

INDIANA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENGINEERING
SPECIFICATIONS AND BIDDING DOCUMENTS
CABIN SEWER IMPROVEMENTS

BROWN COUNTY
STATE PARK
IN BROWN COUNTY

PROJECT #ENG2103776035

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SECTION 011000 – SUMMARY OF WORK

PART 1 – GENERAL

1.1 WORK UNDER THIS CONTRACT

A. This work consists of furnishing all labor, materials, and equipment necessary for to complete the following work:

1. Brown County State Park Cabin Sewer Improvements, Brown County IN: Construct 1,126 LF of 6” Gravity Sewer, 9 Cleanouts, and 9 Manholes and related Appurtenances.

B. Remediation Allowance

1. Contractor shall include an allowance of **\$5,000 in the Base Bid** for remediation of unforeseen constraints
Such constraints may include, but are not necessarily limited to, unforeseen conditions; improperly recorded or unrecorded physical properties and conditions at the site; obstruction of, or delay to, reason work sequences by the Property, or the Owner; uncommon adverse weather or site conditions; and conflict within, or omissions from, the Contract Documents.
3. All remediation work shall be authorized by the Director of Public Works Division, or designee, prior to execution.
4. **If any portion of the allowance is not used during the project, that portion will revert to the owner and will not be included in the contractor’s final payment.**

C. Work to be performed shall be in accordance with drawings and specifications prepared by DNR Engineering, 402 W. Washington Street, RmW299 Indianapolis, IN 46204.

1.2 COORDINATION OF PLANS AND SPECIFICATIONS

A. These specifications and plans and are essential parts of the contract. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions.

B. Instruction to Bidders and description of pay items listed in the Unit Price Bid Tabulation hold over plans and specifications, and plans hold over specifications.

C. The Indiana Department of Transportation Standard Specifications, Latest Revision (INDOTSS) shall become part of the Contract Documents in its entirety. Unless otherwise stated in the Specifications or directed by the Engineer, all INDOTSS shall apply to this project.

RIGHTS OF ACCESS

- A. The Contractor agrees that representatives of the Engineer, Owner, Environmental Protection Agency, U.S. Army Corps of Engineers, and the State of Indiana will have access to the work wherever it is in preparation or progress and that the Contractor will provide facilities for such access and inspection

1.4 DISCOVERY OF HAZARDOUS MATERIAL

- A. The presence of hazardous materials is unknown in the work area. However, if during the course of this work, the existence of hazardous material is observed in the work area, the Contractor shall immediately notify the Owner in writing. The Contractor shall not perform any work pertinent to the hazardous material prior to receipt of special instructions from the Owner. Should any hazardous material control measures be required, the cost thereof shall be handled by an appropriate Change Order or a separate contract or subcontract with Owner.

1.5 OPERATIONS WITHIN PROJECT PROPERTY LIMITS

- A. Under no circumstances shall construction activities take place outside the property lines of the project site.

The work shall be performed at:

1. Brown County State Park located in Brown County near the Town of Nashville, IN.

1.6 ALTERNATE BIDS

- A. Voluntary alternate bids will not be accepted.

1.7 SALES TAX

- A. Sales tax shall not be charged on the bid price of this project.

1.8 CONSTRUCTION PROGRESS SCHEDULE

- A. The Contractor shall submit to the Engineer, prior to start of construction, a detailed schedule showing the order in which he proposes to carry on the work and estimated dates of completion of the various parts. The schedule shall be implemented upon approval of the Engineer.
- B. The construction schedule shall be revised and updated monthly and submitted to the Engineer. It is the Contractor's responsibility to complete the work within the time allotted.

- C. All work required by the Contract Documents shall be completed within **365** days from the date of the contract.

CODE REQUIREMENTS AND MANUFACTURER'S INSTRUCTIONS

- A. In the case of conflicts between state and local codes or regulations, State Codes or State regulations shall prevail. All required approvals for compliance with Fire and Building Services Division of Homeland Security, health regulations, historic preservation or archaeological clearances, floodway construction or state highway crossing may have been obtained by the owner unless stated otherwise in the contract documents.

The following permits have been applied for and shall be obtained prior to beginning work:

No permits have been applied for any projects under this scope.

The Contractor shall be responsible for the project under all permits, may speak directly to the applicable regulatory agency, and adhering to all requirements of approved permits. The Contractor shall be responsible for ensuring that all work meets the terms of required permits, and their GENERAL AND SPECIAL CONDITIONS. The Contractor shall be responsible for notifying the Engineer of any work that does not meet the requirements of the permits.

- B. The Contractor shall be required to comply with all OSHA or IOSHA regulations as may be applicable to this project and obtain all permits that may be required for compliance.
- C. If the Contractor observes that any of the contract documents are at variance with the printed application instructions of any Manufacturer in any respect, he/she shall promptly notify the Project Manager in writing.
- D. If the Contractor performs any work contrary to State Building and other Codes, Regulations, Ordinances, or Manufacturer's printed instructions without notice to the project Manager, the contractor shall bear the cost arising from such non-conformance.

1.10 NOTIFICATIONS

- A. Upon notice of bid award, the Contractor shall notify the Project Manager to establish communications for the above project(s). The notification may be by mail or email to the Project Manager's following mail or e-mail address:

Project Manager: **Michael J. Mathias, P.E.**

1.11 WORKING HOURS

- A. The Contractor shall perform all related activities on Monday through Friday excluding State holidays, between the hours of 7:00 a.m. and 6:00 p.m. local time, unless alternate arrangements are made and approved by the Property Manager or his representative.
- B. All work performed at other times shall only by the approval of the Property Manager or his representative, confirmed in writing, and shall not constitute a change in the contract amount.
- C. The Contractor shall plan all material deliveries during normal working hours, shall be responsible for receiving and deliveries, and shall properly protect delivered materials while being stored on the property. The Property Manager or his representative will not sign for any deliveries.

1.12 PRE-CONSTRUCTION SERVICE MEETING

The Contractor and his/her Subcontractor (if any) shall attend a pre-construction/pre-service meeting with the Property Manager and/or his representative at the work site. The date for this meeting shall be scheduled by the Property Manager within 14 days after the contract is awarded unless Property Manager has approved alternate arrangements.

A. Tree Removal

- 1. The Contractor shall mark all trees designated for removal with survey tape. Once all trees designated for removal are marked, the Contractor shall schedule a separate pre-construction meeting with the Owner to approve all tree removals. Once tree removals are approved the Contractor may proceed with removal.

B. Responsibility for Damage or Destruction as a Result Flooding

1. The Contractor shall be responsible for any and all damage that may occur at the site within the construction limits as a result of floods, and shall replace or restore damaged structures or features of the work, whether of a permanent or temporary character, at no additional cost to the Owner. The Contractor shall have no basis of claims because of floods occurring during the construction period unprecedented in magnitude or frequency.

C. Emergency Access

1. The Project site serves as a designated parking lot and driveway for the East Fork State Hatchery. The Contractor shall be responsible for maintaining safe driveway access and access within the parking lot and to the building at all times. During operations, the Contractor shall coordinate with the Owner to provide an alternate sidewalk access. The Contractor shall be responsible for maintaining vehicular access to the parking lot areas at all times.

1.13 SITE CONDITIONS

- A. Preliminary to the bidding, bidders are strongly encouraged to visit the site of the proposed work and thoroughly familiarize him/herself as to the nature and location of the work, general conditions, and the kind of equipment needed during the execution of the work. Failure to visit the site before bidding does not relieve the Contractor of responsibilities for anything that he/she would be made aware had he/she visited.

1.14 PROTECTION OF FACILITIES AND PREMISES

- A. **The Contractor SHALL** be responsible for the protection of all facilities during the entire period of service. Any damages to the existing facilities, roads, lawns, driveways, or other State owned property caused by the contractor SHALL be repaired by the Contractor at his/her expense and in a manner and schedule approved by the Property Manager.
- B. **The contractor SHALL** confine his/her operations and the storage of materials and equipment within an area approved by the Property Manager or his representative.
- C. **The Contractor SHALL**, at all times, keep the premises free from accumulation of waste materials or rubbish caused by his/her employees or work and prevent the spread of this debris during windy conditions. At the completion of the work, the Contractor SHALL leave the premises in a neat, clean, and orderly fashion.
- D. **The Contractor SHALL power wash any mechanical equipment or vehicle to be used on the job site to remove all mud and debris prior to unloading on the site.** This is necessary to prevent contamination by invasive species seeds that may be attached to the equipment. The Contractor SHALL NOT unload the equipment on site without prior visual inspection by the Property Manager. No other vehicles/machines shall be

permitted in the project area. All other equipment or project related vehicles must be parked in specified parking areas.

1.15 ACCESS ROADS AND PARKING AREAS

- A. Provide and maintain vehicular access to the site and within the site for use by persons and equipment involved in the construction of the project. Maintain access roads and driveways with sufficient rock, stone, or gravel to provide a suitable support for vehicular traffic under anticipated loads.
- B. Provide and maintain temporary parking facilities for use by construction personnel and the Engineer. Maintain parking facilities free of construction materials, mud, snow, ice and debris.
- C. Restore areas to original or to specified conditions shown on the drawings at completion of the work.

1.16 UTILITIES

- A. The Contractor shall be responsible for calling in utility locations prior to beginning construction. The Contractor shall notify the Engineer immediately if existing utilities are found to be in conflict with proposed improvements.

1.17 DUST AND NOISE CONTROL

- A. Dust shall be minimized by use of water. Noise shall be minimized by use of properly constructed and maintained equipment provided with suitable mufflers, snubbers, and other sound attenuating devices and supports. Erosion shall be controlled in such a manner that soil particles from the construction site are prevented from entering public waters or from being deposited on neighboring property, streets, and highways.

1.18 SAFETY AND HEALTH PLAN

- A. **The Contractor SHALL** be required to comply with all OSHA or IOSHA regulations as may be applicable to this project and obtain all permits that may be required for compliance.
- B. **The Contractor SHALL** prepare a safety and health plan that identifies the safety requirements of the project, procedures to follow in case of an emergency, accident, injury, or illness and make this plan available to all employees, and sub-contractors complete with persons and/or phone numbers to call for all who are working at this site. This plan **SHALL** be given to the Project Manager or his representative prior to the start of work and posted at the job site.
- C. **The Contractor SHALL** understand that the Property, DNR Engineering, nor the State of Indiana DOES NOT bare any responsibility for the cost of injuries to Contractor or

Sub-Contractor, or their employees injured during the course of the contract. The **Contractor SHALL** be responsible for the transport of injured employees needing medical or other attention.

1.19 SUBSTITUTIONS

- A. Materials and methods specified herein are known to meet the requirements of the project. Anyone wanting to use substitute materials or methods shall submit a written request, accompanied by necessary supporting information at least 10 days prior to the bid. If the Designer determines that the proposed substitution is acceptable, an addendum to the specifications will be issued to all prospective bidders.

END OF SECTION

SECTION 01010

SUBMITTALS

PART 01 GENERAL

1.01 PROGRESS SCHEDULES

- A. Each Contractor shall submit and maintain a Construction Progress Schedule or CPS for the project. The Progress Schedule or CPS shall be updated bi-weekly. He shall submit for approval a completed Progress Schedule within fourteen (14) days after the commencement date of construction. (Refer to the General Conditions)

1.02 SHOP DRAWINGS PROCEDURES

- A. Each Contractor shall submit a Shop Drawing Schedule to the Engineer for review or comments no later than fourteen (14) days after the commencement date of construction. Fabrication will not proceed until reviewed drawings have been received from the Engineer.
- B. Shop Drawing Schedule shall indicate drawing identification, manufacturer, submission dates to the Engineer, requested return dates to the Contractor, and proposed delivery dates.
- C. This schedule shall closely coordinate with the Construction Progress Schedule.
- D. The Architect/Engineer requires 3 copies of all shop drawings for his use. Additional copies will be returned to the Contractor after review and approval.
- E. Shop drawings shall be clearly marked to identify pertinent materials, products or models and Contract Document identification. Variances from Contract Documents shall be noted including manufacturer's recommended changes to sequencing, piping, and control wiring. Advertising brochures will not be accepted as shop drawings.

1.03 DETAILED BREAKDOWN OF BIDS

- A. Each Contractor shall be required to submit a detailed breakdown of his costs as bid prior to his first partial payment estimate. The form and substance of the breakdown shall be as directed and approved by the Engineer.

1.04 ADDITIONAL SUBMITTALS

- A. Each Contractor is reminded that any part or this entire project may be partially or wholly financed by Federal and/or State agencies. All additional reports, schedules or other submittals required by these agencies to be submitted by the

Contractor shall be so submitted as required. No extra payment shall be allowed for such work as is required to develop and submit this information.

1.05 PRECONSTRUCTION VIDEOTAPING

- A. The Contractor shall produce and provide to the Engineer a videotape of the construction area for a pictorial record of the original condition of the facilities. A monitor and tape player shall be provided for the job for purposes of reviewing record tapes. The monitor and tape player shall remain the property of the Contractor.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PARTel GENERAL

1.01 SECTION INCLUDES

- A. Coordination.
- B. Site mobilization conference.

1.02 PRECONSTRUCTION CONFERENCE

- A. Architect/Engineer will schedule a conference after Notice of Award.
- B. Attendance Required: Owner, Architect/Engineer, and Contractor.
- C. Agenda:
 - 1. Submission of list of Subcontractors, if any, and progress schedule.
 - 2. Designation of personnel representing the parties in Contract, and the Architect/Engineer.
 - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract procedures.
 - 4. Use of premises by Owner and Contractor.
 - 5. Owner's requirements and partial occupancy.
 - 6. Construction facilities and controls provided by Owner.
 - 7. Temporary utilities provided by Owner.
 - 8. Survey and road layout.
 - 9. Security and housekeeping procedures.
 - 10. Schedules.
 - 11. Procedures for testing.

END OF SECTION

SECTION 01310

PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

1.02 RELATED SECTIONS

- A. Section 01000 - Project Description.
- B. Section 01010 - Submittals: Shop drawings, product data, and samples and schedule of values.

1.03 FORMAT

- A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week.

*****[OR]*****

Prepare network analysis system using the critical path method, as outlined in The Associates General Contractors of America (AGC) publication "The Use of CPM in Construction - A Manual for General Contractors".

- B. Sequence of Listings: The Table of Contents of this Project Manual. The chronological order of the start of each item of Work.
- C. Scale and Spacing: To provide space for notations and revisions.
- D. Sheet Size: Minimum 8 ½ x 11 inches.

1.04 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.

- C. Identify work of separate stages by floors (if applicable) and other logically grouped activities.
- D. Provide sub-schedules for each stage of Work.
- E. Provide sub-schedules to define critical portions of the entire schedule.
- F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products, and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.
- H. Indicate delivery dates for Owner furnished products (if applicable).

1.05 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its affect including the effect of changes on schedules of separate contractors.

1.06 SUBMITTALS

- A. Submit preliminary outline Schedules within 15 days after date established in Notice to Proceed for coordination with Owner's requirements. After review, submit detailed schedules with 15 days modified to accommodate revisions recommended by Architect/Engineer and Construction Manager (if applicable).
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Architect/Engineer.

1.07 DISTRIBUTION

- A. Distribute copies of reviewed schedules to Project site file, Subcontractors, suppliers, and other concerned parties.

- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 508

VIDEO TAPED INVENTORY CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Work consists of, prior to the beginning of construction, video taping, with audio sound, the entire project site and any off-site areas used for hauling, dumping, storage, etc. The limits of video taping shall be as determined by the OWNER. The OWNER shall be present during this video taping work. Upon completion of construction, the same areas shall again be video taped with audio sound.
- B. The videotape shall provide a complete record of the physical conditions of the entire project before and after construction.
- C. The videotapes shall become the property of the OWNER who shall maintain same for viewing by the OWNER and the CONTRACTOR for a period not to exceed one (1) year after completion of the Project.

PART 2 MATERIALS

2.01 TAPE AND/OR CD

- A. The videotape shall be one-half inch (1/2") color, cassette type, VHS series or CD and of broadcast quality.

2.02 CAMERA

- A. The camera shall be a high quality color unit.

PART 3 EXECUTION

3.01 TAPING

- A. The videotape shall be cataloged by survey line station.
- B. The videotape shall clearly show all physical features along the route.

END OF SECTION

SECTION 01 700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Project record documents.
- D. Operation and maintenance data.
- E. Instruction of Owner Personnel
- F. Submittals
- G. Warranties.
- H. Spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

- A. 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 Architect/Engineer's inspection.
- B. Provide submittals to Owner's Representative that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted contract sum, previous payments, and sum remaining due.
- D. Clean interior and exterior glass surfaces exposed to dust. Remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeting and soft surfaces.
- E. Clean equipment and fixtures to a sanitary condition.
- F. Replace filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, and drainage systems.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean site, sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the work:
 - 1. Contract drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
- B. Store record documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by addenda and modifications.
- E. Record Documents and Shop Drawings: Legible mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
 - 3. Field changes of dimension and detail.

4. Details not on original contract drawings.
- F. Submit documents to Architect/Engineer with claim for final application for payment.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8- 1/2 x 11 inch text pages, three D-size ring capacity expansion binders with durable plastic covers.
- B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 24-pound white paper.
 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.

- b. Air and water balance reports.
- c. Certificates.
- d. Photocopies of warranties and bonds.

1.06 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.07 SUBMITTALS

- A. Submit two copies of revised volumes of data in final form within ten days before final inspection.

1.08 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in binder with durable cover.
- D. Submit prior to final Application for Payment.
- E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to project site and place in location as directed. Obtain receipt prior to final payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01720

RECORD DOCUMENTS

PART 1 GENERAL

- A. A record of all deviations from the Contract Drawings and improvements completed during the project shall be made by a registered engineer or land surveyor hired by the CONTRACTOR who shall, upon completion, of the project, generate the final Record Drawings. Final Record Drawings are to be generated by drawing a line through the original design information and adding the corrected data to the original plans.
1. Final Record Drawings shall depict the proposed information and the constructed information, which shall include, but not be limited to, such features as detention basins, topographical information, new drawings added to the original set, and new and revised calculations based upon altered site conditions.
- B. Maintenance of Documents:
1. Maintain in CONTRACTOR'S field office in clean, dry, legible condition complete sets of the following: Drawings, Specifications, Addenda, approved Shop Drawings, Samples, photographs, Change Orders, other modifications of Contract Documents, test records, survey data, Field Orders, and all other documents pertinent to CONTRACTOR'S Work.
 2. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specification Institute (CSI), unless otherwise approved by ENGINEER.
 3. Make documents available at all times for inspection by ENGINEER and OWNER.
 4. Record documents shall not be used for any other purpose and shall not be removed from the CONTRACTOR'S office without ENGINEER'S approval.
- C. Marking System: Provide colored pencils or felt tipped pens for marking changes, revisions, additions and deletions, to the record set of Drawings. Use red to indicate any changes unless otherwise approved by the ENGINEER.
- D. Recording:
1. Label each document "PROJECT RECORD" in 2-inch high printed letters.

2. Keep record documents current.
3. Do not permanently conceal any Work until required information has been recorded.
4. Drawings: Legibly mark to record actual construction including:
 - a. Changes in Station and/or Offset on all of the following:
 - Manholes.
 - Cleanouts.
 - Catch Basins or Surface Inlets.
 - Headwalls and Retaining Walls.
 - Slope Stabilization Measures and Channel Linings.
 - Water and Service Valves.
 - Crosses, Tees, Elbows and other Pipe Fittings.
 - Fire Hydrants.
 - Off Sets.
 - Blow-offs and Plugs.
 - b. Changes in Elevation for the following:
 - Inverts.
 - Rims (to the nearest hundredth).
 - Surface Inlet Grates (to the nearest hundredth).
 - Flowlines. Clearly show pipe material and pipe slopes as installed.
 - Structures.
 - c. Changes in Structures including the following:
 - Manhole collar size.
 - All revisions in pipe sizes, lengths, slopes and angles.
 - Changes in offset distances of structures.
 - d. Horizontal and vertical location of all underground utilities and appurtenances referenced to, uncovered and/or modified during construction.
 - e. Changes made by Change Order or Field Order.
 - f. Details not on original Drawings.
5. Specifications 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 matters not originally specified.
- E. Submittal:
- 1. Upon Substantial Completion of the Work, deliver record documents to ENGINEER. Final payment will not be made until the ENGINEER receives satisfactory Record Documents.
 - a. The Registered land surveyor or professional engineer shall stamp and sign all sheets in the space provided.
 - b. Any unverified data shall show “+/-“ thereby indicating the information has not been verified.
 - 2. Accompany submittal with transmittal letter containing:
 - a. Date.
 - b. Project title and number.
 - c. CONTRACTOR'S name and address.
 - d. Title and number of each record document.
 - e. Certification that each document as submitted is complete and accurate.
 - f. Signature of CONTRACTOR, or his authorized representative.

END OF SECTION

SECTION 02110

SITE CLEARING

PART d GENERAL

1.01 SECTION INCLUDES

- A. Remove surface debris.
- B. Remove paving, curbs, and sidewalks as shown on drawings.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove root system of trees and shrubs.

1.02 RELATED SECTIONS

- A. Section 02061 - Demolitions and Removals
- B. Section 02222 - Excavation.
- C. Section 02923 - Landscaping Grading

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable laws for disposal of debris and use of herbicides, etc.
- B. Coordinate clearing work with utility companies.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

- A. Verify that existing plant life designated to remain is tagged or identified.
- B. Remove all trees and stumps from the area as identified on the plans. Removal shall be accomplished without injury to trees which are to remain in the working area. The contractor shall accept the site as he finds it and remove all trash, rubbish, stumps, boulders, and bushes from the site as identified on the drawings.

3.02 PROTECTION

- A. Locate, identify, and protect utilities that remain from damage.
- B. All plant life to remain shall be fenced or protected from damage by some other type of barrier. All damaged trees or shrubs that remain shall be properly trimmed, or replace, depending on amount of damage done to them.

3.03 DISPOSAL

- A. All debris shall be removed from site and disposed of in a lawful manner.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Trench Excavating, Backfilling and Compacting.

1.02 PROTECTION:

- A. The Contractor will be held accountable and responsible for the sufficiency of all sheeting and bracing used, and for all damages to persons and property resulting from the improper quality, strength, placing, maintaining or removing of the same. This includes damage to trees, sidewalks, and other property in the street area, as well as on private grounds. In no case shall sheeting be removed until the trench backfill has reached within two feet of the top of the trench, except that the lower course of sheeting may be removed from a double sheeted trench. In all cases, sheeting shall be driven ahead of excavation.
- B. All trenches five feet or greater in depth shall utilize trench safety systems in compliance with I OSHA Regulations 29C.F.R.1926, Subpart P. All costs associated with the use of said safety systems shall be incorporated into the Contractor's lump sum bid for the project.
- C. Work passing through a wooded area or near landscaping trees or shrubs shall be performed in a way to do as little damage as possible. Routes through wooded areas shall be coordinated with a representative of the Owner. Trenches shall stay at least 10 feet away from landscaping trees unless approved by the Designer.
- D. Where pipes, conduits, or cables cross the trench, the Contractor shall support these pipes, conduits or cables without damage to them and without interrupting their use during the progress of the work. The manner of supporting shall be subject to the approval of the Designer or Inspector for the utility involved.
- E. Keep open excavations free of water, both surface and subterranean by use of pumps and earth damming around such excavations to drain surface water away from the excavations.
- F. Protect open excavations by lighted barricades or railings to prevent injury to personnel.

1.03 MAINTENANCE OF TRAFFIC DURING CONSTRUCTION:

- A. Contractor may, at his option, bore or open cut all pavements to be crossed, unless specified otherwise on the plans.

- B. Contractor shall, at all times, maintain at least one lane of traffic for all public roads and all service roads which are two lanes wide.
- C. Single lane service roads and driveways may be closed to traffic for short periods of time if the Owner is given a minimum of 12 hours advance notice. As soon as the required work is completed, temporary repairs shall be made to allow use of these roads and drives.

1.04 EQUIPMENT CONDITION

- A. The Contractor SHALL power wash any mechanical equipment or vehicle to be used on the job site to remove all mud and debris prior to transportation to the site. This is necessary to prevent contamination by invasive species seeds that may be attached to the equipment. The Contractor SHALL NOT unload the equipment on site without prior visual inspection by the Property Manager. No other vehicles/machines shall be permitted in the project area. All other equipment or project related vehicles must be parked in specified parking areas.

1.05 REFERENCE STANDARDS:

- A. I.D.O.T.S.S. (Indiana Department of Transportation Standard Specifications).

PART 2 - PRODUCTS

2.01 GRANULAR FILL:

- A. Granular fill shall be either a "B" borrow or a fine aggregate.
- B. By weight, a minimum of 90% shall pass the No. 4 sieve and a maximum of 8% shall pass the 200 sieve.

2.02 GENERAL BACKFILL:

- A. Unless specified otherwise, or unless the material excavated does not meet the requirements for a specific location, it is intended that trench backfill shall be the material excavated.
- B. If the material excavated does not meet the requirements, the Contractor may, at his option, modify the existing material to meet the requirements or supply granular fill.

2.03 TOPSOIL:

- A. Topsoil (where landscape backfilling is indicated on the plans) shall be material excavated from the top 6" of the trench or material supplied by the Contractor and meeting the requirements of Section 02933 Seeding.

2.04 PAVEMENT REPAIR MATERIALS:

- A. Crushed stone or crushed gravel shall be #53 as specified in I.D.O.T.S.S. Section 903.02.
- B. All trenches cutting existing asphalt pavement shall be repaired with hot asphaltic concrete base material (No. 8 or No. 9) and hot asphaltic concrete surface material. All materials shall meet the requirements of I.D.O.T.S.S. Section 405 and Section 02511 Paving and Surfacing.
- B. All trenches cutting existing asphalt pavement shall be repaired with hot asphaltic concrete binder Type No. 8 as specified in I.D.O.T.S.S. Section 405.
- C. Filter fabric shall be nonwoven filter fabric as specified in I.D.O.T.S.S. Section 9122.18.

PART 3 - EXECUTION

3.01 GENERAL EXCAVATION:

- A. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. Where topsoil is required for later reuse, it shall be piled separately from other excavated material.
- B. Open-cut trenches shall be sheeted and braced as required by governing state laws and as necessary to protect life, property, or work.
- C. All boulders, waste, and excess excavations shall be hauled away from the property and legally disposed.
- C. All boulders, waste, and excess excavations shall be hauled away from the property and legally disposed. Within ten (10) days of the receipt of Notice to Proceed, the Contractor shall inform the Designer by letter, maps and/or sketches of the location of the disposal site. The Contractor shall be responsible to obtain all necessary permits and/or approvals for the disposal of materials within any protected areas.

3.02 TRENCH EXCAVATION:

- A. Excavate trenches to depth and width required to permit the installation of the work to the lines and dimensions indicated on the Drawings or as otherwise specified, except that the width of a pipeline trench shall not exceed 24 inches plus the pipe diameter at the top of the pipe.
- B. Bedding shall be provided with bell holes at each joint to permit proper jointing and support of the pipeline.
- C. The trench bottom shall be excavated to a minimum of 4 inches below the pipe. No extra payment will be allowed for over depth excavation.

- D. Material excavated from trenches suitable for backfill shall be stockpiled in an orderly manner and deposited a sufficient distance from the trench bank to avoid overloading and to prevent slides or cave-ins.

3.03 TRENCH BACKFILL:

- A. Below finished pipe location to 6 inches above pipe:
 - 1. Granular fill.
 - 2. Sufficiently damp to permit thorough compaction.
- B. Six inches above pipe to 1 foot above pipe:
 - 1. General backfill free from rocks larger than 1".
- C. One foot above pipe to finish grade:
 - 1. General backfill free from rocks larger than 8".
 - 2. Top 6" to be topsoil where landscape backfilling is indicated on the plans.
- D. Paved areas:
 - 1. Trenches cutting or within 5 feet of gravel, stone, or asphalt surfaces shall be backfilled with granular fill below the surface repair material.
- E. Operations of earth work shall be suspended when satisfactory results cannot be obtained because of rain, freezing weather or other unsatisfactory condition.

3.04 COMPACTION:

- A. Granular fill used in areas below the specified grade shall be placed in 4" layers and thoroughly tamped as directed by the Designer so as to provide a uniform and continuous bearing and support for the pipe between bell or coupling holes.
- B. Granular backfill shall be compacted. Layers shall not exceed 4" thick after compaction. Backfill shall be sufficiently damp to permit thorough compaction under and on each side of the pipe. Special care shall be taken to work material under the pipe for support.
- C. After backfilling, remove all excess material, regrade and leave the premises free, clear and in good order. The backfill may be mounded to allow for settlement unless landscape backfilling is required.
- D. Where it is indicated on the plans that compacted backfill or landscape backfilling is required, the Contractor shall compact all backfill in the

trench to such an extent that mounding for settlement is not required. Finish grade shall be at the same level as adjacent areas.

- E. All settlement in the backfill which takes place within one year warranty period specified in General Conditions shall be refilled and restored by the Contractor at his expense.

3.05 PAVEMENT REPAIR:

- A. Gravel or stone surfaces shall be repaired with 6" of #53 crushed stone or crushed gravel placed on top of filter fabric.
- B. Asphalt shall be saw cut 12" past the trench excavation.
- C. Hot asphaltic concrete pavement repair material shall be compacted either by hand or mechanical tampers after placement.
- D. Asphalt pavement surfaces shall be repaired with 6" of #53 crushed stone or gravel placed on top of filter fabric, 220 pounds per square yard of hot asphaltic concrete base material and 110 pounds per square yard of hot asphaltic concrete surface material.
- D. Asphalt pavement surfaces shall be repaired with 6" of #53 crushed stone or gravel placed on top of filter fabric and 330 pounds per square yard of hot asphaltic concrete binder.

END OF SECTION

SECTION 02731

SANITARY SEWER TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing requirements for gravity sewer lines.
- B. Testing requirements for force main sewer lines.
- C. Testing requirements for sanitary sewer manholes.

1.02 RELATED SECTIONS

- A. Section 01 410 - Testing Laboratory Services.
- B. Section 02607 - Manholes and Covers.
- C. Section 02730 - Sanitary Sewage Systems.

1.03 REFERENCES

- A. ASTM C822 - Terminology Relating to Concrete Pipe and Related Products.
- B. ASTM C828 - Air Exfiltration Test.
- C. ASTM C924 - Practice for Testing Concrete Sewer Lines by Low-pressure Air Test Method.
- D. ASTM C969 - Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
- E. AWWA C600-82 - Allowable Leakage Test.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for material and performance of the work of this section.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. The Engineer shall require the Contractor to spot any observable leakage in the sewer lines or manholes. These observable leaks shall be stopped regardless of test results.
- B. The Contractor shall provide all labor, equipment and materials for the particular test to be performed.
- C. The rate of infiltration into the sanitary sewer system between any two adjacent manholes or the entire system shall not exceed 200 gallons per day/inch of diameter/mile of sewer.
- D. All tests shall be conducted under the observation of the Engineer.
- E. If the pipe or manhole installation fails to meet the tests described below, the Contractor shall determine, at his own expense, the source or sources of the leakage and shall replace or repair all defective materials and workmanship until the pipe has passed the test.

3.02 SANITARY SEWER JOINT PRETESTING

- A. All sanitary sewer systems shall be required to allow in infiltration of no greater than 200 gallons per day/inch of diameter/mile of sewer.
- B. The Contractor shall be required to construct one section of sanitary sewer of a length not less than 250 feet for pretesting to determine if the infiltration allowances can be met by the type of joint construction he proposes to use. If multiple types of joints are to be used by a Contractor, he shall be required to test each type similarly. Joint types used exclusively for the repair of existing sanitary sewers disturbed by construction are not included.
- C. The Engineer will be at the site as required during the test to review the results. If the results are not satisfactory, the Contractor shall be required to repeat the test or will be allowed to reconstruct the section with a different joint construction. If the second test results are not satisfactory, the Contractor shall be required to reconstruct with a different type of joint construction unless otherwise ordered. This sequence shall be repeated until satisfactory results are obtained.
- D. Each Contractor shall bear the costs and liability of this pretesting. Each Contractor shall bear the costs of removing and relaying of sewer sections as necessary to meet the pretesting requirement.

3.03 GRAVITY SEWERS (Low Pressure Air Test)

- A. The completed pipe installation shall meet the requirements of ASTM C828 or as abbreviated here for air exfiltration test.

- B. The pipe shall be subjected to an initial pressure of not greater than 4 psi for a minimum of 2 minutes to stabilize temperatures of the compressed air. After stabilization has taken place, the pressure shall be 3.5 psi (or greater), but not more than 4 psi, with all air valves closed.
- C. The interior walls of the pipe may be dampened by flushing a "ball" through the interval to be tested if the Contractor so chooses.
- D. The maximum allowable air leakage shall be 0.0030 cfm per square feet of internal pipe surface tested at an average pressure of 3.0 psi greater than the average back pressure of any groundwater that may submerge the pipe.

TABLE 1

In areas where groundwater is known to exist, the Contractor and Engineer shall determine the extent of groundwater over the invert of the pipe and apply additional pressure to the test pressure as follows. In no case should the starting test pressure exceed 9.0 psig.

| Extent of groundwater over invert of pipe | Pounds of pressure to be added to test pressure |
|--|--|
| 1 foot | 0.5 |
| 2 feet | 0.8 |
| 3 feet | 1.3 |
| 4 feet | 1.7 |
| 5 feet | 2.1 |
| 6 feet | 2.6 |
| 8 feet | 3.4 |
| 10 feet | 4.3 |
| 12 feet | 5.2 |

TABLE 2

If the pressure does not fall below 2.5 psi from 3.5 psi in the following situations, the pipe will be accepted. The length of pipe shall be any length between manholes.

| Size (inches) | Time allowed for pressure to drop from 3.5 to 2.5 psi |
|------------------|--|
| 6 | 3 minutes |
| 8 | 4 minutes |
| 10 | 5 minutes |
| 12 | 5-1/2 minutes |
| 15 | 7-1/2 minutes |
| 18 | 8-1/2 minutes |
| 21 | 10 minutes |
| 24 | 11-1/2 minutes |
| 27 | 13-1/2 minutes |
| 30 | 14-1/2 minutes |
| 33 | 15-1/2 minutes |
| 36 | 17 minutes |

If the pipe does not meet the above test, the time shall be computed by the following expression:

$$\text{time in seconds} = t = \frac{k}{c}$$

$$\text{where } k = 0.011 d^2L$$

$$c = 0.0003883 dL \text{ (if } c \text{ is 1 or less, use value of 1 for } c)$$

t = time in seconds for air pressure inside of pipe to decrease from 3.5 to 2.5 psi

d = inside pipe diameter of pipe under test (inches)

L = length of pipe under test (feet)

3.04 FORCE MAIN (Hydrostatic Pressure Test)

- A. The Contractor shall pretest and be satisfied that all lines are ready for testing before requesting test inspection.
- B. The Contractor shall provide all necessary equipment and perform all work required in connection with the tests. All pipe shall be tested under a hydrostatic pressure range of 150 psi. Each section shall be slowly filled with water with care being taken to expel all air from the pipes. If necessary, pipes shall be tapped at high points to vent the air.

- C. The required pressure (150 psi) shall be applied for not less than 2 hours and all pipe, fittings, valves and joints shall be carefully examined for defects. The Contractor shall replace cracked or defective pipefittings and valves with sound material at no cost to the Owner, and the test shall be repeated. Where actual visual inspection of each joint cannot be made because of the necessity for immediate backfilling, or where the pipe is placed below water level, suitable means shall be provided by the Contractor for determining the quantity of water lost by leakage under the required test pressure.
- D. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air in the pipeline has been expelled and pipe has been filled with water.
- E. No pipe installation will be accepted if the leakage is greater than that determined by the formula,

$$L = \frac{S \times D \times (P^2)}{133200} \quad (\text{AWWA C600-82})$$

in which L is the allowable leakage in gallons per hour; S is the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge (psig).

- F. The pressure shall be a minimum of 150 psi at the beginning of the test and not be allowed to drop below 145 psi during the test.

TABLE 3

For convenience, the following table of allowable leakage has been prepared.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPELINE*-gph
(AWWA C600-82)

| Avg. Test Pressure psi | Nominal Pipe Diameter - in. | | | |
|------------------------|-----------------------------|------|------|------|
| | 6 | 8 | 10 | 12 |
| 150 | 0.55 | 0.74 | 0.92 | 1.10 |

*If the pipeline being tested contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

3.05 MANDREL TESTING

- A. A five percent (5%) "GO-NO-GO" Mandrel Deflection Test shall be performed on all PVC, HDPE and PVC Composite gravity sanitary sewer pipe.

- B. These pipes shall be mandrelled with a rigid device sized to pass five (5) percent or less deflection (or deformation) of the base inside diameter of the pipe. The mandrel test shall be conducted no earlier than thirty (30) days after reaching final trench backfill grade, provided that in the opinion of the Engineer sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. If densification, in the opinion of the Engineer, has not been achieved within the thirty (30) day time frame, the mandrel size shall be increased to measure a deflection limit of three percent (3%).
- C. The mandrel (GO-NO-GO) device shall be cylindrical in shape and constructed with nine (9) or ten (10) evenly spaced arms or prongs. Mandrels with less arms shall not be allowed due to being insufficiently accurate. The mandrel diameter dimension "D" shall be equal to the inside diameter of the sanitary sewer. Allowances for pipe wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension, but shall be counted as part of the five (5) percent or lesser deflection allowance. Each pipe material/type required to be Mandrel tested shall be tested with a mandrel approved by the pipe manufacturer and meeting the requirements of this Section. The "D" mandrel dimension shall carry a tolerance of +/-0.01 inches.
- D. The mandrel shall be hand pulled through all sewer lines and any section or sewer not passing the mandrel shall be uncovered, replaced or repaired to the Engineer's satisfaction and retested.
- E. The contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than as shown below.

(9 Arm Mandrel)

D DIMENSIONS FOR
ASTM D3034
SDR 35
For Deflection of

| <u>NOM. DIA</u> | <u>L</u> | <u>3%</u> (In.) | <u>5%</u> (In.) |
|---------------------|----------|--------------------|--------------------|
| 8 | 8 | 7.71 | 7.56 |
| 10 | 10 | 9.63 | 9.45 |
| 12 | 10 | 11.46 | 11.26 |
| 15 | 12 | 14.03 | 13.78 |

(10 Arm Mandrel)

D DIMENSIONS FOR
ASTM D3034
SDR 35

For Deflection of

| NOM. DIA | <u>L</u> | <u>3%</u> (In.) | <u>5%</u> (In.) |
|----------|----------|--------------------|--------------------|
| 8 | 8 | 7.71 | 7.58 |
| 10 | 10 | 9.65 | 9.48 |
| 12 | 10 | 11.48 | 11.29 |
| 15 | 12 | 14.06 | 13.82 |
| 18 | 24 | | 16.13 |
| 21 | 24 | | 19.00 |
| 24 | 24 | | 21.36 |
| 27 | 24 | | 24.06 |

- F. The Contractor shall provide proving rings to check the mandrel. The Contractor shall furnish drawings of mandrels with complete dimensions to the Engineer upon request for each diameter and specification of pipe.

3.06 MANHOLE TESTING

- A. This test method covers procedures for testing precast concrete manhole sections when using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. This test method is used for testing concrete manhole sections utilizing mortar, mastic, or gasketed joints.
- B. This test method is intended for use as a preliminary test to enable the installer to demonstrate the condition of the concrete manholes prior to backfilling. It may also be used to test manholes after backfilling; however, testing should be correlated with the connector supplier.
- C. For definitions of terms relating to manholes, see ASTM C822.
- D. All lift holes and any pipes entering the manhole are to be plugged. Care shall be taken to securely brace the pipes and plugs to prevent them from being drawn into the manhole during testing. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

- E. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
- F. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury.
- G. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the values indicated in Table 1.
- H. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall be retested until a satisfactory test is obtained.

TABLE 1 Minimum Test Times for Various Manhole Diameters

| Depth (ft) | Diameter, in | | | | | | | | |
|------------|--------------|----|----|----|----|----|----|-----|-----|
| | 30 | 33 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| | Time, s | | | | | | | | |
| 8 | 11 | 12 | 14 | 17 | 20 | 23 | 26 | 29 | 33 |
| 10 | 14 | 15 | 18 | 21 | 25 | 29 | 33 | 36 | 41 |
| 12 | 17 | 18 | 21 | 25 | 30 | 35 | 39 | 43 | 49 |
| 14 | 20 | 21 | 25 | 30 | 35 | 41 | 46 | 51 | 57 |
| 16 | 22 | 24 | 30 | 34 | 40 | 46 | 52 | 58 | 67 |
| 18 | 25 | 27 | 32 | 38 | 45 | 52 | 59 | 65 | 73 |
| 20 | 28 | 30 | 35 | 42 | 50 | 53 | 65 | 72 | 81 |
| 22 | 31 | 33 | 39 | 46 | 55 | 64 | 72 | 79 | 89 |
| 24 | 33 | 36 | 42 | 51 | 59 | 64 | 78 | 87 | 97 |
| 26 | 36 | 39 | 46 | 55 | 64 | 75 | 85 | 94 | 105 |
| 28 | 39 | 42 | 49 | 59 | 69 | 81 | 91 | 101 | 113 |
| 30 | 42 | 45 | 53 | 63 | 74 | 87 | 98 | 108 | 121 |

- I. Use or failure of this vacuum test shall not preclude acceptance by appropriate water infiltration or exfiltration testing (see ASTM C969) or other means.

END OF SECTION

SECTION 02730

SANITARY GRAVITY SEWERS AND MANHOLES

PART 1 - GENERAL

1.01 PIPE AND FITTINGS:

All piping and fittings shall be of the types and materials specified herein or shown on the drawings and all materials shall be new and unused. All pipe sizes and all references to pipe diameter on the drawings shall be the nominal internal pipe diameter.

1.02 CONSTRUCTION STANDARDS:

Sewer construction shall be in accordance with the recommended practice specified herein and in ASTM D-2321 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications".

1.03 QUALITY ASSURANCE - REFERENCE STANDARD:

Materials Standards refer to American Standard for Testing and Materials (ASTM). Particular Standards of relevance to this section include:

- A. ASTM C-478 "Standard Specification for Precast Reinforced Concrete Manhole Sections"
- B. ASTM C-923 "Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, And Laterals."
- C. ASTM C-443 "Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets."

PART 2 - PRODUCTS

2.01 TYPE OF PIPE:

All pipe shall be PVC sewer pipe unless otherwise specified on the plans.

2.02 PVC PIPE:

PVC solid wall pipe shall have push on joints with preformed rubber gaskets. Pipe shall meet the requirements of ASTM D-3034. ASTM D-3034 pipe shall have an SDR of 26.

2.03 DUCTILE IRON PIPE:

Pipe and fittings shall be Class 51, rubber gasket, push on joint, with cement mortar lining complying with AWWA C-104. Pipe and fittings are to meet AWWA C-111 and AWWA C-151.

2.04 MANHOLES:

- A. New manholes shall be constructed of precast reinforced concrete. Precast concrete manhole riser sections and tops shall be in conformance with ASTM C-478. All materials used shall meet the requirements of ASTM C-478.
- B. Precast manhole sections shall have a flexible watertight joint for the entry of sewer pipe. Joints shall comply with ASTM C-923. Joints shall be PSX Series or Econoseal as manufactured by Press Seal Gasket of Fort Wayne, IN or an approved equal. Openings for the entry of sewers shall be precast or core drilled.
- C. Manhole Joints between Sections shall be made with Rubber "O" Ring gaskets and a joint type as specified in ASTM Specification C-443, or a joint sealed by use of a

Controlled Expansion Waterstop Sealant such as ConSeal CS-231 by Concrete Sealants, Inc. (New Carlisle, Ohio), or equal.

- D. Manhole Joints between Riser Sections shall also be provided with an external joint wrap, which is to be applied to exposed joints prior to backfilling.
- E. MANHOLE STEPS ARE NOT REQUIRED AND SHALL NOT BE INSTALLED.

2.05 MANHOLE FRAME AND LID:

- A. Manhole frame and lid shall be manufactured of gray iron meeting the requirements of ASTM A-48 for either class 30 or class 35.
- B. Manhole lid shall be similar to Neenah Type B with concealed pickhole unless otherwise indicated.
- C. Manhole frame and lid shall be as manufactured by Neenah Foundry Company; East Jordan Iron Works, Inc.; or approved equal. Neenah catalog numbers are used on the plans to indicate the style, dimensions, and size that are required for the specific application.

2.06 FLEXIBLE COUPLINGS:

Flexible couplings used to connect two different types of pipe materials or two spigot ends of the same type pipe shall be of PVC construction with stainless steel clamp. All Couplings 6" through 12" shall have adjustable stainless steel shear rings. Couplings shall be as manufactured by Logan Clay Products Company. 4" couplings shall be by Logan, Fernco, Indiana Seal or approved equal.

2.07 FITTINGS:

Only manufactured fittings shall be used during construction.

2.08 SEALING PRODUCTS:

- A. The purpose of the sealing products is to provide for prevention of water leakage in the manholes through application of the product directly on joints, holes, cracks, pipe openings, and castings that show active water leakage or evidence of leakage. The product is intended to stop running water or seepage through cracks in concrete pipes, manholes, tanks, and all surfaces under hydrostatic water pressure.
- B. Hydraulic Cements: This material may be used in a thickened form as a plug or patching material or in a thinner form as a troweled patch or grout application. High quality water sealing materials must be used. The water sealing plug shall be like (1) Sauereisen InstaPlug No. F-180, or (2) Sika Corporation's SikaSet Plug, or (3) Fosroc Preco-Plug, or (4) Master Builders Set-Plug, or (5) IPA Systems, Inc. Octoplug, or (6) CGM Inc. Wet Plug.
- C. Flexible Sealant - Casting to cone or casting to ring joints shall be sealed by the use of a flexible elastomeric compound such as "Kent Seal" by Hamilton-Kent (Toronto, Canada); "ConSeal CS-102" by Concrete Sealants, Inc. (New Carlisle, Ohio) or equal".
- D. External Joint Wrap - The joint wrap shall be of butyl-resin sealant materials laminated to a plastic backing material and provided in various widths for easy installation. A primer is required to insure concrete bonding and proper sealing. The joint wrap utilized shall be a minimum 12" width and be like "ConSeal ConWrap CS-212" by Concrete Sealants, Inc.; "EZ-Wrap" by Press-Seal Gasket Co.; "MacWrap" by Mar-Mac Manufacturing Co., Inc. (800 845-6962); or equal.

2.09 ADJUSTING RINGS:

Adjusting rings that are to be used between the manhole Cone and the Casting for the purpose of elevation adjustment shall be precast concrete, monolithically poured donut sections with an internal diameter to match the supplied castings, cones, and rings, and shall be a minimum 3" thickness. Adjusting Rings shall also have a minimum outside diameter of 33 inches (2'-9").

PART 3 - EXECUTION

3.01 LAYING PIPE:

- A. Line and grade shall be set by use of either batterboards or laser beam.
- B. Batterboards shall be established by line and grade stakes set at 25-foot intervals. Line and grade for sewers shall be transferred from the stakes set to batterboards. No less than three (3) batterboards shall be in use at all times. Line and grade shall be transferred accurately from the batterboard to each joint of pipe.
- C. All pipe shall be laid with bell up-grade.

3.02 MANHOLES:

Where sewer lines pass through or enter manholes, the invert channels shall be smooth and semi-circular in cross section. Changes of direction in flow within the manholes shall be made with a smooth curve with as long a radius as possible. The floor of the manhole outside the channels shall be smooth and slope toward the channel not less than 1 inch per foot.

3.03 LEAKAGE TESTING:

- A. Sewers must be tested for watertightness and shall meet the criteria as specified before being accepted for use. Contractor will test for watertightness by means of an air test. Testing must be performed in sections not exceeding 400' in length.
- B. Air Test:
 - 1. The sewer line shall be sealed at each end of the section to be tested and pressurized to 4 psig. The pressure will be allowed to stabilize between 4 psig to 3.5 psig for a period of not less than 5 minutes. Additional air may be added during this period to maintain the pressure at 3.5 psig.
 - 2. After the stabilization period, the air valve shall be closed. The amount of time, which elapses before the pressure drops 1.0 psig, shall be measured and recorded. This time period shall be a minimum of 3 minutes for a 4" pipe, 4 minutes for a 6" pipe, 5 minutes for an 8" pipe, or 6 minutes for a 10" pipe.
- C. Prior to the end of the warranty period, the Contractor shall test any sections of sewer that the Designer may request.
- D. If a section of pipe fails the test; the Contractor shall make all necessary repairs to enable that section to pass the test.

3.04 DEFLECTION TESTING:

- A. All PVC pipes shall be tested for a maximum allowable deflection of 5% using a deflection mandrel. Mandrel shall be certifiably accurate in size.
- B. Deflection testing cannot be performed until the final backfill has been in place at least 30 days.
- C. Any section with greater than 5% deflection shall be excavated and repaired by

rebedding or replacement of the pipe.

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3.05 MANHOLE TESTING:

The Contractor shall perform vacuum testing on all gravity sewer manholes as part of the sewer testing specified herein. Manholes shall be air vacuum tested in accordance with ASTM C1244 "Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (vacuum) Test".

END OF SECTION

SECTION 02936

SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Seeding, hydroseeding, and mulching.
- B. Maintenance.

1.02 RELATED SECTIONS

- A. Section 02220 - Excavating, Backfilling, Compaction.
- B. Section 02225 - Trenching.

1.03 DEFINITIONS

- A. Weeds: Include dandelion, jimsonweed, quackgrass, horsetail, morning glory, rush grass, mustard, lambsquarter, chickweed, cress, crabgrass, Canadian thistle, nutgrass, poison oak, blackberry, tansy ragwort, bermuda grass, johnson grass, poison ivy, nut sedge, nimble will, bindweed, bent grass, wild garlic, perennial sorrel and brome grass.

1.04 MAINTENANCE

- A. The Owner will provide no maintenance of the lawn until after acceptance. The Contractor shall water and cut the lawn as required until acceptance.

1.05 ACCEPTANCE

- A. The Owner will accept only a smooth, dense lawn of permanent lawn grasses that have rooted and grown for not less than 60 days. The Owner will not accept any portion of the lawn separately and will not accept a lawn that has thin spots, bare spots, eroded areas or excessive weeds. Any major part or portion of the lawn which is unacceptable after 60 days shall be reseeded and established for an additional 60 days before acceptance.

1.06 QUALITY ASSURANCE

- A. Provide seed mixture certificate showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.07 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products in a manner that assures products remain undamaged and suitable for use.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis and name of manufacturer.

1.09 MAINTENANCE SERVICE

- A. After the area has been seeded, the Contractor shall mow, water or reseed, if necessary, and maintain care of the lawn until it has become thoroughly established or until the Owner has accepted it.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Seed shall be "Fresh Crop" complying with Federal Specifications JJJ-S-181, "Seeds Agricultural." The seed mixture shall be composed of the following certified seeds:
 - 1. 5 percent Annual Rye.
 - 2. 30 percent Perennial Rye (NK-200).
 - 3. 35 percent Kentucky Bluegrass.
 - 4. 30 percent Kentucky 31 Fescue.

2.02 ACCESSORIES

- A. Mulching Material: Straw containing not less than $\frac{1}{10}$ gallon of rapid curing or medium curing liquid asphalt per square yard of coverage, or at the Contractor's option a hydro-mulch containing not less than $\frac{1}{25}$ gallon of rapid curing or medium curing emulsified asphalt per square yard of coverage. Mulch shall be free of noxious weed seed.
- B. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- C. Stakes: Softwood lumber, chisel pointed.
- D. String: Inorganic fiber.
- E. Edging: Permaloc Aluminum Edging - null finish $\frac{1}{8}$ " X 4", or approved equal (to be used as shown on the plans).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.02 SEEDING

- A. Apply seed at a rate of 5 pounds per 1,000 sq. ft. Sow uniformly at the prescribed rate making two applications at right angles to each other. Drag to mix seed with upper $\frac{1}{4}$ inch of soil. Lightly roll all seeded areas immediately after sowing with a 200 to 250 pound hand roller. Do not sow during high winds or other adverse weather conditions.
- B. Immediately following seeding and compacting, apply mulch uniformly with straw at 80 to 100 pounds per 1000 square feet. Asphalt binder shall then be applied on the straw mulch at the stated rate.
- C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 2 inches of soil. Further watering shall be made as conditions warrant in order to meet maintenance requirements.

END OF SECTION