITTAL PROCEDURES: CONTRACTOR shall make corrections required by the CITY or OWNER'S REPRESENTATIVE and shall return the required number of corrected copies of the Submittal to CITY for review. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by the CITY or OWNER'S REPRESENTATIVE on previous Submittals.

3.04 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

A. Review of Contract Documents, including the drawings, methods of work, or information regarding materials or equipment the CONTRACTOR proposes to provide, shall not relieve the CONTRACTOR of responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the CITY or the OWNER'S REPRESENTATIVE, or by any officer or employee thereof, and the CONTRACTOR shall have no claim under the Contract Documents on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed.

B. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the CITY has no objection to the CONTRACTOR, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

END OF SECTION 01 33 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 42 19

APPLICABLE CODES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

1.02 SCOPE

A. All materials, equipment, products and construction procedures used during the execution of the Contract Documents or incorporated in the Work shall comply with the latest provisions of applicable codes, regulations, and standards, except as noted elsewhere. A partial listing includes the following:

1. Ohio Environmental Protection Agency.
2. Ohio Administrative Code.
3. Ohio Basic Building Code.
4. City of Cincinnati Municipal Code.
5. Local Building Codes, Rules and Regulations (MSDGC and SMU).
6. Norfolk Southern Public Improvement Projects Manual *(Variances requested)*.
7. Norfolk Southern NSCE-8: Specifications for Pipeline Occupancy and Conduit Operations (*Variances requested)*.
8. CSX Public Project Information Manual *(Variances requested)*.
9. CSX Design and Construction Standard Specifications – Pipeline Occupancies *(Variances requested*).
10. National Fire Codes.
11. Regulations and Standards of the Occupational Safety and Health Act (OSHA), of the U.S. Department of Labor, and of the State.
12. National Electrical Code.
13. Underwriter's Laboratories, Inc.
14. National Electrical Manufacturer's Association.
15. American National Standards Institute.
16. American Society for Testing Materials.
17. American Society of Heating, Refrigerating and Air Conditioning Engineers.
18. American Society of Mechanical Engineers.
19. Institute of Electrical and Electronics Engineers.
20. OSHA Part 1910 Subpart O, "Machinery and Machinery Guarding".
21. ANSI/ASME B15.1, "Safety Standard for Mechanical Power Transmission Apparatus".
22. ANSI/ASME B20.1, "Safety Standard for Conveyor and Related Equipment".
23. All other applicable codes, regulations listed in the Specifications, and standard of utility companies.

B. Specific provisions of codes, regulations and standards may be referenced in the Contract Documents to assist the CONTRACTOR and identify options selected for the design of the Project. Such references do not relieve the CONTRACTOR from compliance with other applicable provisions of the codes, regulations and standards not specifically referenced in the Contract Documents.

C. In case of discrepancy, applicable codes shall govern over the Contract Documents. The CONTRACTOR shall notify the CITY in writing of any discrepancy(ies) noted before proceeding with the related Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 42 19

SECTION 01 45 29

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Description.

C. CONTRACTOR'S Responsibilities.

D. Submittals.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions and other Division 01 through Division 40 Specification Sections, apply to this Section.

1.03 SCOPE

A. This section addresses the requirements and responsibilities of the CONTRACTOR and the CITY, with respect to testing laboratory services for materials used on the Project (the "Materials").

1.04 DESCRIPTION

A. All Materials must conform to Work requirements in the Contract Documents. The CONTRACTOR has the obligation to demonstrate that all Materials conform to the requirements of the Contract Documents.

B. All Materials are subject to sampling, inspection and testing. CONTRACTOR shall provide and deliver, at no additional cost to the CITY, any samples needed for testing. Include samples in the Work if suitable and applicable.

C. CONTRACTOR shall submit Certification of Material Compliance for any Material before incorporating in the Work. Such certification shall include, at a minimum, the following:

1. Project Name.
2. Material Description.
3. Material Supplier including address, phone number and contact.
4. Intended use of Material.
5. Location and date of Material Production.
6. Applicable standards, tests and results thereof.
7. Statements declaring the Material conforms to the Contract Requirements.

D. The CONTRACTOR shall obtain the services of an approved independent testing laboratory to perform and report the tests listed below:

1. Soil and groundwater investigations.
2. Concrete material and mix designs.
3. Grout material, masonry units, and mix designs.
4. Asphaltic concrete materials and mix designs.
5. Embedded, fill and backfill materials.
6. Repeat tests required because of the CONTRACTOR'S negligence or nonperformance.
7. Tests made for the CONTRACTOR'S convenience.

E. At the discretion of the CITY, the CITY will perform or obtain the services of a test laboratory to perform and report the tests listed below:

1. Bedding and backfill material analysis.
2. Soils compaction.
3. Concrete strength, slump and air content.

F. The CONTRACTOR shall pay for all testing listed in 1.04.D above. Additional testing requirements for the CONTRACTOR are included in the individual specification sections. Repeat tests requested by the CITY which do not indicate the CONTRACTOR'S negligence or noncompliance with requirements of the Contract Documents shall be paid for by the CITY.

G. The testing laboratory shall be acceptable to CITY and shall be the same throughout the Project unless a change is requested in writing by the CONTRACTOR and approved by the CITY, or a change is requested in writing by the CITY.

H. One printed copy of all test reports shall be submitted to the CITY as soon as is practical following the completion of each test. Concurrently, one additional copy of each test report shall be submitted electronically to the CITY in PDF format using the e-Builder filing set up for this project.

I. The testing laboratory shall be available to attend Project progress meetings when requested in order to provide their input and opinions regarding construction procedures or problems.

J. The testing laboratory is not authorized to approve or accept any portion of the Work; rescind, alter or augment the requirements of the Contract Documents; or perform any duties of the CONTRACTOR not outlined in this section.

K. The Work of the testing laboratory shall in no way relieve the CONTRACTOR of any obligation to perform Work in accord with the Contract Documents.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. The CONTRACTOR shall provide reasonable notice (at least 48 hours) to the CITY prior to expected time for any testing.

B. Cooperate with laboratory personnel; provide access to Work Site, processes and to manufacturer's operations.

C. Provide to laboratory, preliminary representative samples of Materials to be tested, in required quantities, and properly identified and dated.

D. Furnish copies of mill test reports.

E. Furnish labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the Site.
3. To facilitate and coordinate inspections and tests.
4. For laboratory's exclusive use for storage and curing of test samples.
5. Forms for preparing concrete test beams and cylinders.

F. Notify laboratory and the CITY sufficiently in advance of testing operations to allow for assignment of personnel and scheduling of tests.

G. Arrange with laboratory and pay for, additional samples and tests required for CONTRACTOR'S convenience.

1.06 SUBMITTALS

A. Follow all requirements of Section 01 33 00 - Submittals.

B. The CONTRACTOR shall furnish complete identification and qualification information to the CITY, for consideration of approval, regarding the proposed testing laboratory. Such information shall include current staffing, testing equipment, inventory and calibration data, and shall be sufficient to demonstrate the laboratory's ability to perform all tests required by the Contract Documents.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 45 29

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Temporary Light and Power.

C. Weather Protection.

D. Temporary Air, Steam and Water.

E. Temporary Sanitary Facilities.

F. Fire Extinguishers.

1.02 RELATED SECTIONS

A. Drawings and General Provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.03 SCOPE

A. CONTRACTOR'S temporary offices shall be established on the job Site where approved or directed by the CITY, adequately furnished, and maintained in a clean, orderly condition by the CONTRACTOR. The CONTRACTOR or an authorized representative shall be present in the field office at all times while Work is in progress. Instructions received there from the CITY shall be considered as delivered to the CONTRACTOR.

B. In addition to CONTRACTOR'S temporary office, CONTRACTOR shall provide a suitable temporary office, either adjacent to or partitioned-off within CONTRACTOR'S temporary office for use of the CITY and OWNER's REPRESENTATIVES. The CITY'S temporary office shall include but not limited to the following items or criteria:

1. Minimum 200 square feet of usable floor space.
2. Minimum 7 foot ceiling height.
3. Minimum of one (1) telephone line for contractor to provide WIFI hotspot for City use.
4. One (1) copy machine.
5. One (1) calculator with tape.
6. One (1) desk and chair set.
7. One (1) two-drawer metal file cabinet for desk and chair set
8. 30 inch by 72 inch Work table.
9. One (1) four-drawer legal filing cabinet.
10. One (1) plan rack.
11. One (1) storage locker with lock suitable for surveying equipment.
12. One (1) portable fire extinguisher.

13. Four (4) all-weather parking spaces.
14. Maintaining a room temperature between 68- and 75-degrees Fahrenheit.
15. Furnish cold potable water.
16. Provide unisex toilet facilities.

C. The CONTRACTOR is responsible for establishing utilities, including power, phone, and Internet access if required by the CITY.

1.04 TEMPORARY LIGHT AND POWER

A. The CONTRACTOR shall provide connections to existing facilities sized to provide service required for power and lighting.

B. Where adequate electric service and lighting from the CITY'S facilities is not available or adequate for CONTRACTOR needs, the CONTRACTOR shall furnish temporary light and power, including 220 Volt service for welding, complete with wiring, lamps and similar equipment as required to adequately light all work areas and with sufficient power capacity to meet the reasonable needs of all subcontractors. Make all necessary arrangements with the local electric company for temporary electric service and pay all expenses in connection therewith.

C. The CONTRACTOR shall install circuit(s) and branch wiring with area distribution boxes located so that power and lighting is available throughout the Site by use of construction type power cords where existing plant service is not available or where lighting or power is necessary.

D. The CONTRACTOR shall provide properly configured NEMA polarized outlets to prevent insertion of 110-120 Volt plugs into higher voltage outlets. For connection of power tools and equipment, provide outlets equipped with ground-fault circuit interrupters, reset button and pilot light.

E. The CONTRACTOR shall provide grounded extension cords. Use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if more than one length is required.

F. The CONTRACTOR shall provide general service incandescent lamps as required for adequate illumination where necessary. Provide guard cages or tempered glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

1.05 WEATHER PROTECTION

A. The CONTRACTOR shall furnish, install and maintain temporary heat and enclosures to provide adequate working areas for personnel during the months of November through March.

B. The CONTRACTOR shall furnish temporary heating units that shall have been tested and labeled by UL, FM, or other recognized association related to the type of fuel being used, and maintain reasonable temperatures within the temporary enclosure.

1.06 TEMPORARY AIR, STEAM AND WATER

A. The CONTRACTOR shall provide all air, steam and water, including temporary piping and appurtenances required for cleaning and testing pipelines and equipment. Remove temporary piping and appurtenances upon approval of equipment being tested.

1.07 TEMPORARY SANITARY FACILITIES

A. The CONTRACTOR shall provide self-contained, single occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed in a fiberglass or other approved non-absorbent shell.

B. The CONTRACTOR is responsible for maintaining temporary sanitary facilities, including coordinating and paying for periodic disposal of contents, and removing it at Final Completion.

1.08 FIRE EXTINGUISHERS

A. The CONTRACTOR shall provide portable UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide portable UL-rated Class ABC dry chemical extinguishers or a combination of NFPA recommended Classes for the exposure. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 50 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 57 28

TEMPORARY FLOW CONTROL

PART 1 - GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Inspection, Cleaning, and Restoration Certification (IICRC): S500, Standard and Reference Guide for Professional Water Damage Restoration.

1.02 REFERENCE SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. Section 01 14 00 – Control of Work for Maintenance of Flow requirements.

1.03 DEFINITIONS

A. Bypass Pumping: Temporary flow control accomplished by diverting flow away from the Work area using one or more pumps.

B. Temporary Flow Control: Reducing, limiting, or excluding flow in or to a sanitary sewer, storm sewer, pump station, force main, or other facility as required for performing the Work under the Contract. Draining, handling, and disposal of sanitary sewage and stormwater from pipelines and other facilities as required for performing the Work under the Contract is also part of temporary flow control.

C. Temporary Flow Control Plan: Plan prepared by CONTRACTOR containing complete information on how CONTRACTOR proposes to perform temporary flow control in accordance with specified requirements.

1.04 SYSTEM DESCRIPTION

A. CONTRACTOR is responsible to provide facilities and controls required to intercept, convey, and discharge flow to be controlled; include standby and emergency equipment.

B. Conform to regulatory requirements.

C. Protect water resources, wetlands, and other natural resources.

D. Temporary flow control shall be done in a manner that will not damage private or public property or create a nuisance or public menace. Flow shall be conveyed in enclosed pipes that are adequately protected from traffic or other hazards.

E. Discharge:

1. To sanitary sewer system**.**
   a. MSDGC requires a Special Wastewater Discharge Permit for the discharge of groundwater to MSDGC's sanitary sewer. Contractor shall be required to procure this permit. Refer to https://msdgc.org/sites/default/assets/downloads/Customers/Industrial-Users/Special_Wastewater_Discharge_Form_Instruction_Sheet.pdf and https://msdgc.org/sites/default/assets/downloads/Customers/Industrial-Users/Special_Wastewater_Discharge_Form.pdf
2. Dumping or free flow on private or public property, gutters, streets, or sidewalks is prohibited.
3. Discharge of sanitary sewage or contaminated water to storm sewers, to surface waters or wetlands, or into the ground, is prohibited.

1.05 SITE CONDITIONS

A. Obtain approval and secure permits for placement of temporary flow control facilities within public rights-of-way.

B. Existing facilities in vicinity of CSO 432 and CSO 489 Separation Sewers as shown on Drawings.

1.06 SUBMITTALS

A. Follow Section 01 33 00 - Submittals.

B. Informational Submittals:

1. Temporary Flow Control Plan.
2. Emergency Cleanup Plan.
3. Special permits required for temporary flow control.
4. Names and qualifications of industrial hygienist and standby cleanup Subcontractor, including but not limited to, certification by IICRC.
5. Information describing equipment and materials to be used and showing conformance with specified requirements.

1.07 SEQUENCING AND SCHEDULING

A. Follow Section 01 12 16 - Construction Sequence and Section 01 32 16 - Construction Progress Schedule to provide necessary individual setup, operation and removal of all requirements necessary for temporary bypass flow requirements to maintain flow of Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Install temporary flow control facilities only within public right-of-way, CITY'S property, temporary construction easement, permanent easement, or easement obtained by CONTRACTOR.

B. Operate and maintain temporary flow control 24 hours per day, 7 days per week, including without limitation, holidays, as required to control flows.

C. Promptly remove temporary flow control facilities as soon as they are no longer needed.

3.02 REQUIRED TEMPORARY FLOW CONTROL

A. Except at pipe sags, depth of flow during television inspection and joint testing shall not exceed that shown below for respective pipe sizes:

Maximum Depth of Flow in Inches	
Pipe Size (Inches)	**Television Inspection and Joint Testing**
6	1.20
8	1.60
10	2.00
12	3.00
15	3.75
18	4.50
21	5.25
24	6.00
27	8.00
30	9.00
33 and up	30% of Pipe Diameter

B. Eliminate flow from sewer manhole to manhole segments during spot repair, service connection, service connection rehabilitation, manhole construction, and sewer pipe replacement or lining within that segment.

3.03 EQUIPMENT AND MATERIALS

A. General:

1. Provide materials and equipment that will ensure continuous and successful operation of temporary flow control systems.
2. Repair or modify systems as necessary.

3. Unless otherwise shown or specified, materials and equipment may be new or used at CONTRACTOR'S option.

B. Plugs:

1. Provide with taps for connection of pressure gauges and air hoses, and flow-through capability.
2. Pipe Diameters 24 Inches and Smaller: Use mechanical plugs with rubber gaskets or pneumatic plugs with rubber boots.
3. Pipe Diameters Larger than 24 Inches:
   a. Use inflatable bag stoppers made in two or more pieces.
   b. Manufacturers:
      1) Lansas.
      2) Cherne Industries.
      3) Or approved equal.

C. Pumps:

1. Fully automatic, self-priming units that do not require use of foot valves or vacuum pumps in priming system.
2. Solids handling design with ability to pump minimum 3-inch diameter sphere.
3. Able to run dry for long periods of time to accommodate cyclical nature of flows.
4. Engine: Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.

D. Electric Power Generators:

1. Be able to simultaneously start and run electric powered pumps required for flow to be controlled.
2. Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.
3. Include automatic transfer switch if flow control system is to operate unattended.

E. Standby Equipment:

1. Standby Pump: One of each size to be available onsite.
2. Electric Power Generators: Minimum of one if temporary flow control system contains electric powered pump. Able to simultaneously start and run electric powered pumps required for flow to be controlled.

3.04 TEMPORARY FLOW CONTROL PLAN

A. Prepare and submit Temporary Flow Control Plan at least 60 days before starting the Work requiring temporary flow control; include following information:

1. Drawings indicating location of temporary sewer plugs and bypass discharge lines.
2. Traffic Control Plan specifically applicable to temporary flow control adhering to requirements of applicable agencies and as may be specified in Contract Documents.

3. Locations where flow will be intercepted and discharged.
4. If trucks are to be employed include the following:
   a. Numbers and sizes of trucks.
   b. Configuration of facilities to be used to load trucks at each interception location.
   c. Locations where trucks will unload.
   d. Time for loading, unloading, and travel.
5. Complete descriptions and performance characteristics of pumps, electric power generators, and standby equipment.
6. Acoustical information for equipment to be used showing compliance with noise control requirements of Section 01 50 00 - Temporary Facilities and Control.
7. Details of temporary force mains, including horizontal and vertical alignments, pipe materials, protection of existing buried and aboveground facilities and improvements, maintenance of traffic and access to properties.
8. Design calculations proving adequacy of temporary system and selected equipment to convey all flows.
9. Drawings showing layouts and configurations of temporary flow control facilities and also showing locations relative to right-of-way easement, and property boundaries.
10. Drawings and design calculations of temporary bulkheads and plugs.
11. Drawings and design calculations for thrust restraint of temporary piping.
12. Details of system controls and control logic; include diagrams and narrative.
13. Anticipated schedule for the Work.
14. Other information to completely describe temporary flow control facilities and conformance to specified requirements.
15. Anticipate coordination needs with the East Branch Ohio River Interceptor (EBORI) Extension – Gest Street Tunnel Project, CITY, OWNER'S REPRESENTATIVES, and all contractors and subcontractors contracted with the Project.

3.05 EMERGENCY CLEANUP PLAN

A. Prepare and submit not less than 60 days before scheduled date of temporary flow control activities. As a minimum plan shall include the following:

   1. Procedures for removal of water.
   2. Procedures for determining nature and extent of damage and required restoration where restoration is possible.
   3. Provide for industrial hygienist and standby Subcontractor for cleanup of exterior and building interior spaces that might be affected by a spill, backup, or overflow. Industrial hygienist and cleanup Subcontractor shall be certified by IICRC and follow IICRC S500 for cleanup of Category 3 water.

B. Implement for Full Scale Test and during temporary flow control.

3.06 BLOCKING FLOW

A. Flow control may consist of blocking flow with mechanical or pneumatic plugs if only small amount of flow needs to be controlled and adequate storage is available.

B. Use primary and secondary plugs for each flow control location.

C. When blocking flow is no longer needed for performance and acceptance of the Work, remove plugs in a manner that permits sewage flow to slowly return to normal without surcharging or causing other major disturbances downstream.

D. Remove temporary plugs at end of each working day and restore normal flow. If downstream work is not or cannot be completed during workday provide, operate, and maintain bypass pumping system or other method of flow control to accommodate flows.

3.07 PIPING

A. Minimize disturbance of existing utilities.

B. Where temporary flow control pipelines cross streets and private driveways, install pipeline in trench and cover with temporary pavement.

C. Installation of bypass pipelines is prohibited in salt marsh/wetland areas.

3.08 TEMPORARY SANITARY SEWAGE FLOW REDUCTION

A. CONTRACTOR may request sewer service customers upstream of the Work area to reduce or curtail sewer flow.

1. First Notice: Not less than 1 week nor more than 2 weeks prior to when sewer flow deduction or curtailment is requested.
2. Second Notice: Not more than 24 hours nor less than 12 hours prior to when sewer flow deduction or curtailment is requested.

B. When service lateral must be disconnected from main for more than 1 day, lateral shall be positively drained or pumped a minimum of once every 24 hours. Monitor status of flow and storage. Pump lateral more frequently where flows exceed storage capacity of lateral or temporary storage as may be provided by CONTRACTOR.

C. Temporarily restore full flow services in uncompleted sections during nonwork hours.

D. Promptly notify sewer service customers that were requested to reduce or curtail sewer flow when the Work is complete and full uninterrupted service restored.

E. CONTRACTOR shall be responsible for control of sewage flows and under no circumstances be entitled to rely on flow reduction or curtailment by upstream sewer service customers.

3.09 DRAINING EXISTING PIPELINE

A. Before initiating shutdown, ensure required materials, equipment, and labor are available onsite. Excavate and expose portions of existing pipeline to be removed.

B. Provide tap and piping in place to drain sewage from existing pipeline before it is cut and to capture contents that may drain out when pipe is cut.

C. Sewage drained from combined or sanitary sewers shall be conveyed and discharged to combined or sanitary sewers only.

3.10 FIELD QUALITY CONTROL

A. Hydrostatic Pressure Test for Pump Bypass Systems:

1. Prior to operation, test each section of discharge piping with maximum pressure equal to 1-1/2 times maximum operating pressure of system.
2. Notify OWNER’S REPRESENTATIVE and CITY 24 hours prior to testing.

B. Full Scale Test:

1. At least 14 days prior to test, notify OWNER’S REPRESENTATIVE of date and time of test.
2. Do not begin temporary flow control activities until successful test has been completed.
3. Conduct on proposed temporary flow control at least 14 days before scheduled date of actual proposed temporary flow control.
4. Purpose of test is to demonstrate capability, function, and reliability of CONTRACTOR’S proposed method of temporary flow control.
5. Duration: Minimum of 2 hours.
6. Conduct between 8:00 a.m. and 4:00 p.m. Do not conduct test on Saturday, Sunday, or holiday.
7. If electric pumps are being used, provide standby generators to ensure continuity of pumping operation in event of power failure.
8. Demonstrate system controls and operation, reliability, and transfer to standby equipment during test.
9. Conduct until flow is accommodated for minimum specified test duration.
10. Failure:
    a. Test shall be deemed to have failed if during test flows are not accommodated for whatever reason and for whatever length of time.
    b. If test fails, determine and correct deficiencies that caused test to fail and conduct another Full Scale Test.
11. Determination by OWNER’S REPRESENTATIVE of a successful test, permission by OWNER’S REPRESENTATIVE to proceed with the Work requiring temporary flow control, or anything else shall not relieve CONTRACTOR from responsibility to provide temporary flow control.

END OF SECTION 01 57 28

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 60 00

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Transportation and Delivery.

C. Storage and Protection.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, and other Division 01 Specification Sections, apply to this Section.

1.03 SCOPE

A. This Specification Section specifies the general requirements for the delivery, handling, storage and protection for all items required for the performance of the Work. Specific requirements, if any, are specified with the related item.

1.04 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than 1 month prior to installation without written authorization from the CITY.

C. All items delivered to the Site shall be unloaded and placed in a manner which will not hamper the CONTRACTOR'S normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

D. Provide necessary equipment and personnel to unload all items delivered to the Site.

E. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e., the CITY, other contractors), perform inspection in the presence of the CITY. Notify the CITY verbally, and in writing, of any problems.

1.05 STORAGE AND PROTECTION

A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the CONTRACTOR and reviewed with the CITY or OWNER’S REPRESENTATIVE, when requested. Instruction shall be carefully followed and a written record of this kept by the CONTRACTOR. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 60 00

SECTION 01 66 00

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions and other Division 01 Specification Sections, apply to this Section.

1.03 PRODUCTS

A. For the purpose of standardization, equipment of any one type shall be products of one manufacturer.

B. Do not use secondhand or salvaged materials and equipment whether removed from an existing premises or from another source, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacture for components being replaced.

1.04 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions.

B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

C. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

D. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

E. Limit size and maintain stockpiles of construction materials in such a manner that they will not block existing drainage or be hazardous to pedestrian or vehicular traffic in any way. The limitation relative to the stockpiling of construction materials shall be controlled by the CITY. In the event CONTRACTOR fails to satisfactorily modify his operations relative to the stockpiling of construction materials upon order of the CITY, all Work except cleanup operations will be stopped, and remain stopped, until the order of the CITY has been complied with.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Or As Approved: Submit a request for consideration of any manufacturer not named in accordance with Article 6.05 of the General Conditions.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 66 00

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Description.

C. Field Engineering.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.03 SCOPE

A. This section addresses the requirements and responsibilities of the CONTRACTOR, with respect to onsite engineering tasks performed during performance of the Work.

1.04 DESCRIPTION

A. Field tests required by this Section are additional to the start-up and field test services required elsewhere in the Contract Documents.

1.05 FIELD ENGINEERING

A. CONTRACTOR shall employ and retain at the Site of the Work a field engineer capable of performing all engineering tasks required of the CONTRACTOR. Engineering tasks shall include:

1. Daily reports submitted each day with all required information including numbers of employees, subcontractor employees, breakdown of employees by trade, major equipment and materials installed, major construction equipment utilized, location of all Work areas and materials and equipment received.
2. Maintain field office files and drawings, record drawings, and coordinate engineering services with subcontractors. Prepare layout and coordination drawings for construction purposes.
3. Review and coordinate work for conflicts and interferences and immediately advise the CITY of all discrepancies noted.
4. Cooperate and participate with the CITY in field inspections as required and requested.
5. At Project start, set temporary markers to indicate the construction limits where the Work is in process. Replace the markers as necessary throughout construction and remove the markers upon Final Completion of the Project.
6. Note the location of all field tile, utilities and other underground structures on a field set of Drawings, and to be shown on the As-Built Drawings.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 71 23

SECTION 01 71 33

RESTORATION OF IMPROVEMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structures and Facilities.

B. Roads, Streets, and Other Paved Surfaces.

C. Cultivated Areas and Other Surface Improvements.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

B. Submittals are included in Section 01 33 00.

1.03 STRUCTURES AND FACILITIES

A. The CONTRACTOR shall take all precautions necessary to protect the integrity and usefulness of all existing facilities. The CONTRACTOR may, with the approval of the CITY, remove such existing structures, including but not limited to, curbs, gutters, conduits, pipelines, vaults, manholes, cables and conduits and poles as may be necessary for the performance of the Work, and shall rebuild the structures thus removed in as good a condition as found in accordance with the regulatory requirements and the Contract Documents. The CONTRACTOR shall also repair existing structures which may be damaged as a result of the Work under the Contract Documents as nearly as possible to the original condition, to the satisfaction of the CITY.

1.04 ROADS, STREETS, AND OTHER PAVED SURFACES

A. Unless otherwise specified, roads and streets in which the surface is removed, broken, or damaged during the Work under the Contract Documents, shall be resurfaced and brought to the original grade and section. Roadways used by the CONTRACTOR shall be cleaned and repaired. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of loose material. All paved surfaces shall be cut with a pavement saw. Rough cuts are not allowed. The entire block of damaged sidewalks and driveways shall be replaced. Repair work shall conform to the provisions of the Governing Agency, applicable specifications in Part 3 of this section and as directed by the CITY.

1.05 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the CONTRACTOR shall be restored as nearly as possible to their original condition.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION

A. All restoration shall be completed in strict accordance with the appropriate items of the Specifications, as directed by the CITY. All disturbed areas shall be restored as nearly as practical to the condition they were prior to construction within 30 days of pipe installation, at the direction of the CITY. All drainage ditches disturbed by the CONTRACTOR'S Work shall be restored, reshaped, and graded to drain properly. Sod, erosion control mats, or other methods shall be used by the CONTRACTOR to ensure that drainage ditches are restored to the pre-construction condition as much as practical.

B. Pavement restoration shall be in accordance with the "Typical Restoration Section" on the Drawings and provisions of the Governing Agency responsible for the particular road, as directed by the CITY.

C. The restoration of sunken trenches shall be the CONTRACTOR'S responsibility. Sunken areas shall be backfilled and compacted to meet adjoining grades and the surface area reseeded, or resurfaced with asphalt or concrete matching the existing surface. The CONTRACTOR'S responsibility for this item shall be under the terms of, and for the duration of, the guarantee defined in Section 00 72 00 - General Conditions, Article 13.07 "Correction Period".

D. The CONTRACTOR shall restore unpaved areas by seeding and mulching in accordance with Item 659 of the Ohio Department of Transportation Construction and Material Specifications (ODOT CMS) unless otherwise noted herein. Commercial fertilizer shall be used and shall have a chemical analysis of 10-20-10. The fertilizer shall be delivered to the Project Site in manufacturer's containers, unopened. The container, or an attached tag, shall have printed upon it the manufacturer's name and the chemical analysis of the contents.

E. All <u>maintained yards</u> shall be restored with shredded topsoil and fertilizer prior to seeding and mulching, in accordance with Item 659 of the ODOT CMS. Shredded topsoil is soil that has been run through a shredding machine to break up the lumps and make it easy to work with and rake out. CONTRACTOR shall remove all stones 1-inch and greater in any dimension. Shredded topsoil shall be placed in loose lifts that construct a 4-inch compacted depth. Grass seed shall be 20 percent Annual Ryegrass and 80 percent Finelawn Fescue. Mulch mats or other methods shall be employed to ensure that slopes are properly restored, with any staples or nails removed once the grass has sufficiently rooted to stabilize the slope.

F. When restoration is performed in the summer months of June, July, and August the CONTRACTOR shall utilize temporary mulching and seeding. Temporary mulching shall then be removed as necessary, with final seeding and mulching performed September 1 through September 15.

G. All driveways shall be constructed in kind in accordance with Item 627 of the CITY Supplement to ODOT CMS.

H. Concrete walks shall be restored with a 5-inch-thick Plain Portland Cement Concrete Walk (Item 608).

I. The cost of all restoration of streets, drives, walks, sod, curbs, etc., shall be included in the various items of the Contract Documents. When restoring walks, curb ramps shall be constructed at intersections where the existing walk has been disturbed. Contact the jurisdictional agency for curb ramp requirements.

END OF SECTION 01 71 33

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 74 00

CLEANING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.03 SCOPE

A. CONTRACTOR shall keep the premises free from accumulations of waste materials and rubbish at all times. CONTRACTOR shall provide adequate trash receptacles about the Site and shall promptly empty the containers when filled, or as directed by the CITY.

B. Construction materials such as concrete forms and timbering shall be neatly stacked by CONTRACTOR when not in use. CONTRACTOR shall promptly remove splattered concrete, asphalt, oil, paint, corrosives, or cleaning solutions from surfaces to prevent marring or other damage.

C. Wastes shall not be buried or burned on the Site, nor disposed of into storm drains, sanitary sewers, streams or waterways. All wastes shall be removed from the Site and disposed of in a manner complying with local ordinances and laws.

D. CONTRACTOR shall not use any private service trash removal containers for construction debris removal.

E. CONTRACTOR shall perform end of day visual check, street sweep and debris removal on private drives to remove debris, screws, nails or other sharp objects from driveway to prevent resident vehicles from driving over.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide all required personnel, equipment, and materials needed to maintain cleanliness.

B. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as reviewed by the CITY.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

A. General: Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials. Do not allow the accumulation of scrap, debris, waste material, and other items not required for performance of the Work. Provide adequate storage for all items awaiting removal from job Site, observing all requirements for fire protection and protection of the environment.

3.02 FINAL CLEANING

A. General: Prior to Final Completion of the Work, remove from the job Site all tools, surplus materials, equipment, scrap, debris and waste.

B. Site: Unless otherwise specifically directed by the CITY, broom clean all paved areas on the Site and all public paved areas directly adjacent to the Site. Completely remove all resultant debris.

C. Timing: Schedule final cleaning as approved by the CITY to enable the CITY to accept a completely clean Project.

END OF SECTION 01 74 00

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Closeout Procedures.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections apply to this Section.

B. Substantial Completion is included in Section 01 77 19.

C. Record Documents are included in Section 01 78 39.

1.03 CLOSEOUT PROCEDURES

A. Upon Substantial Completion, as determined in accordance with Section 01 77 19 - Substantial Completion of the specifications, the CITY will issue to the CONTRACTOR a written punch list of minor work required as a condition of final completion. The CITY'S punch list will stipulate a reasonable time, if different than 30 days, to complete the required work. Failure of the CONTRACTOR to complete the punch list items by the stipulated term, normally 30 days, will result in an administrative fee of $100 per calendar day for every day beyond the stipulated time period the punch list work remains incomplete.

B. CONTRACTOR shall submit written certification that Contract Documents have been reviewed, Work has been inspected and that Work is complete in accordance with Contract Documents and ready for CITY inspection. The CITY will inspect the improvement, and if items remain which the CONTRACTOR must complete or remedy, perform the work immediately. When the CONTRACTOR corrects such items, the CITY will make final inspection. The Work must pass final inspection before the CITY will accept it.

C. Provide submittals to the CITY or the OWNER'S REPRESENTATIVE that are required by governing or other authorities.

D. Submit Application for Final Payment, in accordance with Article 14.07 of Section 00 72 00 - General Conditions. Application for Final Payment shall include all Record Documents in accordance with Section 01 78 39 – Record Documents of the specifications, and identify total adjusted Contract Sum, previous payments and sum remaining due.

E. CONTRACTOR shall repair defective land, areas, or Work during the Correction Period in accordance with article 13.07 of section 00 72 00 - General Conditions and as stipulated in Contract Documents.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 77 00

SECTION 01 77 19

SUBSTANTIAL COMPLETION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope.

B. Partial Utilization.

C. Final Completion.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 01 Specification Sections apply to this Section.

B. Summary of Project is included in Section 01 11 00.

C. Cleaning is included in Section 01 74 00.

D. Measurement and Payment is included in Section 01 20 00.

E. Contract Closeout is included in Section 01 77 00.

F. Record Documents 01 78 39.

G. Time for Completion and Liquidated Damages are included in Division 0.

1.03 SCOPE

A. Forty-five calendar days prior to the when the CONTRACTOR considers the Work ready for its intended use, CONTRACTOR shall, in writing to CITY, certify that the Work is substantially complete as defined below and request that CITY issue a Certificate of Substantial Completion. Within 14 calendar days after receipt of such notice from the CONTRACTOR, CITY and the CONTRACTOR shall make an inspection of the Work to determine the status of the Work. If CITY does not consider the Work substantially complete, CONTRACTOR will be notified in writing giving reasons, therefore. If CITY considers the Work substantially complete, a Certificate of Substantial Completion will be prepared by the CITY which shall fix the date of Substantial Completion. There shall be attached to the Certificate of Substantial Completion a final list of items to be completed or corrected before Final Completion and final payment. If appropriate, CITY will deliver to the CONTRACTOR a written recommendation as to division of responsibilities pending final payment between CITY and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance.

B. The CONTRACTOR shall submit the following pertinent documentation with the request for Substantial Completion.

1. Preliminary Record Drawings. Approved set by Final Completion.
2. Video tape of installed sewers and other testing results.

C. Substantial Completion is the completion of construction and installation of equipment such that the system may be placed in full operation and will both function and perform as designed. This specifically includes all control systems, instrumentation and all residual handling systems.

D. The inspection to verify Substantial Completion shall include, but not be limited to:

1. All Work performed under the original Contract Documents and any additional Work performed in accordance with approved changes to the Contract Documents.
2. All equipment and systems tested and shown operational in the presence of the CITY and/or the OWNER'S REPRESENTATIVES.

E. CITY shall have the right to exclude items from the Work after the date of Substantial Completion, but CITY shall allow CONTRACTOR reasonable access to complete or correct items on the list attached to the Certificate of Substantial Completion. CONTRACTOR shall also have reasonable access to make corrections during the 1 year Correction Period in accordance with Paragraph 13.07 of the General Conditions included in the Contract Documents.

1.04 PARTIAL UTILIZATION

A. Prior to Substantial Completion of all the Work, CITY may request CONTRACTOR in writing to permit CITY to use a specified part of the Work that CITY believes to be substantially complete, and which may be used without significant interference with Work on the other parts of the Project. If CONTRACTOR agrees, it shall certify to CITY that said part of the Work is substantially complete and request CITY to issue a Certificate of Substantial Completion for that part of the Work. Within 14 calendar days of this request by the CONTRACTOR, the CITY and CONTRACTOR shall inspect that part of the Work to determine its status of completion and shall issue a Certificate of Substantial Completion for that portion of the Work as described in Paragraph 1.03.A.1 above.

B. In lieu of the issuance of a Certificate of Substantial Completion as part of the Work, CITY may take over operation of a facility constituting part of the Work whether or not it is substantially complete if such facility is functional and separately useable; provided that prior to any such take over, the CITY and CONTRACTOR have agreed as to the division of responsibilities for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility. The correction period, described in Article 13.07 of the General Conditions, shall be interrupted if the equipment is out of service for repairs during the correction period.

1.05 FINAL COMPLETION

A. Final completion occurs at a point in time after Substantial Completion has been attained. At Final Completion all Work outstanding at Substantial Completion has been satisfied;

all punch list items have been satisfactorily completed to the CITY'S requirements; and all restoration, seeding, final cleaning, and site demobilization have occurred.

B. At Final Completion, all closeout submittals, final adjustment of accounts, and the final payment request have been submitted and approved in accordance with Section 01 77 00 - Contract Closeout.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 INSPECTION

A. If the Substantial Completion inspection by CITY and CONTRACTOR confirms that the Work is substantially complete, the CITY or the OWNER'S REPRESENTATIVE shall:

1. Prepare and submit to the CONTRACTOR a list of items (punch list) to be completed or corrected, as determined by the Substantial Completion inspection, along with the designated timeframe for completion.
2. Prepare and issue a Certificate of Substantial Completion, containing:
    a. The date of Substantial Completion.
    b. A list of items (punch list) to be completed or corrected by the CONTRACTOR.
    c. The timeframe within which the CONTRACTOR shall complete or correct the list of items (punch list).
    d. The time and date the CITY will take possession of the Work or designated portion thereof.
    e. The responsibilities of the CONTRACTOR for:
        1) Operation of mechanical, electrical, and other systems.
        2) Maintenance and cleaning.
        3) Security.
    f. The signature of the:
        1) CITY.
        2) CONTRACTOR.

END OF SECTION 01 77 19

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 78 39

RECORD DOCUMENTS

PART 1 - GENERAL.

1.01 SECTION INCLUDES

A. Scope.

B. Description.

1.02 RELATED SECTIONS

A. Contract Closeout is included in Section 01 77 00.

1.03 SCOPE

A. This section addresses the requirements and responsibilities of the CONTRACTOR, with respect to record documents to be maintained in the field by the CONTRACTOR. Drawings and general provisions of the Contract Documents, including General Conditions, and Division 01 Specification Sections, apply to this Section.

1.04 DESCRIPTION

A. CONTRACTOR shall maintain and provide the CITY with Record Documents as specified as follows, except as otherwise specified or modified in Divisions 02 through 48 of the Specifications.

B. Maintenance of Record Documents:

1. Maintain in clean, dry legible condition the following: Contract Drawings, Specification, Addenda, Approved Shop Drawings and Submittals, Change Orders, other Modifications of Contract, Progress Meeting Minutes, Test Records, Survey Data, and all other documents pertinent to the Work of the CONTRACTOR (collectively referred to as the "Record Documents").
2. Provide for proper storage and easy access. File in accordance with filing format acceptable to the CITY.
3. Make documents available at all times for inspection by the CITY.
4. Record Documents shall not be used for any other purpose and shall not be removed from the Project Site without the approval of the CITY.

C. Marking System: Provide and maintain colored pencils for making changes, revisions, additions and deletions, to the record set of Contract Drawings. Document and maintain a consistent color code.

D. Recording:

1. Label each document "PROJECT RECORD" in 2-inch-high printed letters.
2. Keep record documents current.

3. All pertinent and required information shall be collected and recorded before the related work becomes inaccessible.
4. Contract Drawings: Legibly mark to record actual Work including:
    a. Depths of various elements of foundation in relation to datum.
    b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
    c. Location of internal utilities and appurtenances concealed in Work referenced to visible and accessible features of structure.
    d. Field verifications and changes of dimension and detail.
    e. Changes made by Change Order or Field Order.
    f. Pertinent details not on original Contract Drawings.
5. Specification and Addenda: Legibly mark up each Section to record:
    a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
    b. Changes made by Change Order or Field Order.
    c. Other installation additions or changes not originally specified.
6. Submittals: Maintain Submittals, including Shop Drawings, as Record Documents and legibly annotate Drawings to record changes made after review and after installation.

E. Submittals:

1. At the Request for Substantial Completion, submit the Preliminary Record Documents to the City in accordance with the requirements of Section 01 33 00 - Submittals.
2. At completion of Project, submit Record Documents to the CITY in accordance with the requirements of Section 01 33 00 - Submittals.
3. Accompany Submittal with transmittal letter containing:
    a. Date of Submittal.
    b. Project identification, including title, Project ID (Number), and sewer number (if applicable).
    c. CONTRACTOR'S identification, including name and address.
    d. Title and document identification number for each Record Document provided.
    e. Certification that each Record Document as submitted is complete and accurate.
    f. Signature of CONTRACTOR, or authorized representative.
4. A copy of all record drawings of improvements constructed on or adjacent to railroad property shall be provided to the railroad.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 01 78 39

SECTION 02 40 00

TUNNELED CROSSINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This section includes requirements for the tunneled installation of the 42-inch jacked RCP storm sewer. Base bids and select equipment based on the soil and groundwater conditions defined in this section. In no case will any geotechnical data or reports take precedence over soil and groundwater conditions defined for the tunneled crossings and associated shafts and risers in this section.

1.02 SUBMITTALS

A. Informational Submittals:

1. Abandonment-Recovery Contingency Plan: Prepare an Abandonment Contingency Plan to handle the possibility that a tunneled crossing, once started, cannot be completed. Submit the Abandonment Contingency Plan in writing to the OWNER'S REPRESENTATIVE 2 weeks prior to commencement of tunnel operations. Follow and manage provisions of the approved Plan.

1.03 DEFINITIONS

A. Open Face Rotary Wheel TBM Tunneling: As defined in Section 31 79 19 - Open Face Rotary Wheel TBM Tunneling.

B. Radial Overcut: Radial overcut is defined as the difference between the maximum diameter created by the cutting teeth, cutting shoe, or overcut band on the machine or auger (whichever is greater) and the outer diameter of the casing, divided by two.

C. Riser Pipe: Segment of the pipeline that transitions from the trenchless crossing to the shallower open cut portion of the pipeline.

1.04 DESIGN CRITERIA

A. Employ methods and equipment that will control surface settlement and heave above the tunnel to prevent damage to existing utilities, facilities, and improvements. Limit ground movements (settlement/heave) to values that do not cause damage or distress to surface features, utilities, or improvements. In no case will settlements exceed the shutdown values provided in Section 31 09 13 - Settlement Monitoring. Repair damage to existing features, improvements, or utilities to the satisfaction of the OWNER'S REPRESENTATIVE.

B. Initial tunnel support will be provided by a jacked RCP Pipe.

C. The allowable tunneling methods for each crossing are:

1. Open Face Rotary Wheel TBM Tunneling in accordance with Section 31 79 19 - Open Face Rotary Wheel TBM Tunneling.

D. If desired, propose other tunneling means and methods in accordance with the General Conditions. Proposed alternative tunneling methods shall install the specified steel casing and meet the intent of the allowable tunneling methods. Demonstrate that the proposed alternate tunneling method is technically feasible and will result in settlement less than the shutdown values presented in Section 31 09 13 – Settlement Monitoring. Submit three examples of crossings of similar lengths and in similar soil or rock conditions where the proposed alternate was successfully completed. The alternative tunneling method description must be signed and sealed by a professional engineer registered in the State of Ohio who attests to the suitability of the method and the degree to which it meets the above-described intent of the allowable tunneling methods.

E. The maximum radial overcut is 1 inch. The maximum allowable radial overcut value has been selected to minimize potential settlements of the ground and subsurface facilities.

F. The use of water under pressure water jetting or puddling will not be permitted to facilitate boring, pushing or jacking operations.

1.05 PERMITS

A. Obtain and comply with permits as required and as applicable from entities that are crossed by tunneled crossings.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Soil conditions anticipated to be encountered during construction of the shafts, tunnels, and associated riser pipes are presented in Table 1. Base bids and develop schedules from these tables, which defines the subsurface conditions.

B. The soils are classified according to the Unified Soil Classification System (USCS) in accordance with ASTM D2487, including fines content and particle size, and the relative density or consistency is based on the correlations presented in Table 2. In addition, for fine-grained soils (clays and silts) the unconfined compressive strength is defined according to the consistency presented in Table 2.

C. Soil behavior is classified according to the system presented in Table 3.

3.02 GEOTECHNICAL CONDITIONS

A. The primary purpose of the defined subsurface conditions presented herein is to establish a contractual understanding of the geotechnical conditions anticipated to be encountered during construction of the tunneled portions of the Project in order to provide a basis for bidding and to assist in resolution of disputes that may arise over subsurface conditions during tunneling. Secondarily, the definitions:

1. Present the geotechnical and construction conditions that formed the basis of tunnel design.
2. Provide information to assist the CONTRACTOR in evaluating requirements for excavating and supporting the ground.
3. Provide guidance to the OWNER'S REPRESENTATIVE in administering the Contract.

B. The defined subsurface conditions contained herein provide the basis for identifying geotechnical and geologic conditions that qualify as “Differing Subsurface or Physical Conditions,” as defined in the General Conditions. The defined subsurface conditions contained within this section, are not necessarily geotechnical fact. The defined conditions were developed using judgment to interpolate between borings and extrapolate beyond the boring logs and laboratory test data. The judgment applied in the interpolations and extrapolations reflects the view of the CITY and CITY’S DESIGN ENGINEER. Bidders will use the defined conditions in defining the subsurface conditions and the surface conditions which can be observed during a Site visit as the basis for bids. The Project design was based on assumed construction methods and levels of workmanship. The behavior of the geologic materials present in the surface and subsurface excavations will be influenced by the CONTRACTOR'S selected equipment, means, and methods.

C. A Geotechnical Data Report is included as a Contract Document. Other available geotechnical information is not considered a Contract Document. If there are disagreements or ambiguities between the defined conditions presented in this section and the geotechnical data, this section takes precedence.

D. Bidders should have a geotechnical engineer or engineering geologist licensed in the State of Ohio review and explain the information to assure a complete understanding of the reported information as a basis for submitting a bid.

E. Where unstable soil conditions exist, boring or tunneling operations shall be conducted in such a manner as not to be detrimental to the surface being crossed.

3.03 RISK ALLOCATION

A. Risks associated with subsurface conditions consistent with, or less adverse than, the defined conditions are allocated to the CONTRACTOR. The risk of higher construction costs associated with subsurface conditions more adverse than the conditions presented herein are accepted by the CITY. The definition of the subsurface conditions in the Contract is not a warranty that the defined conditions will be encountered. The defined conditions are the contractual standard that the CITY and the CONTRACTOR will agree to use when interpreting the differing subsurface conditions or physical conditions clause, contained in the General Conditions.

B. In the event that CONTRACTOR believes more adverse conditions have been encountered, CITY will negotiate with the CONTRACTOR for additional compensation if CITY determines the following four conditions exist:

1. Notify CITY of the differing conditions in writing in accordance with the General Conditions.
2. The actual subsurface conditions encountered are materially different than the defined conditions.
3. Documentation that the subsurface conditions are more adverse than those defined and that the conditions materially and significantly increased the cost and/or time required to complete the Work.
4. Diligent efforts were made to complete the Work described in the Contract Documents, including any changes to methods, equipment, labor, and materials made necessary by the more adverse conditions.

C. If the foregoing conditions are satisfactorily met, additional compensation will be negotiated in accordance with the General Conditions.

3.04 DEFINED SUBSURFACE CONDITIONS

Table 1
Defined Subsurface Conditions –
7th Street Storm Sewer – Station 3+38.21 to 6+15.39

Depth (ft)	Elevation (ft)	USCS Soil Type	Consistency or Relative Density
East Shaft			
0 – 18	495.5 – 477.5	Fill with brick and wood	Medium Stiff to Stiff
18 – 23	477.5 – 472.5	Silt with Sand (SM)	Medium Dense
23 – 25	472.5 – 470.5	Poorly Graded Gravel (GP)	Medium Dense
25 – 30	470.5 – 465.5	Lean Clay (CL)	Hard
30 – 35	465.5 – 460.5	Clayey Sand (SC)	Medium Dense
35 – 40	460.5 – 455.5	Silty Sand (SM)	Medium Dense
West Shaft			
0 – 33.5	496.6 – 463.1	Fill with brick and wood	Loose to Medium Dense
33.5 – 38.5	463.1 – 458.1	Silt with Sand (SM)	Very Loose to Loose
38.5 – 40	458.1 – 456.6	Fat Clay (CL)	Very Stiff
Tunnel: The tunnel will be completed in a full face of FILL consisting of Medium Stiff to Stiff moist to very moist Sandy Silty Clay (CL) to Clayey Sand (SC) with gavel, bricks, asphalt, construction debris, and wood. The FILL will behave as slow to fast raveling if unsupported. No groundwater is anticipated at this crossing.			

Table 2
Summary of Consistency or Relative Density

Soil Type	Description	Corrected SPT Blow Count (blows/ft)	Unconfined Compressive Strength (tons/ft2)
Cohesive (silts, clays, limestone, and shale)	Very Soft	0-2	<0.25
	Soft	3-4	0.25-0.50
	Firm	5-8	0.50-1.00
	Stiff	9-15	1.00-2.00
	Very Stiff	16-30	2.00-4.00
	Hard	>30	4.00-75.00
Noncohesive (sands and gravels)	Very Loose	0-4	Not Applicable
	Loose	5-10	
	Medium Dense	11-30	
	Dense	31-50	
	Very Dense	>50	

Table 3
General Ground Behavior and Tunnelman's Ground Classification

Classification	General Ground Behavior When Exposed in Tunnel
Firm	Heading can be advanced without initial support.
Raveling	Chunks or flakes of material begin to drop out of the arch or walls sometime after the ground has been exposed. "Fast raveling" begins within a few minutes; otherwise, the ground is "slow raveling."
Cohesive Running	Material with sufficient cohesion to stand for a brief period of raveling before it breaks down and runs.
Running	Granular materials without cohesion are unstable at a slope greater than the angle of repose (+/- 30° to 35°). When exposed at steeper slopes, they run like granulated sugar or dune sand until the slope flattens to the angle of repose.
Cohesive Flowing	Material with sufficient cohesion to stand for a brief period of raveling before it breaks down and flows as a mixture of soil and water.
Flowing	A mixture of soil and water flows into the tunnel like a viscous fluid. The material can enter the tunnel from the invert as well as from the face, crown, and walls, and can flow for great distances as it accumulates in the tunnel.

Table 3 General Ground Behavior and Tunnelman's Ground Classification	
Classification	**General Ground Behavior When Exposed in Tunnel**
Source: Modified after Heuer, 1974.	

END OF SECTION 02 40 00

SECTION 02 41 13

DEMOLITION, SALVAGE, CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies demolition, salvage, cutting, and patching.

1.02 RELATED SECTIONS

A. Submittals, Section 01 33 00.

B. Construction Sequence, Section 01 12 16.

C. Restoration of Improvements, Section 01 71 33.

D. General Conditions Section 00 72 00: Article 4.06 Hazardous Environmental Conditions at Site, Article 6.14 Safety Representative, Article 6.15 Hazard Communication Program.

1.03 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 33 00 – Submittals:

1. Plan for disposal for demolition debris and materials.
2. Salvage Equipment Turn-Over Form: Form No. 02 41 00.

1.04 SALVAGE DISPOSITION, STORAGE AND HANDLING

A. GENERAL

1. The CONTRACTOR shall salvage items, designated for CITY salvage, as a unit. Removal of salvaged equipment shall be done in a manner that protects adjacent equipment and piping. Clean, list, and tag for storage. Protect from damage and deliver to locations designated by the OWNER’S REPRESENTATIVE. Salvage each item with auxiliary systems or associated equipment required for operation.
2. The CONTRACTOR shall not salvage any items for turnover to CITY until the CITY receives the CONTRACTOR signed Salvage Equipment Turn-Over Form: Form No. 02 41 00. The CITY shall prepare the Salvage Equipment Turn-Over Form for CONTRACTOR’S signature of acknowledgement. CONTRACTOR must submit the signed form to CITY as a Construction Submittal in accordance with Section 01 33 00 – Submittals prior to starting salvage work.

B. ITEMS DESIGNATED FOR SALVAGE

1. Items designated for salvage to CITY are identified in table below. These items shall be removed, cleaned, labeled and delivered to a location to be designated by the OWNER’S REPRESENTATIVE.

CITY SALVAGE LIST	
ITEM	EXISTING LOCATION
Manhole castings and rims	Manholes to be removed and/or abandoned
Inlet and catch basin frames and grates	Inlets or catch basins to be removed and/or abandoned

C. DISPOSAL

1. Dispose of items or materials not designated for the CITY'S salvage or reuse. Promptly remove from site. Do not store or sell CONTRACTOR salvaged items or materials on site.

PART 2 - PRODUCTS

A. Comply with ODOT Item 202, the City Supplement, and this Section, unless otherwise noted on the plans or directed by the CITY. This allows abandonment in place.

B. Compacted granular fill (No. 304 aggregate or CITY approved equal) or Controlled Low Strength Mortar (CLSM).

C. Accurately show locations of abandoned utilities or subsurface obstructions remaining on site on as-built record drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. The CONTRACTOR shall notify the OWNER'S REPRESENTATIVE prior to beginning any salvage work so that the proper salvage items are verified and the condition of the salvage item and adjacent equipment, piping, and structures can be documented. The OWNER'S REPRESENTATIVE may elect to have any items on the salvage list removed and disposed of by the CONTRACTOR, rather than being salvaged.

B. Survey the site and examine the Drawings and Specifications to determine the extent of the Work before beginning any demolition or renovation.

C. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain the property of CITY; any CONTRACTOR-damaged items shall be repaired or replaced as directed by OWNER'S REPRESENTATIVE.

3.02 OPERATION PROCEDURES

A. Start and complete work in order of precedence as established by Section 01 12 16 - Construction Sequence and the approved schedule. Operational procedures and sequence of work are optional with CONTRACTOR, provided they do not infringe upon or violate SCHEDULE.

B. Provide protection to persons and property. Conduct operations to ensure minimum interference with roads, walks, entrances, exits, and other adjacent occupied facilities.

3.03 CUTTING AND REMOVAL

A. Neatly cut and remove materials, and prepare all openings to receive new work.

B. Remove masonry or concrete in small sections.

C. Provide shoring, bracing, and other supports to prevent movement, settlement, or collapse of remaining or adjacent wall areas, structure, or facilities. Arrange shoring, bracing, and supports to prevent overloading of structure.

D. Take all precautions necessary to prevent damage to existing remaining work or to adjacent facilities. Execute work using methods which will prevent interference with use of remaining and adjacent facilities by the CITY.

E. Salvaged items shall be properly disconnected to retain their full salvage value, removed from their foundations and carefully stored at a location on the plant site as directed by the OWNER'S REPRESENTATIVE.

3.04 UTILITIES

A. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by OWNER'S REPRESENTATIVE.

B. When utility lines are encountered that are not indicated on the Drawings, notify OWNER'S REPRESENTATIVE prior to further work in that area.

C. Determine whether there are utilities in demolition areas that are needed for continued service to other facilities. Relocate, test and make functional such utilities before demolition work begins.

D. Notify OWNER'S REPRESENTATIVE of utilities that must be turned off before isolation and demolition are started. Utilities serving facilities to be demolished shall be isolated as directed by the OWNER'S REPRESENTATIVE. Isolation shall occur at a point closest to the remaining active portion of the utility.

3.05 MATCHING AND PATCHING

A. Where items are removed from existing walls, ceilings, floors, or partitions to remain, CONTRACTOR shall repair wall, ceiling, floor, or partition disturbed by removal.

B. Where walls, ceilings, floors, or partitions are removed, CONTRACTOR shall repair abutting walls, ceilings, or floors disturbed by removal.

C. Where existing construction is cut or otherwise disturbed to permit installation of new work, CONTRACTOR shall match and patch existing disturbed construction.

D. Use methods and materials similar in appearance, and equal in quality to areas or surfaces being repaired.

E. Methods, materials, and finished work are subject to review and approval by the OWNER'S REPRESENTATIVE.

F. Remove areas, surfaces, or items which cannot be satisfactorily matched and patched. Replace at no additional expense to the CITY.

G. Unless otherwise called for on the plans; all equipment bases and pads are also to be removed where the equipment is shown or otherwise called to be removed on the drawings or in the specifications.

3.06 CLEANUP

A. Cleanup of demolition activities shall be performed in accordance with Section 01 71 33 - Restoration of Improvements.

B. Debris and rubbish shall be removed from site, excavations and as otherwise shown in the Drawings. Debris and rubbish shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

3.07 ABANDON EXISTING PIPELINES

A. Pipe lines that are designated to be abandoned shall be plugged or sealed. Pipe less than 1-inch diameter shall be sealed by grouting unless otherwise shown on the Drawings. Pipe between 1-inch and 6-inches shall be sealed by the installation of a mechanical plug a distance of either 2 inches or equal to the diameter of the pipe whichever is greater, and grouted flush using a nonshrink, nonmetallic grout. Pipe less than 12-inches but greater than 6-inches in diameter shall be sealed by the installation of a suitable precast concrete or vitrified clay stopper, properly cemented into place.

B. Pipe 12-inches and larger shall be filled, sealed, and abandoned in accordance with the method described in Section 202.041 of the Cincinnati Supplement to the State of Ohio, Department of Transportation, Construction and Material Specification. The material used for filling the existing pipe shall be Controlled Density Fill when the pipe is located in pavement areas.

END OF SECTION 02 41 13

SECTION 02 61 00

REMOVAL AND DISPOSAL OF CONTAMINATED SOIL AND GROUNDWATER

PART 1 - GENERAL

1.01 SUMMARY

A. This Section describes the procedures to be followed for the following work.

1. Sampling, laboratory testing, excavating, containerizing and hauling of suspect contaminated excavated soil and groundwater.
2. Disposal and/or recycling of hazardous, non-hazardous, and petroleum-contaminated soil and groundwater. All proposed landfill(s) to accept waste must be submitted and approved by the CITY prior to conducting any excavation. Due to the project work area limitations, stockpiling of soil is not feasible. Thus, CONTRACTOR must be prepared to live load waste hauling.
3. No PCBs in groundwater are permitted to be discharged to the MSDGC sewer system.
4. The CONTRACTOR may potentially be required to provide a groundwater on-site treatment system or containerize and haul off-site for shallow contaminated groundwater prior to discharge.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 01 33 00 – Submittals.
2. Section 01 31 21 – Site Safety Plan.
3. Section 31 23 00 – Trenching and Backfilling.

C. A Phase II Environmental Assessment (ESA) Report was prepared in 2024 and is provided as supplemental information to the Contract Documents.

D. The CONTRACTOR shall expect that excavated soil will require handling and disposal as unclassified or noncontaminated material, contaminated nonhazardous, or petroleum-contaminated waste material. Based on the Phase II ESA results, the depth of soils to be excavated were characterized as noncontaminated and nonhazardous contaminated. The hazardous soil identified during the Phase II ESA was below the proposed depths of excavation. If a differing material, suspect to be contaminated or hazardous, is encountered, the CONTRACTOR shall segregate the material and store in container(s) off-site at a secure location at the landfill until a composite sample is analyzed for characterization.

E. Dewatered groundwater shall be tested prior to discharging into local sewers to verify contaminants and concentrations are allowed to be received at the Mill Creek Wastewater Treatment Plant (WWTP) based on comparison to the Mill Creek WWTP Pretreatment Rules. Analytical results will be discussed with the CITY prior to any dewatering activities and the CONTRACTOR is responsible for obtaining a Special Wastewater Discharge Permit through the CITY prior to dewatering:

Refer to: https://msdgc.org/sites/default/assets/downloads/Customers/Industrial-Users/Special_Wastewater_Discharge_Form_Instruction_Sheet.pdf and

https://msdgc.org/sites/default/assets/downloads/Customers/Industrial-Users/Special_Wastewater_Discharge_Form.pdf.

The CONTRACTOR should be prepared to conduct additional analytical testing of groundwater for conformance to the Mill Creek WWTP Pretreatment Rules if requested by the CITY before dewatering into the sanitary sewer.

1.02 REFERENCES

A. Federal Requirements that govern hazardous material management or transportation, and disposal of hazardous waste material.

B. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) including, but not limited to:

1. Respiratory Protection: 29 CFR 1910.134.
2. Construction Industry: 29 CFR 1926.
3. Hazard Communication: 29 CFR 1910.
4. Specifications for Accident Prevention Signs and Tags: 29 CFR 1910.14.
5. Lead in Construction: 29 CFR 1926.62.

C. U.S. Environmental Protection Agency (USEPA) including, but not limited to:

1. Hazardous materials table, special provisions, hazardous materials communication, emergency response information, and training requirements: 40 CFR 172 and 40 CFR 261 Subpart D.
2. Shippers – General requirements for shipments and packaging: 49 CFR 173.
3. USEPA Field Methods for Petroleum Hydrocarbon Analysis.

D. State Requirements that govern include, but are not limited to, the following:

1. Ohio Administrative Code (OAC) 1301: 7-9-16, Petroleum Contaminated Soils.
2. Ohio Administrative Code (OAC) 3745: Hazardous Waste Management Standards.

E. U.S. Department of Transportation (DOT), including but not limited to: 49 CFR 171 and 172 Hazardous substances.

F. American National Standards Institute (ANSI): Z88.2-80, Practices for Respiratory Protection.

G. National Institute of Occupational Safety and Health (NIOSH): Respiratory Protection – An Employer's Manual & Respiratory Protection – A Guide for the Employee.

H. American Industrial Hygiene Association (AIHA) publications.

1. Other Regulations: All other federal, state, county municipal, and local statutes, ordinances, regulations, or rules pertaining to hazardous materials, including storage, transportation and disposal, construction safety and health and hazard communication (worker right-to-know), and CONTRACTOR or other licensure, certification and regulation.

I. Metropolitan Sewer District of Greater Cincinnati (MSDGC), Rules and Regulations, Effective March 1, 2001, and all Amendments, Article XV, Pretreatment.

J. Reference Standards:

1. American Industrial Hygiene Association (AIHA).
2. American National Standards Institute (ANSI).
3. Department of Transportation (DOT).
4. Environmental Protection Agency (EPA).
5. Mine Safety & Health Administration (MSHA).
6. National Institute of Occupational Safety and Health (NIOSH).
7. Occupational Safety and Health Administration (OSHA).
8. Ohio Department of Health (ODH).
9. Underwriter's Laboratories (UL).

1.03 DEFINITIONS

A. Hazardous Waste: A waste that exhibits any of the characteristics as identified in Ohio Administrative Code (OAC) 3745-51 and 40 CFR 261 Subpart D.

B. Non-Hazardous Waste: A waste that is not defined as a hazardous waste under OAC 3745-51 or as petroleum-contaminated soil under OAC 1301: 7-9-16. Nonhazardous waste may include solid waste; infectious waste, and construction and demolition debris.

C. Petroleum-Contaminated Soil (PCS): A soil that is not defined as a hazardous waste under OAC 3745-51; however, contains chemicals of concern in concentrations that exceed one or more of the re-use action levels in Table 1 of OAC 1301: 7-9-16.

D. Unclassified Material: Excavated material that does not exhibit visual or olfactory indicators of contamination and is to be reused onsite.

E. Potentially Contaminated: Excavated material that exhibits evidence of contamination, including visual and olfactory indicators and/or field screening.

F. Soil Chemicals of Concern (COC): TPH (total petroleum hydrocarbons), PCBs (polychlorinated biphenyls), VOCs (volatile organic compounds), SVOCs (semi-volatile organic compounds), and RCRA (Resource Conservation and Recovery Act) total metals classified through analysis for totals or through Toxicity Characteristic Leaching Procedure (TCLP).

G. Groundwater Chemicals of Concern (COC): PCBs, VOCs, SVOCs and RCRA total metals.

1.04 QUALITY ASSURANCE AND QUALITY CONTROL

A. The CONTRACTOR shall bear complete responsibility for worker safety and adherence to all laws, regulations, and standards. The CITY will not be responsible for the CONTRACTOR'S and/or subcontractor's work described in this Section.

B. Personnel must be trained in accordance with 29 CFR 1926.65, Safety and Health Regulations for Construction for Hazardous Waste Operations and Emergency Response.

C. Prepare and have in place an emergency response cleanup plan which details response plan in the event of transporter vehicle accident/cargo spill.

D. The CONTRACTOR shall be liable for any fines, etc. that arise from the mishandling, improper disposal or use of faulty equipment associated with the removal of contaminated soil and groundwater.

E. Maintain current licenses, permits and certifications as required by applicable federal, state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to work of this Contract.

F. The CONTRACTOR shall have a site-specific health and safety plan that includes provisions for air monitoring and equipment to monitor VOCs (combustible gases), oxygen level, carbon monoxide level, hydrogen sulfide level and lower explosive limit (LEL) within the excavation. If any of the levels are exceeded, the CITY shall be notified immediately.

G. The CONTRACTOR will provide a third-party Environmental Inspector experienced in the evaluation of potentially contaminated soils and groundwater; knowledge of proper sampling, storage, and transportation of soil/groundwater samples. Qualifications of the third-party Environmental Inspector shall be submitted to the CITY for approval, for approval, and should include a minimum of 5 years of experience and a minimum of three past similar projects. The third-party Environmental Inspector shall characterize the soil (i.e., noncontaminated, contaminated, or hazardous) to be directly loaded and hauled to the appropriate, selected landfill. Third-party Environmental Inspector shall be present during all live-loading operations.

H. Provide a Site Safety and Health Officer responsible for evaluating the safety conditions during excavation of contaminated soils and/or pumping and dewatering of potentially contaminated groundwater. The Health and Safety Officer must have a minimum of 5 years of experience with safety assessments and oversight associated with excavating potentially contaminated soil and groundwater.

I. Testing, transportation, disposal, and recycling activities shall be performed in accordance with federal, state and local requirements.

J. Disposal facilities and/or petroleum contaminated soil remediation facilities (PCSRF) shall be licensed by the local health department and permitted by the OEPA.

K. Obtain all necessary permits and approvals for transporting material to a licensed disposal or recycling facility.

L. Groundwater discharge to any sanitary sewer must be below the MSDGC Rules and Regulations, Article XV - Pretreatment, Section 1502.4 Local Limits for Mill Creek Waste Water Treatment Plant. The Pretreatment Program is intended to prevent the introduction of pollutants in the MSDGC wastewater treatment plants that could interfere with treatment operations, that may not receive adequate treatment in the process, and which may pass through the system into the receiving waters or the atmosphere or otherwise be incompatible with the system. In addition, the program is intended to protect the general health and safety of the wastewater treatment plant, employees, and the environment.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals for requirements for the mechanics and administration of the submittal process.

B. Submit a Site Specific Health and Safety Plan (HASP) as required in Section 01 31 21 – Site Safety Plan. The plan must identify the health and safety concerns pertaining to encountering potentially contaminated soils and groundwater, and include appropriate monitoring requirements and proposed management procedures. A copy of the HASP shall be submitted in advance of any excavation work.

C. Submit a Lead safety plan as required in 29 CFR 1926.62 for potential exposure to lead in soil and groundwater.

D. Submit an emergency response cleanup procedure which details response plan for transporter vehicle accident/cargo spill.

E. Submit the qualifications for the Site Safety and Health Officer and third-party Environmental Inspector which must include a minimum of 5 years of experience with safety assessments and oversight associated with excavating potentially contaminated soil and/or groundwater.

F. Refer to this section for submittal requirements associated with the groundwater water quality testing, treatment, and disposal plan.

G. Submit the following items:

1. A Work Plan including descriptions of proposed methods and equipment to be used for execution of this work.
2. A Soil Management Plan providing details for Contractor management of the unclassified or non-contaminated, contaminated non-hazardous, petroleum contaminated, or hazardous soils.
3. Lead in Construction Safety Plan to meet the 29 CFR 1926.62 requirement.
4. HAZWOPER or other qualifications of CONTRACTOR workers performing excavation of contaminated soils.
5. Qualification of the Contractor's analytical testing laboratory.
6. The name and address of the proposed licensed disposal facility(s) and waste hauler(s). Include copies of permits and licenses.

7. Description of proposed disposal site(s) including a pre-approved letter from each disposal site operator indicating the allowable range of contaminants that are acceptable at each site.
8. Analytical results and laboratory chain-of-custody records for all samples.
9. Records of transportation and disposal including weight tickets, manifests, disposal receipts, etc.
10. Copies of Waste Hauler Bond Application and permitting documents.
11. If required by MSDGC, water treatment system design and operating information, including sample results, flow rates, treatment volumes, maintenance performed, and other pertinent system data.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 SOIL CONTAINERIZING, SAMPLING, TESTING, AND DISPOSAL

A. Based on the results of Phase II ESA and the CONTRACTOR'S third-party Environmental Inspector's field characterization, soils may be required to be segregated to be hauled to separate landfills. The CONTRACTOR should be prepared for conducting additional sampling and analyses if requested by the landfill.

B. For any petroleum contaminated soils (PCS) and potential hazardous material that will need to be segregated based on landfill acceptance, the CONTRACTOR'S third-party Environmental Inspector shall field screen excavated material within the suspect contaminated area using a photoionization detector (PID), a portable x-ray fluorescence (XRF) analyzer for RCRA metals, and make visual observations to segregate and haul to the appropriate landfill.

C. The CONTRACTOR'S Site Safety and Health Officer must evaluate the air quality conditions within any trenching or any open excavation operations within the suspect contaminated area, develop a baseline analysis of the air quality, and incorporate appropriate engineering controls and PPE to allow for safe working conditions.

1. Before any workers are to enter the excavation, a Benzene Specific Monitor must be used to evaluate the benzene levels within the excavation do not exceed 1.0 parts per million (ppm), which is the OSHA personal exposure level (PEL).
2. During excavation where contaminated soils are encountered:
    a. A multi-gas detector shall be used to monitor at minimum the oxygen level, carbon monoxide level, hydrogen sulfide level and lower explosive limit (LEL). If any of the levels exceed OSHA acceptable levels or indicate unsafe working conditions, Work should immediately stop, and all workers should evacuate the area to 150 feet upwind of the excavation.
    b. A PID shall be used to monitor for VOCs within the excavation. If VOC levels exceed 20 ppm, the site workers will be required to immediately exit the excavation and engineering controls must be re-evaluated.
    c. An XRF shall be used to monitor for RCRA metals in the soil.

D. Testing shall be done by an independent, certified analytical laboratory paid by the CONTRACTOR and approved by the CITY.

E. Determination of the regulatory classification of the excavated soils using the analytical test results and field characterization as either 1) noncontaminated or unclassified material, 2) petroleum-contaminated soil (PCS), 3) nonhazardous contaminated waste, or 4) hazardous waste for disposal requirements.

1. Nonregulated unclassified materials shall be used on the project as specified in Section 31 23 00 - Trenching and Backfill.
2. If the analytical results conclude the contaminated soil meets hazardous characteristics, the soil will be considered as hazardous waste and must be handled and disposed of as hazardous waste in accordance with OAC 3745-52. This soil shall not be re-used.
3. If the soil does not meet hazardous characteristics but petroleum compounds are detected above the re-use action levels, the soil will be considered non-hazardous petroleum-contaminated soil and disposed of in accordance with OAC 1301: 7-9-16. This soil shall not be re-used.
4. Waste manifests shall be signed by the CITY.

F. All hazardous and nonhazardous contaminated and petroleum-contaminated soil shall be disposed of or recycled off-site at a Permitted Disposal Facility.

1. Perform all field and analytical testing required by the disposal/recycling facility.
2. An appropriate number of samples shall be obtained, as required by the disposal facility.

G. Excavated material shall not remain on-site as stockpiled soil until the analytical results are provided and accepted by the disposal facility. It is the responsibility of the CONTRACTOR to coordinate with the landfill that all landfill required testing is provided prior to hauling as stockpiling is not a consideration given the work space restriction.

3.02 GROUNDWATER REMOVAL, TESTING AND DISPOSAL

A. CONTRACTOR must provide proper control of groundwater.

B. The CONTRACTOR must provide proper equipment capable of removing contaminated groundwater without causing unsafe work conditions.

C. Remove contaminated groundwater from excavation by pumping, bailing or other methods acceptable to the CITY and in accordance with applicable requirements of USEPA, Ohio EPA, and State Fire Marshal and local regulatory agencies.

1. Contaminated groundwater must be properly analyzed and results provided to CITY prior to authorizing groundwater discharge to the sanitary sewer.
2. On-site treatment system(s) must be approved by CITY prior to implementing. The CONTRACTOR is responsible for the proper disposal of the spent filter media from the treatment system.

D. Sample and provide testing of groundwater encountered during excavation and dewatering activities within the suspect contaminated area for the COC. The groundwater testing is to include PCBs as required by MSDGC.

1. If the results are above the MSDGC Pretreatment Local Limits, then the contaminated groundwater shall be treated or disposed of properly. MSDGC Pretreatment Limits regulatory reference is provided in the reference section. If the results are above the MSDGC Pretreatment Limits, groundwater shall be treated to be within the regulation limits or containerized and properly disposed of at a permitted disposal facility.

E. Sanitary sewer system discharge requirements:

1. Obtain an appropriate number of samples and provide test results as required by CITY for discharge into the sanitary sewer.
2. Notify the CITY prior to discharge of the material into the sanitary sewer system.

F. Permitted Disposal Facility Disposal Requirements:

1. Provide Phase II results and/or obtain an appropriate number of samples as required by the permitted disposal or recycling facility.
2. Notify the disposal or recycling facility prior to transportation of the material to the facility. The CONTRACTOR shall be responsible for any laboratory testing as required by the disposal/recycling facility to fully characterize the waste material. No additional compensation will be allowed for delays in accepting waste or waste rejected by the facility due to incomplete classification, or due to invalid or expired transporter permits.

G. Under no circumstances shall any of the groundwater be discharged prior to receipt of the analytical results.

3.03 GENERAL

A. Refer to Section 31 23 00 – Trenching and Backfilling for additional requirements including, but not limited to excavation, containerizing, and testing.

B. Excavation and handling of contaminated soil and/or groundwater shall prevent any runoff or further contamination. Prevent personnel and equipment which have come into contact with contaminated material from exiting the work zone without first being decontaminated. Properly dispose of project-generated wastes which are or may have become contaminated.

C. Maintain daily logs, landfill tickets, and manifests records that document the source, movement, and destination of each truckload of contaminated soil. Transport materials in leak-proof vehicles or containers. During the transport of excavated soil open-top vehicles or containers shall be covered or tarped.

1. All waste material transported off-site shall be shipped under a bill of lading and, as applicable, waste manifests, waste profiles, land disposal restriction forms, and all other documentation required by federal, state, and local regulations.

2. The disposal/recycling facility shall determine the weight of the material and report the weight on the returned bill of lading and all other required documents.
3. The CONTRACTOR shall provide an initialed and dated copy of the weight ticket receipt to the CITY with 2 working days of the delivery. The weight ticket shall clearly identify the bill of lading.
4. The CONTRACTOR shall submit copies of all waste manifests and bills of lading for tracking material through transportation and treatment or disposal to the CITY.

D. The CITY shall be considered the generator.

E. If hazardous waste is generated, notify the CITY immediately.

F. The CITY signs all waste profiles and manifests for the disposal of hazardous and non-hazardous wastes.

END OF SECTION 02 61 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE

A. This section covers cast-in-place concrete, including sewer encasements, cradles, caps, junction chambers, collars, key blocks, reinforcing steel, forms, finishing, curing, and appurtenant work.

B. See section 01 45 29 - Testing Laboratory Services and responsibilities.

PART 2 - PRODUCTS

2.01 LIMITING REQUIREMENTS

A. Unless otherwise specified in the Contract Documents or by a governing authority, concrete shall be controlled within the following limiting requirements:

Cement Content	At least 600 lbs per cubic yard.
Maximum Water-Cement Ratio	The maximum water-cement ratio shall be 0.42 on a weight basis, or, if fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.
Fly Ash Content	At the option of the CONTRACTOR, fly ash may be substituted for up to 25 percent of the Portland cement, on the basis of 1.0 lbs of fly ash added for each lb of cement reduction.
Concrete Strength	4,000 psi minimum compressive strength at 28 days.
Air Content	6 percent ±1 percent.
Coarse Aggregate	Maximum nominal coarse aggregate size, 1 inch.
Admixtures	A water-reducing admixture and an air-entraining admixture shall be included in all concrete. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.
Consistency	Workable, without segregation, with slump not more than 5 inches when concrete is placed.
Mixing	In accordance with ASTM C94.

2.02 MATERIALS

Cement	ASTM C150, Type I or II, low alkali .
Cement	ASTM C150, Type II or l/ll 4 , low alkali 4 .
Fly Ash	ASTM C618, Class F, except loss on ignition shall not exceed 4 percent.
Fine Aggregate	Clean natural sand, ASTM C33.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, class 4S, except that clay and shale particles shall not exceed 1 percent.
Water	Potable.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
Superplasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Mechanical Connector (Couplers or Form Savers)	Classified Type 2 per ACI 318-02 or per UBC-97. Use only where indicated on the drawings.
Form Coating	Nonstaining and nontoxic after 30 days, VOC-compliant; Burke "Form Release (WB)", L&M Chemical "E Z Strip", Nox-Crete "Form Coating", or Symons "Thrift Kote E".
Pre-Cure Finishing Aid	Burke "Finishing Aid Concentrate", Euclid "Eucbar", L&M Chemical "E-Con", Master Builders "Confilm", or Sika "Sikafilm".

2.03 PRELIMINARY REVIEW

A. Reports covering the source and quality of concrete materials, and the concrete proportions proposed for the work shall be submitted to the CITY for review before any concrete is placed.

2.04 FORMS

A. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the Drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment. Forms shall be thoroughly cleaned and oiled before concrete is placed and shall not be removed until the concrete has attained sufficient strength to safely support all loads without damage.

2.05 REINFORCEMENT

A. Reinforcement shall be accurately formed and positioned and shall be maintained in proper position while the concrete is being placed and compacted. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connections shall be used only as indicated on the Drawings.

PART 3 - EXECUTION

3.01 PLACEMENT

A. Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent segregation or loss of the ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Unless otherwise authorized, compaction shall be by immersion-type vibrators. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

3.02 FINISHING

A. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill. Surface voids and recesses resulting from removal of form ties shall be filled with mortar.

B. Unless otherwise specified, unformed surfaces shall be given a float finish.

C. Application of Pre-Cure Finishing Aid:

1. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight 4 shall 4 may 4 be protected with a pre-cure finishing aid. The finishing aid shall form a monomolecular film on the surface of fresh, plastic concrete to retard evaporation.
2. Immediately following screeding, pre-cure finishing aid shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon, in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to

continuously spray finishing aid at approximately 40 psi with a suitable nozzle as recommended by the manufacturer.

3. The sprayable solution shall be prepared as recommended by the manufacturer.
4. Under severe drying conditions, additional applications of finishing aid may be required following each floating or troweling, except the last finishing operation.

D. Sidewalks and Driveways:

1. Concrete surfaces shall be screeded to the proper elevation and contour. All aggregates shall be completely embedded in mortar. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar.
2. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface. Initial floating shall be followed by a second floating at the time of the initial set.
3. Floated surfaces shall be given a light broom finish, using a horsehair broom, to provide a nonslip surface. Brooming shall be done at right angles to the length of the walk.
4. Sidewalks shall be edged using a 3- or 4-inch-wide edging tool with a 1/8 inch corner radius. Edger lap marks at corners of each slab shall be carefully removed. The depth of the transverse joints shall be no less than one-fourth the thickness of the slab. Joints shall divide each sidewalk into square sections.
5. The finished surface of all sidewalks shall be neat in appearance, shall be sloped to drain, and shall not pond water.

E. Curb and Gutter: After the forms have been removed, all exposed edges shall be rounded, using an edging tool with a 1/8-inch corner radius. Exposed surfaces shall be float finished and given a light broom finish applied at right angles to the curb at the time of initial set, using a horsehair broom.

3.03 CURING

A. Concrete shall be protected from loss of moisture for at least 7 days by membrane curing compound or by water curing. Membrane curing compound shall be applied as recommended by the manufacturer. Acceptable methods of water curing are described in ACI 308. Concrete shall be protected from freezing for at least 7 days following placement.

END OF SECTION 03 30 00

SECTION 31 09 13

SETTLEMENT MONITORING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Work specified in this section includes furnishing and installing settlement instrumentation to monitor ground movements around and above tunneled crossings and where otherwise shown. The Work includes, but is not limited to, installing settlement instrumentation and recording observations and measurements from the monitoring points on a periodic basis before, during, and after tunneling.

B. The minimum required settlement instrumentation is shown on Drawings. The CONTRACTOR should add additional instrumentation as necessary to manage the Work and demonstrate compliance with settlement monitoring limits provided herein.

1.02 SUBMITTALS

A. Informational Submittals:

1. Qualifications: Submit surveying personnel qualifications in accordance with the requirements herein.
2. Submit the following, at least 1 month before scheduled installation of monitoring points:
    a. Instrumentation Schedule: Submit the proposed schedule for installing the monitoring points.
    b. Description of methods and materials for installing monitoring points.
    c. Drawings with locations of proposed monitoring points shown in plan and profile.
    d. Monitoring Plan: Submit the monitoring plan for each monitoring location separately. The plan should identify the procedures (including instruments used, datum, bench marks used, monuments used, and surveying methodologies) and frequency of measurements, the procedure by which the information is tabulated graphically for each point and submitted electronically in Microsoft Excel format to the OWNER’S REPRESENTATIVE, and the procedures to be used to identify and communicate values that have exceeded the threshold values defined in this section.
3. Reports and Records:
    a. Within 72 hours following installation of the monitoring points (x, y, z), submit Drawings to the OWNER’S REPRESENTATIVE showing the actual as-built installed location, the identification number, the type, the installation date and time, the coordinates of the point, and the tip elevation and instrument length. Include details of installed instruments, accessories and protective measures including all dimensions and materials used.

b. At least 72 hours prior to commencement of any adjacent construction activities, including dewatering, submit to the OWNER'S REPRESENTATIVE pre-construction survey of existing conditions, documenting any existing damage, distress, settlement, cracking, etc., of streets, roadways, sidewalks, curbs, gutter, utilities, buildings, railroad embankment walls, railroad track piers, and foundations. Include photographs, video, and written notes for each item or instance of damage or distress existing before construction. Provide photographs and video in accordance with the Contract Documents.

B. Action Submittals:

1. Shop Drawings: Indicate sizes, materials, and details of monuments and posts.

1.03 DEFINITIONS

A. Monitoring Points: Surface, subsurface and facility monitoring points as defined herein.

B. Facility Monitoring Point (FM): Geoprisms or targets that allow for the repeatable measurement of movement of a structure at that point. A prism or target shall be affixed to the façade of the target structure.

C. Geotechnical Instrument: A device designed to facilitate measurement of ground or structure response such as movements and stresses due to construction activities, as defined herein.

D. Inclinometer (IN): 2-3/4-inch diameter PVC inclinometer casing that is installed in a borehole and the annulus between the ground, or the concrete structure is filled with a cement/bentonite grout. The inclinometer casing has four orthogonal grooves along the inside, and these are used to guide an inclinometer probe along in order to survey the line of the inclinometer casing to monitor lateral deformations of the ground.

E. Instrument Monitoring: Gathering, analyzing, and reporting data from geotechnical instruments.

F. Surface Settlement Array (SA): Settlement points installed along the centerline of the tunneled alignment with a point installed along either side of it perpendicular to the tunnel alignment or as shown on Drawings.

1.04 QUALITY CONTROL

A. Surveyor Qualifications: Perform surveying for establishing monitoring points by a professional Land Surveyor licensed in the State of Ohio with previous experience surveying for the detection of structural or surface deformations.

B. Install monitoring points shown on Drawings, or as directed by the OWNER'S REPRESENTATIVE. Install additional monitoring points if directed by the OWNER'S REPRESENTATIVE.

C. Should actual field conditions prevent installation of instruments at the locations shown on Drawings, or specified herein, obtain written acceptance from the OWNER'S REPRESENTATIVE for new instrument locations and elevations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide each monitoring point with a tag or marking indicating the station and offset from centerline. Assign each point a unique identification number and protect from damage or burial. Flag each point so as to remain visible.

B. Facility Monitoring Points (FM). L-Bar Mini Prisms by Geo-Instruments or approved equal. Building monitoring points shall be as approved by affected property Owner.

C. Inclinometer (IN). Inclinometer system consisting of sensor nodes in a vertical string installed in an inclinometer casing:

1. Inclinometer casing for vertical boreholes shall be 2-3/4 inch internal diameter ABS plastic pipe with internal longitudinal grooves, self-aligning couplings, caps, and fittings.
2. Node spacing at 2 feet centers.
3. Wireless data acquisition system, capable of transmitting to processing software that can trigger alarms based on displacements or rate of change.
4. Software shall be capable of presenting tabulations of casing deformations, and plots of cumulative and progressive deformations.
    a. Geo-Flex Inclinometer, as manufactured by Durham Geo Slope Indicator
    b. "Or-equal" as approved by OWNER'S REPRESENTATIVE.

D. Surface Settlement Array (SA). Each point shall consist of a No. 4 rebar settlement rod extending at least 18 inches below the paved surface. Do not damage the existing utilities. Each point shall be assigned a unique identification number. The casing shall be flush with pavement or recessed and capped and protected with a road box or approved equal.

E. All materials shall be new and shall have a design life of at least 5 years.

PART 3 - EXECUTION

3.01 GENERAL

A. Install instrumentation at the locations shown on Drawings, as described in these specifications, and as approved by the OWNER'S REPRESENTATIVE. Install instruments in accordance with the approved installation schedule.

B. Install instruments and perform a baseline survey of surface monitoring points at least 7 days prior to the commencement of any construction activities within 100 feet of the monitoring point, including the start of dewatering.

C. Once tunneling commences, survey monitoring points located within 50 feet of the excavation face once a day and settlement monitoring points once a day while the shaft/pit is open.

D. Once tunneling operations are complete and the shafts or trench backfilled, survey settlement monitoring points once every other day for a period of 1 week, and once again at 14 days after tunneling and backfill are completed.

E. Provide access and assistance to the OWNER'S REPRESENTATIVE for obtaining additional monitoring data, as discussed herein and as requested by OWNER'S REPRESENTATIVE.

3.02 MONITORING POINT LOCATIONS

A. Establish an array of surface monitoring points in accordance with Drawings and as defined herein.

B. Install the monitoring points adjacent to the paved road surface being crossed between the launch shaft/pit and the paved road and the receiving pit and the paved road as shown on Drawings.

C. Locate and visually confirm utilities within 10 feet laterally of monitoring point locations, and protect utilities or relocate monitoring points as necessary to protect utilities. Follow accepted industry procedures for one-call notification (Ohio one-call) and visual confirmation of locations of adjacent utilities.

3.03 INSTRUMENT PROTECTION, MAINTENANCE, AND REPAIR

A. Protect the monitoring points from damage. Replace or repair damaged installations within 24 hours prior to continuing dewatering, excavation, or tunneling, unless permitted otherwise in writing by the OWNER'S REPRESENTATIVE.

3.04 RESPONSE VALUES

A. Response Values:

	Threshold Value (Action Required)	**Response Value**	**Shutdown Value**
Surface Settlement Array (SA)	0.5 inches V	0.9 inches V	1.0 inch V
Inclinometers (IN)	0.25 inches H	0.40 inches H	0.50 inches H
Facility Monitoring Point (FM) (structure) (X, Y, & Z)	0.25 inches	0.45 inches	0.50 inches

B. When the instruments indicate movement equal to 50 percent of the maximum allowable value has occurred, the Threshold Value is said to have been reached. Meet with the OWNER'S REPRESENTATIVE to discuss construction means and methods to determine what changes, if any, will be made to better control ground movement. Instrument readings will be taken by the OWNER'S REPRESENTATIVE on a daily basis until five consecutive working days of stabilized readings are observed, or more often as specified elsewhere in this section.

C. When the instruments indicate movement equal to 90 percent of the maximum allowable value has occurred, the Response Value is said to have been reached. Actively control ground movement in accordance with the approved plan to prevent reaching the Shutdown Value. Instrument readings will be taken by the OWNER'S REPRESENTATIVE on a daily basis until 5 consecutive working days of stabilized readings are observed, or more often as specified elsewhere in this section.

D. When the instruments indicate movement equal to 100 percent of the maximum allowable value has occurred, the Shutdown Value is said to have been reached. Stop excavation Work immediately making sure that the excavation is stable and measures have been implemented to avoid additional ground movement at the OWNER'S REPRESENTATIVE'S direction. Meet with the OWNER'S REPRESENTATIVE to develop a plan of action before excavation Work can be resumed. No standby time will be paid if excavation Work is shut down because the Shutdown Value is reached.

3.05 ABANDONMENT OF INSTRUMENTS

A. Inclinometers (IN): At the completion of the job, remove the inclinometer system. Grout the full depth of inclinometer casings by tremie method or by pressure injection from the ground surface. Grout shall consist of cement and water, with the minimum amount of water necessary to allow pumping. Remove guard casings and valve boxes, and patch holes with materials and to a durability consistent with the surrounding surface. Salvaged material except readout instruments, and the inclinometer system shall become the property of the CONTRACTOR. Readout instruments, and the inclinometer system including any software used with the instruments for data collection, will remain the property of the OWNER.

B. Surface Monitoring Points: Surface Settlement Arrays (SA) may be abandoned without removal. All FMs shall be removed by the CONTRACTOR during the cleanup and restoration work, or sooner as allowed or required by the OWNER'S REPRESENTATIVE. UMs shall be abandoned by removal of inner rods, filling of the protective casing with grout, and cutting and removal of protective casing to a depth of at least 5 feet below ground surface. Abandonment shall be documented and records submitted to the OWNER'S REPRESENTATIVE and agencies requiring abandonment records. The resulting voids from casing removal shall be filled with soil and the ground surface restored.

END OF SECTION 31 09 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 23 00

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SCOPE

A. This section covers clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation and trenching; the handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection of Work; preparation of subgrades; pumping and dewatering as necessary; protection of adjacent property; backfilling; pipe embedment; surfacing and grading; and other appurtenant work.

1.02 GENERAL

A. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, CONTRACTOR shall employ a competent person and, when necessary based on the regulations, a registered Professional Engineer, to act upon all pertinent matters of the Work of this section.

B. All sanitary sewer backfill operations shall be in accordance with the City of Cincinnati Supplement to the State of Ohio (ODOT) Construction and Material Specifications, as shown on MSD Standard Drawing Acc. No. 49032, except as otherwise noted herein. All storm sewer bedding and backfill operations shall be in accordance with City of Cincinnati Stormwater Management Utility requirements and Item 603 of the City of Cincinnati Supplement to the State of Ohio (ODOT) Construction and Material Specfications. All requirements of these items shall be strictly adhered to by the CONTRACTOR and enforced by the CITY.

1.03 SUBMITTALS

A. Drawings, Specifications, and data covering the proposed materials shall be submitted in accordance with the Submittals section.

B. At least 30 days before starting construction on the sheeting and shoring, the CONTRACTOR'S sheeting and shoring design engineer shall complete and submit to OWNER'S REPRESENTATIVE the Protection System Design Certificate (Figure 2-02202) and the CONTRACTOR shall use the sheeting and shoring design. A separate certificate shall be submitted for each unique design. The certificate shall be signed and sealed by the registered professional engineer that designed the protection system. The professional engineer shall be licensed and registered in the State of Ohio.

C. Filter Fabric Data. Complete descriptive and engineering data for the fabric shall be submitted in accordance with the Submittals section. Data submitted shall include:

1. A 12 inch square sample of fabric.
2. Manufacturer's descriptive product data.
3. Installation instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Controlled Low Strength Material (CLSM) as specified herein above the "initial backfill" shall be required in the following locations:

1. Where the trench is located anywhere in the right of way or any part of the trench is within 2 feet of the outside edge of Right-of-Way, CLSM shall be used and shall extend to the pavement subgrade or to the topsoil for the entire width of the trench.

B. CLSM shall meet or exceed the requirements as defined in the latest edition of the Hamilton County and City of Cincinnati Controlled Low Strength Material – Controlled Density Fill Performance specification, including addendums and attachments thereto.

C. Compacted bank run gravel backfill, meeting the requirements of Section 703.20 of the City supplement and MSD Standard Drawing No. 49032, above the “initial backfill” shall be required for all conduits and trenches under sidewalks, driveway and parking lot pavements, when CLSM is not required as specified above.

D. Costs for backfilling, meeting the above requirements, shall be included in the price bid for all types of conduit specified on the Contract Plans.

E. Bedding, Initial Backfill and Minimum Trench Width for Sanitary Sewer Plastic Pipes:

E. Allowable bedding and initial backfill for plastic pipe shall be Class I or Class II as defined below and applied as per MSD Standard Drawing Accession Number 49032 requirements.

1. Class I: Angular 1/4 inch to 1 inch graded stone (No. 57), including a number of fill materials such as slag, cinders and crushed stone. Where any ungraded (one size aggregated) crushed stone or slag is used, limit size to 3/4 inch maximum. Use this material where the depth of cover of the conduit is between 14 feet and 35 feet.
2. Class II: Coarse sands and gravels with maximum particle size of 1 inch, including various graded sands and gravels containing small percentages of fines, generally being granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as further defined in ASTM-D-2487. Use of this material is applicable to conduits when the depth of cover is 14 feet or less.
3. Minimum trench width shall be not less than the greater of either the pipe outside diameter plus 16 inches (400 mm) or the pipe outside diameter times 1.25, plus 12 inches (300 mm) and as further refined in ASTM D-2321.

2.02 MATERIALS TESTING

A. Preliminary Review of Materials: As required by CITY, all tests for preliminary review of materials shall be made by an acceptable independent testing laboratory at the expense of CONTRACTOR. Two initial gradation tests shall be made for each type of embedment, fill, backfill, or other material, and one additional gradation test shall be made for each additional 500 tons of each material delivered to the site. In addition, one set of initial Atterberg Limits test shall be made for each fill materials containing more than 20 percent by weight passing the No. 200 sieve. One additional Atterberg Limits test shall be made or each additional 500 tons of each material delivered to the site.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing and Grubbing shall be performed as specified in Division 01 and the bid item description in Section 01 20 00 - Measurement and Payment.

3.02 EXCAVATION

A. Excavations shall provide adequate working space and clearances for the Work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

B. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

C. Except where exterior surfaces are specified to be damp-proofed, monolithic concrete manholes and other concrete structures or parts thereof, which do not have footings that extend beyond the outside face of exterior walls, may be placed directly against excavation faces without the use of outer forms, provided that such faces are stable.

D. Classification of Excavated Materials. No classification of excavated materials will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Work, regardless of the type, character, composition, or condition thereof.

E. Blasting: Blasting or other use of explosives for excavation will not be permitted.

F. Dewatering:

1. See Section 02 61 00 – Removal and Disposal of Contaminated Soil and Groundwater for the handling and disposal requirements of groundwater in contaminated areas.
2. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

3. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater beneath such excavations.
4. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.
5. CONTRACTOR shall be responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.
6. CONTRACTOR shall obtain from the appropriate agencies and authorities, the dewatering and stormwater discharge permits required to remove and dispose of groundwater, surface water, and any other water used in CONTRACTOR'S operations. The permits shall be obtained prior to start of construction. CONTRACTOR shall comply with applicable laws and regulations, including but not limited to the requirement that if CONTRACTOR has the capacity to withdraw water at a quantity greater than 100,000 gallons per day the CONTRACTOR shall register with the Ohio Department of Natural Resources (ODNR), Division of Water and then track and report on how much water was pumped. (Ohio Revised Code 1521.16).

G. Sheeting and Shoring:

1. See Specification Section 31 41 00 – Shoring for additional requirements, especially for Shaft/Pit Excavation Support where there are trenchless crossings.
2. Except where banks are cut back on a stable slope or other effective trench support is provided, excavations for structures and trenches shall be supported with shoring as necessary to prevent caving or sliding.
3. Sheet piling or other excavation support systems shall be installed as necessary to limit the extent of excavations for deeper structures and to protect adjacent structures and facilities from damage due to excavation and subsequent construction. CONTRACTOR shall assume complete responsibility for, and shall install adequate protection systems for prevention of damage to existing facilities.
4. Sheeting, shoring and excavation support systems shall meet all applicable OSHA (Occupational Safety & Health Administration) requirements. The design shall also meet the requirements of Specification Section 01 14 00 – Control of Work, and shall be submitted to the CITY as required for the City of Cincinnati DOTE Street Opening / Right-of-Way permit.
5. Trench sheeting may be removed if the pipe strength is sufficient to carry trench loads based on trench width to the back of sheeting. Trench sheeting shall not be pulled after backfilling. Where trench sheeting is left in place, it shall not be braced against the pipe, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe to support sheeting may be removed after pipe embedment has been completed. Trench sheeting shall be removed unless otherwise permitted by CITY. Trench sheeting will not be removed, if in the opinion of CITY, removal of the sheeting will cause damage to the facility it is protecting. If left in place, the sheeting shall be cut off 12 inches below finished grade. The design of the support system shall be such as to permit complete removal while maintaining safety and stability at all times.

H. Stabilization:

1. Subgrades for concrete structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.
2. Subgrades for concrete structures or trench bottoms which are otherwise solid, but which become mucky on top due to construction operations, shall be reinforced with crushed rock or gravel as specified for granular fills. The stabilizing material shall be placed in a manner that no voids remain in the granular fill. All excess granular fill with unfilled void space shall be removed. The finished elevation of stabilized subgrades shall allow for installation of pipes, manholes, etc. to the elevations indicated on Drawings.

3.03 TRENCH EXCAVATION

A. No more trench shall be opened in advance of pipe laying than is necessary to expedite the Work. One block or 400 feet, whichever is the shorter, shall be the maximum length of open trench on any line under construction.

B. Except where no dig methods are indicated on Drawings is specified, or is permitted by CITY, all trench excavation shall be open cut from the surface and conform to MSD Standard Drawing No. 49032.

C. Alignment, Grade, and Minimum Cover: The alignment and grade or elevation of each pipeline shall be fixed and determined from offset stakes. Vertical and horizontal alignment of pipes, and the maximum joint deflection used in connection therewith, shall be in conformity with requirements of the section covering installation of pipe.

D. Fill Section: Where the sewer trench is in a fill section and the top of the pipe extends above the vertical limits of where the fill begins (portions of the trench backfill are in the constructed embankment) the CONTRACTOR shall refer to ODOT Section 603 requirements, and City Supplement requirements thereto, for placement of the embankment fill prior to beginning the trench excavation.

E. Mechanical Excavation:

1. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, hand excavating methods shall be used.
2. Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated, that the rough trench excavation bottom elevation can be controlled, and that trench alignment is such that pipe, when accurately laid to specified alignment, will be centered in the trench with adequate sidewall clearance. Undercutting the trench sidewall to obtain sidewall clearance will not be permitted.
3. In locations where maximum trench widths are required for designated rigid conduits, mechanical equipment shall be operated so that uniform trench widths and vertical sidewalls are obtained at least from an elevation 12 inches above the top of the installed pipe to the bottom of the trench.

F. Cutting Concrete Surface Construction:

1. Cuts in concrete pavement and concrete base pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with a concrete saw in a manner which will provide a clean groove at least 1-1/2 inches deep along each side of the trench and along the perimeter of cuts for structures.
2. Concrete pavement and concrete base pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the center line of the trench.
3. Pavement removal for connections to existing lines or structures shall not exceed the extent necessary for the installation.
4. Where the trench parallels the length of concrete walks, and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, or other surface construction, the surface construction shall be removed and subsequently replaced between existing joints or between saw cuts as specified for pavement.

G. Excavation Below Pipe Subgrade:

1. Except where otherwise required, pipe trenches shall be excavated below the underside of the pipe, to provide for the installation of granular embedment.
2. Bell holes shall provide adequate clearance for tools and methods used for installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

H. Artificial Foundations in Trenches: Whenever unsuitable or unstable soil conditions are encountered, trenches shall be excavated below grade and the trench bottom shall be brought to grade with suitable material. In such cases, payment will be made under the applicable CONTINGENCY item or adjustments will be made in the Contract Price in accordance with the provisions of the General Conditions.

3.04 BACKFILL INSTALLATION REQUIREMENTS

A. Compacted Backfill:

1. Where CLSM is not required, compacted granular backfill for the full depth of sewer trench shall conform to requirements of MSD Standard Drawing Accession Number 49032, in the locations indicated below:
   a. Where beneath pavements, surfacings, driveways, curbs, gutters, walks, or other surface construction or structures.
   b. Where in street, road, or highway shoulders.
2. The top portion of backfill beneath established lawn areas shall be finished as specified in Section 01 71 33 - Restoration of Improvements.

3. For backfilling in other areas than indicated in 1 above can consist of local site material with the following qualifications:
   a. No rocks, frozen lumps, or foreign matter and particle in excess of 3 inches shall be included.
   b. Material does not consist of highly plastic silts, clays, organic silts or peat.
   c. No rubbish, muck or unsuitable materials are included, and any stones or shale of up to 0.5 cubic foot in volume in the backfill are separated for each other and the pipe by at least 6 inches of earth or approved site or select backfill.

B. Jetted Backfill:

1. In lieu of compacting the bank run gravel backfill in 4-inch lifts, the bank run gravel backfill may be compacted by thoroughly jetting with water, in areas outside of the right-of-way, provided satisfactory drainage and removal of the free water is provided.
2. The Bank Run Gravel backfill shall be consolidated by thoroughly jetting with water. For jetting, a hose not smaller than 1-1/2 inch diameter and a nozzle not smaller than 1 inch diameter and not shorter than 2/3 the depth of the trench carrying a water pressure of 40 pounds per square inch (psi) shall be inserted in a uniform pattern, at 5 feet maximum spacing, to obtain maximum consolidation. After the final jetting of the trench, the backfill shall be left to settle and to permit drainage of impounded water. Typical jetting procedures shall include a water removal system at intervals not to exceed 500 lineal feet of trench. Water removal shall not begin until the water surfaces above the backfill. After jetting is complete, the area around the jetting hole shall be filled and compacted by the use of the bucket on the equipment used for excavating. Settled trench surfaces shall then be brought to grade by filling with Bank Run Gravel backfill and compacted to a density equal to that of the adjacent ground.
3. Water shall be removed by installing an opening in the manhole or installing a vertical 8-inch perforated pipe with filter paper adjacent to the manhole. If the vertical pipe method is used, the vertical pipe shall be filled with #57 stone after all water is removed by pumping. All manhole openings shall be plugged and sealed after jetting and water removal operations are completed.

C. Special Backfilling Requirements:

1. Backfill material for Type "C" Conduit shall conform to BACKFILL Installation REQUIREMENTS – Items 3.04 A or B above.
2. The backfill for Type “C” Conduit shall be finally consolidated by mechanical compaction or by thoroughly jetting with water as specified above. If the backfill is finally consolidated by jetting, the CONTRACTOR shall assume all responsibility and associated costs for any ground or hillside movement and/or instability related to the jetting compaction procedures.
3. The CONTRACTOR shall include the cost for the necessary backfill and compaction with the various Conduit items in unit prices for various Conduit Class Items. No additional payment shall be made for the use of Controlled Low Strength Material (CLSM) Density Backfill when required by the jurisdictional agency or due to unsupported trenches, over excavating, or the inability to properly compact the backfill in the excavated trench.
4. Inundated Sand. Not used.

5. Graded Gravel. Gravel backfill shall be deposited in uniform layers not exceeding 12 inches in uncompacted thickness. The backfill shall be compacted with a suitable vibratory roller or platform vibrator to at least 70 percent relative density as determined by ASTM D4253 and D4254.
6. Groundwater barriers specified under pipe embedment shall extend to the top of the graded gravel backfill.
7. Ordinary Backfill. Compaction of trench backfill above pipe embedment in locations other than those specified will not be required except to the extent necessary to prevent future settlement. CONTRACTOR shall be responsible for backfill settlement as specified.
8. Ordinary earth backfill material to be placed above embedments shall be free of brush, roots more than 2 inches [50 mm] in diameter, debris, cinders, and any corrosive material, but may contain rubble and detritus from rock excavation, stones, and boulders in certain portions of the trench depth.
9. Backfill material above embedments shall be placed by methods which will not impose excessive concentrated or unbalanced loads, shock, or impact on installed pipe, and which will not result in displacement of the pipe.
10. Compact masses of stiff clay or other consolidated material more than 1 cubic foot in volume shall not be permitted to fall more than 5 feet into the trench, unless cushioned by at least 2 feet of loose backfill above pipe embedment.
11. No trench backfill material containing rocks or rock excavation detritus shall be placed in the upper 18 inches of the trench, nor shall any stone larger than 8 inches in its greatest dimension be placed within 3 feet of the top of pipe. Large stones may be placed in the remainder of the trench backfill only if well separated and so arranged that no interference with backfill settlement will result.
12. Water-Settled Earth Backfill. Settlement or consolidation of trench backfill using water jetting or ponding shall not be performed.
13. Structure Backfill. Backfill around manholes and small concrete vaults shall meet the requirements specified for compacted trench backfill.
14. Controlled Low Strength Material (CLSM). CLSM shall not be placed on frozen ground. Batching, mixing, and placing of CLSM may be started when weather conditions are favorable and when the temperature is at least 34 degrees F and rising. At time of placement, CLSM shall have a temperature of at least 40 degrees F. Mixing and placing shall stop when the temperature is 38 degrees F and falling. Each filling stage shall be as continuous an operation as is practicable.
15. CLSM shall be discharged from the mixer by an acceptable procedure into the area to be filled. CLSM shall be placed to limits indicated on the drawings. Mixing CLSM with in-situ soil shall be avoided.
16. When CLSM is placed as backfill against structures, the fill shall be placed in lifts of 2 to 3 feet [0.6 to 1 meter] and the next lift shall not be placed until the previous lift has taken initial set and at least 16 hours have elapsed from the end of placement. Lift thickness shall be reduced as necessary to prevent floatation of the structure.
17. When CLSM is placed over culverts or pipelines, they shall be anchored to prevent flotation during the placement of CLSM. Unless otherwise required, CLSM shall be placed to one foot below subgrade elevation if the subgrade elevation is not more than 5 feet [1.5 meters] over the top of the culvert or pipe. If the subgrade is more than 5 feet [1.5 meters] over the top of the culvert or pipe fill, CLSM shall be placed to an elevation 2 feet [0.6 meters] over the top of the culvert or pipe, and the remainder shall be backfilled with soil designated by OWNER'S REPRESENTATIVE.

3.05 DRAINAGE MAINTENANCE

A. Trenches across roadways, driveways, walks, or other traffic ways adjacent to drainage ditches or watercourses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the traffic way, to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by CONTRACTOR. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other watercourses crossed by the line of trench shall be removed immediately after backfilling is completed, and the original section, grades, and contours of ditches or watercourses shall be restored. Surface drainage shall not be obstructed longer than necessary.

3.06 FINAL GRADING

A. After other outside work has been finished, and backfilling and embankments completed and settled, all areas which are to be graded shall be brought to existing grade and slope at the indicated elevations, slopes and contours.

B. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage.

C. Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

D. Seeding and other restoration activities shall comply with Section 01 71 33 - Restoration of Improvements.

3.07 DISPOSAL OF EXCESS EXCAVATED MATERIALS

A. See Section 02 61 00 – Removal and Disposal of Contaminated Soil and Groundwater for handling and disposal requirements of contaminated soils discovered during excavation.

B. Disposal of excess noncontaminated material from trench excavation shall be disposed of away from the site.

C. Broken concrete and other debris resulting from pavement or sidewalk removal, excavated rock, debris encountered in excavation work, and other similar waste materials shall be disposed of away from the site.

3.08 SETTLEMENT

A. CONTRACTOR shall be responsible for all settlement of trench backfill which may occur within the correction period stipulated in the General Conditions.

B. CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from CITY.

END OF SECTION 31 23 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 41 00

SHORING

PART 1 - GENERAL

1.01 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Specification Section 31 23 00 – Trenching and Backfill for additional trench shoring requirements.

B. Occupational Safety and Health Administration (OSHA) Regulations for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction, and Subpart P, Excavation.

1.02 SUBMITTALS

A. Informational Submittals:

1. Provide an excavation support plan for open cut reaches of the Project when nontraditional shoring systems are used, to be designed and sealed by a registered professional engineer in the State of Ohio. Traditional shoring systems are trench sloping or pre-engineered supports (such as trench boxes). Include, as a minimum, the following information:
   a. Details of shoring, bracing, sloping, or other provisions for worker protection from hazards of caving ground.
   b. Qualifications of excavation support design engineer.
   c. Design assumptions and calculations including adjacent ground movement limits.
   d. Methods and sequencing of installing excavation support.
   e. Proposed locations of stockpiled excavated materials.
   f. Minimum lateral distance from the crest of slopes for vehicles and stockpiled excavated materials.
   g. Anticipated difficulties and proposed resolutions including provisions for subgrade stability and protection.
2. Provide Shaft/Pit Excavation Support Plan for the trenchless crossing that is designed and sealed by a registered professional engineer in the State of Ohio. Include, as a minimum, the following information:
   a. Scaled Drawings (plan and section views with dimensions and sizes) showing the proposed shaft and pit elements, adjacent and nearby existing structures and utilities; details of tunneled pipe penetrations; details of pipe penetrations for connection to open cut sections of the pipeline; staging areas for shaft construction operations, such as storage, and minimum setbacks from the excavation.
   b. Details for locating and protecting existing utilities and structures.
   c. Methods and sequencing of soil excavation and installation of staged excavation support.
   d. Procedures for checking and maintaining plumbness of the shaft and ensuring proper elevation is reached.

e. Calculations for the shaft support elements and bracing, indicating it can withstand earth and groundwater pressures, equipment, applicable traffic, and construction loads and other surcharge in accordance with the soil conditions presented in Section 02 40 00 - Tunneled Crossings, and other requirements described in the Drawings and Specifications.

1.03 QUALITY ASSURANCE

A. The CONTRACTOR is responsible for quality control, including workmanship and material furnished by their subcontractors and suppliers.

B. Provide surveys to monitor movements of critical facilities.

C. Provide trench excavation support designed by a professional engineer registered in the State of Ohio who has a minimum of 5 years of experience in the design of retaining structures.

PART 2 - PRODUCTS

2.01 GENERAL

A. Structural Steel: ASTM A36 or better, unless otherwise approved.

PART 3 - EXECUTION

3.01 GENERAL

A. Utilize the type of shoring and protection methods that meet the specification requirements and that are of a size large enough to facilitate the necessary groundwater control, construction operations, pipeline equipment and operations, trenchless operations, and to accommodate indicated connections to open cut reaches of the Project.

B. Provide excavation support systems for areas to support earth pressure, unrelieved hydrostatic pressures, bottom heave, utility loads, equipment, jacking loads, applicable traffic loads, and other loads in such manner as to allow safe construction and to prevent damage to adjacent structures (including existing pipelines and utilities) and injury to workers and the public. In addition, the installation of excavation support systems will not cause a disruption to public convenience or access.

C. Provide excavation support systems to be compatible with the geologic conditions presented in Section 02 40 00 – Tunneled Crossing, and in the geotechnical data report completed for the Project.

D. Provide the support system to protect adjacent utilities from damage and to minimize horizontal and vertical movements to the maximum allowable values for deformation which are specified in Section 31 09 13 – Settlement Monitoring.

E. Provide shafts for the removal of the upper 5 feet to accommodate construction of connections and backfill sequences.

3.02 TRENCHES

A. For trench excavation at or exceeding 5 feet in depth, provide adequate safety system meeting requirements of applicable local construction safety orders, and OSHA requirements.

B. When personnel are not present within the immediate vicinity of the Work, plate, fence, or barricade open excavations to protect the public and to provide for worker safety.

3.03 REMOVAL OF SUPPORT SYSTEM

A. Do not remove excavation support until support can be removed without damage to existing facilities, completed Work, or adjacent property.

B. Remove excavation support in a manner that will maintain support as excavation is backfilled and will not leave voids in backfill. Perform removal of the support system in a manner that will not disturb the pipeline, the compacted backfill, or adjacent construction or facilities.

C. Remove the excavation support from the excavation and from the Site.

END OF SECTION 31 41 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 79 19

OPEN FACE ROTARY WHEEL TBM TUNNELING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish labor, equipment, and materials necessary for installation of the 42-inch RCP Jacking Pipe using an open face rotary wheel tunnel boring machine (TBM), pipe jacking, and other associated work.

B. The CONTRACTOR shall not utilize any other tunneling method without written authorization from the OWNER'S REPRESENTATIVE. The CONTRACTOR will be required to demonstrate that the proposed alternate tunneling method is technically feasible and will result in settlement less than the shutdown values presented Section 31 09 13- Settlement Monitoring. The CONTRACTOR will be required to submit three examples of crossings of similar lengths and in similar soil conditions where the proposed alternative was successfully completed.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The publications listed below form a part of this Specification to the extent referenced. Where conflicts between these Specifications and the referenced Specification, code, or standard occur, the more restrictive specification shall govern. The publications are referenced in the text by basic designation only. Where a date is given for referenced standards, that edition shall be used. Where no date is given for referenced standards, the latest edition available on the date of issue of Contract Documents shall be used.

1. Occupational Safety and Health Administration (OSHA) Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction, and Subpart P, Excavations.

1.03 SUBMITTALS

A. Informational Submittals:

1. Qualifications: Submit qualifications and detailed qualifying project experience for the Subcontractor, Subcontractor's superintendent, and TBM operator(s) that meet the requirements of Article Quality Assurance. In addition, submit names and training/qualifications of personnel that will perform air quality monitoring and the Site Safety Representative.
2. Quality Control Methods:
    a. Submit a description of the quality control methods proposed for the nonpressurized face rotary wheel TBM operation at least 30 days prior to the start of tunneling. Include:
        1) Supervision: Supervisory control to ensure that Work is performed in accordance with Drawings and Specifications and Tunneling Work Plan and Drawings.

2) Line and Grade: Procedures for surveying, controlling and checking line and grade, including field forms.
3) Tunneling Observation and Monitoring: Procedures for preparing and submitting daily logs of tunneling operations, including field forms.
4) Products and Materials: A plan for testing and submittal of test results to demonstrate compliance with the Specifications and criteria for permanent products, materials, and installations. Identify applicable standards and procedures for testing and acceptance.

3. Safety Plan: A Safety Plan for the tunneling operations.
   a. Air monitoring equipment and procedures.
   b. Provisions for lighting, ventilation, and electrical system safeguards.
   c. Protection against soil instability and groundwater inflow.
   d. Safety for tunnel and shaft access and exit including ladders, stairs, walkways, and hoists.
   e. Protection against mechanical and hydraulic equipment operations, and for lifting and hoisting equipment and material.
   f. Monitoring for hazardous gases.
   g. Means for emergency evacuation and self-rescue.
   h. Protection of shaft including traffic barriers, accidental or unauthorized entry, and falling objects.
4. Schedule:
   a. Provide a schedule for tunneling work, identifying major construction activities as independent items. Include, as a minimum, the following activities:
      1) Mobilization.
      2) “One call” utility locate requests and visual confirmation of all crossing utilities and parallel utilities within 10 feet laterally of the bore centerline.
      3) Shaft excavation and support.
      4) Thrust wall construction.
      5) TBM equipment setup.
      6) Tunneling.
      7) Contact grouting.
      8) Shaft backfill.
      9) Cleanup.
      10) Demobilization.
      11) Include the work hours and workdays for each activity, and a written description of the construction activities. Update every 2 weeks, or more frequently if requested by OWNER’S REPRESENTATIVE.
5. Daily Records: The following daily records shall be submitted to OWNER’S REPRESENTATIVE by noon on the day following the shift for which the data or records were taken.
   a. Jacking Records:
      1) Provide complete jacking records to OWNER’S REPRESENTATIVE. These records shall include, at a minimum: Date, time, name of operator, tunnel crossing identification, installed pipe number and corresponding tunnel length, cutterhead

rotation speed and torque, rate of advance for each pipe, jacking forces, spoil feed rates including estimated insitu excavation in volume per ft^3 of advance and assumed bulking factor (with comparison to theoretical excavation volume), line and grade offsets, any movement of the guidance system, problems with the TBM or other components or equipment, and durations and reasons for delays. Manually recorded observations should be made at intervals of not less than three feet of advance, as conditions change, and as directed by OWNER'S REPRESENTATIVE. Submit samples of the automated and manual jacking records at least 7 days prior to the start of tunneling. Samples shall include electronic data and any necessary programs to interpret data, and the manual logs or records to be used.

b. Survey Measurements: Survey measurements of RCP Jacking Pipe alignment.

6. Contact Grout Reports and Records: Maintain and submit daily logs of grouting operations, including grouting locations, pressures, volumes, and grout mix pumped, and time of pumping. Note any problems or unusual observations on logs.

B. Action Submittals:

1. Open Face Rotary Wheel TBM Tunnel Operations:
   a. Submit a Tunneling Work Plan with complete construction drawings and written description identifying details of the proposed method of construction and the sequence of operations to be performed during construction, as required by the method of tunneling. The Drawings and descriptions shall be sufficiently detailed to demonstrate whether the proposed materials and procedures will meet the requirements of this section. The Tunneling Work Plan, including Drawings, shall at a minimum include the following items:
      1) Arrangement Drawings and technical Specifications of the TBM and experience record with this type of machine. Include the following information concerning the TBM:
         a) Dimensions.
         b) Cutterhead arrangement with dimensions.
         c) Cutter types.
         d) Horsepower, torque, speed, and thrust.
         e) Procedure for replacing cutters.
         f) Overcut.
         g) Articulation and steering capability.
         h) Cutterhead jets/ports.
         i) Arrangement of flood doors, guillotine doors, or similar.
         j) Mucking system.
      2) Method of maintaining and controlling line and grade of tunneling operation.
      3) Method and details of spoil removal, including equipment type and numbers, processing, and disposal procedures and locations.

4) Techniques to be used for both lubrication and contact grouting including equipment, pumping and injection procedures, pressure grout types, and mixtures, in accordance with the manufacturer's recommendations.
5) Details of the TBM operation.
6) Plans for storage and handling of RCP Jacking Pipe.

2. Contingency Plans: The following list includes problem scenarios that may be encountered during the tunneling operations. Submit contingency plans for dealing with each problem scenario while satisfying the specifications. These plans shall include the observations and measurements required to clearly identify the cause of the problems.
   a. Machine Unable to Advance:
      1) Insufficient auger torque or jacking capacity.
      2) Machine malfunction.
      3) Excess cutter wear or damage requiring access to replace or repair cutters.
   b. Spoil Feed Problems:
      1) Strong hydrocarbon smell is detected in the spoils or in the shaft.
      2) Rock fragment, brick, timber, or other materials jamming cutterhead and/or mucking system.
   c. Jacking Forces:
      1) Jacking forces increase dramatically or suddenly.
      2) Jacking forces reach design capacity of RCP Jacking Pipe, jacking frame, or thrust wall (treat these scenarios as separate incidents).
   d. Settlement and Subsidence:
      1) Survey measurements indicate deformations exceed allowable limits as defined in Section 31 09 13 - Settlement Monitoring.
      2) Excavated volumes with appropriate bulking factors exceed RCP Jacking Pipe volume installed by over 20 percent.
   e. Line and grade tolerances being exceeded.
      1) Laser distorted by heat, humidity, or physical disturbance.
   f. Pipe has been damaged or has been found to be out of compliance with Specifications during, or after installation.
   g. Thrust block deforms excessively under jacking loads or provides insufficient capacity to advance RCP Jacking Pipe.

3. Contact Grout Work Plan and Methods:
   a. Submit Work plan, for each type of contact grouting required, including contact grouting methods and details of equipment, grouting procedures and sequences, injection pressures, monitoring and recording equipment, pressure gauge calibration data, methods of controlling grout pressure, method of transporting grouting equipment and materials within the pipe, and provisions to protect interior of pipe and shaft supports.
   b. Submit details of grout mix proportions, admixtures, including manufacturers' literature, and laboratory test data verifying the strength of the proposed grout mix.

1.04 DEFINITIONS

A. Jacking Pipe: Permanent pipe for operational use that is used to convey flows.

B. Grout Port: A port located within the RCP Jacking Pipe. During tunneling, the port will be sealed with a threaded plug. During contact grouting and lubrication, the port will be fitted with a one-way valve for injection of grout (or lubricant for lubrication) into the annular space between the RCP Jacking Pipe and the ground.

C. Jacking Record: A manually or automatically recorded report that contains information on tunneling operations and may include date, time, name of operator, tunnel crossing identification, installed tunnel length, rate of advance, jacking forces, spoil production rates, line and grade offsets, any movement of the guidance system, problems encountered with the tunneling machine or other components or equipment, and durations and reasons for delays.

D. Open Face Rotary Wheel TBM: Steerable tunneling shield that achieves soil excavation by means of a rotating cutter-wheel. TBM operations are usually performed from within the TBM, and excavated soil is discharged to a conveyor or muck car where it is transported to the ground surface for disposal. The guidance system consists of a laser or theodolite and EDM device mounted in the jacking shaft communicating a reference line to a target mounted in the TBM's articulated steering head. The target in the TBM provides the operator with information about machine attitude and pitch and allows for accurate steering control. The TBM includes flood doors, guillotine doors, or similar to prevent uncontrolled entry of soil into the TBM during work stoppage.

E. Open Face Rotary Wheel TBM Tunneling: A steerable tunneling and pipe jacking process that utilizes an open face rotary wheel TBM with a rotating cutterhead for excavation and a conveyor belt and muck car spoil removal system.

F. Radial Overcut: As defined in Section 02 40 00 - Tunneled Crossings.

G. Settlement Monitoring Point: Surface points, as defined in Section 31 09 13 - Settlement Monitoring. The point is resurveyed periodically to monitor ground movements.

1.05 DESIGN CRITERIA

A. Open Face Rotary Wheel TBM:

1. Select tunnel and pipe jacking equipment suitable for and capable of efficiently advancing through the geologic conditions defined in Section 02 40 00 - Tunneled Crossings, and the geologic conditions anticipated.
2. The cutterhead shall have a reversible drive system so that it can rotate in either direction.
3. Provide lubrication injection system to inject pipe lubricant around the TBM and RCP Jacking Pipe to reduce functional resistance. Lubrication materials may include a mixture of bentonite and/or polymers and water.

B. Methods and equipment shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements. Limit ground movements (settlement/heave) to values that do not cause damage or distress to surface features, utilities, or improvements.

C. In no case shall settlements exceed the applicable values listed in Section 31 09 13 - Settlement Monitoring. Comply with the requirements of Section 31 09 13 - Settlement Monitoring.

D. Design jacking pipe in accordance with Section 33 05 24, Reinforced Concrete Jacking Pipe.

E. The maximum radial overcut for each crossing is specified in Section 02 40 00 - Tunneled Crossings.

F. Use thrust block to transfer jacking loads to the soil behind the jacking shaft. Construct the thrust block perpendicular to the proposed RCP Jacking Pipe alignment. Design the thrust block to withstand the maximum jacking forces developed by the main jacks, without excessive deflection or displacement. Forces applied to the soil shall not exceed the allowable passive earth pressure, with a minimum factor of safety of 2.0.

1.06 QUALITY CONTROL

A. Grout Strength Tests: Prepare samples for 24-hour and 28-day compressive strength tests according to ASTM C31 for cylinders or ASTM C109 for cubes. Cylinder molds shall be at least 2 inches in diameter and 4 inches long. Grout cubes shall be either 2 inches or 50 millimeters square. Test samples according to ASTM C39 or C109 as applicable. Obtain grout for the cylinders or cubes from the nozzle of the contact grout injection line. Provide at least one set of four samples for each 100 cubic yards of grout injected but not less than one set for each grouting shift, unless directed otherwise by OWNER'S REPRESENTATIVE.

1.07 QUALITY ASSURANCE

A. The Project Superintendent shall have at least 5 years of experience supervising tunneling operations. The TBM operator(s) shall have technical training in the operation of the proposed open face rotary wheel TBM equipment and shall have completed, as a primary operator, at least three similar tunneling projects involving at least a 250-foot open face rotary wheel TBM tunnel in similar soil on each project. The Site Safety Representative and personnel responsible for air quality monitoring shall be experienced in tunnel construction and shall have current certification.

B. The surveyor responsible for line-and-grade control shall be a professional Land Surveyor licensed in the State of Ohio who has prior experience in similar underground projects.

C. Provide at least 72 hours advance written notice to OWNER'S REPRESENTATIVE of the start of the tunneling. Immediately notify OWNER'S REPRESENTATIVE, in writing, when any problems are encountered with equipment or materials, or if the conditions encountered are materially and significantly different than those represented within the Contract Documents. Perform Work in the presence of OWNER'S REPRESENTATIVE, unless OWNER'S REPRESENTATIVE grants prior written approval to perform such Work in OWNER'S REPRESENTATIVE absence.

D. Allow access to OWNER'S REPRESENTATIVE and furnish necessary assistance and cooperation to aid OWNER'S REPRESENTATIVE in observations, measurements, data, and sample collection including, but not limited to the following:

1. Allow OWNER'S REPRESENTATIVE access to the jacking and reception shafts prior to, during, and following jacking operations. This shall include, but not be limited to, visual inspection of installed RCP Jacking Pipe and verification of line and grade. Provide safe access in accordance with safety regulations.
2. Allow OWNER'S REPRESENTATIVE access to the spoil material. Allow OWNER'S REPRESENTATIVE to collect soil samples from the spoil removal system at any time.

1.08 SAFETY

A. Be responsible for safety on the site. Ensure the safety of the Work, personnel onsite, and the public. Perform Work in accordance with current applicable regulations and safety requirements of the federal, state, and local agencies. Comply with all applicable provisions of 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations, by OSHA. In the event of conflict, comply with the more stringent requirements.

B. No gasoline powered equipment is permitted in jacking and receiving shafts and pits. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable local, state, and federal regulations.

C. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are in the shaft or in the RCP Jacking Pipe. Perform required air and gas monitoring. Provide a ventilation system sufficient to supply fresh air and maintain an atmosphere free of toxic or flammable gasses in underground Work areas.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Jacking Pipe: Pipe used as a RCP Jacking Pipe, shall conform to Section 33 05 24 - Reinforced Concrete Jacking Pipe.

B. Contact Grout:

1. Provide contact grout consisting of cement and water with optional additives and aggregates. The proposed mix shall be pumpable and suitable to fill all voids outside the tunneled RCP Jacking Pipe.
2. Minimum Strength: 150 psi.

3. Constituents:
   a. Cement: Type II or Type V portland cement conforming to ASTM C150. Type II cement shall meet Table 4 false set requirements of ASTM C150.
   b. Bentonite: Commercially processed powdered bentonite, Wyoming type, such as Baroid, Imacco-gel, and Black Hills.
   c. Sand: Conform to ASTM C144 except where modified in the following subparagraphs.
      1) Fineness Modulus: Between 1.50 and 2.00.
      2) Grading Requirements:

Sieve Sizes	**Percentage Passing by Weight**
No. 8	100
No. 16	95 - 100
No. 30	60 - 85
No. 50	20 - 50
No. 10	10 - 30
No. 200	0 - 5

   d. Fluidifier: Designed to hold the solid constituents of the grout in colloidal suspension, be compatible with the cement and water used in the grouting work and comply with the requirements of ASTM C937.
   e. Admixtures: Other admixtures may be used subject to the written approval of OWNER’S REPRESENTATIVE to improve the pumpability, to control set time, to hold sand in suspension, and to prevent segregation and bleeding.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Do not begin tunneling until the following tasks have been completed:

1. Required Submittals have been provided, reviewed, and approved.
2. Jacking shaft/pit and receiving shaft/pit excavations and support systems have been completed in accordance with approved Submittals. Locations and elevations of shafts/pits shall have been surveyed to confirm that Work can be completed in accordance with alignment and grade shown on Drawings.
3. Settlement monitoring points have been installed and baseline measurements established.
4. The location, orientation and grade of the jacking frame has been surveyed to ensure it is on the proper line and grade and to verify that it is properly supported. Take special care when setting the jacking frame in the jacking shaft to ensure stability and accuracy of the alignment and grade. Securely attach jacking frame to prevent movement or shifting during the Work.
5. Complete startup inspection of mechanical and hydraulic systems associated with tunneling operations. Test the system on the surface to ensure that the

open face rotary wheel TBM and supporting equipment is functioning properly.

6. Site Safety Representative has prepared a code of safe practices and an emergency plan in accordance with OSHA and other applicable requirements. Provide the OWNER'S REPRESENTATIVE with a copy of each prior to starting auger boring tunneling. Hold safety meetings and provide safety instruction for new employees as required by OSHA. Conduct a pre-construction safety conference in accordance with OSHA requirements. Arrange this conference and inform the OWNER'S REPRESENTATIVE of the time and place of the conference at least 7 days in advance.

B. Properly manage and dispose of groundwater and surface water inflows to the shafts in conformance with approved discharge permit requirements and Section 02 61 00 - Removal and Disposal of Contaminated Soil and Groundwater. Do not discharge groundwater inflows into storm sewers, sanitary sewers, drainage ditches, water bodies, or streets without an approved discharge permit.

C. Conduct operations such that trucks and other vehicles do not interfere with traffic or create a mud, dust, or noise nuisance in the streets and to adjacent properties. Promptly clean up, remove, and dispose of spoils spillage, and any material discharges.

D. Conduct Work so as not to disturb roadways, adjacent structures, railroads, sidewalks, landscaped areas, or existing utilities. Repair damage immediately to original or better condition and to the satisfaction of OWNER'S REPRESENTATIVE.

E. Operate with a full crew 24 hours a day whenever there is a condition that is likely to endanger the stability of the excavation or adjacent structures, including weekends and holidays, without interruption, until those conditions no longer jeopardize stability.

3.02 JACKING OPERATIONS

A. Provide a suitable jacking frame and thrust block to carry out the Work.

B. Transport the RCP Jacking Pipe from storage to the jacking shaft without damage. Transport methods shall be acceptable to RCP Jacking Pipe manufacturer. Do not use damaged RCP Jacking Pipe in the Work, unless permitted in writing by OWNER'S REPRESENTATIVE. Set the RCP Jacking Pipe on a properly braced and supported jacking frame.

C. Distribute the axial forces from the thrust jacks to the RCP Jacking Pipe uniformly through a thrust ring and cushion material, if applicable, to prevent damage to the ends of the pipe. Do not exceed the specified allowable compressive stresses on the RCP Jacking Pipe.

D. Jack the RCP Jacking Pipe into position following the design line and grade without damaging the RCP Jacking Pipe.

3.03 OPEN FACE ROTARY WHEEL TBM TUNNELING

A. Complete the open face rotary wheel TBM tunneling in accordance with approved Submittals, and applicable permit conditions.

B. Control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements. Repair damage resulting from construction activities. Pressure grout voids caused by or encountered during the shaft construction and tunneling. Modify equipment and procedures as required to avoid recurrence of excessive settlements or damage.

C. Control the advance of the RCP Jacking Pipe so as to restrict the excavation of the materials to a volume equal to the pipe jacked, plus allowance for the allowable radial overcut, to prevent loss of ground and settlement or possible damage to overlying structures. Control the advance rate and monitor the volume of material excavated and adjust advance rate, as required, to avoid loss of ground, overexcavation, or surface heave.

D. Completely contain, transport, and dispose of fluid additives and lubricants away from the site. Contain spoils in trucks or other containers. Dumping of fluid additives and lubricants on the ground, discharge into sewers or ditches, or discharge into the shafts is not permitted.

E. Contact Grouting: After RCP Jacking Pipe installation is complete, fill the annular space created by the radial overcut of the machine with contact grout as per the requirements herein.

3.04 CONTROL OF LINE AND GRADE

A. Establish and protect benchmarks as necessary prior to the start of construction.

B. After establishing required benchmarks, use these benchmarks to furnish and maintain reference lines and grades for tunneling. Use these lines and grades to establish the location of the RCP Jacking Pipe using a laser or theodolite guidance system. Submit to OWNER'S REPRESENTATIVE copies of field notes used to establish all lines and grades and allow OWNER'S REPRESENTATIVE to check guidance system setup prior to beginning each tunneling drive. Provide access for OWNER'S REPRESENTATIVE to perform survey checks of guidance system and line-and-grade of RCP Jacking Pipe as necessary. Be fully responsible for the accuracy of the Work and the correction of it, as required.

C. Install the RCP Jacking Pipe in accordance with the following tolerances:

1. Variations from Design Line: 4 inches maximum.
2. Variations from Design Grade: 4 inches maximum.

D. Control the RCP Jacking Pipe advancement to maintain line and grade within the tolerances specified. If the installation is off line or grade, attempt to make the necessary corrections, as identified in the contingency plans.

E. Mount the guidance system independently from the thrust block and jacking frame. Stop tunneling operations and reset guidance system if its alignment shifts or is moved off design alignment and grade. Check guidance system setup at least once per shift. Guidance system should only be reset by experienced, competent surveying personnel in accordance with approved procedures outlined in the Submittals.

F. Monitor line and grade continuously during tunneling operations. Record deviation with respect to design line and grade at least once per foot and submit records to OWNER'S REPRESENTATIVE as requested. Control line and grade of the RCP Jacking Pipe to within the specified tolerances.

G. Correct the installation including necessary redesign of the pipeline or structures and acquisition of necessary easements if the RCP Jacking Pipe installation does not meet the specified tolerance.

3.05 CONTACT GROUTING EQUIPMENT

A. Satisfactorily mix and agitate the grout and force it into the grout holes, in a continuous flow at the required pressure. Continuously develop a sustained pressure of 15 pounds per square inch or 1/2 psi per foot of earth cover at the grout hole connection.

B. Provide two pressure gauges, one at the grout pump and one at the collar of each hole being grouted. Periodically check the accuracy of the gauges with an accurately calibrated pressure gauge. Have a minimum of two spare pressure gauges available on site.

C. Provide the grouting equipment with a meter to determine the volume of grout injected. Calibrate the meter in cubic feet to the nearest one-tenth of a cubic foot.

D. Maintain the grouting equipment in satisfactory operating condition throughout the course of the Work to ensure continuous and efficient performance during grouting operations.

E. Provide suitable stop valves at the collar of each grout fill hole and suitable packing material between the excavated diameter and the collar of the RCP Jacking Pipe for use in maintaining pressure as required until the grout has set.

F. Provide grout hoses with an inside diameter not less than 1-1/4 inches capable of withstanding the maximum water and grout pressures to be used.

3.06 MIXING AND INJECTION OF CONTACT GROUT

A. Provide materials free of lumps when put into the mixer. Continuously agitate the grout mix. Completely fill voids. Do not use grout not injected after 90 minutes of mixing.

B. Operate and control the grouting process so that the grout will be delivered uniformly and steadily. The locations of contact grout holes in the pipe are shown on Drawings. Drilling grout holes through pipe is not permitted.

C. Recirculate grout mixes when new mix is batched or after adding water, fluidifier, or sand to mix. Recirculate mix for at least 2 minutes prior to pumping grout into grout hole.

D. In general, grouting will be considered completed when less than 1 cubic foot of grout of the accepted mix and consistency can be pumped in 5 minutes under the specified maximum pressure. After the grouting is finished, close the valve before the grout header is removed and keep closed until grout has set.

E. Provide maximum sustained grouting pressure of 15 pounds per square inch (psi) or 1/2 psi per foot of earth cover, whichever is less, at the grout hole collar connection unless otherwise approved in writing by OWNER'S REPRESENTATIVE.

3.07 CONTACT GROUTING OF TUNNELED RCP JACKING PIPE

A. Commence contact grouting outside of the RCP Jacking Pipe within 24 hours of completing the tunneled drive. Grouting operations shall be continuous until completed.

B. Install contact grout ports in the pipe in accordance with Section 33 05 24 - Reinforced Concrete Jacking Pipe and the Contract Drawings. Drilling or coring grout holes through installed RCP Jacking Pipe is not permitted. Thread grout ports to accept valve fittings and plugs.

C. Inject grout through the tunneled pipe grout connections in such a manner as to completely fill all voids outside the pipe resulting from, or encountered during, tunneling operations. Control grout pressure so as to avoid damaging the pipe, and to avoid movement of the surrounding ground or improvements.

D. Grouting shall generally progress sequentially in a constant upgradient direction from one grout port to the next grout port in the sequence indicated in the approved submittals.

E. Clean sufficient contact grout ports ahead of the port to be grouted to prepare for grouting. Attach valves or other suitable devices and place in the fully open position on ungrouted ports within the maximum grout communication distance. Only close ports when grout issues forth of the same consistency and color, and at the same rate as that being pumped at the fill location.

F. Grouting operation shall only advance forward to the next open grout port once grouting pressure limits are achieved at the fill location.

G. Seal pipe grout fittings with screw type plugs no sooner than 24 hours following the completion of grouting.

3.08 CLEANUP

A. After completion of tunneling remove construction debris, spoils, oil, grease, and other materials from the tunneled RCP Jacking Pipe, jacking and receiving shafts, and work areas.

END OF SECTION 31 79 19

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 33 05 24

REINFORCED CONCRETE JACKING PIPE

PART 1 - GENERAL

1.01 SUMMARY

A. This specification section sets forth requirements for furnishing and installing reinforced concrete jacking pipe.

B. Furnish labor, materials, equipment and incidentals necessary to supply and deliver reinforced concrete jacking pipe to be installed by trenchless methods in accordance with Section 31 79 19 - Open Face Rotary Wheel TBM Tunneling. This section sets forth the material and performance requirements for the reinforced concrete jacking pipe.

1.02 REFERENCES

A. The following publications, referred to hereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. ASTM C76-19: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. ASTM C443: Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe.
3. ASTM C1417: Standard Specification for Manufacture of Reinforced Concrete Sewer, Storm Drain, and Culvert Pipe for Direct Design.
4. ASCE 27-17: Standard Practice for Direct Design of Precast Concrete Pipe for Jacking in Trenchless Construction.

1.03 DESIGN REQUIREMENTS

A. The CONTRACTOR is responsible for design of pipe under this Section. The design must be prepared by a registered professional engineer licensed in the State of Ohio, experienced in the design of pipe for jacking.

B. Pipe shall be designed in accordance with ASCE 27-17.

C. The CONTRACTOR must demonstrate through design calculations, and material and pipe test results, that pipe to be provided under this Section is suitable for the intended application.

D. Loading conditions for design:

1. Long term soil and groundwater loads.
2. Construction loads, including handling loads and jacking loads, to be determined by the CONTRACTOR.
3. Joints must be designed for external hydrostatic pressure of 20 feet.

E. Factors considered in design and analysis of jacked pipe must include the following:

1. Jacking load concentrations due to angular deflection between pipe joints.
2. Jacking pit dimensions, jacking capacity, frame alignment and interface with the pipe.
3. Design of jacking collar to be used to transfer jacking forces to the pipe.
4. Requirements for introduction of lubricant.

F. The CONTRACTOR must obtain any information needed for the design which is not provided in the Contract Documents.

G. Pipe will be marked inside at a minimum with diameter, date of manufacture, place of manufacture, name of manufacturer and individual pipe reference number.

1.04 SUBMITTALS

A. Submit design documentation for the reinforced concrete jacking pipe that is signed and sealed by a professional engineer licensed in the State of Ohio responsible for the pipe design, including the information listed below:

1. Design calculations that determine the maximum allowable jacking loads with a safety factor of 3, and calculations for allowable external loads including maximum allowable water pressure of the outer reinforced concrete pipe joint.
2. Pipe dimensions including inside diameter, wall thickness, nominal length, squareness of pipe ends, and dimensional tolerances.
3. Concrete mix design, including types and proportions of cementitious materials and admixtures, and aggregate gradation.
4. Concrete compressive strength.
5. Steel reinforcement requirements including specification, type, yield strength, bar or wire size and cross-sectional area, spacing, and placement.
6. Lubrication and grout port design, including material properties of inserts and plugs; and positioning of ports along pipe string.

B. Joints:

1. Shop Drawing showing cross section of a closed joint, and joint features including gasket groove, bell, spigot, and sleeve coupling, fully dimensioned.
2. Sleeve coupling material composition.
3. Shop Drawing showing cross section of gasket, fully dimensioned.
4. Gasket material composition and physical properties demonstrating conformance with specified requirements.
5. Sample of gasket.
6. Qualification test results demonstrating joint performance under standard conditions of angular deflection and shear.
7. Joint cushioning material composition and dimensions.
8. Manufacturer’s recommendation for joint lubricant.

C. Pipe finishing and repair:

1. Procedure and technical data for filling grout ports in pipe.
2. Proposed method of repairing damaged pipe and defects within the pipe.

D. Manufacturer's information:

1. Submit the design standards used for the pipe design including manufacturer's certification that pipe conforms to the manufacturing design data, and that the concrete and materials have been sampled and tested and conform to these Specifications. If direct design standard is used, drawings shall be stamped by a qualified Professional Engineer licensed in the State of Ohio.
2. Manufacturer's certifications of gasket and gasket material, including identification of basic polymer used.
3. Manufacturer's certification that joints conform to these Specifications, and results of hydrostatic testing.
4. Manufacturer's certification that joint lubricant conforms to all specified requirements for the specific gaskets supplied.

1.05 QUALITY ASSURANCE

A. Manufacturer of the pipe shall have a minimum of 5 years of experience manufacturing pipe to the reference standards and shall have successfully supplied to a minimum of five projects or 10,000 feet of similar diameter (42-inch and over), length, and complexity to the Work, within the last 5 years as an example.

PART 2 - PRODUCTS

2.01 CONCRETE PIPE

A. The reinforced concrete jacking pipe shall conform to ASCE 27-17 and shall be minimum Class IV, D Wall and shall be the diameter and length as specified by the trenchless contactor. The direct design guidelines of ASCE 27-17 shall be collaboratively engineered between the pipe supplier and CONTRACTOR.

B. The pipe manufacturer will prepare calculations that confirm stresses and deflections imparted on the RCP are within allowable limits under these in-service loading (primarily axial thrust from curved jacking), and then during construction,

C. End squareness: Pipe ends shall be manufactured in accordance with the applicable requirements of ASCE 27-17.

D. Pipe joints shall be in accordance with ASTM C443. Pipe joints shall be in wall bell and spigot with steel joint bands with rubber gasket and load spreading packing spacer in accordance with ASCE 27-17 joint Type B or Type C.

E. The gaskets shall be designed and manufactured so that the completed joint will withstand an external water pressure in excess of 20 pounds per square inch for a period of 10 minutes without showing leakage by the gasket or displacement of it in accordance with ASTM C443.

F. The pipe shall be uniform internal diameter and uniform external diameter for the length of the pipe including the joints. Wall thickness shall be as determined to satisfy the requirements of the trenchless contractor's equipment, methods, and means for installing the pipe.

G. Joint faces between pipes shall be protected at a minimum by the installation of a medium density fiberboard packer of 3/4-inch-thickness and with an internal diameter 1/4 inch less than the RCP pipe bell load bearing surface area of the pipe and to fit closely inside the steel pipe bell.

H. Sections of packer when applied to the pipe end should be glued into position so they cannot slip or overlap during installation of the pipe. Special joint packer design through the curved segment of the pipe profile shall be provided by the trenchless contractor based on the selected means and methods.

PART 3 - EXECUTION

3.01 PIPE INSTALLATION

A. Installation of pipe specified in this Section shall conform to Section 31 79 19 - Open Face Rotary Wheel TBM Tunneling.

END OF SECTION 33 05 24

SECTION 33 31 00

SEWER PIPE

PART 1 - GENERAL

1.01 SCOPE

A. This section covers furnishing reinforced concrete and polyvinyl chloride (PVC) gravity sewer pipe and fittings, complete with all jointing materials and appurtenances including, but not limited to, all necessary site preparation, excavation, embankment, dewatering, maintaining existing sanitary flow, sheeting, preparation of trench bottom, granular bedding and initial backfill, backfill, testing, disposal of waste material, dust, odor and noise control, traffic control, lights, signs and barricades, cleaning up, coring of existing manholes and connection, saw cutting and concrete encasement.

1.02 RELATED SECTIONS

A. Construction Sequencing requirements are included in Section 01 12 16.

B. See Control of Work in Section 01 14 00.

C. Refer to Section 01 20 00 for Measurement and Payment.

D. Submittal requirements are included in Section 01 33 00.

E. See Restoration of Improvements in Section 01 71 33.

F. Pipe trenching, bedding, and backfilling are covered in Section 31 23 00 – Trenching and Backfill.

G. Dewatering of Sewers is included in Section 01 57 28 – Temporary Flow Control.

PART 2 - PRODUCTS

2.01 VYLON PVC PIPE

A. “Vylon” PVC Pipe, as manufactured by Prime Conduit, Inc., shall meet the performance requirements of ASTM F1803 “Standard Specification for Poly (Vinyl Chloride) (PVC) Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter”. Flexible elastomeric seals meeting the requirements of ASTM D-3212 shall be used with “Vylon” PVC Pipe.

2.02 ULTRA-RIB PVC PIPE

A. “Ultra-Rib” PVC Pipe, as manufactured by J-M Manufacturing Company, Inc., shall meet the performance requirements of ASTM F794 “Standard Specification for Poly (Vinyl Chloride) (PVC) Closed Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter”. Flexible elastomeric seals meeting the requirements of ASTM D-3212 shall be used with “Ultra-Rib” PVC Pipe.

2.03 PVC (S.D.R. 35) PIPE

A. If PVC (S.D.R. 35) Pipe is used under these items, all operations shall be in accordance with Items 603.016 and 707.41 of the City of Cincinnati Supplement to the State of Ohio, Department of Transportation, Construction and Material Specifications, latest edition. PVC sewer pipe and fittings, ASTM D-3034 and ASTM F-679 (ASTM F-679 for 18 inch and greater PVC only) latest edition, shall have ASTM D-3212 joints (flexible elastomeric seals).

2.04 "SANITITE HP PIPE"

A. "Sanitite HP" pipe, as manufactured by ADS, shall meet the performance requirements of ASTM F2736 for 12 inch to 30 inch pipe, and ASTM F2764 for 30 inch to 60 inch pipe. Pipe shall be joined with a gasketed integral bell and spigot to provide a watertight seal in accordance with ASTM D3212.

2.05 CONCRETE SEWER PIPE

A. Reinforced Concrete Pipe (R.C.P.) shall be provided in the locations and class as indicated on Drawings, in accordance with Section 706 of the State of Ohio, Department of Transportation, Construction and Material Specifications, and City of Cincinnati supplement thereto. Joints shall be resilient and flexible watertight joints which meet or exceed the requirements of ASTM C-443 for depths of installation less than 30 feet and ASTM C-361 for depths of installation 30 feet or greater. The joint material shall be a profile type gasket designed to fill the joint void area and obtain the required water tightness. The profile type gasket shall be installed as per the recommendations of the pipe and gasket manufacturers.

2.06 MISCELLANEOUS

A. Field-cut joints and connections to other piping material shall be made using Fernco "Flexible Couplings" or Mission "Eastern Standard Band-Seal Couplings" with stainless steel shear rings.

2.07 <u>MATERIALS</u>.

Pipe and Fittings.

Solid wall 4 through 15 inches [100 through 375 mm].	ASTM D3034, SDR 35, Cell Classification 12454.
18 through 60 inches [450 through 1500 mm].	ASTM F1803, or ASTM F679, Wall T-1, Cell Classification 12454.

Jointing Materials.

Bell-and-Spigot Joints.	ASTM D3212, integral bell push-on type elastomeric gasket joints.
Gaskets.	ASTM F477, synthetic rubber. Natural rubber will not be acceptable.

Field-Cut Joints and Connections to Other Piping Materials.	Fernco "Flexible Couplings" or Mission "Eastern Standard Band-Seal Couplings" with stainless steel shear rings.
For Grouted Connections to Cast-in-Place Concrete Manholes	Rubber ring water stop.

PART 3 - EXECUTION

3.01 INSTALLATION AND TESTING

A. A deflection test will be required on all main line P.V.C sewers as specified in the City of Cincinnati Supplement to the State of Ohio, Department of Transportation, Construction and Material Specifications. Maximum limit for vertical deflection shall be 5 percent of the pipe inside diameter. Deflection tests shall be conducted 30 days after placing backfill. CONTRACTOR shall repair or replace sewers failing the deflection tests at no cost to CITY.

B. All mainline conduits, shall be subjected to a leakage check by either an infiltration or exfiltration test with water or by an air test.

1. Water infiltration or exfiltration tests will only be allowed for conduits larger than 36 inches in diameter, shall be 0.079 gallons per inch of the internal pipe diameter per 100 feet of conduit per hour. The exfiltration test allowance shall be the same as for infiltration except that an additional allowance of 10 percent shall be permitted over the basic allowance for each 2 feet of head over a basic 2 foot minimum.
2. All mainline conduits 36 inches and smaller, except storm sewer mainline, shall be subjected to an air test. This test shall be performed in accordance with the latest ASTM or UNI-BELL PVC Pipe Association requirements for each unique pipe material in effect at the time that bids are submitted.

C. The CONTRACTOR shall perform the leakage test at no additional cost to the CITY, including the furnishing of all labor, materials, and appurtenances necessary for the performance of the leakage test. The cost of the leakage test shall be included in the price bid for the appropriate 603 items. Pipe failing to pass the leakage test shall be repaired and retested at no additional cost to the CITY.

D. Flow will be permitted through the newly constructed sewer, prior to testing requirements being met, on an as needed basis, as directed by the CITY.

E. Whenever the proposed sewer is located at approximately the same alignment as the existing sewer and it is necessary to remove the existing sewer in order to construct the proposed sewer, the CONTRACTOR shall uncover the existing sewer as the first order of work in order to determine the elevation and alignment of the existing conduit. The CITY shall determine if adjustments are required.

F. Mechanical joints shall be carefully assembled in accordance with the manufacturer’s recommendations. If effective sealing is not obtained, the joint shall be disassembled, thoroughly cleaned, and reassembled. Over tightening of bolts to compensate for poor installation practice will not be acceptable.

G. Whenever the proposed sewer is located at approximately the same alignment as the existing sewer and it is necessary to remove the existing sewer in order to construct the proposed sewer, the cost for removing the existing sewer, including the cost for disposing and transporting of materials or any additional excavation, restoration, or labor required, shall be included in the price bid for the various ODOT Specifications 603 items.

3.02 VIDEO TAPING OF INSTALLED SEWERS

A. CONTRACTOR to furnish videotaping of installed sewers, including storm sewers, meeting the requirements of Item 603.059 of the City Supplement to the State of Ohio (ODOT) Construction and Material Specifications and according to the following current requirements:

1. The person coding the pipeline inspection must be NASSCO PACP certified with a minimum of 3 years of full-time experience coding defects using the NASSCO standard. PACP certification numbers must be provided to MSDGC, and proof of experience must be demonstrated by documentation such as a resume with references.
2. All PACP CCTV Work shall be carried out utilizing a color pan and tilt rotating head camera specifically designed and constructed for sewer inspection. All CCTV work shall be recorded entirely in digital MP4 format encoded with a file compression of High Efficiency Video Coding (HEVC or H.265) (other formats need MSDGC PM approval) with an appropriate PACP/LACP database file (NASSCO PACP/LACP V7.0 Certified Access Database having compatibility with Pipetech® pipeline inspection software), and all video must be continuously metered.

B. Initial Survey Television Inspection:

1. The CONTRACTOR shall televise the sewer and shall inspect the upstream and downstream manholes of each sewer segment televised and document all observations.
2. Sewer sections and manholes shall be inspected by means of remote CCTV. If a blockage cannot be removed and hampers the videotaping of the sewer in one direction, then the CONTRACTOR shall attempt to complete the section by televising from the other manhole to complete the section. This reversal must immediately follow the initial direction on the same survey and report. The CONTRACTOR must immediately report the obstruction to the CITY.
3. The recorded video must show the entire circumference of the sewer. Any flow control to remove standing water and debris shall be incidental to this item. The CONTRACTOR must also consider weather conditions to obtain the best video image of the sewer. This may require the CONTRACTOR to delay any video work until after major rain events to allow the system to return to lower dry weather flow.
4. Perform all CCTV inspections in accordance with NASSCO's PACP. CCTV inspections will be conducted entirely in digital format written to DVD with digital links to survey. Each PACP Video File must be in standard *.mp4 format and named as described below:
    a. [month]_[day]_[year]-[hour]_[minute]_[AM/PM]-[Inspector Name]-[Work Order Number].mp4, e.g., "1_03_2012-11_23_AM-M LONGMIRE-411032.mp4".

5. All cleaning and television inspection reports shall be with-in +/- 2 feet of the measured linear footage between manholes along the existing sewer centerline from the center of the manhole.
6. The documentation of the Work shall consist of PACP CCTV Reports, Unmodified PACP database, logs, electronic reports, etc. noting important features encountered during the inspection. The speed of travel shall be slow enough to inspect each pipe joint, tee connection, structural deterioration, infiltration and inflow sources, and deposits, but should not, at any time, be faster than 30 feet per minute. The camera must be centered in the pipe to provide accurate distance measurements to provide exact locations of important features in the sewer and these footage measurements shall be displayed and documented on the video. The completed DVD will become the property of the CITY.
7. Every section of sewer (manhole to manhole) shall be identified by audio and alphanumeric on the video display and shall include project name, municipality, street name, CAGIS manhole numbers (CONTRACTOR shall request the eight-digit manhole numbers assigned by CITY for all proposed and existing manholes included in video), inspector's name, sewer diameter and length, and date of inspection. Important features shall be identified by audio and on PACP log to include all manholes, active and inactive service connections, structural defects, maintenance problems, grease, roots, infiltration, obvious inflow sources, etc. All video must be continuously metered from manhole to manhole. In addition to televising the sewer, all manholes shall be panned with the video camera and visually inspected.
8. If the CONTRACTOR does not submit the specified information, or if it is not in the required format, **or if CAGIS manhole numbers are not included**, payment for videotaping of final sewers and for sewer pipe installed will not be made until the video information is corrected. All specified information is to be submitted to the CITY prior to Substantial Completion.

END OF SECTION 33 31 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 33 39 00

SEWER MANHOLES

PART 1 - GENERAL

1.01 STANDARD DRAWINGS

A. SANITARY SEWER MANHOLES

1. Drop manholes shall be in accordance with Standard Drawing Acc. No. 49003.
2. Precast Concrete Drop manholes shall be in accordance with Standard Drawing Acc. No. 49003A.
3. Standard Type “S” manholes shall be in accordance with Standard Drawing Acc. No. 49037.
4. Modified Type “S” manholes shall be in accordance with Standard Drawing Acc. No. 49049.
5. Inside drop manhole shall be in accordance with Standard Drawing Acc. No. 49061.
6. Doghouse manhole shall be submitted by CONTRACTOR for approval.

B. STORM MANHOLES

1. Storm manholes on conduit greater than 42-inch shall be in accordance with Standard Drawing Acc. No. 49040.
2. Storm manholes on conduit 42-inch and under shall be in accordance with SMU Standard Drawings Acc. No. 120354.

C. SANITARY SEWER CASTINGS

1. All manhole frames and covers shall be in accordance with Standard Drawing Acc. Nos. 49005, 49006, 49051, 60866 and 60867 as specified on the Drawings and as applicable.

D. STORM MANHOLE CASTINGS

1. All storm manhole frames and covers shall be in accordance with Standard Drawing Acc. No. 120282.

1.02 SUBMITTALS

A. Drawings and data covering precast concrete sections and castings shall be submitted in accordance with the Submittals section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Precast Concrete Manholes and Reinforcement shall be in accordance with ASTM C478, except as modified herein.

B. Standard Precast Concrete Manhole Base shall be in accordance with Standard Drawing Acc. No. 49056.

C. Concentric cones shall be provided for all Standard Type “S” manholes, unless specified otherwise or with written approval from the CITY to use eccentric cones.

D. Steps constructed of Rubber Coated Cast-Iron, Plastic-Coated Steel, Stainless Steel or Fiber Reinforced Plastic (FRP) shall be provided for all manholes, unless specifically stated otherwise.

2.02 MANUFACTURER

A. Precast sections may be provided with lifting notches on the inside faces of walls to facilitate handling. Lifting notches shall be not more than 3 inches deep; holes extending through the wall will not be acceptable.

B. Inverts shall be in accordance with Standard Drawing Acc. No. 49004.

PART 3 - EXECUTION

3.01 INSPECTION

A. Precast concrete sections shall be inspected when delivered and all cracked, or otherwise visibly defective units shall be rejected.

3.02 CONSTRUCTION

A. Bases:

1. No wedging or blocking under precast concrete bases will be permitted.
2. In no case shall the invert section through a manhole be greater than that of the outgoing pipe. The shape of the invert shall conform exactly to the lower half of the pipe it connects. Side branches shall be connected with a radius of curve as large as practicable. All inverts shall be troweled to a smooth, clean surface. See Standard Drawing Acc. No. 49004.

B. Riser and Cone Sections:

1. Lifting notches in manhole walls shall be filled with nonshrink grout.
2. Rubber coated cast-iron, plastic-coated steel, stainless steel or FRP manhole steps shall be provided, and shall be grouted into prepared holes with nonshrink grout. Embedded legs shall be cut if required to prevent protruding through the manhole wall.

C. Frames: Securely fasten the frame to the concrete portion of the manhole by means of 4-3/4-inch stainless steel cinch anchors with 5-inch-long bolts. If grade rings are installed, the CONTRACTOR shall use bolts long enough to securely fasten the frame into the concrete cone section.

3.03 TESTING

A. Manhole Vacuum Test:

1. The CONTRACTOR shall test all proposed manholes, except storm sewer manholes, for leakage by means of vacuum testing. The CONTRACTOR shall also test all proposed connections to existing manholes for leakage by means of vacuum testing. The vacuum testing shall not be performed until after the manholes are set to final grade and the manhole castings are bolted down. All lift holes shall be plugged. Any other openings, such as pressure relief valves, shall be temporarily plugged to allow the vacuum tests. All pipes entering the manhole shall be plugged and care shall be taken to securely brace the plugs from being drawn into the manhole. The vacuum equipment test head shall be placed in the opening of the casting only and the seal inflated in accordance with the manufacturer's recommendations.
2. Vacuum testing shall be in accordance with ASTM C1244. A vacuum of 10 inches of mercury (10 inches Hg) shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches of mercury (9 inches Hg). The manhole shall pass if the time meets or exceeds the allowable times as calculated from ASTM C1244, or as approved by the CITY. All manhole repair and testing required because of the failure to meet the testing requirements shall be at the CONTRACTOR'S cost. The cost of the manhole vacuum leakage test shall be included in the price bid for the various ODOT Specification 604 items.

END OF SECTION 33 39 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 33 44 13

CATCH BASINS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope: Furnish all labor, materials, equipment and incidentals necessary to provide all new precast and cast-in-place catch basins and inlets as shown on Drawings and Schedules and as specified herein, or otherwise required to complete the Work.

B. Related Work Specified Elsewhere:

1. Section 31 23 00 – Trenching and Backfill.
2. Section 03 30 00 – Cast-In-Place Concrete.

C. Coordination with the Supplement:

1. Comply with ODOT Item 611, the City Supplement Item 604, ODOT Standard Drawings, SMU Standard Drawings, and this Section, unless otherwise noted on the plans or directed by the OWNER'S REPRESENTATIVE.
2. Whenever requirements conflict, this section shall govern.

1.02 QUALITY ASSURANCE

A. The following is a list of standards that may be referenced in this section:

1. ASTM International (ASTM):
   a. A36/A36M, Standard Specification for Carbon Structural Steel.
   b. A48, Standard Specification for Gray Iron Castings.
   c. A615/A615M, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   d. C94/C94M, Standard Specification for Ready-Mixed Concrete.
   e. C387, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
   f. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.

1.03 SUBMITTALS

A. Shop Drawings:

1. Comply with Section 01 33 00 - Submittals.
2. Submit for review Shop Drawings of design and construction details of each type of catch basin and all associated materials.
3. Submit manufacturer's name for all precast structures.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Concrete shall be in accordance with 03 30 00 - Cast-In-Place Concrete.

2.02 FORMS

A. Exposed surfaces shall be plywood. Others shall be steel, matched boards, plywood, or other acceptable material. Form vertical surfaces. Provide fillets on re-entrant angles. Trench walls, large rock, or earth will not be acceptable form material.

2.03 REINFORCING STEEL

A. Reinforcing steel shall be in accordance with 03 30 00 - Cast-In-Place Concrete.

2.04 PRECAST UNITS

A. Precast units shall conform to ASTM C478. Concrete risers for extensions shall be a maximum of 6 inches high and of same quality as sections. Risers shall be reviewed by OWNER’S REPRESENTATIVE before installation.

2.05 MORTAR

A. Standard premixed mortar conforming to ASTM C387, Type S, or proportion 1 part portland cement to 2 parts clean, well-graded sand which will pass a 1/8-inch screen. Admixtures may be used not exceeding the following percentages of weight of cement: Hydrated lime, 10 percent; diatomaceous earth or other inert materials, 5 percent. Consistency of mortar shall be such that it will readily adhere to concrete.

2.06 FRAMES AND GRATINGS

A. Cast iron frames and gratings for catch basins and storm drain inlets shall be as indicated. Bearing surfaces shall be clean and shall provide uniform contact. Castings shall be tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and defects, and shall conform to ASTM A48, Class 30.

2.07 SMU STANDARD CACH BASINS AND INLETS

A. DOUBLE GUTTER INLET MANHOLE

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49010 and as directed by the OWNER’S REPRESENTATIVE.

B. SINGLE GUTTER INLET

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49011 and as directed by the OWNER’S REPRESENTATIVE.

C. DOUBLE GUTTER INLET

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49013 and as directed by the OWNER'S REPRESENTATIVE.

D. COMBINATION INLET

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49016 and as directed by the OWNER'S REPRESENTATIVE.

E. SINGLE VALLEY INLETS

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49019 and as directed by the OWNER'S REPRESENTATIVE.

F. DOUBLE VALLEY INLETS

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49021 and as directed by the OWNER'S REPRESENTATIVE.

G. DITCH INLETS

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49023 and as directed by the OWNER'S REPRESENTATIVE.

H. DOUBLE DITCH INLETS

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49024 and as directed by the OWNER'S REPRESENTATIVE.

I. COMBINATION INLET MANHOLE

1. This item shall be constructed in accordance with Stormwater Management Unit Standard Drawing Acc. No. 49041 and as directed by the OWNER'S REPRESENTATIVE.

PART 3 - EXECUTION

3.01 EXCAVATION AND BACKFILL

A. Excavate as required to accomplish construction. Backfill shall be as specified for adjoining pipe trench.

3.02 CONSTRUCTION OF CATCH BASINS AND INLETS

A. Construct inlets and catch basins at locations shown and in accordance with Drawings. Construct forms to dimensions and elevations required. Forms shall be tight and well braced. Chamfer corners of forms.

B. Prior to placing concrete, remove water and debris from forms. Moisten forms just prior to placing concrete. Handle concrete from transporting vehicle to forms in a continuous manner as rapidly as practical without segregation or loss of ingredients. Immediately after placing, compact concrete with mechanical vibrator. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation.

C. Screed top surface of exposed slabs and walls. When initial water has been absorbed, float surfaces with wood float and lightly trowel with steel trowel to smooth finish free from marks or irregularities. Finish exposed edges with steel edging tool. Remove forms and patch defects in concrete with mortar mixed in same proportions as original concrete mix.

D. Cure concrete by preventing loss of moisture for a period of 7 days. Accomplish with a membrane-forming curing compound. Apply curing compound immediately after removal of forms or finishing of slabs. Protect concrete from damage during 7-day curing period.

E. Work under this Item shall include the pavement removal and restoration as detailed in the construction documents or in accordance with City of Cincinnati SMU standard inlet drawings or as directed by the OWNER’S REPRESENTATIVE.

F. The CONTRACTOR shall note the above items vary in depth. Consult the construction documents for actual dimensions. Before commencing construction of any inlet, the elevations of the adjacent existing underground utilities and sewer conduits and appurtenances should be verified. If elevations of the underground utilities and sewer conduits differ from the elevations shown on the plans, the OWNER’S REPRESENTATIVE shall be notified before any portion of the Work affected by the variance is constructed. Adjustment of inlet depth, if required, will be determined by the OWNER’S REPRESENTATIVE.

3.03 PLACING PRECAST UNITS

A. If material in bottom of trench is unsuitable for supporting unit, excavate and backfill to required grade with 3-inch minus, clean, pit-run material. Set units to grade at locations shown.

3.04 EXTENSIONS

A. Install extensions to height determined by OWNER’S REPRESENTATIVE. Lay risers in mortar with sides plumb and tops to grade. Joints shall be sealed with mortar, with interior and exterior troweled smooth. Prevent mortar from drying out and cure by applying a curing compound. Extensions shall be watertight.

3.05 INSTALLATION OF FRAMES AND GRATES

A. Set frames and grates at elevations indicated or as determined in field and in conformance with Drawings.

B. Frames may be cast in or shall be set in mortar.

3.06 REMODEL BOTTOM OF EXISTING INLET

A. This item shall include all labor, material and equipment provide a new outlet opening to redirect existing inlet outlet to proposed storm sewer and to seal the existing inlet outlet as shown on the drawings or as directed by the OWNER'S REPRESENTATIVE.

3.07 CLEANING

A. Upon completion, clean each structure of all silt, debris, and foreign matter.

END OF SECTION 33 44 13

THIS PAGE INTENTIONALLY LEFT BLANK