TOWN OF MORRISTOWN, INDIANA

CONSTRUCTION STANDARDS SPECIFICATIONS AND DETAILS

JULY 2015

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DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01100 - PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 General Items

- A. The standard details and specifications for the Town of Morristown (Town) apply to all infrastructure construction. The applicable standard details and specifications shall be incorporated into the construction plans for all projects in the Town.
- B. Prior to commencement of construction, the Town must approve all Drawings and Specifications for said construction. The Town shall have a minimum of 3 weeks to review these items.
- C. The Town must approve all materials and any proposed deviations from the construction standards prior to construction and installation. Submit copies of all Shop Drawings to the Town for record keeping purposes.
- D. One set of drawings and specifications "approved" by the Town and the Indiana Department of Environmental Management (IDEM), if applicable, shall be maintained on the job at all times.
- E. Notify the Town a minimum of 48 hours prior to commencement of all construction activities and construction activities within 40 feet of a Town sanitary force main.
- F. Trenchless installation methods shall be used for all waterway crossings unless otherwise approved by the Town and applicable State and Federal permitting agencies.
- G. For roadway crossings, installation method (open trench and trenchless methods) must be approved by the Town and any applicable permitting authority prior to construction.
- H. Sump pump discharge piping shall connect to a piped stormwater conveyance or discharge over the ground to a swale or ditch. A sump pump shall not discharge over a sidewalk or to a street or paved surface. Upon approval by the Town, a French drain may be used when soil conditions will promote infiltration into the ground and other alternatives are not available.

1.02 Contact information for the Town of Morristown:

Water/Wastewater Department	765-763-7112
Town Municipal Building	765-763-6748
Development/Plan Commission	765-763-6748

- 1.03 Meetings
 - A. Schedule a pre-construction conference with the Town a minimum two (2) business days prior to commencement of construction.
 - B. No work shall begin prior to pre-construction meeting with the Town.
- 1.04 Domestic Product Requirements
 - A. All steel and foundry products, including ferrous and non-ferrous metals, piping, fittings, and piping related products, shall be manufactured in the United States.
- 1.05 Definitions
 - A. Acceptance: The formal written acceptance by the Town of Morristown of an entire project which has been completed in all respects in accordance with the approved Drawings, Specifications, and these Standards including any previously approved modifications.
 - B. Annexation: The inclusion of additional property into the Corporate Limits by proper legal procedures.
 - C. Building Sewer (Lateral): The conduit for transporting waste discharged from the building to the public sewer commencing three (3) feet outside the building walls and ending at and exclusive of the wye or tee fitting at the connection to the public sewer.
 - D. Contractor: Any Contractor who meets the Town's requirements to perform the work under the Town's jurisdiction.
 - E. County: The County of Shelby, State of Indiana.
 - F. Designer: The person responsible for the design of the work and who is licensed in the State of Indiana to perform the design services.
 - G. Drawings: Construction drawings, including system maps, plans and profiles, cross sections, utility plans, detailed drawings, etc., or reproductions thereof, approved or to be approved by the Town and the Morristown Plan Commission, which show location, character, dimensions and details of the work to be completed.
 - H. Easement: Areas along the line of all public utilities which are outside of the dedicated utility easements or road right-of-way, and are recorded and dedicated to the Town granting rights along the line of the utility. Easements shall be exclusive easements for the utility installed in the easement. No other utilities shall be constructed or encroach upon the easement except with the expressed written approval of the Town.
 - I. Engineer: The individual, partnership, firm, corporation retained by the Town to provide professional engineering services on any given Project.

- J. Governing Agency/Bodies: Governing Agency having jurisdiction due to location or type of work being performed.
- K. Indiana Plumbing Code: The International Plumbing Code currently adopted and as amended by the State of Indiana.
- L. Infiltration/Inflow: The total quantity of water from both infiltration and inflow without distinguishing the source.
- M. Inspector: A representative of the Town of Morristown assigned to make detailed inspection of any or all portions of the work and materials. The inspector has full authority to reject materials and any portion of the work not supplied and installed in accordance with these Standards, and to stop work if the work is not proceeding in accordance with these Standards.
- N. Lift Station: Any arrangement of pumps, valves, and controls that lift and convey wastewater to a higher elevation.
- O. Project Owner: Any individual, partnership, firm, corporation, or other entity who, as property owner, is initiating the work on any given project.
- P. Permits: Clearance to perform specific work under specific conditions at specific locations. The Project Owner or his duly authorized representative shall prepare and submit all permit applications to the applicable regulatory agency. Copy the Town on all permit related correspondence.
- Q. Public Sewer: Any sewer constructed, installed, maintained, operated, and owned by Town.
- R. Record Drawings: Drawings certified, signed, and dated by a professional engineer registered in the State of Indiana, indicating that the Drawings have been reviewed and revised to accurately show all as-built construction and installation details including, but not limited to key elevations, locations, and distances.
- S. Right-of-Way: All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the Town shall have the right to install and maintain public utilities.
- T. Standard Drawings: The drawings of structures, utility lines, or devices commonly used and referred to on the plans and in these Standards.
- U. Standards: The Construction Standards within the Town of Morristown as contained herein and all subsequent additions, deletions, or revisions.
- V. Ten States Standards: Recommended Standards for water works and sewage works, latest editions.
- W. Town: Town of Morristown, Indiana.

- X. Work: All the work to be done under Town's permit, in accordance with the approved Plans, Specifications, these Standards and permit conditions.
- 1.06 Management of Contractor's Forces
 - A. Designate a Superintendent who shall represent the Contractor on the job site. Directions given to this Superintendent shall be as binding as if given to the Contractor.
 - B. Plan, schedule, and supervise the Work to meet the construction schedule.

1.07 Coordination

- A. Notify the Town in writing a minimum of two (2) working days prior to commencement of construction.
- B. No water or sewer system construction may begin until approval from IDEM in the form of an approved construction permit, when applicable, has been received by the Town.
- C. Advise the Town as to who the Contractor will be prior to the pre-construction conference. The Town reserves the right to reject the Contractor.
- D. Coordinate work with other contractors and the Town.
- E. Maintain service to existing customers affected by Contractors' operations during construction. Schedule and perform construction to minimize interruptions to existing services and inconvenience to others.
- F. Locate all existing utilities prior to commencement of construction. Call Indiana 811 at 811 or 1-800-382-5544 for public utilities.
- G. Street closures must be approved by the Town prior to beginning work.
- H. Notify the Town immediately in the event of damage to any public street during the course of the work requiring the street to be closed. Contractor shall be responsible for the street repair and other costs resulting from the street damage and the closure.
- Notify the Town and the affected utility immediately in the event of damage to any utility line or facility. Contractor shall be responsible for repair and other costs resulting from the utility damage as determined by the Town or effected utility. A representative from the Town or effected utility must be on-site to inspect all repairs prior to backfill.
- J. Provide bonds as required by the Subdivision Control Ordinance.
- K. Notify the Town one (1) working day prior to working on weekends. Compensate the Town for all inspection services provided in response to work performed on the weekends or beyond the normal 40-hour work week.

- 1.08 Rights of Access
 - A. The Project Owner and Contractor agrees that representatives of the Town and regulatory agencies 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.
- 1.09 Safety and Health Regulations for Construction
 - A. Obligations prescribed as employer obligations under Chapter XVII of Title 29, Code of Federal Regulations, Part 1926, otherwise known as "Safety and Health Regulations for Construction and CFR Part 1910.46 Permit Required for Confined Space" are the sole responsibility of the Contractor.
 - B. Upon request, provide the Town with the name of the Contractor's Safety Officer, plus the on-site Safety Representative, if other than the Superintendent.
 - C. Safety must be kept at all times. The Contractor is solely responsible for the safety of the construction site and the safe work practice of all of their employees and subcontractors, without supervision, direction, input, oversight, or comment by the Town, or the Town's personnel or construction representative.
- 1.10 Discovery of Hazardous Material
 - A. If, during the course of this work, the existence of hazardous material, including asbestos containing material, is observed in the work area, immediately notify the Town in writing. Do not perform any work pertinent to the hazardous material prior to receipt of instructions from the Town.
- 1.11 Division of Responsibility
 - A. The Town is responsible for maintaining the water main, service line to the meter pit, and all appurtenances inside the meter pit. The remainder of the service line and all appurtenances from the meter to the customer is the responsibility of the customer.
 - B. The Town is responsible for maintaining the sanitary sewer main. The customer is responsible for maintaining the sewer lateral. If the sewer lateral requires cleaning and is 6-inch in diameter or larger, the Town may assist with cleaning.
- 1.12 Operations Outside of Right-of-Ways or Easements
 - A. If the methods of the construction employed require the use of land beyond the public right-of-way limits, make arrangements with the property owners affected for the use of such additional land. Such additional agreements will not include any liability for the Town and shall have no direct effect on the completion of the project, project cost, or the time of completion.

1.13 Permits

- A. Obtain permits including, but not limited to, permits from the following:
 - 1. Town of Morristown
 - 2. Shelby County
 - 3. Indiana Department of Transportation (INDOT)
 - 4. Indiana Department of Environmental Management
 - 5. Indiana Department of Homeland Security Fire and Building and Safety Division
 - 6. Indiana Department of Natural Resources
 - 7. U.S. Army Corps of Engineers
 - 8. Applicable Railroad Authority
- B. Submit all permits to the Town for review and approval prior to any construction activities. Provide copies of all permit applications to the Town.
- C. Perform construction in full accordance with all permit requirements.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 Site Maintenance

- A. The working area shall be kept free, at all time, of tools, materials, and equipment not essential to the work in progress. Debris, waste materials, and rubbish shall not be allowed to accumulate and shall properly be disposed of. On site burning of trash and debris is prohibited. On-site burial of trash and debris is prohibited.
- B. If the Contractor fails to maintain the construction site or sites, the Town will make the necessary arrangements to clean up the site or sites at the Contractor's expense. If such action becomes necessary the Town shall not be responsible for the inadvertent removal of materials which the Contractor would not have disposed of had he or she performed the clean up.
- C. Where material or debris has washed, flowed, blown, or been purposely deposited into watercourses, drains, ditches, inlets, or elsewhere as a result of the construction operation, such material or debris shall be entirely removed and satisfactorily disposed of immediately upon identification.
- D. The Contractor shall be responsible for restoring or replacing any public or private property damaged by the construction operations, equipment, or employees to a condition at least equal to that existing immediately prior to beginning the project.

- E. The Contractor shall be responsible for the repair of all drainage tile broken or damaged during construction. The replacement pipe shall be installed with pea gravel or other approved granular backfill from the bottom of the trench to six (6) inches above the top of the replacement pipe. The repair of the drainage tile shall be made to the satisfaction of the Town and the property owner on whose property the drainage tile is located.
- F. Repair or replace all parking lots and drives in-kind to their original state of usefulness. Streets and side ditches shall be left in neat and operable condition.
- G. Restore the grades to the original contours and condition, and install and maintain the erosion control measures until the grades and slopes are stabilized.
- H. The Contractor shall be responsible for maintaining and mowing the properties on which the construction is being perform once construction has commenced until the construction is complete and the work has been accepted, including all easements, right-of-ways, and common areas. If the Contractor fails to maintain the project site or sites, the Town will make the necessary arrangements to maintain and mow the site or sites at the Contractor's expense.

-END-

SECTION 01400 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Abbreviations used in these Specifications
 - 2. General reference standards, rules and regulations that govern construction work, alterations, repairs, mechanical installations and appliances connected therewith
 - 3. Administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Documents requirements.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Documents requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Town, or authorities having jurisdiction are not limited by provisions of this Section.
- 1.02 Reference Abbreviations
 - A. Reference to a technical society, trade association or standards setting organization may be made in the Specifications by abbreviations in accordance with the following list:

AABC AAR AAMA	Associated Air Balance Council Association of American Railroads American Architectural Manufacturers Association
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers Association
A-E	Architect/Engineer
AGA	American Gas Association
AHAM	Association of Home Appliance Manufacturers
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute

AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
APA	The Engineered Wood Association
AREA	American Railway Engineers Association
ARI	American Refrigeration Institute
ASCE	American Society of Civil Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
CABO	Council of American Building Officials
CAGI	Compressed Air and Gas Institute
CISPI	Cast Iron Soil Pipe Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute
DOH	Department of Health
DOT	Department of Transportation
FS	Federal Specifications
FHWA	Federal Highway Administration, Department of Transportation
FM	Associated Factory Mutual Laboratories
GANA	Glass Association of North America
HPVA	Hardwood Plywood and Veneer Association
ICEA	Insulated Cable Engineers Association
IDEM	Indiana Department of Environmental Management
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
IGCC	Insulating Glass Certification Council
	Indiana Department of Transportation
IPCEA	Insulated Power Cable Engineers Association
	Indiana State Plumbing Code
	Minitary Specifications
	Manufacturer's Standardization Society
	National Association of Architectural Metal Manufacturers
	National Association of Chain Manufacturers
	I S Noval Escilition Engineering Command
	National Environmental Balancing Burgau
NEC	National Electrical Code
	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NEPA	National Fire Protection Association
NFPA	National Forest Products Association
NIST	National Institute of Standards and Technology
NSF	National Sanitation Foundation

OSHA	Occupational Safety and Health Administration
PCI	Precast Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PFI	Pipe Fabricators Institute
SAE	Society of Automotive Engineers
SPECS	Specifications
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPI	Society of the Plastics Industry
SSPC	The Society for Protective Coatings
STI	Steel Tank Institute
TCNA	Tile Council of North America
UL	Underwriter's Laboratories, Inc.
USBR	US Bureau of Reclamation
WPCF	Water Pollution Control Federation
WWPA	Western Wood Products Association

- 1.03 Definitions
 - A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 - C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful inservice performance.
 - D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
 - E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
 - F. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
 - G. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements.

- H. Specialists: Certain sections of the Specification may require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialist shall not supersede building codes and similar regulations governing the Work, and shall not interfere with local trade-union jurisdictional settlements and similar conventions.
- I. Testing Agency: An entity with the experience and capability to perform specific tests, inspections, or both. Testing laboratories shall mean the same as testing agency.
- 1.04 Delegated Design
 - A. Where professional design services or certifications by a design professional are specifically required of the Contractor by the Contract Documents, provide these services and certifications in compliance with specific performance and design criteria indicated. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to the Town.
 - B. Submit a statement, signed and sealed by the responsible design professional, for each product or system specifically assigned to Contractor to be designed or certified by a design professional, indicating the products or systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other design factors used in performing these services.
- 1.05 Tests and Inspections
 - A. Prior to the issuance of a Construction Permit and the commencement of construction, the Project Owner shall make arrangements with the Town and Shelby County, if applicable, for construction inspection services to be provided.
 - B. All materials and each part or detail of the work shall be subject to inspection by the Town at all times. The Town shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.
 - C. Shop inspections may be required including observations of the preparation, manufacture and coating of materials and products at the plant.
 - D. The inspection of the work shall not relieve the Contractor of any obligation to fulfill his contract as prescribed. Defective work shall be made good and unsuitable materials shall be rejected, notwithstanding that such defective work and materials have been previously overlooked and accepted on estimates for payments.
 - E. All work shall be tested to the satisfaction of the Town before acceptance. The cost of all tests is the responsibility of the Contractor.

- F. Prepare and submit a schedule of tests, inspections, and similar quality-control services required for the project at least 10 days before the start of construction. Include the following information in the schedule:
 - 1. Standard Section number and title
 - 2. Description of test and inspection
 - 3. Identification of applicable standards
 - 4. Identification of test and inspection methods
 - 5. Number of tests and inspections required
 - 6. Time schedule or time span for tests and inspections
 - 7. Entity responsible for performing tests and inspections
 - 8. Requirements for obtaining samples
 - 9. Unique characteristics of each quality-control service
- G. Distribute schedule to Town, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- H. Prepare and submit certified written reports that include the following:
 - 1. Date of issue
 - 2. Project title and number
 - 3. Name, address, and telephone number of testing agency
 - 4. Dates and locations of samples and tests or inspections
 - 5. Names of individuals making tests and inspections
 - 6. Chain of Custody Record (where applicable)
 - 7. Description of the Work and test and inspection method
 - 8. Identification of product and Specification Section
 - 9. Complete test or inspection data
 - 10. Test and inspection results and an interpretation of test results
 - 11. Ambient conditions at time of sample taking and testing and inspection
 - 12. Comments or professional opinion on whether tested or inspected Work complies with the Contract Documents requirements
 - 13. Name and signature of laboratory inspector
 - 14. Recommendations on retesting and reinspection
- 1.06 Submittals
 - A. Qualification Data: For testing agencies specified in "Quality Assurance" Article, submit data to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
 - B. Permits, Licenses, and Certificates: For the Town's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.07 Quality Assurance

- A. Regulatory Requirements: Work shall comply with the following:
 - 1. Army Corps of Engineers
 - 2. Environmental Protection Administration (EPA)
 - 3. Great Lakes Upper Mississippi River Board (GLUMRB) Ten States Standards
 - 4. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD)
 - 5. Indiana Department of Environmental Management (IDEM)
 - 6. Indiana Department of Homeland Security (IDHS) Fire and Building Safety Division
 - 7. Indiana Department of Natural Resources (IDNR)
 - 8. Indiana Department of Transportation (INDOT)
 - 9. Indiana Occupational Safety and Health Act (IOSHA)
 - 10. Local utility regulations
 - 11. Local town and county ordinances, rules, and regulations pertaining to the Work
 - 12. Any other applicable State or Federal regulations
- B. State codes, and the national and international codes that they are based on, that apply include, but are not limited to:
 - 1. Indiana Building Code (International Building Code)
 - 2. Indiana Plumbing Code (International Plumbing Code)
 - 3. Indiana Electrical Code (National Electrical Code)
 - 4. Indiana Mechanical Code (International Mechanical Code)
 - 5. Indiana Energy Conservation Code
 - 6. Indiana Fire Prevention Code (International Fire Code)
- C. Included in the codes that apply are the codes and standards that are incorporated by reference which apply to the Work. Those include, but are not limited to, the National Electrical Manufacturer's Association (NEMA) and the National Fire Protection Association's (NFPA) codes and standards.
- D. Such rules, regulations and ordinances are to be considered part of these Specifications.
- E. Fees for licenses shall be paid by the Contractor.
- 1.08 Quality Control
 - A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 2. Do not employ the same entity engaged by Town, unless agreed to in writing by Town.

- 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
- 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
- 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
- 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- C. Retesting/Reinspection: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspection, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Town, Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Town, Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 - 5. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 - 4. Facilities for storage and field-curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- F. Schedule time for tests, inspections, obtaining samples, and similar activities. Coordinate sequence of activities to accommodate required quality-assurance and

quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

- 3.01 Repair and Protection
 - A. On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - B. Protect construction exposed by or for quality-control service activities.
 - C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

-END-

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

- 1.01 Summary
 - A. Section Includes: Providing and coordinating temporary facilities, utilities and controls.
 - B. Related Sections
 - 1. Section 01010 Project Requirements
 - 2. Section 01400 Quality Requirements

1.02 References

- A. Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) and Indiana Supplement, latest editions
- 1.03 Submittals
 - A. Quality Assurance/Control Submittals
 - 1. Before beginning work adjacent to any street, provide the Town with a proposed signing schedule, which shall include location, size and messages of all signs to be used.

1.04 Quality Assurance

- A. Regulatory Requirements
 - 1. Obtain permits as specified in Section 01100.
 - 2. Comply with the latest applicable Federal, State, and local codes.
 - 3. Maintain lights and barricades on all obstructions and hazards during contract period in conformance with federal, state and local laws and codes.

PART 2 - PRODUCTS

- 2.01 Temporary Facilities, Utilities and Services
 - A. Storage Sheds and Enclosures
 - 1. Provide storage sheds or construction trailers as needed for the storage of materials and management and performance of the work. Coordinate location and removal of the storage sheds and trailers with the Town.
 - 2. Provide temporary weather-tight enclosures for all exterior openings.
 - 3. Equip exterior doors with locks and closers.

TOWN OF MORRISTOWN CONSTRUCTION STANDARDS JULY 2015

- B. Sanitary Facilities
 - 1. Provide sanitary facilities for use of all construction personnel including personnel of other contractors for the duration of the project as follows:
 - a. Chemical units complete with weather-tight enclosure adequately ventilated and equipped with latching door.
 - b. Maintain chemical units weekly or at lesser periods if determined necessary. Chemical units shall be in accordance with the rules and regulations of the locality of the project (State, county or Town).
 - c. Furnish toilet paper and hand sanitizer for the chemical units and replenish supply as needed.
- C. Water and Electric Service
 - 1. Install and maintain all extensions from the service sources to work areas as required providing adequate water supply and electric power for all aspects of the work and in accordance with all relevant codes and regulations.
- D. Heat and Ventilation
 - 1. Provide heat and ventilation as required to maintain specified conditions for construction operations, to provide for a safe working environment in accordance with health regulations, and to protect materials and finishes from damage due to temperature or humidity. Follow requirements set forth elsewhere in these Specifications.
 - 2. Whenever fixtures, water services or items subject to damage from cold have been installed, maintain the temperature above 50 degrees Fahrenheit.
 - 3. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place. Provide and pay for operation, maintenance, and utilities and fully service all equipment, including cleaning filters, until the time the Work is turned over to the Project Owner.
 - 4. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.
 - 5. No open fires will be permitted.
- E. Trash Containers
 - 1. Provide a trash container for the disposal of packaging materials, pieces of broken pipe, rubbish, trash and all other debris. Empty trash containers weekly or as container is filled.
- F. Fire Extinguishers
 - 1. Provide multipurpose dry chemical fire extinguishers as required. Mount units in protective red enclosures plainly marked and readily accessible.

- G. Bulletin Board
 - 1. Provide a bulletin board or display area to post required notices in an appropriate weather-protected manner.
- H. Construction Signs and Equipment
 - 1. Provide and erect construction signs, lights, channelizing devices, and other traffic control equipment in accordance with the MUTCD and the Indiana Supplement requirements.

PART 3 - EXECUTION

- 3.01 Installation
 - A. Locate temporary facilities herein specified, and facilities required by the Contractor and his or her subcontractors for storage or other purposes in the performance of the work, to avoid interference with work. Relocate as required and/or directed by the Town.
 - B. Construct temporary structures on stable foundation with code approved service connections.
 - C. Install temporary electrical service and distribution overhead. Do not run branch circuits on floor.
- 3.02 Protection
 - A. Safety: Maintain signs, lights, and barricades on all obstructions and hazards during construction period in conformance with local, state, and federal laws and codes.
- 3.03 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 compacted aggregate to provide a suitable support for vehicular traffic and anticipated loads.
 - B. Provide and maintain temporary parking facilities for use by construction personnel, the Town, and the Designer. 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.

3.04 Maintenance of Traffic

A. General

- 1. Comply with the requirements of the State, County Highway and Town Street Departments for all traffic maintenance.
- 2. Maintain all construction signs, lights, channelizing devices, and other traffic control equipment in proper working order.
- 3. During construction, maintain and protect the pedestrian and vehicular traffic at all times on all streets involved and provide access to all residential and commercial establishments adjacent to the construction area.
- B. Notification Requirements
 - 1. Before closing any thoroughfare, notify and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction (state, county, or Town).
 - 2. Notify the Town and Designer of intended road or drive closures 72 hours in advance of the proposed closing. Place all proper detour signs and barricades prior to the actual street closing.
 - 3. Notify each resident or property owner of work which will impact access to his property a minimum of two (2) business days in advance of restricting access to the property.
- C. Lane/Road Restriction Requirements
 - 1. Do not unduly or unnecessarily restrict or impede normal traffic through the streets of the community. Keep the traveled way of all streets, roads, and alleys clear and unobstructed. Do not use streets, roads, or alleys for the storage of construction materials, equipment supplies, or excavated earth, except when and where necessary.
 - Adjacent street segments shall not be closed at the same time to reduce delays for emergency responders. For this requirement, an "adjacent street segment" shall include the next block of the same street in either direction, the same block of a parallel street in either direction, and the nearest blocks of perpendicular (connecting) streets in all directions.
 - 3. The public streets shall remain open and unrestricted by construction activities at all times unless specific prior written approval has been obtained from the Town.
 - 4. Daily lane closures on the public streets may be permitted. Lane closures are only permissible between 7:00 am and 5:00 pm, weekdays. Unless otherwise provided, maintain at least one 12-foot wide lane of traffic at all streets and service drives during construction of the project. Provide flagmen or temporary signals where required to maintain flow of traffic. During non-construction hours, open all lanes for public use.
 - 5. Partial road closures <u>overnight</u> on all streets may be allowed with prior written approval by the Town, provided that the maximum length of closure is less 400 feet, no driveways are blocked, and no more than one overnight partial road closure will occur simultaneously. When re-opening these roads, move

the traffic channelizing devices to the edge of the travel lanes, and cover every flagger and one lane road sign with an opaque material, turn signs to face away from the roadway, or remove.

- 6. The Contractor may limit or prohibit public parking within the limits of the project if prior approval from the Town is obtained.
- 7. If required by duly constituted public authority, construct bridges or other temporary crossing structures over trenches at no additional cost. Such structures shall be of adequate strength and proper construction and shall be maintained in such manner as not to constitute an undue traffic hazard.
- D. Access to Private Property
 - Private driveways shall not be closed, except when and where necessary, and then only upon advance approval from the Town and for the shortest practicable period of time, consistent with efficient and expeditious construction. When a residential driveway is closed due to construction activity, designate safe parking areas and provide access to adjacent properties. The Contractor shall be liable for any damage to persons or property resulting from his work.
 - 2. Maintain a clean pedestrian access to all establishments within the project limits during construction by use of temporary bridging or other means. Make every effort to ensure that no business establishment is without a paved sidewalk for more than 10 calendar days.
- E. Walks and Passageways
 - 1. Make provisions at cross streets for the free passage of vehicles and foot passengers, either by bridging or otherwise.
 - 2. Do not unnecessarily obstruct the sidewalks, gutters, or streets, or prevent in any manner the flow of water in streets. Use all proper and necessary means to permit the free passage of surface water along the gutters.
 - 3. Immediately remove and dispose of excavated materials and offensive matter to avoid inconveniencing the public and adjacent tenants. Erect suitable barriers to prevent such inconveniences and to prevent injury to trees, sidewalks, fences, and adjacent properties.
 - 4. At any time during construction, when there is not a curb adjacent to the roadway, place barricades as shown on the Drawings or as directed by the Town. Protect any gaps adjacent to an open sidewalk with orange snow fencing.
- F. Pavement Restoration
 - 1. Streets in which excavation has occurred shall be temporarily restored to receive traffic as soon as possible. Permission to close additional streets shall be denied the Contractor if, in the opinion of the Town the restoration on streets where excavation has occurred has not progressed satisfactorily.
 - 2. Maintain the road surfaces during the construction, take precautions to prevent unnecessary damage to partially completed surfaces, and repair any portions

which do become damaged. Bear all costs involved in such maintenance, precautions, and repairs, including the cost of all necessary materials.

- 3. During construction of new piping, prior to final pavement repair, backfill all public roads and drive crossings as shown on the Drawings and top with 12 inches of Compacted Aggregate No. 53 or approved material.
- 3.05 Barricades, Warning Lights and Arrow Boards
 - A. Provide, erect and maintain all necessary barricades, suitable and sufficient danger signals and signs. Take all necessary precautions for the protection and safety of the public, workmen, structures and equipment. Roads closed to traffic shall be protected by effective barricades. Obstructions shall be illuminated during hours of darkness.
 - B. Erect warning signs in advance of any location on the project where operations may interfere with the use of the road by traffic and at all intermediate points where the new work crosses or coincides with an existing road.
 - C. Place sufficient warning lights and arrow boards on or near the work and keep them illuminated during periods of construction and reduced visibility (from twilight in the evening until sunrise). The Contractor is responsible for all damages that any party or the Town may sustain in consequences of neglecting the necessary precautions in prosecuting this work.
- 3.06 Removal and Clean-Up
 - A. Remove all temporary facilities, utilities, services and materials upon completion of construction. Remove debris and clean area. Repair all damage and restore area to finish condition.

-END-

SECTION 01570 - STORM WATER POLLUTION PREVENTION AND EROSION CONTROL

PART 1 - GENERAL

1.01 Summary

- A. Section Includes
 - 1. All temporary and permanent control measures as shown on the Drawings or as ordered by the Town during the life of the contract to control water pollution, soil erosion, and siltation through the use of berms, dams, dikes, gravel, mulches, grasses, and other erosion control devices or methods.
 - 2. Temporary erosion control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.
- B. Related Sections
 - 1. Section 02300 Earthwork

1.02 References

- A. 327 IAC 15-5 Storm Water Runoff Associated with Construction Activity (Rule 5)
- B. INDOT Standard Specifications 2012, Section 918.02.
- 1.03 Submittals
 - A. Provide notification to the Town a minimum of 48 hours before the start of construction. Provide verbal or written notification of the actual construction start date to the local Soil and Water Conservation District (SWCD) and IDEM Rule 5 Coordinator.
 - B. Prior to the start of construction, submit erosion control schedules for temporary and permanent erosion control work as applicable for clearing and grubbing, grading, construction, paving and structures at watercourses.
 - C. Submit a plan for erosion and dust control on haul roads and borrow pits.
 - D. Submit a plan for disposal of waste materials.
 - E. Provide inspection reports per Part III of this Section.
 - F. Provide notification to the Town when land disturbing activities have been completed, the entire site has been stabilized (permanent vegetation established at 70% density of coverage), and all temporary erosion control measures have been removed.
 - G. Once the notification that the land disturbing activities have been completed, submit a Notice of Termination (NOT) letter to IDEM and the local SWCD, with a copy to the Town, to close out the Rule 5 permit.

1.04 Quality Assurance

- A. Regulatory Requirements
 - 1. Comply with Rule 5 permit requirements and conditions until a NOT is submitted to close out the permit.
 - 2. Provide grass seed containers bearing a seed label tag in accordance with the requirements of the Indiana Seed Law.
 - 3. Provide fertilizer conforming to federal and state regulations and to the standards of the Association of Official Agricultural Chemists.
 - 4. Comply with all federal, state and local erosion control and pollution prevention laws
 - 5. Post the following information at the project site:
 - a. Notice of Intent (NOI) letter
 - b. National Pollution Discharge Elimination System (NPDES) permit number
 - c. Name, Address, and phone number of the local contact person
 - d. Location of a copy of the construction Drawings
- B. Authority of Town: The Town has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds and areas of water impoundment.
- 1.05 Delivery, Storage and Handling
 - A. Deliver grass seed in new and unopened containers or bags.
- 1.06 Warranty
 - A. For one year after Work has been completed and accepted by the Town, correct any defective work, including but not limited to such things as bare spots in grass coverage, erosion, gullies, etc. in a timely manner upon notification from the Town.

PART 2 - PRODUCTS

2.01 Materials

- A. General: Provide materials in accordance with the requirements specified herein.
- B. Temporary Grass Seed
 - 1. Quick-growing species such as ryegrass, Italian ryegrass, or cereal grasses suitable to the area
 - 2. Use grass species that will not compete with the grasses sown later for permanent cover
 - 3. Apply temporary seeding to all disturbed areas to be left idle for 15 days or more during the growing season (August 15 to October 15 and April 1 to June 1).

- C. Permanent Grass Seed
 - 1. Provide permanent grass seed consisting of 35 percent Kentucky Bluegrass, 30 percent Perennial Rye, 30 percent Kentucky 31 Fescue, and no more than 5 percent inert matter.
 - 2. Contains no objectionable weeds
- D. Sod
 - 1. Provide fibrous, well rooted bluegrass, or other approved sod, with the grass free of weeds cut to a height of not more than 3 inches.
 - 2. Provide cleanly cut sod to a uniform thickness of not less than 1-1/2 inches to a uniform width of not less than 16 inches and in strips not less than 3 feet in length.
 - 3. Use within 1 week of its cutting do not allow to dry out
 - 4. Strongly rooted sod, a minimum of 2 years old
 - 5. Capable of growth upon planting
- E. Mulch
 - 1. Hay, straw, fiber mats, netting, bark or wood fiber
 - 2. Straw mulch shall consist of threshed straw of cereal grain such as oats, wheat, barley, rye, and rice.
 - 3. Free of objectionable weeds, seeds, or other material that may be detrimental to the planting being established.
 - 4. Apply mulch to all areas that have been seeded and to disturbed areas to be left idle for 15 days or more outside of the growing season.
 - 5. Application rates:
 - a. Straw/hay mulch: 115 pounds per 1,000 square feet (2.5 ton/acre)
 - b. Wood fiber mulch: 46 pounds per 1,000 square feet (0.5 ton/acre)
- F. Fertilizer
 - 1. Contains the minimum percentage of available nutrients (Nitrogen, Phosphorus, and Potash) based on soil content, seed mix and local conditions.
 - 2. If local conditions do not indicate otherwise and soil testing is not required, provide 12-12-12 analysis fertilizer.
 - 3. Application rate: as specified by the supplier.
- G. Lime
 - 1. When soil testing results require pH levels to be increased, apply agricultural lime to the soils. Produce a slightly acid soil (pH 6.5).
 - 2. Other available forms of liming materials may be applied depending on their potential to neutralize soil acidity.
 - 3. Provide agricultural lime from a dealer or manufacturer whose brands and grades are registered or licensed by the State of Indiana Department of Agriculture.
 - 4. Changes to the lime requirements will be determined by the pH test, as indicated on soil analysis results.

- H. Topsoil
 - 1. Provide topsoil meeting the requirements specified in Section 02300.
- I. Erosion Control Blanket: Provide North American Green meeting the requirements of the specific application.
- J. Fiber Filtration Tubes
 - 1. Natural or man-made fiber filter media encased within cylindrical tubes composed of a photodegradable mesh.
 - 2. Performance: slowing and filtering of suspended particles in storm water runoff. The tubes shall allow water to flow freely while providing filtration of suspended particles.
- K. Geotextile Fabric for Use Under Riprap, Crushed Stone or Aggregate
 - 1. Provide non-woven needle punched or heat bonded geotextile fabric consisting of strong, rot resistant, chemically stable long-chain synthetic polymer materials which are dimensionally stable relative to each other. The geotextile plastic yarn or fibers shall consist of at least 85 percent by weight of polyolefins, polyesters, or polyamides and resist deterioration from ultraviolet and heat exposure.
 - 2. Provide geotextile meeting or exceeding the following requirements (Source: INDOT Standard Specifications 2012, Section 918.02)

TEST	METHOD	REQUIREMENTS
Grab Strength	ASTM D4632	80 lb (355.8 N)
Seam Strength	ASTM D4632	70 lb (311.4 N)
Puncture Strength	ASTM D6241	25 lb (111.2 N)
Trapezoid Tear	ASTM D4533	25 lb (111.2 N)
Apparent Opening Size	ASTM D4751	Sieve No. 50 max.
Permeability	ASTM D4491	0.1 mm/sec
Ultraviolet Degradation	ASTM D4355	70% strength retained

- L. Straw Bale Filters
 - 1. Use straw bale filters for the slowing and filtering of storm water before it enters storm water conveyances such as driveway culverts or other inlet structures that drain small drainage areas.
 - 2. Do not use across a stream, ditch, channel, swale or where concentrated flows will occur.

- M. Silt Fence
 - 1. Provide synthetic filter fabric shall be a pervious sheet of woven or non-woven geotextile fabric and shall be certified by the manufacturer or supplier as conforming to the following requirements:
 - a. Textile strength at 20% (maximum) elongation, per ASTM D4632
 - b. Woven extra strength 50 lb/linear inch (minimum), non-woven extra strength 70 lb/inch (minimum)
 - c. Woven standard strength 30 lb/linear inch (minimum), non-woven standard strength 50 lb/inch (minimum)
 - Apparent opening size (AOS) (U.S. Sieve) No. 30 particle size of 0.6 mm (maximum), ASTM D 4751
 - e. Permittivity 0.05 S⁻¹ (maximum), ASTM D4491
 - 2. Provide 2-inch diameter wood or equivalent metal posts with a minimum length of 5 feet. Metal posts shall have projections for fastening wire to them.
 - 3. Provide 1-inch x 2-inch anchor stakes with a minimum length of 18 inches.
 - 4. Furnish standard strength filter cloth wire fence a minimum 42 inches in height, a minimum of 14 gauge, and shall have a maximum mesh spacing of 6 inches.
 - 5. The height of the barrier shall be a minimum of 18 inches and a maximum of 30 inches.
 - 6. Purchase the fabric as a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter fabric shall be spliced together only at a support post, with a minimum 6 inch overlap, and securely sealed.
- N. Other: All other materials shall meet commercial grade standards and be approved by the Town before being incorporated into the project.

PART 3 - EXECUTION

3.01 Preparation

- A. Do not start work until the erosion and sediment control schedules and methods of operations for the applicable construction activities have been accepted by the Town.
- B. Coordinate temporary erosion and sediment control measures contained herein with the permanent erosion control measures and soil stabilization methods as specified as part of this contract to assure economical, effective, and continuous erosion and sediment control throughout the construction and warranty period.

3.02 Protection

- A. Temporarily or permanently stabilize unvegetated areas that are scheduled or likely to be left inactive for 15 days or more with measures appropriate for the season in order to minimize erosion potential.
- B. Do not discharge pollutants such as sediments, fuels, lubricants, bitumen, raw sewage, or wash water from concrete mixing operations (concrete washout), water from trench or pit dewatering, and other harmful materials into or near storm water conveyances, wetlands, rivers, streams, and impoundments or into natural or manmade channels leading thereto.

- C. Do not apply pesticides when working in or adjacent to a floodway, river, stream, ditch, or other storm water conveyance.
- D. Properly dispose of all waste materials.

3.03 Installation - General

- A. Incorporate all permanent erosion control features into the project at the earliest practical time. Except where future construction operations will damage slopes, perform the permanent seeding, mulching and other slope protection work in stages as soon as substantial areas of exposed slopes can be made available.
- B. Use temporary erosion and pollution control measures to correct conditions that develop during construction, that are needed prior to installation of permanent control features, or that are needed temporarily to control erosion that develops during normal construction practices.
- C. Schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, install temporary erosion control measures between successive construction stages.
- D. Limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress.
- E. In the event temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or as ordered by the Town, perform such work at Contractor's expense.
- F. Maintain all erosion and sediment control practices during the construction period.

3.04 Installation - Erosion and Sediment Control Measures

- A. Temporary Construction Entrance
 - 1. Install a temporary construction entrance.
 - 2. Construct temporary construction entrances where needed to prevent tracking of soil or mud onto publicly or privately owned paved surfaces.
 - 3. Place temporary construction entrances at locations where construction vehicles will repeatedly access a disturbed or unpaved area from a paved roadway.
 - 4. The Contractor is responsible for locating and placing construction entrances to prevent tracking and to avoid disturbance to existing waterways.
 - 5. Should tracking of soil occur, clear accumulated sediment from public and private driveways on a daily basis at a minimum and more frequently as sediment is tracked onto roadways.
 - 6. Redistribute or properly dispose of collected sediments in a manner that is in accordance with all applicable statutes and regulations.
 - 7. Do not rinse tracked material with water unless water is collected and disposed of properly.
- B. Silt Fence
 - 1. Install silt fence to provide sediment control at the top of slopes, at the down-gradient project limits, as periodic filter breaks on down slopes, at project limits and other locations indicated.
 - 2. Provide additional silt fence where the extents of land disturbance extend beyond the lengths of silt fence.
 - 3. Install silt fence across a utility route in accordance with the following:
 - a. At locations where the utility route runs uphill or downhill, install silt fence across the utility route and perpendicular to the direction of runoff.
 - b. Install a silt fence segment across the utility route at every 5 feet in elevation change along the utility route. Less frequent intervals will be allowed if the Contractor can demonstrate erosion can be prevented and disturbed soil can be stabilized by other erosion control means such as mulching.
 - c. Turn the ends of each silt fence segment in the uphill direction to collect sediment.
 - d. Install silt fence segments from edge of land disturbance to edge of land disturbance.
 - 4. Install silt fence along the length of the utility route in accordance with the following:
 - a. At locations where the utility route runs along the slope, install silt fence at the edge of the land disturbance on the downhill side of the utility route.
 - b. Silt fence installed along the utility route shall be continuous until the land disturbance termination point or the direction of the slope begins to be uphill or downhill with the utility route.
 - c. Turn the ends of each silt fence segment in the uphill direction to collect sediment.
 - 5. Install silt fence posts a maximum of 6 feet apart at the barrier location and driven securely into the ground a minimum of 18 inches. When standard strength fabric is used with the wire support fence, post spacing shall not exceed 8 feet.
 - 6. Space the tiebacks equal to the spacing of the posts. Additional post depth or tiebacks may be required in unstable soils.
 - 7. Excavate a trench approximately 4 inches wide and a minimum of 8 inches deep along the line of posts and upslope from the barrier.
 - 8. When standard strength filter fabric is used with a wire mesh support fence, fasten it securely to the upslope side of the posts using heavy duty 1 inch wire staples, tie wires or hog rings. Extend the wire into the trench a minimum of 2 inches and not more than 36 inches above the original ground surface. Do not staple filter fabric to existing trees.
 - 9. When extra strength filter fabric or burlap is used and post spacing is less than the maximum specified spacing of 6 feet, the wire mesh support fence may be eliminated.
 - 10. Backfill the trench and compact the soil over the filter fabric.
 - 11. Remove silt fences when they have served their useful purpose, but not before the upslope area has been permanently stabilized.
- C. Fiber Filtration Tubes
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Use fiber filtration tubes for the slowing and filtering of storm water

- 3. Use the appropriate tube size for the slope and the distance between tubes as specified by the manufacturer
- 4. The tubes shall allow water to flow freely and provide filtration of suspended particles.
- D. Straw Bale Filters:
 - 1. Install bales so that bindings are orientated around the sides rather than along the tops and bottoms of the bales (in order to prevent deterioration of the bindings.
 - 2. The barrier shall be entrenched and backfilled. Excavate trench the width of a bale and the length of the proposed barrier to a minimum depth of 4". After the bales are staked and chinked, backfill the excavated soil against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4" against the uphill side of the barrier.
 - 3. Securely anchor each bale by at least two stakes of wood or steel, with a length of at least 36", driven through the bale. Drive the first stake in each bale toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.
 - 4. Chink (fill by wedging) the gaps between bales with straw to prevent water from escaping between the bales.
 - 5. In sheet flow applications, place bales in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.
 - 6. In channel flow applications, place bales in a single row, lengthwise, oriented perpendicular to the direction of flow, with ends of adjacent bales tightly abutting one another. The barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment laden runoff will be trapped.
- E. Dust Control
 - 1. Use water to dampen surfaces to minimize dust and prevent wind erosion.
 - 2. Do not rinse surfaces with water unless water is collected and disposed of properly.
 - 3. Implement dust control methods on a routine basis where conditions warrant.
 - 4. Provide water and dust suppression when requested by the Town.
- F. Pumping Bags
 - 1. Provide pumping bags to filter sediment from dewatering operations.
 - 2. Properly dispose of used pumping bags.
 - 3. Appropriately size the bags for the amount of flow.
 - 4. Use pumping bags on an erosion resistant surface.
 - 5. Do not discharge sediment-laden water from dewatering operations into or near storm water conveyances, wetlands, rivers, streams, and impoundments or into natural or manmade channels leading thereto.
- G. Outlet Protection:

- 1. Construct outlet protection to prevent erosion, provide energy dissipation and retain sediment in areas of concentrated flow where storm water conveyances outfall.
- 2. Place at pipe and channel outfalls.
- H. Inlet Protection
 - 1. Install inlet protection at all storm water inlets within the construction area, or in areas that receive runoff from disturbed areas, to prevent sediments, construction debris, and other potential storm water pollutants from entering storm sewer inlets and catch basins.
 - 2. For inlets within a road or driving lane, equip the inlet protection practice with an overflow or bypass so ponding water does not cause unsafe driving conditions.
 - 3. Remove accumulated sediment and debris collected by inlet protection practices and dispose of properly after every rain event.
 - 4. When cleaning or removing inlet protection, do not place sediment and debris in a ditch, stream, wetland, waterway or storm water conveyance.
- I. Riprap Check Dam: Install riprap check dams as needed to reduce erosion potential and capture potential pollutants in drainage channels or areas of concentrated flow.
- J. Concrete Washout Area
 - 1. Provide a designated concrete washout area for use of washing out concrete trucks in order to contain potential storm water pollutants. Use one of the following methods:
 - a. Construct a minimum 10-foot by 10-foot by 3-foot deep area (or larger as required to contain liquid and solid waste from concrete washout operations) with a polyethylene lining. Construct and prepare the base of the system so that it is free of rocks and other debris that may cause tears or punctures in the polyethylene lining.
 - b. Install and maintain a pre-fabricated containment system in accordance with the manufacturer's instructions.
 - c. Use a polyethylene-lined roll-off dumpster when other methods are not practicable.
 - d. Subcontract with a concrete supplier that collects all washout water and pumps it back into the mixer drum for proper disposal off-site. In this instance, a concrete washout area would not be required.
 - 2. Install orange safety fencing around concrete washout area perimeter. Post signage directing contractors and suppliers to the designated concrete washout location.
 - 3. Locate washout areas at least 50 feet from storm drains, open ditches, or water bodies.
 - 4. Inspect system daily and after each storm event. Inspect the integrity of the overall structure including, where applicable, the containment system. Inspect the system for leaks, spills, and tracking of soil by equipment. Inspect the polyethylene liner for failure. The liner may need to be replaced after every cleaning if removal of material has damaged the liner. Repair the concrete washout structure, as needed, or construct a new system.
 - 5. Allow concrete wastes to set. Break up and properly dispose of hardened wastes. Liquid that collects in the washout area could be high in alkalinity and could

contain pollutants. Liquid must be disposed of as wastewater. Upon removal of waste, inspect the structure.

- 6. Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose of in the trash.
- 7. Discuss the concrete management techniques (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.
- 8. Incorporate requirements for concrete waste management into material supplier and subcontractors' agreements. Inspect construction activities on a regular basis to ensure suppliers, contractors, and others are utilizing designated washout areas. If concrete waste is being disposed of improperly, identify the violators and take appropriate action.
- 9. Perform washout of concrete trucks offsite or in designated areas only. Never dispose of washout from concrete trucks in a ditch, stream, wetland, waterway, or storm water conveyance.
- 10. Do not dump excess concrete onsite, except in designated areas.
- 11. When concrete washout systems are no longer required, close the concrete washout systems. Dispose of all hardened concrete and other materials used to construct the system. Backfill, grade, and stabilize any holes, depressions, and other land disturbances associated with the system.
- K. Temporary Slope Drains: When necessary, route runoff away from steep slopes through the use of a temporary slope drain.
- L. Temporary Sediment Trap: Construct a temporary sediment trap to retain sediment in a pooling area. Construct the temporary sediment trap of an embankment or excavated area and provide a stone outlet structure.
- M. Grass
 - 1. Restore all non-paved surfaces that were disturbed during construction with permanent seeding or sod.
 - 2. Prior to seeding disturbed areas must be graded and receive a minimum of 6 inches of topsoil. Use excavated material which meets the specified requirements for topsoil, or if the quantity of suitable topsoil is not sufficient, use topsoil obtained from another source.
 - 3. Scarify the planting area to a minimum depth of 6 inches. Mix soil amendments such as fertilizer and lime if required, in the top 2 to 4 inches of topsoil with a disk or rake operated across the slope.
 - 4. Apply seed uniformly with a drill or cultipacker seeder, or by broadcasting at a rate of not less than 3 pounds per thousand square feet. Cover seed with topsoil a minimum of 1/2 inch. Cover newly seeded areas with anchored mulch or erosion control blanket. Seeding shall only be completed within the seasons extending from August 15 to October 15 and April 1 to June 1, unless otherwise permitted by the governing agencies.
 - 5. Keep seeded and fertilized areas adequately watered to a minimum of 1 inch depth per week until germination of all seed is completed and uniform grass cover is accomplished.
 - 6. Immediately prior to installing sod, water the planting area with a fine spray to a minimum penetration of 1 inch.

- 7. Do not place frozen sod, and do not place sod on frozen or dry soil. Do not place sod when the air temperature is less than 32 degrees Fahrenheit.
- 8. Lay sod with closely fitted abutting joints without stretching and overlapping, and stagger the ends of the strips. Trim and fit sod into irregular areas to eliminate gaps.
- 9. On slope areas, lay sod starting from the bottom of the slope and lay sod horizontal to the contour. Where slopes are greater than a horizontal to vertical ratio of 3 to 1, staple or stake each sod strip at the corners and in the middle.
- 10. After initial watering, tamp or roll sod with a roller to eliminate irregularities. Repeat watering at regular intervals to keep sod moist until it is rooted and to maintain growth until final acceptance.
- N. Mulch: Anchor mulch unless held in place by a tackifier or netting.
- O. Erosion Control Blanket
 - 1. Where construction disturbs slopes equal or steeper than 3 to 1 or within drainage channels, protect bare slopes with an erosion control blanket.
 - 2. When vegetation is to be established, place erosion control blanket over the seed and anchor according to manufacturer's instructions to prevent the seed from washing away.
 - 3. Place erosion control blankets on seedbeds free of sticks, rocks and other objects larger than 1 inch.
- 3.05 Soil Stockpiles
 - A. Manage soil stockpiles for wind erosion, storm water erosion and sediment control.
 - B. Temporarily or permanently stabilize stockpiled soil that is scheduled or likely to be left inactive for 15 days or more with measures appropriate for the season in order to minimize erosion potential.
 - C. Position stockpiles away from any ditch, stream, wetland, or storm water conveyance.
 - D. Properly dispose of soil that will not be used for the project.
- 3.06 Trench Excavation
 - A. Pile material from trench excavations in an area away from any ditch, stream, wetland or storm water conveyance and install silt fence around the material for sediment control.
 - B. Install inlet protection within the project area when excavated material is placed on a paved surface.
 - C. Following pipe installation, backfill trenches and temporarily or permanently stabilized all bare areas to prevent soil erosion.

- 3.07 Work within a Waterway (Stream Crossing) or Floodway
 - A. Minimize tree removal and brush clearing within floodways and near waterways. When possible, maintain a 30-foot vegetated buffer from the top of bank of all waterways.
 - B. Avoid disturbing the ground within the drip line of any tree.
 - C. Install erosion and sediment control practices during and after construction to minimize impacts to a waterway or floodway.
 - D. Stabilize bare areas immediately following construction activities.
 - E. Reclaim all disturbed areas within a waterway or floodway that are to be revegetated, with native species.
 - F. Do not use tall fescue.
 - G. Install erosion control blanket to cover bare areas and seedbeds and to prevent erosion until vegetated species are established.
 - H. Stockpiling of soil, excavated materials, or stone is not permitted within or near a ditch, waterway or floodway.
 - I. When installing pipe by open cutting a trench across a waterway, if the work cannot be completed during dry conditions, bypass pump the stream flows. Dam the stream as necessary and pipe or pump the water from upstream past the area of excavation.
 - J. Utilize existing roads to move equipment and materials from one side of the waterway to the other.
- 3.08 Directional Drilling or Horizontal Boring Erosion and Sediment Control
 - A. Install silt fence around all work areas at bore and receiving pits to control sediments.
 - B. Pile materials from ditch excavation away from ditches, streams, wetlands or storm water conveyances.
 - C. Properly dispose of material that is not used to backfill pits.
 - D. Filter pit dewatering discharge to properly dispose of sediment-laden water as follows:
 - 1. Do not discharge sediment-laden water from pumping operations into or near storm water conveyances, wetlands, rivers, streams, waterways and impoundments or into natural or manmade channels leading thereto.
 - 2. Discharge sediment-laden water from dewatering of trenches, or other excavations by means of a pump or similar means into a manufactured pumping bag for filtering in accordance with the manufacturer's recommendations unless the pumped water is routed through another erosion control measure such as a sediment trap or outlets onto a well-established vegetated area without eroding.

- 3. Pumping operations moving clean water through a site are not required to have a pumping bag or similar device at the outlet.
- 4. Protect the point of discharge to prevent soil erosion.
- E. Seed and mulch disturbed soil surfaces
- 3.09 Working Near Water Wells
 - A. Identify water wells.
 - B. Implement erosion and sediment control practices to reduce sedimentation introduction into groundwater.
 - C. Position construction materials and equipment so that the area slopes away from wells.
 - D. Provide secondary containment for all chemicals, fuels or other liquids to capture spills or leaks.
 - E. Clean up spills with absorbents or dry methods. Do not allow spills to soak into the ground and do not wash off with water or detergents.
 - F. Properly dispose of waste materials.
- 3.10 Field Quality Control
 - A. Inspections
 - 1. Inspect all erosion and sediment control measures at least once every 7 days.
 - 2. Inspect all erosion control measures the next business day after any storm event with greater than 0.5 inches of rain has occurred.
 - 3. Conduct a weekly inspection of the construction site to identify areas contributing to storm water discharges associated with construction activity.
 - 4. Inspect on a regular basis disturbed areas, material storage areas and equipment storage areas that are exposed to precipitation for evidence of, or the potential for, pollutants leaving the project site or entering a storm drainage conveyance.
 - 5. Inspect storm water discharge locations to determine if control measures are effective in preventing adverse impacts to receiving waters.
 - 6. Observe erosion and sediment control devices to ensure that they are operating properly.
 - 7. Inspect haul routes and construction entrance(s) daily for evidence of off-site vehicle tracking of sediments.
 - 8. Inspect staging area to ensure that solid and liquid wastes are being properly disposed of and are not allowed to be discharged into storm water runoff.
 - B. Inspection Reports
 - 1. Summarize the results of each inspection.
 - 2. Include the following:
 - a. Name(s) and qualifications of personnel making the inspection
 - b. Date(s) of the inspection

- c. Major observations relating to the implementation of the erosion control plan
- d. Identification of any incidents of noncompliance
- 3. Retain inspection reports for two (2) years following Town approval of final payment.
- 4. Make reports available to inspecting authority within 48 hours of a request.

3.11 Maintenance

- A. Maintain all erosion and sediment control measures and perform the following maintenance procedures throughout the project and until such time as the disturbed area has been completely stabilized or other provisions have altered the need for these measures.
 - 1. Implement maintenance practices.
 - 2. Replace mulch materials to their original level when the level has been substantially reduced due to decomposition of the organic mulches and displacement or disappearance of both the organic and inorganic mulches.
 - 3. Remove rubbish and channel obstructions from bare and vegetated channels within the project limits. Repair damage from scour or bank failure, rodent holes, and breaching of diversion structures. Remove deposits of sediment.
 - 4. Immediately repair excessive wear, movement or failure of erosion control blankets.
 - 5. Repair any damage to silt fence barriers immediately and monitor barriers daily during prolonged rainfall.
 - 6. Repair or replace any filter fabric which has decomposed or become ineffective prior to its expected usable life.
 - 7. Remove sediment deposits after each storm event. Remove sediment when deposits reach approximately half the height of a silt fence barrier.
 - 8. Till and smooth to conform to the existing grade and reseed any sediment deposits remaining in place after erosion and sediment control measures are no longer required and have been removed.
 - 9. Maintain construction entrances in a condition to prevent tracking or flowing of sediment onto roads. This could require periodic top dressing of the construction entrance with additional surface materials as conditions demand. Repair and clean out any features used to trap sediment and remove all sediment spilled, dropped, washed, or tracked onto road surfaces and dispose of properly.
 - 10. Remove accumulated sediments and debris from inlet protection devices after each storm event.
 - 11. Periodically remove concrete and residual liquid from the concrete washout area, as needed to maintain available space for the future washout and rainwater.
 - 12. Repair any and all rills that may appear. Re-grade to eliminate rill and stabilize ground by seeding or other methods as approved by Town.
 - 13. Remove and dispose of all temporary erosion and sediment control practices within 30 days after site stabilization is achieved or after the temporary practices are no longer needed, as determined by the Town.
 - 14. Stabilize the site and reapply seed and mulch to achieve 70 percent density of cover on vegetated areas.

3.12 Schedules

- A. Coordinate erosion and sediment control measures with construction activities so controls are in place before construction begins.
 - 1. Install the temporary construction entrance and sediment traps or filters before clearing and grading begins.
 - 2. Install temporary perimeter controls (e.g. silt fences and inlet protection) before clearing and grading begins.
 - 3. Do not clear, grub or grade until it is necessary for construction to proceed. Maintain natural vegetation and vegetated buffers when practical to reduce the need for control devices. Maintain all controls as described throughout the construction project and until upstream drainage areas are stabilized.
 - 4. Permanently stabilize bare soils once construction activities cease in an area.

-END-

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes: Administrative and procedural requirements for submittals including construction schedules, product data, O&M manuals, and Project Record Documents. Provide content, number of copies and other information stated in this Section for all submittals.
- 1.02 Construction Schedules
 - A. Submit Progress Schedules (Bar Charts or CPM/PERT Charts) once a month at the Progress Meetings held every other week during the construction.
 - 1. Provide complete sequence of construction by activity showing dates for beginning and completion of each element of construction.
 - 2. Identify work in separate phases, or other logically grouped activity.
 - 3. Identify first work day of each week on a horizontal time scale. Sheet size shall be 24" x 36" maximum and 8 1/2" x 11" minimum, but of sufficient size to allow space for updating.
 - B. Show all changes occurring since previous submission of updated schedule. Indicate progress of each activity and show completion dates. Include major changes in scope, activities modified since previous updating, revised projections due to changes and other identifiable changes.
 - C. Distribute copies of progress schedule once a month at the Progress Meetings held every other week to:
 - 1. Town
 - 2. Engineer
 - 3. Subcontractors
 - 4. Other concerned parties
 - D. Instruct recipients to report any inability to comply, and provide detailed explanation, with suggested remedies.
- 1.03 Products and Materials Approvals
 - A. Unless directed otherwise in a formal contract with the Town, submit a reviewed copy of all information on the products and materials in accordance with the requirements herein to the Town.
 - B. Submit the products and materials and other descriptive data together with a letter of transmittal. The letter of transmittal shall contain the name of the project, workmanship and materials section number if applicable, the name of the Contractor, the list of products and materials submitted, including requests for any

approval of departures from the Town's Standards, and any other pertinent information as required for the items being submitted. The letter of transmittal shall have the Contractor's stamp of approval and the signature of the individual responsible for the submittal, indicating that he, or she has reviewed, checked, and approved the data submitted; that they are in compliance with the Town's Standards and Details, and requirements of the project; that any exceptions to the Standards and or Detail are specifically noted or pointed out as such; and that he, or she has verified all field measurements and construction criteria, materials, catalog numbers, and similar data.

- C. Products and materials may be submitted and processed electronically upon authorization of the Town. The Town reserves the right to request up to three (3) hard copies of any and all submittals.
- D. A Specification followed by one or more manufacturers and "or approved equal" is open to equal products or materials as determined to be "equal" solely by the Town. The Town's decision shall be final in this regard.
- E. Where specific manufacturers and/or model numbers for materials or equipment are listed in these Standards. Materials and equipment submitted as an alternate or "or equal" item must be certified by the Contractor as:
 - 1. Meeting or exceeding the requirements of the detailed Standards,
 - 2. Being of equal or better quality, and
 - 3. Being of equal function to the specific manufacturer and/or model listed.
- F. If the submitted alternate or "or equal" item requires any modification or deviation from the Drawings, prepare and submit detailed drawings to the Town and Designer showing all modifications in structures, piping, electrical, mechanical, or other work required to adapt the work to the submitted alternate or "or equal" item. The Designer will review the submitted detailed drawings of the modifications and indicate whether changes are necessary to comply with the project requirements. Detailed drawings which do not comply with the project requirements shall be revised and resubmitted.
- G. Voluntary alternate and "or equal" products or materials that are installed by Contractor but fail to meet the specified requirements as determined by the Designer shall be replaced with the specified item.
- H. Revise and resubmit the information of the products and materials as required, until approval thereof is obtained.

1.04 Equipment Manuals

A. Submit Manufacturer Operation and Maintenance (O&M) Manuals to the Town for review a minimum of 45 days prior to system start up for each respective system or equipment. System or equipment start up and substantial completion may be delayed at the discretion of the Town if O&M Manuals are not received by the Town in the time frame specified herein.

- B. Furnish three (3) printed sets and two (2) CD's or DVD's with electronic copies in pdf/bookmarked format of the equipment manufacturer's O&M materials and manuals to the Town. The O&M Manual shall include local sources of service and parts for the equipment.
- C. All O&M Manuals submitted shall be specific for the items and models furnished under this contract and reflect as-approved and as-installed information. Standard manuals from equipment suppliers which reflect all sizes and options of equipment available from the supplier shall be clearly marked to indicate the applicable sizes and options specific to this project.
- D. Manual Organization
 - 1. Organize O&M Manuals into suitable sets of manageable size.
 - 2. Bind data into individual binders for each manual, properly identified on front and spine. For large manuals, provide an index sheet and thumb tabs for separate information categories.
 - 3. Provide heavy-duty, three-ring, vinyl-covered binders, 1/2 to 3 inches thick as required to contain information, sized for 8½" x 11" or 11" x 17" paper with inside pockets or pocket folders for folded sheets.
- E. Information to be Included
 - 1. Include in each O&M Manual information specified in individual Specification Sections and the following:
 - a. Project title, equipment manufacturer, local equipment supplier, subcontractor, and prime contractor, including contact information (address, phone number, and e-mail) for each.
 - b. Copy of manufacturer warranties specific to this project.
 - c. Copies of factory tests or certified tests and reports, if required by the Specification Section or by referenced standards.
 - d. Equipment installation instructions.
 - e. Troubleshooting guide and emergency instructions.
 - f. List of spare parts provided or recommended.
 - g. Recommended maintenance materials, instructions, and procedures, including schedules, drawings, and diagrams.
 - h. Precautions against improper maintenance and exposure.
 - i. Inspection and system test procedures.
 - j. Copies of revised Shop Drawings and Product Data showing as-installed information, including:
 - Detailed drawings and descriptions of equipment showing all dimensions, elevations, parts, constructed details, materials of construction, performance data, descriptive literature, weights, and other physical characteristics, including performance curves, motor starting and full-load amps, motor horsepower, and motor data.
 - 2) Project name, equipment name, tag numbers, location, and/or other identifying description included on the drawings and cut sheets.
 - 3) All sizes, special features, options, modifications, etc., that are provided specific to this project.

- 4) All options or features not provided specific to this project are deleted, crossed out, or otherwise removed.
- k. Electrical & Controls Information:
 - 1) Detailed drawings and descriptions of electrical and controls equipment, including main and auxiliary control panels, showing all dimensions, parts, constructed details, and materials of construction.
 - 2) Complete electrical system drawings and description including, but not limited to, the following:
 - a) Complete system interconnection diagrams between power supply, control panels, drive motors, secondary drive motors, and all ancillary equipment connected to control system, including terminal number connection points.
 - b) Control panel overall dimensions and layout of external and internal mounted components.
 - c) Complete electrical schematics with power wiring and control wiring in accordance with current standards. Schematics shall include all component ratings.
 - 3) Complete motor rating including all nameplate data, guaranteed minimum rated efficiency, and speed torque curves
 - 4) Description of control system in written form including functions monitored, controlled, and alarmed. Include sequence of operation and interface requirements.
- F. Each prime contractor is responsible for O&M manuals for its own Work. Where a manual includes information on installations by more than one contract, the Contractor who is the principal source of information, as designated by the Town, is responsible to receive information from other contractors, coordinate and collate information for a unified manual, and provide binders and submittal as specified.
- 1.05 Project Record Documents
 - A. Record Drawings
 - 1. For substantial completion to be established, deliver one (1) set of "Contractor's Record Drawings" to the Designer. The Designer shall review the Record Drawings for accuracy and completeness prior to acceptance.
 - 2. If the Designer determines the Record Drawings are not in conformance with the specifications, the Designer shall return the Record Drawings to the Contractor. Revise the Record Drawings and resubmit to the Designer prior to final completion. The Designer shall review the revised Record Drawings for completeness and accuracy. If the revised Record Drawings are not in conformance with the specifications the Designer or a third party as determined by the Town shall then perform all necessary field survey and measurements, field excavations and locations, engineering calculations, and drafting to complete the Record Drawings in conformance with the specifications.
 - 3. The Contractor shall be responsible for payment to the Town for work to make the corrections and revisions to the incomplete Record Drawings submitted by the Contractor.

- 4. All sheets shall have "Record Drawing" boldly printed on them with the date, stamp, and signature of the Designer.
- 5. Once Designer reviews and approves the Record Drawings, deliver three (3) sets of hard copy Record Drawings and one (1) set of Record Drawings in PDF format to the Town.
- 6. Provide a copy of the Record Drawings in .DXF and .DWG format using AutoCAD software for all projects dedicated to the Town and for all multi-family, industrial, and commercial sites 5 acres and larger. Provide a copy of the information in .SHP format for use with the Town's GIS. Each disc shall be labeled with project name, property name, and date. Any auxiliary design program data files shall also be included and required subdirectory file structure and path relationships shall be maintained. All files shall be "Read-Only" files and shall be write protected. All auxiliary fonts used on the project and necessary data files to support, import, and utilize the fonts shall be included on the disc. A text file describing all files on the disc(s) including creating program names, versions, and all other necessary details to allow the Town to fully understand and utilize the data files shall be included on the disc.
- 7. Organize into sets and bind and label sets for the Town's continued use.
- 8. The Town will not recommend Final Completion until Record Drawings are submitted and approved.
- B. Markup Procedures
 - 1. During construction, maintain one (1) set of Contract Drawings for Project Record Document purposes. Label each drawing "Contractor's Record Drawing" in 2-inch high printed letters. Keep Record Drawings current. Do not permanently conceal any work until required information has been recorded.
 - a. Legibly and accurately mark these Drawings in an understandable drawing technique to show the actual installations where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Items required to be marked include as applicable, but are not limited to, the following:
 - 1) Dimensional changes to the Drawings
 - 2) Revisions to details shown on the Drawings
 - 3) Building pad elevations
 - 4) Depths of foundations below the first floor
 - 5) Locations and depths of underground utilities
 - a) Horizontal alignment of sewers, pipes, culverts, streets, and structures to a minimum accuracy of ±2 feet.
 - b) All valves (gate, plug, air release, combination sewage, etc.) shall be located and referenced to three (3) permanent surface improvements.
 - c) All fittings (tees, wyes, bends, crosses, plugs, caps, etc.) shall be located and referenced to three (3) permanent surface improvements.
 - d) All force mains shall be located and referenced to the centerline of the road or street at 500 foot minimum intervals.

- e) All structures (manholes, vaults, etc.) shall be located and referenced to three (3) permanent surface improvements. All structure inverts, pipe inverts, and top of casting elevations.
- f) All sewer laterals shall be located and referenced to the downstream manhole (stationing in feet) and depth of lateral at property line.
- g) All water service lines and meter pits shall be located and referenced to the water main (stationing in feet).
- 6) Permanent easements (if applicable)
- 7) Revisions to routing of piping and conduits
- 8) Horizontal location or bank cross sections for all detention/retention facilities or other information to verify storage volume
- 9) Flowline of rear and side yard swales at 50 foot intervals or at lot lines
- 10) Revisions to electrical circuitry
- 11) Actual equipment locations
- 12) Duct size and routing
- 13) Locations of concealed internal utilities
- 14) Changes made by Change Order or Field Transmittal Memo
- 15) Changes made following the Designer 's written orders
- 16) Details not on original Contract Drawings
- c. Mark record prints of Contract Drawings, whichever is most capable of showing actual physical conditions, completely and accurately.
- d. Mark record sets with red erasable colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
- e. Mark important additional information that was either shown schematically or omitted from original Drawings.
- f. Note Field Transmittal Memo numbers, alternate numbers, Change Order numbers, and similar identification.
- 2. Responsibility for Markup: Contractor shall be solely responsible for the measurement and recording of the Record Drawings. The presence of the Town or Project Owner shall not relieve the Contractor in any way of his/her obligation in this regard.
 - a. The individual or entity who obtained record data, whether the installer, subcontractor or similar entity, should provide their Record Drawings to the Contractor. The Contractor shall be responsible for collecting and recording subcontractor's and other's information on the Record Drawings.
- C. Record Product Data
 - 1. During the construction period, maintain one (1) copy of each Product Data submittal for Project Record Document purposes.
 - a. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation.
 - b. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

- c. Note related Change Orders and markup of Record Drawings, where applicable.
- d. Upon completion of markup, submit a complete set of Product Data to the Town.
- e. Where Record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data.
- f. Each subcontractor is responsible for marking up and submitting record Product Data for its own Work. Contractor is responsible for collecting and submitting Record Product Data.
- D. Record Sample Submittal
 - 1. Immediately prior to date of Substantial Completion meet with the Designer and the Town's personnel at the site to determine which of the samples maintained during the construction period shall be transmitted to the Town for record purposes. Comply with the Town's instructions for packaging, identification marking, and delivery to the Town.
 - 2. Dispose of other samples in a manner specified for disposing of surplus and waste materials.
- E. Miscellaneous Records
 - 1. Miscellaneous records include, but are not limited to, the following categories as applicable:
 - a. Field records on excavations and foundations
 - b. Field records on underground construction and similar work
 - c. Survey showing locations and elevations of underground lines
 - d. Invert elevations of drainage piping
 - e. Surveys establishing building lines and levels
 - f. Authorized measurements utilizing unit prices or allowances
 - g. Records of landscaping and plant treatments
 - h. Ambient and substrate condition tests
 - i. Certification received in lieu of labels on bulk products
 - j. Batch mixing and bulk delivery records
 - k. Testing and qualification of tradesmen
 - I. Documented qualification of installation firms
 - m. Load and performance testing
 - n. Inspections and certifications by governing authorities
 - o. Leakage and water-penetration tests
 - p. Fire-resistance and flame-spread test results
 - q. Equipment Manuals
 - r. Final inspection and correction procedures

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

- 3.01 Recording
 - A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project.
 - B. The Documents shall be available for review by the Town at all times. Have Documents readily available for review at the progress meetings held every other week. Partial pay claims may be withheld if record documents are not kept updated in a satisfactory manner.

-END-

TECHNICAL SPECIFICATIONS

DIVISION 2 TECHNICAL REQUIREMENTS

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SECTION 02300 - EARTHWORK

PART 1 - GENERAL

- 1.01 Scope
 - A. Furnish all labor, tools, equipment and materials necessary to complete all stripping, storage and redistribution of topsoil, cut and fill operations, rough and finish grading and construction of drainage swales as applicable.
 - B. 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.
 - C. Protect open excavations by roping areas off, or with barricades or railings to prevent injury to personnel. Contractor shall be responsible to comply with any and all applicable Occupational Safety and Health Administration (OSHA) regulations.
- 1.02 Related Work Specified Elsewhere
 - A. Section 01570 Storm Water Pollution Prevention and Erosion Control

1.03 Submittals

A. Submit compaction test results to the Town for approval.

PART 2 - PRODUCTS

- 2.01 Materials
 - A. Backfill
 - 1. Suitable earth removed from the excavation, free of rocks, boulders, stones larger than 2-inch, and other debris.
 - 2. Topsoil and soil containing decomposed organic materials shall be considered suitable for topsoil fill material only.
 - 3. Aeration of some backfill may be required for compaction.
 - B. Granular Fill
 - 1. Clean granular material: Sand, pit run gravel.
 - 2. Contain a maximum 2-percent, by weight, passing a No. 220 sieve and 100-percent passing a 3/4-inch sieve.
 - C. Topsoil
 - 1. Natural, fertile, agricultural soil, capable of sustaining vigorous plant and lawn growth.

- 2. Uniform composition throughout, without admixture of subsoil.
- 3. Free of stones, lumps, clods and sticks larger than one inch, live plants and their roots, sticks and other extraneous matter.

2.02 Excavation Classification

- A. This work shall consist of excavation, hauling, disposal, or compaction of all materials encountered within the limits of the work. All excavation will be classified as hereafter described.
 - 1. Common Excavation: Common excavation shall consist of all excavation not included as rock excavation or excavation which is otherwise classified.
 - 2. Rock Excavation: Rock excavation shall consist of igneous, metamorphic, and sedimentary rock which cannot be excavated without blasting, or the use of a modern power shovel of no less than one cubic yard capacity, properly used, having adequate power and in good running condition, or the use of other equivalent power equipment. It shall also include all boulders or detached stones each having a volume of one half (1/2) cubic yard or more.
 - 3. Unclassified Excavation: Unclassified excavation shall consist of the excavation and disposal of all materials of whatever character encountered in the work.
 - 4. Borrow: Borrow shall consist of approved material required for the construction of embankments or for other portions of the work and shall be obtained from offsite and in accordance with all local, state, and federal regulations. Unless otherwise designated in the contract, the Contractor shall make his own arrangements for obtaining borrow and shall pay all costs involved. All Contractor operations including erosion and sediment control shall be conducted in accordance with all local, state, and federal regulations.
 - 5. Before borrow or disposal operations are begun, plans for the control of drainage water shall include measures to keep sediment from entering streams.
 - 6. Suitable topsoil meeting the requirements specified herein from the borrow pit area shall be saved for use in restoring the excavated area, or similar material from another source may be substituted.
 - 7. Final restoration of borrow areas shall include grading, seeding, and/or other necessary treatments that will blend the area into the surrounding landscape. Restored areas within 150 feet of the nearest right-of-way line shall be well drained. Areas beyond 150 feet shall be drained unless the landowner desires other treatment of the borrow pit area. Drainage, location, or use of the pit shall comply with existing laws, regulations, and ordinances. Under no conditions shall borrow sites detract from the appearance of the natural topographical features nor increase any potential hazard.

PART 3 - EXECUTION

- 3.01 Preparation
 - A. Remove all topsoil at construction areas. Stockpile topsoil for use in finish grading operation. Do not use topsoil for fill.

B. No fill materials shall be placed until the subgrade and construction has been inspected and approved by the Town.

3.02 Excavation

- A. Excavate true to line and grade, and level at bottom of the excavation. Excavate to undisturbed structurally stable subsoil.
- B. Excavations shall be of the dimensions indicated for new construction plus sufficient space as applicable to permit erection of forms, shoring, masonry, foundations, structure installations, and excavation inspections.
- C. Excavation below structures and paving shall be sufficient to permit placement of subbase material.
- D. Foundations and Paved Areas
 - 1. If suitable bearing subsoil is not encountered at the depth required for installation for any type of structure or foundation, immediately notify the Designer and Town. Do not proceed further until instructions are given by the Designer and required tests are completed.
 - 2. Foundations, structures, and paved areas shall not be placed on soft earth; if soft earth is encountered remove soft pockets. Backfill with lean concrete or backfill with compacted granular fill for footings, structures, paved areas, and within five feet of paved areas.
- E. Provide shoring or piling as required to protect excavation bank.
- 3.03 Filling and Backfilling
 - A. All material entering the fill shall be free of organic matter such as leaves, grass, roots, and other objectionable material.
 - B. Operations of earth work shall be suspended when satisfactory results cannot be obtained because of rain, freezing weather or other unsatisfactory conditions in the field.
 - C. Material in layers shall be of the proper moisture content before compaction. Should the material be too wet to permit proper compaction, all work on all portions thus affected shall be delayed until the material has dried to the required moisture content.
 - D. In the construction of filled areas, starting layers shall be placed in the deepest portion of the fill. As placement progresses, layers shall be constructed approximately parallel to the finished grade line.
 - E. Boulders, if encountered, must be disposed of outside of the construction area.
 - F. The Contractor shall be responsible for the stability of fill above top of all footings. Backfilling shall not be done until walls are braced or shored and the Designer has

approved the backfilling operation. If fill is to be provided on both sides of walls, fill on both sides at same time.

- G. Install vapor barrier on drainage fill prior to installing floor slabs. Drainage fill under floor slabs, slabs on grade, walks and paving shall be placed to indicated depths but not less than four (4) inches.
- H. Fill excess cuts under slabs with gravel and thoroughly compact.

3.04 Compaction

- A. Fill areas shall be compacted using equipment capable of compacting each lift to its full depth. Moisture during compaction operations shall be maintained at optimum content.
- B. Compacting equipment shall be approved equipment of such design, weight and quantity to obtain the required density in accordance with soil compaction requirements. Under no circumstances will a bulldozer or similar tracked vehicle be used as compacting equipment.
- C. Water distribution equipped with a suitable sprinkling devices shall be used to add moisture to the soil if required.
- D. For fill areas around new structures and within building lines: Continue compaction operations for up the top 12-inch of fill until the fill is compacted to not less than 95-percent Standard Proctor of the maximum dry density, and compact the final 12-inch of fill to not less than 100-percent Standard Proctor of the maximum dry density as determined in accordance with ASTM D-698.
- E. For footings, paved areas, and within five (5) feet of paved areas: Up to the top 12-inch of fill, place fill in 8-inch maximum balanced lifts and compact each layer to 95-percent of Standard Proctor dry density in accordance with ASTM D-698. Place the final 12-inch of fill in 6-inch maximum balanced lifts and compact each lift to 100-percent Standard Proctor dry density in accordance with ASTM D-698.
- F. For all other areas: Continue compaction until the fill is compacted to not less than 90percent Standard Proctor of the maximum dry density, as determined in accordance with ASTM D-698. Unless otherwise specified herein, fills shall be placed in successive horizontal layers of approximately twelve inches in loose depth for the full width of the section.
- G. Areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. The equipment shall be operated in such manner that hardpan, cemented gravel, clay, or other chunky soil material are broken up into small particles and become incorporated with the material in the layer.
- H. Compaction by flooding is not acceptable.
- I. Compaction tests shall be provided as required by the Town and Designer and shall be performed by Contractor.

3.05 Proof Rolling

- A. Proof rolling shall be performed with a pneumatic-tire roller conforming to the requirements of INDOT Specification 203.26. There shall be two complete coverages unless otherwise directed. Correct any and all roller marks, irregularities, and failures.
- B. Proof roll subgrades below paved areas with heavy equipment prior to filling, consisting of one coverage of an earthmover, scraper.
- C. After completion of filling and compaction operation, proof roll area with smooth wheel vehicle to leave a smooth surface sealed to shed all water.

3.06 Grading

- A. Furnish, operate, and maintain equipment necessary to control uniform layers, section, and smoothness of grade for maximum compaction and drainage.
- B. Rough Grading
 - 1. Evenly grade to elevations 6 inches below the finish grade elevations indicated.
 - 2. Protect all constructed items during grading operations and repair if damaged.
 - 3. All areas in the project including excavated and filled sections and adjacent transition areas shall be reasonably smooth, compacted, and free from irregular surface changes.
 - 4. The degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified.
 - 5. The finished subgrade surface generally shall be not more than 0.3 feet above or below the established grade or approved cross-section, with due allowance for topsoil and seeding or sod as applicable.
 - 6. The tolerance for areas within 10 feet of buildings shall not exceed 0.15 feet above or below the established sub-grade.
 - 7. All ditches, swales and gutters as applicable shall be finished to drain readily.
 - 8. The subgrade shall be evenly sloped to provide drainage away from the building walls in all directions at a grade not less than 1/2-inch per foot.
 - 9. Provide grade rounding at top and bottom of banks and at other breaks in grade.
- C. Protection
 - 1. Protect newly graded areas from the action of the elements.
 - 2. Settlement or washing that occurs prior to acceptance of the work shall be repaired, and grades re-established to the required elevations and slopes.
 - 3. Fill to required subgrade levels any areas where settlement occurs.
- D. Finish Grading
 - 1. Proceed to finish elevations with a tolerance of plus or minus .04 ft. (1/2-inch).
 - 2. Rake subsoil clean of stones and debris. Scarify to depth of 3-inches.
 - 3. Spread stockpiled topsoil over prepared subgrade to a minimum depth of 6-inches, and roll until suitable for seeding or placement of sod as applicable.
 - 4. Maintain surfaces and replace additional topsoil necessary to repair erosion.

EARTHWORK

-END-

02300-6

SECTION 02320 - TRENCHING, BACKFILLING AND COMPACTION FOR UTILITIES

PART 1 - GENERAL

- 1.01 Summary
 - A. Section Includes: Performing surface preparation and excavation work as required for the installation of utilities and appurtenances including excavation, trenching, bedding, backfilling and other related work.
 - B. Related Sections
 - 1. Section 01570 Storm Water Pollution Prevention and Erosion Control
 - 2. Section 02510 Water Mains
 - 3. Section 02530 Gravity Sanitary Sewer Systems
 - 4. Section 02535 Force Main Sewer Systems

1.02 References

- A. American Society for Testing and Materials (ASTM), latest editions
 - 1. ASTM C403 Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
 - 2. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
 - 3. ASTM D6024 Standard Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application
 - 4. ASTM D6103 Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM)
- B. Indiana Department of Transportation (INDOT) Standard Specifications, latest edition
 - 1. Section 213 Flowable Backfill
 - 2. Section 904 Aggregates
- C. Occupational Safety & Health Administration (OSHA) Regulations (Standards 29 CFR), latest editions
 - 1. Part 1926 Safety and Health Regulations for Construction

1.03 Definitions

- A. Bedding Granular material placed beneath the pipe to establish line and grade and to provide pipe support.
- B. Final (Trench) Backfill Granular or other specified material placed from the top of the Initial Backfill to the top of the trench, or to just beneath the surface that is to be restored.

- C. Granular Backfill Class I or Class II material as described in 2.01 A and B.
- D. Haunching Granular or other specified material placed from the top of the bedding to the springline (center) of the pipe, installed uniformly in lifts on each side of the pipe, and shoveled under the sides of the pipe to provide resistance against soil and traffic loading.
- E. Initial Backfill Granular or other specified material placed from the springline of the pipe to the specified height above the crown of the pipe, to provide adequate pipe support and to protect the pipe from damage due to compaction of the final backfill.
- F. Pavement/Structure Loading Zone the area within 5 feet of any edge of pavement, curb, gutter, sidewalk, building, or other structure and extending beyond this point at a downward slope of 2:1, beginning at ground level and extending indefinitely.

1.04 Submittals

- A. Product Data
 - 1. Class I material source and gradation
 - 2. Class II material source and gradation
 - 3. Flowable Fill Mix Design
 - a. Provide mix design which includes:
 - 1) List of all ingredients
 - 2) Source of the materials
 - 3) Gradation of aggregates
 - 4) Names of admixtures and dosage rates
 - 5) Batch weights
 - 6) Mix design designation number
 - b. If requested, provide a trial batch demonstration.
 - c. Provide test data from a laboratory inspected by the Cement and Concrete Reference Laboratory that shows the proposed mix design is in accordance with the requirements listed in this specification.
- B. Quality Control Submittals
 - 1. Backfill Compaction Test Results
 - 2. Flowable Fill Test Results
 - a. Unconfined Compressive Strength
 - b. Flow Consistency
 - c. Setting and Early Strength
 - 3. Delivery Tickets

1.05 Quality Assurance

- A. Qualifications
 - 1. Provide the services of a qualified, independent testing laboratory to perform all field tests.

1.06 Warranty

- A. Refill and restore to the original grade settlement in the backfill which takes place within the 1-year warranty period. Restore the surface area where settlement has occurred, including, but not limited to seeding, fertilizing, erosion control and restoration of streets, drives, yards, and sidewalks.
- B. Guarantee all disturbed and replaced trees and shrubs for a period of 1 year from date of substantial completion of project.

PART 2 - PRODUCTS

- 2.01 Bedding and Backfill Material Classifications
 - A. Class I: Angular, 6 to 40 millimeters (1/4 to 1-1/2 inches) graded stone such as crushed stone. INDOT Classification No. 5, No. 8, No. 9, and No. 53 gravel possessing a minimum 50 percent mechanical crush count will be considered an equivalent Class I material.
 - B. Class II: Coarse sands and gravel-sand mixtures with a maximum particle size of 40 millimeters (1-1/2 inches), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. Provide Class II material which meets the requirements of INDOT Standard Specifications Section 904 classification for Structure Backfill.
 - C. Excavated Material: Excavated material suitable for use as trench backfill must be clean and free of rocks and frozen soil lumps larger than 6 inches, wood, debris, or other extraneous material.
 - D. Flowable Fill: Removable, self-leveling, self-compacting, flowable material with a minimum unconfined compressive strength (28 day) of 50 psi and a maximum unconfined compressive strength of 150 psi. Provide Removable Flowable Backfill material which meets the requirements of INDOT Standard Specifications Section 213 and Section 904 classification for Type 4 Structure Backfill.
- 2.02 Sheeting and Bracing
 - A. Provide sheeting, shoring and bracing capable of sustaining the lateral forces of the trench and pit banks and that comply with all applicable OSHA requirements. Protective systems for excavations 20 feet deep or greater must be designed and certified by a registered Professional Engineer.

PART 3 - EXECUTION

3.01 Preparation

A. Planning

- 1. Maintain traffic flow at all streets and service drives during construction.
- 2. Do not cut farm fences when gates are available within a reasonable distance to move equipment from one field to another.
- 3. Comply with the terms and limits of easements. Obtain property access permission prior to accessing or traversing yards or fields outside easements.
- B. Protection
 - 1. Before any excavation is started, provide adequate protection for all lawns, trees, landscape work, shrubs, fences, hydrants, sidewalks, utility poles, and other objects that are to remain in place.
 - 2. Maintain such protection for as long as necessary to prevent damage from operations.
 - 3. Movable items such as mailboxes and roadway signs may be temporarily relocated during construction. Reinstall movable items in their original location immediately after backfilling and compacting is complete. Replace movable items damaged during construction with new items.
 - 4. Verify the location of existing storm sewers, sanitary sewers, water mains, gas mains, electric ducts, telephone ducts, utility services, and other underground structures. Determine the exact location of and the means of protection for these facilities and structures. Protect, support and maintain operation of these facilities during construction.
- C. Site Preparation
 - 1. Complete site clearing and grubbing.
 - 2. Remove existing pavement and walks from the areas of excavation.
 - 3. Strip topsoil and vegetation from the areas of excavation.
 - a. Clean topsoil may be stockpiled for reuse.
 - b. Do not mix grass, weeds, roots, brush, and stones larger than 1-inch in diameter with stockpiled topsoil. Dispose of root contaminated topsoil.

3.02 Excavating

- A. Excavate carefully and cautiously to avoid damaging existing underground utilities and structures.
 - 1. Repair, or have repaired, existing utilities and structures broken or otherwise damaged during Construction.
 - 2. Immediately bring to the attention of the Town and Designer any unforeseen conflicts with existing utilities exposed during excavation and preparation of trenches and pits.

- 3. If proposed utility cannot be installed at locations shown on the Drawings, make adjustments in its alignment or relocate the existing utilities as approved by the Town and Designer.
- B. Store excavated materials suitable and necessary for backfilling in a neat pile adjacent to the excavation in a manner that will not interfere with traffic. Do not place such materials at heights or within the proximity of excavations where they may cause earth slides or cave-ins. Do not stockpile excavated material closer than 2 feet from the top edge of the excavation wall at ground surface.
- C. Remove excavated material not suitable for backfilling and excess suitable material from the job site. Dispose of the materials in accordance with all local, state, and federal regulations.

3.03 Dewatering

- A. Where groundwater is encountered, secure a dry trench bottom before laying pipe. Provide, install, and operate sufficient sumps, pumps, hose, piping, wellpoints, etc. necessary to depress and maintain the groundwater level below the base of the excavation. If the standing water is unable to be removed, over-excavate the proposed bottom grade of the sewer bedding and place a minimum of three inches of No. 8 crushed stone in the over-excavated area. Filter water from dewatering operations to remove sediment before discharge in accordance with Section 01570.
- B. Keep the site free of surface water at all times and install drainage ditches, dikes, pumps, and perform other work necessary to divert or remove rainfall and other accumulated surface water from excavations. Perform the diversion and removal of surface and groundwater in a manner which will prevent water from accumulating within the construction area
- C. Under no circumstances shall surface water or groundwater be discharged to, disposed of, or allowed to flow into the Town's sanitary sewer system.
- D. The Contractor or Project Owner shall be liable for all lawsuits which may arise as a result of the Contractor's dewatering efforts.

3.04 Sheeting and Bracing

- A. Properly shore, sheet, brace, or cut back at the proper slope, all excavations to safely install utilities and to protect adjacent streets and structures. Follow Indiana Occupational Safety and Health Administration, Indiana Department of Labor, and all other applicable governmental agencies' safety requirements.
- B. The Contractor is responsible and accountable for all sheeting and bracing used and for damages to persons or property resulting from the improper quality, strength, placement, maintenance and removal of the sheeting, shoring, and bracing, including damage to trees, shrubs, walkways and other property.

3.05 Trenching

- A. Excavate trenches to the depths and widths shown or as required for the proper installation of the pipe and appurtenances.
- B. Excavate trenches in straight lines. Keep sides of trenches as near vertical as possible and properly sheet and/or brace, if required. Perform open cut excavation except where otherwise required by the Town.
- C. Provide a continuous, uniform bearing support for the pipe on bedding within the trench, dished to provide circumferential support to the lower third of each pipe. Dig out holes to receive pipe bells.
- D. Remove rock and soft material encountered in the trench which, in the opinion of the Town is incapable of providing adequate bearing to support the pipe. Remove material to accommodate the minimum specified bedding depth below the required elevation and fill with Class I material as specified. Field measure with the Town the locations where additional granular backfill is required due to rock or soft material, prior to backfilling.
- E. Do not open more than 50 feet of trench in advance of the installed pipe, unless otherwise directed or permitted by the Town. Excavate the trench within 6 inches of full depth for a distance of at least 30 feet in advance of the pipe installation, unless otherwise directed or permitted.
- F. Support all sewer, gas, water or other pipes or conduits crossing the trench to prevent damage and service interruptions. The manner of supporting such pipes or conduits will be subject to the approval of the Town.
- G. Provide adequate sheeting and bracing in trenches and pits to protect life, property and the Work. Renew and maintain sheeting, planking, timbering, shoring, bracing, and bridging, and do not remove until sufficient backfill has been placed to protect the pipe.
- H. Where rock is encountered in excavations, remove the rock by mechanical means. Use a rock trencher which produces excavated material commensurate to granular backfill, which can then be used as bedding for pipe in areas of rock excavation. Blasting is not permitted.
- I. Where water and sanitary force mains are to be installed under asphalt or concrete driveways, roads or streets, install the main by boring a hole and inserting the main in the bore hole. Casings may be required on permitted crossings.

3.06 Trench Backfill

- A. Specifications regarding trench backfilling also apply to excavated pits.
- B. Do not backfill trenches until all piping and utilities have been inspected by the Town.

- C. Backfill all trenches within State Highway right-of-way in accordance with INDOT Specifications. Backfill all trenches within the right-of-way of other public authorities having jurisdiction in accordance with requirements of the public authority.
- D. For any trench that intersects any portion of the pavement loading zone use Class I Class II, or flowable fill backfill materials below the line defining the pavement loading zone beginning at such line and extending to the bottom of the excavation. If flowable fill is used, install a minimum 6-inch concrete cap above the flowable fill in all locations.
- E. For any utility located in proximity to a building foundation use the Geotechnical recommendations or use 2:1 structure loading zone rule, whichever is more stringent, for the placement of compacted bedding and backfill materials.
- F. Comply with details for the placement of bedding and backfill materials for each pipe material.
- G. Placement and Compaction Requirements:
 - 1. Place Bedding, Haunching, and Initial Backfill materials in 6 to 8-inch balanced lifts to ensure proper compaction and filling of all voids.
 - 2. Use procedures and equipment for the Standard Proctor compaction test in accordance with ASTM D698/AASHTO T99.
 - 3. Outside the pavement/structure loading zone:
 - a. Place final backfill in maximum 12-inch lifts.
 - b. Compact each layer to a minimum of 90 percent of the maximum Standard Proctor dry density.
 - c. Additional compaction if required to minimize settling. Limited mounding of backfill above finish grade may be performed to compensate for settlement with the approval of the Town.
 - d. Place 6 inches of topsoil over areas to be seeded.
 - 4. Within the pavement/structure loading zone:
 - a. Place final backfill in 6 to 8-inch lifts, except place final 12 inches in 6-inch lifts.
 - b. Compact each layer to 95 percent of the maximum Standard Proctor dry density, except the final 12 inches under pavement, compact each 6-inch lift to 100 percent of the maximum Standard Proctor dry density.
 - c. Prepare upper portion of trench for pavement replacement as applicable.
 - 5. Stone and unpaved driveways and alleys:
 - a. Place final backfill in 6 to 8-inch lifts.
 - b. Compact each layer to 95 percent of the maximum Standard Proctor dry density.
 - c. Replace the last 12 inches of surface with the same material as the original surface unless otherwise specified and compact to 100 percent of the maximum Standard Proctor dry density.

- H. Compaction Procedures
 - 1. Place trench backfill in balanced lifts to ensure proper compaction and filling of all voids.
 - 2. Class I material: Shovel slice or otherwise carefully place; walk or hand tamp into place.
 - 3. Class II material: For the first 24 inches of backfill over the pipe, use handoperated tamping devices. Use standard mechanical methods (powered tampers, vibrators, etc.) for the remainder of the trench.
 - 4. Do not flood or puddle with water to consolidate backfill.
 - 5. When compaction test results are unsatisfactory, re-excavate, re-compact the backfill and retest until the specified compaction is obtained.
- I. Flowable Fill
 - 1. Discharge the mixture from mixing equipment into the space to be filled. Do not float pipe when placing flowable fill. Bring the flowable fill up uniformly to the fill line. Keep each filling stage continuous.
 - 2. Protect flowable fill from freezing until the material has stiffened and bleeding water has subsided. As the temperature nears freezing, additional curing time may be needed.
 - 3. Concrete may be placed on the flowable fill as soon as bleeding water has subsided. Place all pavements on flowable fill according to manufacturer's recommendations.
- J. Maintain backfilled trenches in a smooth and uniform condition until paving or seeding operations are completed.
- 3.07 Field Quality Control
 - A. Tests
 - 1. Class II Compaction Tests: Perform compaction tests for Class II trench backfill material in accordance with ASTM D698 and as follows:
 - a. At each road crossing: vertically at 2-foot intervals in the trench
 - b. At every 1,000 feet longitudinally in roadways along the pipe alignment and vertically at 2-foot intervals in the trench
 - c. Notify the Town two (2) business days prior to the tests so that a Town's representative may be present for the compaction tests.
 - d. No additional payment will be made for compaction tests. Compaction tests are considered incidental to the Work.
 - 2. Flowable Fill Tests: Perform the following tests for flowable fill:
 - a. Unconfined Compressive Strength
 - b. Flow Test: Conduct flow consistency testing in accordance with ASTM D6103 by filling a 3-inch diameter by 6-inch high open ended cylinder placed on a smooth, nonporous, level surface. Pull the cylinder straight up within 5 seconds and measure the spread of the fill. The diameter of the spread shall be 8 inches or more with no noticeable segregation.

- c. Setting and Early Strength Test: Determine whether the flowable fill has hardened sufficiently for loads to be applied and construction activities to continue by conducting one of the following tests:
 - 1) Penetration Resistance test in accordance with ASTM C403 minimum value of 500 psi required for loading
 - 2) Ball Drop test in accordance with ASTM D6024 maximum indentation diameter of less than 3 inches required for loading
- 3.08 Material Disposal
 - A. All existing utility infrastructure and appurtenances (piping, structures, etc.) that are to be replaced or removed to allow for new construction are the responsibility of the Contractor unless otherwise designated below. As these materials are excavated, remove them from the job site and dispose of them in accordance with applicable local, state and federal rules and regulations.

-END-
SECTION 02340 - TRENCHLESS EXCAVATION - HORIZONTAL BORINGS

PART 1 - GENERAL

- 1.01 Description
 - A. Scope: Furnish and install casing pipes beneath highways, railroads, and/or other locations as required by the Town and do related work necessary to complete work shown and specified.
 - B. Codes, Specifications, and Standards: Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto. Latest revisions shall apply, unless otherwise shown or specified.
- 1.02 Related Work Specified Elsewhere
 - A. Section 01570 Storm Water Pollution Prevention and Erosion Control
 - B. Section 02320 Trenching, Backfilling and Compaction for Utilities
 - C. Section 02350 Trenchless Excavation Directional Drilling
 - D. Section 02510 Water Mains
 - E. Section 02530 Gravity Sanitary Sewer Systems
 - F. Section 02535 Force Main Sewer Systems

1.03 Permits

The permits for crossing(s) shall be obtained by the Project Owner. The Contractor shall give notification to the applicable agency or officials prior to the start of the work. Do not start work until all arrangements are completed and permission to start work is given by the Town and the INDOT District Highway Engineer, County Highway Engineer, Railroad Authority, or authorized representative as applicable.

1.04 Borings and Casings

The Contractor shall be responsible for installing welded steel pipe casings as shown and specified, in accordance with approved jacking and boring methods. The Contractor shall maintain the lines and grades, as shown, for the entire length of the steel casing. Before beginning any work, the Contractor shall submit to the Designer and the Town plans and details describing the materials and methods which he proposes to use. Do not proceed with the work until such plans and methods have been reviewed for conformity with the approved permit by the Designer.

1.05 Submittals

- A. Submit the following:
 - 1. Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.
 - 2. Certified copies of reports of factory tests specified in this Section and required by the referenced standards.
 - 3. Plans and details describing materials and methods proposed by the Contractor for use in special crossings.
 - 4. Experience Documentation:
 - a. The Contractor shall provide documentation showing successful completion of at least 10,000 linear feet of horizontal bore installation of piping, or shall obtain the services of an experienced subcontractor to supervise the installation prior to commencing any work. Conventional trenching shall not be considered as applicable experience.
 - b. All supervisory personnel shall be adequately trained and shall have at least four years of experience in this trenchless installation method.

1.06 General Procedures

- A. Attend all meetings and provide all necessary data, reports, information, details, and construction schedules as requested by the governing officials.
- B. Notify the Town when each individual boring and receiving pit has been staked in the field. Do not proceed with the work until the survey information is obtained for the respective boring location and is approved by the Town.
- C. Review and modify as necessary the scheduling of any and all construction activities under the highway right-of-way in order to prevent interruption to traffic.
- D. Notify the proper officials before beginning the installation of casing pipe on each individual boring.
- E. All work shall be done in a careful, workmanlike manner to the satisfaction of the proper officials, as well as the Town.

PART 2 - PRODUCTS

2.01 Steel Casing

- A. The casing pipe and joints shall be of steel construction. The casing pipe and joints shall be capable of withstanding the load of traffic or the load of pavement, subgrade, and traffic, as applicable. The casing pipe and joints shall be constructed to prevent leakage of any matter from the casing or conduit throughout its entire length including the ends of the casing pipe.
- B. The casing pipe shall be welded steel pipe, new and unused material in accordance with current ASTM Specifications A-139 Grade B for "Electric Fusion of Welded Steel

Pipe" with a minimum yield of 35,000 psi. The inside diameter shall be at least 6 inches greater than the largest bell diameter of the conduits main joint.

C. The minimum wall thickness of the casing pipe shall be as shown in the following table:

Diameter	<u>Minimum Wall Th</u>	<u>ckness (Inches)</u>		
of Casing	Under Highway	Under Railroad		
_				
Under 14"	0.250	0.188		
14"	0.250	0.219		
16"	0.250	0.219		
18"	0.250	0.250		
20"	0.375	0.281		
22"	0.375	0.312		
24"	0.375	0.344		
26"	0.375	0.375		
28"	0.500	0.406		
30"	0.500	0.406		
32"	0.500	0.438		
34"	0.500	0.469		
36"	0.500	0.469		
38"	0.500	0.500		
40"	0.500	0.500		
42"	0.500	0.500		

- D. The exterior walls of casing shall be coated with protective coal tar or bitumastic material, after the welding of each joint has been completed.
- E. When casing is installed without benefit of a protective coating and the casing is not cathodically protected, the wall thickness shown above shall be increased to the nearest standard size, which is a minimum of 0.063 inch greater than the thickness shown except for diameter under 12-3/4 inches.
- F. The diameter, gauge, ASTM specification and manufacturer's name must be marked on the exterior of each pipe length.

2.02 Concrete Pipe Casing

- A. Reinforced concrete pipe may be used for a casing pipe in an open-cut and jacking method of installation if approved by the applicable permitting agency.
- B. Reinforced concrete pipe shall conform to the current ASTM Specification C-76, Class V, Wall C.
- C. If concrete pipe is to be used for the jacking method, grout holes tapped for no smaller than 1-1/2-inch pipe spaced approximately 3 feet around the circumference and approximately 4 feet longitudinally shall be cast into the pipe at manufacture. These holes are for pressure grouting the voids behind the pipe.

2.03 Casing Spacers

A. Install casing pipe spacers to provide uniform support throughout the entire length of the casing. Casing pipe spacers shall have stainless steel bands and risers, plastic liner and runners as manufactured by Cascade Waterworks Manufacturing Company or approved equal.

PART 3 - EXECUTION

- 3.01 Installation of Casing Pipe
 - A. The casing operation and installing shall proceed from a pit, excavated at a minimum of 30 feet from the edge of the highway pavement and shall be constructed without interruption to traffic. Contact the highway department before entering property to do work.
 - B. The conduit shall be installed inside a casing pipe of the length indicated on the plans. Except as otherwise permitted by the Highway authorities, the casing pipe shall be bored or jacked into place to satisfactory alignment and grade for its entire length.
 - C. The jacking pipe shall be constructed to provide not less than 30 feet clearance between the side of the pit adjacent to the road and the edge of pavement of the road measured at right angles. Open trenches shall be properly sheeted and braced in accordance with all applicable OSHA requirements, when and where sheeting is necessary to provide safe working conditions and protection for highway, roads, structures, and utilities.
 - D. Provide, maintain during casing and conduit installation, and backfill pits at locations as directed by the Town or applicable permitting agency. Excavation for pits shall be sheeted as necessary, in accordance with all applicable OSHA requirements.
 - E. Remove all excavated material and replace or change existing structures or utilities encountered to the satisfaction of the Town.
 - F. Install casing pipe by Directional Drilling under highways or railroads at the required locations and elevations as specified in Section 02350. All work shall be in strict accordance with the authority having jurisdiction. Contractor shall not proceed with work until notified that crossing permits are approved.
 - G. Casings under railroads shall be set with top not less than 5-1/2 feet below base of the rails. Casing shall be a minimum of 99 feet long centered under the track and measured at normal angle to centerline of track.
 - H. After casing pipe is installed, push successive lengths of conduit pipe through and make connections. Ends of casing pipe shall be blocked up in such a way as to prevent the entrance of foreign material, but shall not be tightly sealed for water mains. For sanitary sewers, tightly seal the ends of the casing pipe. Grouting of the void space between the casing and the pipe is not required.

- 3.02 Construction of Casing Pipe by Methods Other Than Jacking or Boring
 - A. The installation of the casing pipe by methods other than the jacking method must be performed in a manner which meets with prior approval of the authorities. Any expense incurred in connection with the construction of the crossing, removal, replacement, or maintenance resulting from the construction of the casing pipe and the conduit shall be at the expense of the Contractor.
- 3.03 Installation of Conduit
 - A. The conduit shall be as specified in other Sections for the type of conduit, whether water main, gravity sanitary sewer, or force main.
 - B. Jointing of the conduit pipe shall be as specified in other Sections for the type of pipe material and joint fittings.
 - C. Fill or plug the space between the outer shell of the conduit and casing at the ends of the casing pipe.
 - D. Place the conduit into and through the casing. Employ suitable methods to maintain tight joints, to the satisfaction of the Town.
 - E. Each end of the casing pipe shall be referenced to a minimum of two (2) permanent reference points for Record Drawing purposes.

-END-

SECTION 02350 - TRENCHLESS EXCAVATION – DIRECTIONAL DRILLING

PART 1 - GENERAL

- 1.01 Scope
 - A. Before beginning any work, submit to the Designer and the Town plans and details describing the materials and methods which he proposes to use. Do not proceed with the work until such drawings and methods have been reviewed for conformity with the approved permit by the Designer.
 - B. Perform all work necessary and required for construction of the project as indicated.
 - C. Codes, specifications and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto. Latest revisions shall apply, unless otherwise shown or specified.
- 1.02 Related Work Specified Elsewhere
 - A. Section 01570 Storm Water Pollution Prevention and Erosion Control
 - B. Section 02320 Trenching, Backfilling and Compaction for Utilities
 - C. Section 02340 Trenchless Excavation Horizontal Borings
 - D. Section 02510 Water Mains
 - E. Section 02530 Gravity Sanitary Sewer Systems
 - F. Section 02535 Force Main Sewer Systems

1.03 Permits

The permits for crossing(s) shall be obtained by the Project Owner. The Contractor shall give notification to the applicable agency or officials prior to the start of the work. Do not start work until all arrangements are completed and permission to start work is given by the Town and the INDOT District Highway Engineer, County Highway Engineer, Railroad Authority, or authorized representative as applicable.

1.04 Submittals

- A. Submit the following:
 - 1. Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.
 - 2. Certified copies of reports of factory tests specified in this Section and required by the referenced standards.

- 3. Details of equipment and written procedure with working drawings describing in detail the proposed boring method and the entire operation to be used as described.
- 4. Experience requirements per paragraph 3.03.
- 1.05 General Procedures
 - A. Attend all meetings and provide any necessary data, reports, information, details and construction schedules as requested by the Town.
 - B. All work shall be done in careful, workmanlike manner to the satisfaction of the Town.

PART 2 - PRODUCTS

- 2.01 Pipe
 - A. Water Main Pipe shall conform to the requirements in Section 02510
 - B. Sanitary Sewer Pipe shall conform to the requirements in Section 02530
 - C. Force Main Pipe shall conform to the requirements in Section 02535

PART 3 - EXECUTION

- 3.01 Surface and Subsurface Conditions
 - A. Verify the location of all known and unknown utilities and structures by test pitting prior to any boring or drilling. These utilities and structures may include, but are not limited to:
 - 1. Underground utilities such as, but not limited to:
 - a. Storm drains
 - b. Electric cables
 - c. Water mains
 - d. Sewer lines and septic systems
 - e. Gas lines
 - f. Telephone lines
 - g. Fiber optic lines
 - h. Cable television lines
 - i. Wells
 - j. Field drain tiles
 - 2. Above-ground utilities and other obstructions such as, but not limited to:
 - a. Electric and telephone poles
 - b. Buildings
 - c. Trees
 - d. Existing road signs

TOWN OF MORRISTOWN CONSTRUCTION STANDARDS JULY 2015 B. Contractor is responsible for inspecting the site, for conducting investigations, surveys and tests, including subsurface investigations and tests, that Contractor determines are necessary for the complete execution of all the work under this Contract.

3.02 Equipment

- A. The directional drilling system to be used must have the following features:
 - 1. The system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. The system shall be able to control the depth and direction of the pipe and must be accurate to a window of ± 2 inches.
 - 2. The system shall utilize a fluid-cutting process, using a liquid clay such as bentonite. This clay shall be totally inert and contain no risk to the environment.
 - 3. The liquid clay shall remain in the tunnel to increase the stability of the tunnel and to provide a lubricant to reduce frictional drag when the pipe is installed.
 - 4. The spoils shall be recovered by use of a vacuum system mounted on a vehicle for removal of the spoils. Spoils must not be discharged into sewers or storm drains. The Contractor is responsible for disposal of all spoil material.
 - 5. Equipment shall be fitted with a permanent alarm system capable of detecting an electrical current. The system will have an audible alarm to warn the operator when the drill head nears electrified cables within a safe operating distance. Refer to paragraph 3.04 for additional safety requirements.

3.03 Experience

- A. The Contractor shall demonstrate experience and expertise in trenchless excavation methods by providing a list of six (6) references for whom similar work has been performed prior to commencing any work. These references shall include a name and telephone number for contact so the Town may verify the claims.
- B. Provide documentation showing successful completion of at least 50,000 linear feet of directional drilling or shall obtain the services of an experienced directional drilling subcontractor meeting the experience requirements of this section to supervise the installation prior to commencing any work. Conventional trenching shall not be considered as applicable experience.
- C. All supervisory personnel shall be adequately trained and shall have at least four (4) years of experience in directional drilling. Submit the names and resumes of all supervisory field personnel for review by the Town prior to commencing any work.

3.04 Safety

- A. Mechanical, pneumatic or water-jetting methods shall not be acceptable due to the risk of surface subsidence and damage.
- B. Upon completion of drilling and pipe installation, the Contractor shall remove all spoils from all starting and termination pits. Restore pits to their original condition.

- C. Where manholes or grinder pumps are to be installed, adequate protection in the form of steel plates in traffic areas and timber shutters in other areas will be used until such times as the manhole or grinder pump is installed and the pit is backfilled and stabilized. Contractor shall be responsible for maintaining these areas.
- D. Because directional drilling may be performed while existing buried electrical cable is energized; the following safety requirements shall be met:
 - 1. All crews shall be provided with grounded safety mats, heavy gauge ground cables with connectors, hot boots and gloves.
 - 2. All supervisor personnel shall be adequately trained and have direct supervisory experience in directional drilling.

3.05 General

- A. The Town must be notified 48 hours in advance of starting directional drilling work. The directional bore shall not begin until the Town, or his authorized representative, is present at the job site and agrees that proper preparations for the operation have been made. The Town's approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.
- B. All directional drilling work performed must be in accordance with laws, permits, requirements and regulations of the authority having jurisdiction of the Rights-of-Way.
- C. Under no circumstances will the Contractor be allowed to cut or disturb pavement, asphalt or excavate within the relative limits of the roadway surface to retrieve any lost boring appurtenances or equipment.
- D. Maintain a log of drilling operations which shall include vertical depths of the pipe at established horizontal intervals every 25 feet.

3.06 Drilling Procedure

- A. Prior to any alterations to the work site, the Contractor shall video tape the entire work area, including entry and exit points. One copy of the video shall be given to the Town and one copy shall remain with the Contractor for a period of one year following the completion of the project.
- B. The work site, within the right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations shall be made. Confine all activities to the designated work areas and construction limits.
- C. The entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations. If the Contractor is using a magnetic guidance system, the drill path will be surveyed for any surface geo-magnetic variations or anomalies.
- D. Environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place as needed, including berms, liners, turbidity curtains and other

erosion control measures as specified in Section 01570. Adhere to all applicable environmental regulations. Fuel and oil must not be stored in bulk containers within 200 feet of any water-body or wetland.

- E. Pipe resting on paved or hardened surfaces (i.e., sidewalks, asphalt, concrete, gravel, etc.) shall be placed on pipe rollers before being pulled into the drill hole with rollers spaced close enough to prevent excessive sagging and dragging of the pipe upon rough surfaces which could scar the pipe.
- F. Calibrate the directional drilling head locator at the start of the day and at each new directional drilling operation. A daily calibration log shall be kept for the Town's review.
- G. The directional drilling operator shall have full control of the direction of the drilling tool at all times. Shallow, misdirected or other unsuccessful drill shall be abandoned and filled at the direction of the Town.
- H. The maximum drill angle shall be fifteen (15) degrees measured perpendicular to grade to the design depth elevation.
- I. A pilot hole shall be drilled on the drill path with no deviations greater than 5-percent of depth over a length of 100 feet. In the event that the pilot hole does deviate from the drill path more than 5-percent of depth in 100 feet, notify the Town and the Town may require the Contractor to pull back and re-drill from the location along the drill path before the deviation.
- J. In the event of a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a Marsh funnel and then wait another 30 minutes. If mud fracture or returns loss continues, cease operations and notify the Town. The Town, Project Owner and Contractor will discuss additional options and work will then proceed accordingly.
- K. Upon successful completion of the pilot hole, ream the drill hole to a minimum of 25-percent greater than the outside diameter of the pipe using the appropriate tools. Do not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
- L. After successfully reaming the drill hole to the required diameter, pull the pipe through the drill hole. In front of the pipe will be a swiveling mandrel. Once pull-back operations have commenced, operations must continue without interruption until the pipe is completely pulled into the drill hole. During pull-back operations do not apply more than the maximum safe pipe pull pressure at any time.
- M. Pull back two (2) strands of continuous tracer wire with the pipe. Do not pull back tracer wire with splices. Tracer wire shall conform to requirements as listed in Section 02510.
- N. In the event the pipe becomes stuck during pull-back, cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If

the pipe remains stuck, notify the Town. The Town, Project Owner and the Contractor will discuss options and then work will proceed accordingly.

- O. At all drill pits and directional drilling entrances and exits to the surface, a backhoe or equivalent shall be used to gradually return the bore depth to the prescribed depth.
- P. All drill pits and directional drilling entrances and exits to the surface shall be backfilled and compacted as specified in Section 02320.
- Q. Test/pressure relief holes (potholes) shall be dug every 25 feet 50 feet along the bore route to confirm alignment and grade for sanitary sewers, and to relieve subsurface pressure.
- R. Provide completed forms or computer generated output to the Town on a daily basis for checking line and grade of the drilling operation.

3.07 Testing and Acceptance

- A. Vertical Tolerance
 - Gravity sewer pipe (in direction of flow) shall be a maximum deviation of 6 inches in downward vertical alignment for any 100-foot section from plan grade but no more than 12 inches lower in a 500-foot section. Deviation of grade (in direction of flow) in the upward direction is allowed only for corrective means. Maintain a minimum absolute grade to provide a flow velocity of at least 2.0 feet per second.
 - 2. A variation greater than plus 0 feet or minus 5 feet from vertical alignment designated on the Contract Documents may be allowed at the discretion of the Designer and must be approved by the Town prior to installation.
- B. Horizontal Tolerance
 - Gravity sewer pipe deviations in horizontal line shall be a maximum of ±12 inches in any 100-foot section but no more than ±24 inches in 500 linear feet. Horizontal offsets from plan line must be corrected at manholes.
 - 2. A variation greater than ±2 feet from horizontal alignment designated on the Contract Documents may be allowed at the discretion of the Designer and must be approved by the Town prior to installation.
- C. Sections of pipe that do not meet the above requirements shall be replaced by the Contractor. New pipe installed that does not meet the above requirements shall be grouted and abandoned in place or removed and all voids filled as directed by the Town.
- D. Pressure test the installed sewer as specified in Section 02545.

-END-

SECTION 02510 - WATER MAINS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes
 - 1. Furnishing and installing all water mains, fittings, valves, hydrants, casings and appurtenances as specified herein.
 - 2. All pipe, fittings, valves and hydrant sizes in these Standards are intended to be nominal size and diameter.
- B. Related Sections
 - 1. Section 02320 Trenching, Backfilling and Compaction for Utilities
 - 2. Section 02340 Trenchless Excavation Horizontal Borings
 - 3. Section 02350 Trenchless Excavation Directional Drilling
 - 4. Section 02515 Disinfection

1.02 References

- A. American Society of Mechanical Engineers (ASME), latest editions
 - 1. ASME B16 Standards of Pipes and Fittings
 - 2. ASME B18.2.1 Hex Cap Screw, Hex Bolt, Machine Bolt Fasteners
 - 3. ASME B31 Standards of Pressure Piping
- B. American Society for Testing and Materials (ASTM), latest editions
 - 1. ASTM A36 Carbon Structural Steel
 - 2. ASTM A194 Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
 - 3. ASTM A307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
 - 4. ASTM D1330 Rubber Sheet Gaskets
 - 5. ASTM D1784 Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
 - 6. ASTM D2737 Polyethylene (PE) Plastic Tubing
 - 7. ASTM D3139 Plastic Pressure Pipes Using Flexible Elastomeric Seals
 - 8. ASTM D3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
 - 9. ASTM D3350 Polyethylene Plastics Pipe and Fittings Materials
 - 10. ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- C. American Water Works Association (AWWA), latest editions
 - 1. AWWA C104 Cement Mortar Lining for Ductile Iron Pipe and Fittings
 - 2. AWWA C110 Ductile Iron and Gray Pipe Fittings
 - 3. AWWA C111 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - 4. AWWA C151 Ductile Iron Pipe, Centrifugally Cast

WATER MAINS

- 5. AWWA C153 Ductile Iron Compact Fittings for Water Service (3-inch through 64-inch)
- 6. AWWA C223 Fabricated Steel and Stainless Steel Tapping Sleeves
- 7. AWWA C502 Dry Barrel Hydrants
- 8. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
- 9. AWWA C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
- 10. AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances
- 11. AWWA C605 Underground Installation of PVC Pressure Pipe and Fittings for Water
- 12. AWWA C651 Disinfecting Water Mains
- 13. AWWA C800 Underground Service Line Valves and Fittings
- 14. AWWA C900 PVC Pipe and Fabricated Fittings (4-inch through 12-inch) for Water Transmission and Distribution
- 15. AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing (1/2-inch through 3-inch) for Water Service
- 16. AWWA C905 PVC Pipe and Fabricated Fittings (14-inch through 48-inch) for Water Transmission and Distribution
- 17. AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, (4-inch through 63-inch), for Water Distribution and Transmission
- D. Indiana Department of Environmental Management (IDEM) Regulations in 327 of the Indiana Administrative Code (IAC), latest edition
- E. Indiana Plumbing Code, latest edition
- F. National Sanitation Foundation (NSF) Standards 60, 61, and 372, latest editions
- 1.03 Definitions
 - A. Collapse Zone: Considered to be one and a half times the tallest portion of a building
- 1.04 System Description
 - A. Design Requirements
 - 1. Comply with all associated requirements of IDEM and other applicable regulatory agencies.
 - 2. The Town will dictate the size of the mains as necessary to provide adequate fire protection and to allow for future growth.
 - 3. Fire Hydrants
 - a. Design and install fire hydrants at all intersections and at intervals no greater than 400 feet. Closer hydrant spacing may be required and must be approved by the Town prior to construction.
 - 4. Valves
 - a. Design and install valves to isolate areas of the system for routine maintenance and repair.

- b. Place isolation valves at all intersections (3 valves at tees and 4 valves at crosses) and at intervals no greater than 600 feet.
- c. Tightly group valves and locate valves out of the roadway whenever possible.
- d. The Town reserves the right to require smaller valve intervals if the Town believes the nature of development necessitates such intervals.
- 5. Post Indicator Valves (PIVs)
 - a. Install PIVs where required by the Town and outside the collapse zone of buildings and structures.
- 6. Fire Department Connection (FDC)
 - a. Place FDCs outside of the collapse zone and adjacent to the public street.
 - b. When FDCs cannot be placed outside the collapse zone due to property line restrictions, place the FDC adjacent to an outside corner of a building as far away as possible and adjacent to the public street.
- 7. Backflow Prevention
 - a. Refer to Town Ordinance No. 06-2014 for requirements.
- 8. Connection to Existing Water Main
 - a. All connections must be reviewed and approved by the Town prior to construction.
 - b. An inspector from the Town must be present during the connection.
 - c. Appointments must be made 48 hours in advance of construction.

1.05 Submittals

- A. Manufacturer's Certificate of Compliance certifying compliance with the applicable specifications and standards
- B. Shop Drawings
 - 1. Pipe
 - 2. Valves
 - 3. Valve Boxes
 - 4. Fittings
 - 5. Air release valves
 - 6. Joint restraints
 - 7. Hydrants
 - 8. Tracer wire
 - 9. Water service items and appurtenances
 - 10. Other related items and appurtenances
- C. Test Results
 - 1. Hydrostatic test
 - 2. Continuity test
- 1.06 Delivery, Storage, and Handling
 - A. Store materials in an area safe from damage and deterioration.

- B. Keep the interior of pipe, fittings, valves, hydrants and appurtenances free from dirt and foreign matter.
- C. Drain and store valves and hydrants in a manner to prevent damage from freezing. Store gaskets in a cool location out of direct sunlight and free from contact with petroleum products.
- D. Do not stack pipe higher than recommended by manufacturer. Do not stack fittings, valves, and hydrants.
- E. Store polyethylene materials out of direct sunlight. Do not expose polyethylene materials to direct sunlight for long periods before installation.

1.07 Warranty

A. Locate and repair leaks on any and all water mains installed that occur within the 1-year warranty period at no cost to the Town.

PART 2 - PRODUCTS

2.01 General

- A. All pipes, fittings, valves, hydrants, and appurtenances shall be new and unused.
- B. All products used in potable water applications and contained in this specification section shall meet NSF Standard 61 and NSF Standard 372 and shall be clearly marked as being in compliance with these standards.
- 2.02 Ductile Iron (DI) and Polyvinyl Chloride (PVC) Water Main Pipe and Fittings
 - A. Ductile Iron (DI) Pipe
 - 1. Provide pipe centrifugally cast in metal or sand-lined molds and conforming to AWWA C151. Provide pipe with standard cement mortar lining and seal coated with an approved asphaltic seal coat in accordance with AWWA C104. Provide pipe with a minimum of:
 - a. 350 PSI rated water working pressure for 12-inch diameter and smaller pipe
 - b. 250 PSI rated water working pressure for 14-inch diameter and larger pipe
 - 2. Pipe joint and gasket: push-on type joints and gaskets conforming to AWWA C111 unless otherwise specified herein.
 - 3. Pipe markings: Mark each length of pipe with manufacturer's name or trade mark, pipe class, and year of manufacture.
 - 4. Provide Tyton Joint pipe as manufactured by U.S. Pipe, Fastite Joint pipe as manufactured by American Ductile Iron Pipe's, or approved equal.
 - 5. DI River Crossing Pipe
 - a. Joints: ball and socket type joints made specifically for river crossing pipe.
 - b. Pressure Class: 350 PSI rated working pressure for all sizes
 - B. Polyvinyl Chloride (PVC) Pipe C900 or C905 (Ductile Iron O.D.)

- 1. Provide PVC pipe conforming to AWWA C900 or C905 as applicable and having Dimension Ratio of DR 18.
- 2. Pipe materials: conform to ASTM D1784, Class 12454-A or Class 12454-B virgin compounds with hydrostatic design basis of 4,000 psi.
- 3. Pipe joint and gasket: conforming to ASTM D3139 for joints; single gasket bell and spigot type, the bells being formed integrally with the pipe; bell consisting of a factory-installed solid cross section elastomeric gasket which meets the requirements of ASTM F477.
- 4. Furnish PVC pipe as manufactured by J-M Eagle, North American Pipe Corporation, National Pipe and Plastics, Inc., or approved equal.
- C. Ductile Iron Fittings
 - 1. Provide mechanical joint ductile iron fittings conforming to AWWA C153 and AWWA C110. Use restrained joints in addition to thrust blocking. Designer shall determine required lengths of restrained pipe from all fittings.
 - 2. Gaskets: conforming to AWWA C111.
- D. Fitting Restraints
 - 1. Series 1100 Megalug by EBAA Iron for DI pipe (3- to 48-inch diameter)
 - 2. Series 2000 PV Megalug by EBAA Iron for C900 or C905 PVC pipe (3- to 36-inch diameter)
 - 3. Ford Meter Box Uni-Flange Series 1400 Restrainer for DI pipe (3- to 36-inch diameter)
 - 4. Ford Meter Box Uni-Flange Series 1500 Restrainer for C900 PVC pipe (3- to 36-inch diameter)
 - 5. RomaGrip by Romac Industries, Inc. for DI pipe (3- to 48-inch diameter)
 - 6. RomaGrip by Romac Industries, Inc. for C900 and C905 PVC pipe (3- to 24-inch diameter)
- E. Pipe Joint Restraints
 - 1. Series 1500/1600 Bell Restraint Harness by EBAA Iron for C900 PVC pipe (4to 12-inch diameter)
 - 2. Series 1700 Megalug Restraint Harness by EBAA Iron for DI pipe (4- to 48-inch diameter)
 - 3. Field Lok 350 Gaskets by U.S. Pipe & Foundry Company for DI pipe (4- to 24-inch diameter)
 - 4. Fast-Grip Gaskets by American Cast Iron Pipe for DI pipe (4- to 30-inch diameter)
 - 5. Flex-Ring Joint System by American Cast Iron Pipe for DI pipe (4- to 48-inch diameter)
 - 6. JCM 620 Sur-Grip Bell Joint Restrainer for DI or C900 PVC pipe (4- to 12-inch diameter)
 - 7. Grip Ring Series 600 Pipe Restraining System manufactured by ROMAC Industries, Inc. for DI pipe and PVC pipe (4- to 12-inch diameter)
 - 8. Ford Meter Box Uni-Flange Series 1390 Joint Restrainer for C900 or C905 PVC pipe (black body) (4- to 36-inch diameter)

- 9. Ford Meter Box Uni-Flange Series 1390 Joint Restrainer for DI pipe (black body) (4- to 16-inch diameter)
- F. Pipe Joint Restraints in Casing Pipe
 - 1. Provide restrained joints for all pipe installed in casing.
 - 2. Ductile Iron Pipe
 - a. TR FLex pipe by U.S. Pipe
 - b. Flex-Ring Joint System by American Cast Iron Pipe
 - c. Tyton Joint Pipe by U.S. Pipe
- G. Coatings Furnish DI pipe and fittings which have a standard thickness cement mortar lining as specified in AWWA C104 and a bituminous seal outside coating as specified in AWWA C151.
- H. Nuts and Bolts Furnish high strength, heat treated cast iron nuts and bolts which conform to AWWA C111. Nuts shall be hexagon and bolts shall be tee head.
- 2.03 High Density Polyethylene (HDPE) Pipe and Fittings
 - A. HDPE Pipe
 - 1. Pipe material: conforming to AWWA C901 and C906, manufactured from high density, extra high molecular weight polyethylene and conforming to PE Standard Code PE 4710. Pipe shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
 - 2. Designed and manufactured in ductile iron pipe size and to the pressure class required by the Designer. The pipe Dimension Ratio (DR) shall be used to determine the pressure rating classification. Supply pipe designed to withstand crushing, buckling and deformation resulting in ovality.
 - 3. Deflection: Do not deflect pipe on a radius of less than 50 times the pipe diameter or less than the manufacturer's recommendation. If an HDPE fitting, flange or mechanical joint is present within the length of pipe to be deflected, do not deflect on a radius of less than 100 times the pipe diameter.
 - 4. Pipe markings: blue shell or blue permanent striping and AWWA specification stamp embedment or permanent blue-line print clearly and continuously marked longitudinally along the outside pipe wall.
 - B. HDPE Fittings
 - 1. Fittings material: manufactured from high density, extra high molecular weight polyethylene which conforms to PE Standard Code PE 4710. Fittings shall have a minimum cell classification of 445574C per the requirements of ASTM D3350.
 - 2. Provide fabricated polyethylene fittings designed and manufactured for one pressure class rating higher than the pressure class rating of the pipe specified in this section.
 - 3. Manufactured per the requirements of ASTM D3261; injection molded or fabricated using a combination of extrusion and machining. Fabricate HDPE fittings from HDPE pipe specified in this section. Supply HDPE fittings

manufactured or fabricated in facilities designed for that purpose; field fabricated HDPE fittings are not allowed.

- 4. Fitting markings: blue shell or permanent blue striping and the AWWA pipe specification stamp embedment or permanent blue-line print clearly and continuously marked longitudinally along the outside pipe wall.
- C. Flange Backup Rings and Gaskets
 - 1. Provide flange backup rings conforming to AWWA C207; Class D with bolting dimensions conforming to ASTM B16.5.
 - 2. Flange backup ring coating: fusion-bonded epoxy applied to all exterior and interior exposed surfaces with a minimum dry film thickness of 4 mil.
 - Flange gaskets: synthetic red rubber (SBR) hardness (Shore A) 80 +/- 5, ring or full face, 1/8-inch thick and conform to ASTM D1330 grades I and II. Asbestos gaskets are not allowed.
 - 4. Bolts and Nuts
 - a. Flange to flange connection bolts: carbon steel, ASTM A307 grade B for Class D flanges.
 - b. Nuts: conforming to ASTM A194 grade 2H.
 - c. Furnish bolts and nuts having regular unfinished hexagonal dimensions in accordance with ASTM B18.2.1 for wrench head bolts and nuts and wrench openings.
 - d. Minimum bolt lengths shall be the sum of the mating flange maximum thicknesses, the gasket and the depth of nut plus 1/8 inch minimum before torquing.
- D. Mechanical Joints
 - 1. Use polyethylene mechanical joint adaptors when making connections to mechanical joint fittings and when connecting to dissimilar pipe materials such as PVC or ductile iron.
 - 2. Connect polyethylene adaptor to mechanical joint fitting using a mechanical joint gland and gasket and in accordance with the specifications regarding mechanical joint ductile iron fittings. Meg-A-Lugs and Field-Lok gaskets are not allowed for use with polyethylene mechanical joint adaptors.
 - 3. Provide "Harvey" style polyethylene mechanical joint adaptors that include a stainless steel stiffener inserted into the inside of the mechanical seal end of the adaptor to provide additional axial strength and prevent pipe diameter reduction at the seal.
 - 4. Provide mechanical joint adaptors as a kit complete with gasket, mechanical gland, bolts and nuts per this section.
- 2.04 Polyethylene Encasement
 - A. Provide high-density, cross laminated polyethylene film with a minimum thickness of 4 mils conforming to ANSI/AWWA C105/A21.5 for all ductile iron pipe and fittings or confirm there are no corrosive soils in the project area by a soil investigation from a Town approved geotechnical engineer.

2.05 Valves

- A. Gate Valves
 - 1. Resilient seated with mechanical joint ends conforming to AWWA C509 or AWWA C515.
 - 2. Iron body with bronze stem nuts, glands and bushings: non-rising stem type with O-ring packing.
 - 3. Valves shall open counterclockwise (left) and have a 2-inch operating nut.
 - 4. Provide Series 2500 gate valves as manufactured by American Cast Iron Pipe or approved equal.
- B. Tapping Valves
 - 1. Valve
 - a. Iron body, non-rising stem gate valves conforming to AWWA C515. Supply valve gates, gate rings and body-seat rings which are oversized to permit entry and exit of tapping machine cutters.
 - b. Valve end connecting to tapping sleeve shall have a flange for bolting to the sleeve. The flange shall have a tongue which fits a recess in the tapping sleeve.
 - c. Valve end connecting to plain end of water main pipe or adapter shall be mechanical joint.
 - d. Valves shall open counterclockwise (left) and have a 2-inch operating nut.
 - 2. Tapping Sleeve
 - a. Stainless steel with a stainless steel flange end branch connection fabricated in accordance with AWWA C223.
 - b. Oversized branch connection inside diameter to permit entry and exit of tapping machine cutters.
 - c. Flange end shall have a recess to center the tapping valve.
- C. Inserting Valves
 - 1. Insertion valves are only allowed on existing water mains in locations approved by the Town. Prior written approval must be obtained from the Town before using insertion valves.
 - 2. Provide tapping valve and sleeve assembly designed to drill and ream the pipe and install the insertion valve without any interruption in water service.
 - 3. Provide valve assembly containing a ductile iron casting insert coated with styrene butadiene rubber compound and which seals on the inside diameter of the insertion valve sleeve neck and the lower half of the water main.
 - 4. Valve stem and nut assembly: conforming to AWWA C500.
 - 5. Bolts, nuts and washers: Type 304 stainless steel.
 - 6. Tapping sleeve: ASTM A36 steel
 - 7. Coating: epoxy coated to 10-12 mils; lined and coated with fusion-bonded epoxy meeting the requirements of AWWA C213.
 - 8. Gaskets: styrene butadiene rubber (SBR) compound which provides a positive 360 degree seal on the pipe and with a resilient seal at the pipe sleeve and valve insertion junction.
 - 9. Valves shall open counterclockwise (left) and have a 2-inch operating nut.

- 10. Provide inserting valve and sleeve assembly as manufactured by Romac Industries, Inc., or approved equal.
- D. Air Release Valves
 - 1. Cast iron body, cover and baffle, with stainless steel float brass water diffuser and Buna-N seat.
 - 2. Install air release valves in vented meter boxes.
 - 3. Provide air release valve as manufactured by APCO Valve, Val-Matic Valve Corp., or approved equal.
- 2.06 Post Indicator Valves (PIVs)
 - A. Gate Valve
 - 1. Resilient seated with mechanical joint ends conforming to AWWA C515.
 - 2. Iron body with bronze stem nuts, glands and bushings: non-rising stem type with O-ring packing.
 - 3. Valves shall open counterclockwise (left) and have a 2-inch operating nut.
 - 4. Provide Series 2500 gate valves with indicator plate as manufactured by American Cast Iron Pipe or approved equal.
 - B. Indicator Post
 - 1. Indicator post shall open counterclockwise (left) and be capable of operating a 2-inch valve nut.
 - 2. Provide Model IP-71 as manufactured by American Cast Iron Pipe or approved equal.
- 2.07 Valve Boxes
 - A. Provide all buried valves with adjustable 5-inch diameter valve boxes with a minimum thickness of 3/16 inch, constructed so that the removable cover will not be thrown out by travel over it.
 - B. Provide cast iron, extension type valve boxes with slide or screw type adjustment to permit movement of the top section without transmitting forces onto the valve body.
 - C. The valve box shall rest on the valve bonnet and be centered over the valve, and the top of the section shall be approximately on line with nut at top of valve stem. The entire assembly shall be plumb.
 - D. Covers for valve boxes on water service valves shall be marked "WATER".

2.08 Hydrants

- A. Flushing Hydrant
 - 1. Flushing hydrant locations must be approved by Town prior to use.

- 2. Provide dry barrel, compression shutoff type hydrants with 2-1/8-inch main valve opening, 3-inch mechanical joint inlets, and one 2-1/2-inch hose nozzle.
- 3. Supply hydrants with National Standard Threads and open left (counter-clockwise).
- 4. Provide hydrants as manufactured by American Cast Iron Pipe Company or approved equal.
- B. Standard Fire Hydrants
 - 1. Provide dry barrel, compression shutoff, traffic model hydrants conforming to AWWA C502 with 5-1/4-inch main valve opening, 6-inch mechanical joint inlets, two 2-1/2-inch hose nozzles, and one 5-inch Storz hose coupling.
 - 2. Supply hydrants with National Standard Threads and open left (counter-clockwise).
 - 3. Provide Waterous model hydrants as manufactured by American Cast Iron Pipe Company.
- C. Auxiliary Gate Valves
 - 1. Install an auxiliary gate valve with every hydrant.
 - 2. Provide 3-inch valve for flushing hydrants, and 6-inch valve for standard fire hydrants.
 - 3. Provide auxiliary gate valve conforming to the gate valve specifications herein.
- D. Hydrant coating
 - 1. Provide each hydrant with an epoxy prime coat and 2-component exterior grade full gloss polyurethane exterior enamel topcoat.
 - 2. Supply hydrants painted red.
 - 3. Touch-up painting for field repairs shall be in accordance with Manufacturer's recommendations.
- 2.09 Fire Department Connections (FDCs)
 - A. Provide FDC outside the collapse zone with a 5-inch Storz hose coupling between 40-inches and 48-inches above finished grade and at a downward angle of 45-degrees.
 - B. If the FDC is within five (5) feet of a surface for vehicle traffic, protect the FDC with a minimum of two (2) 6-inch pipe bollards cast in and filled with concrete.
- 2.10 Backflow Prevention Device
 - A. Provide a Town approved device meeting the requirements of Town Ordinance 06-2014 where required by applicable codes and standards.
- 2.11 Tracer Wire
 - A. Install tracer wire with all pipe.

- B. Provide direct burial 10-gauge AWG solid, steel core soft drawn high strength, 684# tensile break load, 30 mil high molecular weight-high density blue polyethylene jacket complying with ASTM D-1248, 30 volt rating tracer wire as manufactured by Copperhead Industries, Inc. or approved equal.
- C. Supply 3M Direct Bury splice kits (KIK 3M) consisting of tubes prefilled with silicone electrical insulating gel or approved equal. Use splice kits on open cut installations only.
- D. On pipe installed by trenchless methods, pull two (2) strands of continuous tracer wire with the pipe. Do not splice the tracer wire to be installed. Provide direct burial #10 AWG solid, steel core hard drawn extra high strength, 2032# average tensile break load, 45 mil high molecular weight-high density blue polyethylene jacket complying with ASTM D-1248, 30 volt rating as manufactured by Copperhead Industries, Inc. or approved equal.
- 2.12 Services and Meter Pits
 - A. Saddles Provide saddles manufactured and tested in accordance with AWWA C800. Supply Series S70 (hinged) as manufactured by Ford Meter Box Company, or approved equal.
 - B. Corporation Stops Provide corporation stops manufactured and tested in accordance with AWWA C800. Provide Series F-1000-Q-NL Corporation Valves (100 psi rating) or Series FB-1000-Q-NL Ball Type Corporation Valves (300 psi rating) as manufactured by Ford Meter Box Company or approved equal.
 - C. Service Lines Provide 3/4 or 1-inch CTS polyethylene flexible tubing rated at a minimum of 200 psi and conforming to ASTM D2737 and AWWA C901. Provide compression fittings as manufactured by Ford Meter Box Company or approved equal. Supply larger service lines with diameters equivalent to the diameter of the meters being installed when larger meters are required.
 - D. Meter Boxes and Covers Provide 20-inch inside diameter, 36-inch depth meter pit as manufactured by FRATCO or approved equal. Provide 20-inch meter box cover unit C Cover/Standard Pentagon as manufactured by Ford Meter Box Company or approved equal. Supply recessed type lid indicating water service with 1-1/32-inch pentagon bolts and one Standard Waterworks locking pentagon nut.
 - E. Coppersetters Provide 5/8-inch by 3/4-inch coppersetter. Provide Catalog No. VBHH71-12W-44-33-NL for 3/4" and VBHH74-12W-44-44-NL for 1" as manufactured by Ford Meter Box Company.
 - F. Dual Check Valves Provide angle meter valves, bronze body, acetal plastic dual poppet assemblies with rubber gasket and stainless steel springs for each new service. Provide Series No. HHA31-NL as manufactured by Ford Meter Box Company or approved equal.

- G. Meters Provide radio read meters as manufactured by Badger Meter, Inc. and as approved by the Town.
- 2.13 Additional Items
 - A. Concrete Blocking Provide minimum 2,000 psi compressive strength quick-set concrete blocking.
 - B. Cast-in-Place Concrete Provide ready-mixed concrete meeting the requirements of ASTM C94. Each cubic yard of concrete shall have:
 - 1. Cement minimum 6 bags
 - 2. Air Content 5 to 7 percent
 - 3. Coarse Aggregate Size maximum 1-1/2 inches
 - 4. Slump 3 to 5 inches
 - 5. Compressive Strength 4,000 psi

PART 3 - EXECUTION

- 3.01 General
 - A. Install all water mains, fittings, valves, hydrants, casing and appurtenances as specified in this Section, and in accordance with applicable AWWA standards. Do not install pipe when, in the opinion of the Town, trench conditions are unsuitable.
 - B. Inspect water mains, fittings, valves, hydrants, casing and appurtenances prior to installation and promptly remove damaged or unsuitable materials from the job site. Replace damaged or unsuitable materials with new and unused materials.
- 3.02 Installation of Water Mains
 - A. Provide all tools, labor and equipment necessary for the safe and expeditious installation of water mains and appurtenances.
 - B. Install water mains to the lines approved by the Town and as specified in this Section.
 - C. Install fittings, valves and hydrants in the locations approved by the Town.
 - D. Water mains installed parallel to existing sanitary sewers or sewage force mains shall have a minimum horizontal separation of 10 feet measured from edge of pipe to edge of pipe.
 - E. When crossing existing sanitary sewers install water mains with the bottom of the main at least 18 inches above the top of the sewer and with not less than a 45 degree angle between the alignment of the water main and sanitary sewer. Install water mains so that a full length of pipe is centered on the sewer. No water main shall pass through or come in contact with any part of a sanitary sewer manhole.

- F. When crossing existing sewage force mains install the water mains above or below the force main with a minimum vertical separation of 18 inches measured edge to edge, and with not less than a 45 degree angle between the alignment of the water main and forced main. Install water mains so that a full length of pipe is centered on the force main.
- G. Install water mains with a minimum cover of 60 inches.
- H. Install temporarily plugs in installed piping systems at the end of each day's work or other interruption of progress on a given line. Install plugs in a manner satisfactory to the Town, and ensure plugs are adequate to prevent the entry of animals into the pipe or the entrance or insertion of deleterious materials.
- I. Install hydrants with a minimum bury not less than that required for the water mains in locations that provide complete accessibility. Choose a placement that reduces the possibility of damage from vehicles or injury to pedestrians. Provide a minimum clearance radius of 10 feet around all hydrants. Check the hydrant locations and determine whether the hydrant requires a deeper bury depth. Adjust hydrants when required to the bury depth recommended by the manufacturer for the hydrant to function properly.
- J. Follow manufacturer's installation procedures when installing water mains, fittings, valves, hydrants and appurtenances.
- K. Excavate trenches to widths which provide adequate working space for proper pipe installation, jointing and embedment. Shape the bottom of trench to give uniform circumferential support to the lower quarter of each pipe. Lay pipe with bell ends facing in the direction of laying.
- L. Lower pipe, fittings, valves and hydrants into trench by hand, by means of hoists or ropes, or by other suitable tools or equipment which will not damage materials, coatings or linings. Do not drop or dump pipe, fittings, valves or hydrants into trench.
- M. As each length of pipe is installed, join the pipe to the previously installed pipe. Bring the pipe to the correct line and grade and secure in place with bedding tamped under and around each side of the pipe. Deposit and compact backfill material uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
- N. Wherever it is necessary to deflect pipe from a straight line in either a vertical or horizontal plane, do not exceed the amount of deflection allowed by the pipe manufacturer's specifications. If the alignment requires joint deflections in excess of the allowable, furnish and install fittings or a sufficient number of shorter lengths of pipe.
- O. Cut pipe in a neat and workmanlike manner without damage to PVC pipe or to the cement lining of DI pipe. Use a cutting machine so as to leave smooth ends at right angles to the axis of the pipe. Flame cutting with an oxyacetylene torch is not allowed on DI pipe. For bell and spigot joint installation, bevel the edges of all field

cut pipe after cutting. For mechanical joint installation do not bevel the pipe end. Remove all burs that form as a result of field cutting the pipe, whether the pipe end is beveled or not.

- P. For DI fittings with mechanical joints that require harnessing, provide DI mechanical joint retainer glands. For DI push-on joints that require harnessing provide push-on gripper gaskets. Use a stencil and paint the word "HARNESSED" in 2-inch safety orange letters on the top of the bell on each push-on joint assembled with a gripper gasket. Do not use gripper gaskets when installing plugs.
- Q. Fusion Bonding Procedure for HDPE Pipe
 - 1. The method of joining polyethylene pipe to polyethylene pipe or polyethylene fittings, other than those shown on the Drawings as flanged or otherwise mechanically connected, shall be by means of butt-fusion or sidewall fusion in accordance with the polyethylene pipe manufacturers written bonding procedure specifications (BPS) and conforming to ASME B31.3, Chapter VII, paragraph A-328. BPS shall include, but not be limited to, cutting and facing requirements and shall utilize a data logger, such as the "Datalogger" manufactured by McElroy Manufacturing, Inc., to monitor and record the assembly of each butt-fusion or sidewall fusion joint, except when making small diameter service connections (2-inch or smaller) service connections.
 - 2. Mechanical sleeves and saddles will not be allowed for branch or service connections.
 - 3. Fusion bonding equipment specified in the BPS shall be clean and in proper operating condition capable of meeting all conditions and requirements of the pipe and bonding equipment manufacturer, including temperature, alignment and fusion pressure. Test and certify equipment heater performance prior to use for fusion bonding each day at start up and at one other time each day, no sooner than four (4) hours after start up.
 - 4. Use a data logger for quality control to electronically log each fusion joint, except as noted above. Store logged fusion joint data in the data logger unit such that it can be downloaded.
 - 5. Remove one fusion joint for every five (5) days of fusing bonding work and forward to a certified lab for testing. Include bend back tests of the fused joint per AWWA C906.
- R. Allow HDPE pipe to reach ambient temperature for the installed condition before final cutting, installation of concrete restraint system, or connection of transition couplings.

3.03 Installation of Appurtenances

- A. Clean the interiors of all fittings, valves and hydrants of foreign matter prior to installation. Inspect valves and hydrants in open and closed positions to ensure all parts are in working condition.
- B. Provide adequate thrust blocking in addition to joint restraints for all hydrants, valves, and fittings such as bends, tees and plugs as determined by the Designer

or a minimum of one full length of pipe on each side of all valves and fittings, whichever is more stringent. Where concrete blocking is used, place concrete between fitting and solid trench wall. Form concrete thrust block in place and do not cover bolted glands. Place a sheet of polyethylene plastic wrap between the main or fitting and concrete thrust block prior to placement of the concrete. Where solid trench wall conditions are not present, tie fittings to the next full joint in each direction by use of tie rods or fittings with integral cast flanges or set screw devices.

- C. Place valves vertically on solid concrete block and bed them solidly. Center valve box over operating nut. Place and compact backfill in lifts around valve box so valve box remains plumb. Tamp backfill on all sides of each valve box to the undisturbed trench face. Adjust valve box covers so they are flush with finish grade. Re-adjust covers as necessary so that they remain flush with the finished grade after final paving and grading work is complete.
- D. Set hydrants plumb with the pumper nozzle facing toward the street or drive surface. Set hydrants so the centerline of hydrant outlet nozzles are not less than 18 inches nor more than 20 inches above finish grade. Provide hydrant extensions where required to obtain proper elevation. Provide washed coarse gravel to ensure proper drainage of hydrant barrel. Place and compact backfill around hydrant to finish grade so that hydrant remains plumb. Furnish and install a gate valve and valve box on each hydrant branch connection.
- E. Install tracer wire on all pipe by taping to pipe in 15- to 20-foot intervals. Do not wrap wire around pipe. Install tracer wire on inside of all valve boxes. Seal splices and branch connections with epoxy and wrap with tape. Provide a continuity test on all tracer wire installed.
- F. Assemble tracer wire splices and branch connections with splice kits. Remove 1/2 inch of insulation from wire. Tie together wires using an overhand knot to prevent pull apart and use a split bolt connector or solder to connect for electrical continuity. Seal connection with epoxy contained in splice kit and wrap with tape.
- G. At locations where a new hydrant assembly is to be installed on an existing water main, install new tee in the existing main to connect the new lead to the new hydrant assembly.

3.04 Installation of Casing by Open Cut

- A. For steel casing pipe installed by trenchless methods under streets, highways and railroads, see Section 02340.
- B. For casing pipe and accessories material requirements see Section 02340.
- C. Assemble the casing pipe and joints to prevent leakage of any matter from the casing or conduit throughout its entire length.
- D. Coat the exterior walls of casing with protective coal tar or bitumastic material, after the welding of each joint has been completed.

- E. Install casing pipe spacers to provide uniform support throughout the entire length of the casing.
- F. Install the conduit inside the casing pipe as specified in Section 02340.

3.05 Field Quality Control

- A. General
 - 1. Perform all disinfection and testing with the Town's inspector present.
 - 2. Notify the Town at least 72 hours in advance of any testing and disinfection.
 - 3. Provide all necessary equipment for testing and disinfection.
- B. Filling and Disinfection
 - 1. Fill and sterilize all new water mains, services, leads and appurtenances in accordance with AWWA C651 and Section 02515. Each section of water main shall be complete and concrete thrust blocking shall have been in place for not less than 10 days prior to being tested.
 - 2. Fill the new mains with water from the Utility distribution system. Expel all air from the mains as they are filled. Tap the water main at high points, if necessary, to assure removal of all air.
 - 3. Flush all water mains and fire hydrants prior to disinfection. Flush mains with a flushing velocity of at least 2.5 feet per second. Flush water mains and hydrants until the water discharged is clear.
 - 4. Disinfect all new water mains, valves, and other items prior to placing in service in accordance with Section 02515.
- C. Continuity Test
 - 1. Conduct continuity tests on all tracer wire. Repair or replace all tracer wire found not to be continuous after testing at no cost to the Town.
- D. Hydrostatic Leakage Test
 - Hydrostatically test all water mains installed. Perform leakage test under a hydrostatic pressure in accordance with AWWA C600 for Ductile Iron pipe or AWWA C605 for PVC pipe and these specifications. The hydrostatic pressure shall be 150 psi or 1-1/2 times the working pressure at the point of testing, whichever is greater, but shall not exceed 150 psi at the lowest point in elevation of the system being tested. Allow the pipeline to stabilize at the test pressure before conducting the hydrostatic test.
 - 2. The hydrostatic test shall be at least 2 hours in duration. Maintain the test pressure within +/-5 psi during the test period by adding makeup water using a test pump. At the end of the test duration, return the line pressure to the original test pressure by adding makeup water. Accurately measure the total amount of makeup water added during and at the end of the test duration, or leakage, in gallons by means of a water meter installed on the supply side of the pressure pump.

- 3. The pipe installation will not be accepted if the leakage is greater than that determined by the following formula in which L is the allowable leakage, in gallons per hour; <u>S</u> is the length of pipeline tested, in feet; <u>D</u> 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 gage .:
 - a. Ductile Iron L=0.0000068SD(P)^{1/2} b. Polyvinyl Chloride

c. Polyethylene

- See Table 3.05-1 L=0.0000068SD(P)^{1/2}
 - See Table 3.05-2 See Table 3.05-3
- 4. Where the leakage rate exceeds the permissible maximum, locate and repair the leak or leaks. Repeat the leakage test until the test results are acceptable.
- 5. Repair all leaks discovered within 1 year from the date of final acceptance of the work and retest the repaired segments to confirm leaks have been stopped.

Table 3.05-1: Allowable Leakage for Ductile Iron Pipe per 1000 ft. of Pipeline* - gph

Average	e Test Press	sure	Nominal			
psi	3	4	6	8	10	12
50	0.14	0.19	0.28	0.38	0.48	0.57
75	0.17	0.23	0.35	0.47	0.58	0.70
100	0.20	0.27	0.41	0.54	0.68	0.81
125	0.23	0.30	0.45	0.60	0.76	0.91
150	0.25	0.33	0.50	0.66	0.83	0.99
175	0.27	0.36	0.54	0.72	0.89	1.07
200	0.29	0.38	0.57	0.76	0.96	1.15
225	0.30	0.41	0.61	0.81	1.01	1.22
250	0.32	0.43	0.64	0.85	1.07	1.28

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

Table 3.05-2 – Allowable Leakage for PVC Plastic Pipe with Elastomeric Joints – gph (Allowable Leakage per 1,000 Ft. or 50 Joints)*

Average Test Pressure					Nominal Pipe Diameter – in.							
psi	4	6	8	10	12	14	16	18	20	24	30	36
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43	1.72
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.20	3.85

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

Conditions							
Nominal	Allowance for Expansion (U.S. gal per 100 feet of Pipe)						
Pipe Size							
(inch)	1-Hour Test	2-Hour Test	3-Hour Test				
4	0.13	0.25	0.40				
6	0.30	0.60	0.90				
8	0.50	1.00	1.50				
10	0.75	1.30	2.10				
12	1.10	2.30	3.40				

Table 3.05-3 – Allowance for Expansion of HDPE Pipe Under Pressure* for Ambient Conditions

*These allowances only apply to the test phase and not the initial expansion phase. In addition, they assume that the pipe is being tested for a system design pressure equal to the pipe's pressure class. If the pipe is being tested to a lower system design pressure, the above allowances should be reduced by the ratio of the system design pressure to the pipe's pressure class.

- 3.06 Installation of Service Connections
 - A. After new mains have been tested, sampled and approved, install new brass saddles (on PVC pipe only) and corporation stops on the new main at the locations of new service lines.
 - B. Provide stainless steel stiffeners for HDPE service line.
 - C. Install tracer wire on all service lines.
 - D. Where new meters are installed on opposite sides of road from new mains, push services under road to connect to meters. No open cutting of road surfaces will be allowed for service lines unless prior written approval by the Town is obtained.
 - E. Install meter pits at right-of-way property lines or as directed by the Town. Set meter boxes plumb, and adjust the meter box covers so that they are flush with the finish grade (+/-1 inch).
 - F. Install, flush, and perform leakage test on service lines in accordance with the Indiana Plumbing Code.

-END-

SECTION 02515 - DISINFECTION

PART 1 - GENERAL

1.01 Summary

- A. Section Includes: Disinfection of all potable water lines, valves, hydrants, service connections, and all other appurtenances which are to store, handle or carry potable water. Furnish all labor, water, chemical and equipment, including taps, corporation stops, temporary pumps and other items necessary to perform the Work, unless noted otherwise.
- **B.** Related Sections
 - 1. Section 02510 Water Mains

1.02 References

- A. All disinfection work shall be acceptable to the Indiana Department of Environmental Management. If any requirements of this section are in conflict with requirements of the authority of disinfection, those of the authority shall govern.
- B. American Water Works Association (AWWA), latest editions
 - 1. AWWA C651 Disinfecting Water Mains
- C. Indiana Plumbing Code

1.03 Submittals

- A. Quality Control Submittals
 - Prior to starting any disinfection work, furnish for the Town's review a detailed outline of the proposed sequence of operation, disinfection method to be used, manner of filling and flushing units, source and quality of water to be used, and disposal of heavily chlorinated water.
- B. Test Results
 - 1. Submit copies of all bacteriological and chlorine residual test results to the Town.

1.04 Quality Assurance

- A. Perform all work for and in connection with disinfection under the direction of an experienced supervisor.
- B. All equipment used in disinfection work shall be in proper working condition, and shall be adequate for the specified work.

PART 2 - PRODUCTS

2.01 Materials

A. Liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets, as identified by AWWA as acceptable disinfection materials.

PART 3 - EXECUTION

3.01 Preparation

- A. Perform pressure and leakage tests prior to disinfection when specified in related sections.
- B. Thoroughly flush all pipes to remove foreign material. The source of potable water shall be flushed prior to use to ensure that contaminants or debris are not introduced into the new pipes.
- C. Release entrapped air at high points and fill the unit with water when specified in related sections.
- D. Provide necessary corporation cocks and vent piping in the event that complete venting cannot be accomplished through available outlets.
- E. Prevent admission of contaminated water into previously disinfected units.

3.02 Application

- A. Disinfection Procedures for Water Mains, Valves, Fittings, and Appurtenances
 - 1. Disinfect by one of the three methods described in AWWA C651: tablet, continuous feed, or slug.
 - a. Tablet Method
 - 1) Perform in accordance with AWWA C651.
 - 2) Do not use calcium hypochlorite on solvent-weld plastic or screwedjoint steel pipe due to the danger of fire or explosion.
 - 3) Keep pipe and appurtenances clean and dry during construction.
 - 4) Place calcium hypochlorite granules or tablets to give an average chlorine dose of 25 mg/L as follows:
 - a) During construction, place calcium hypochlorite granules at the upstream end of the first section of pipe, at the upstream end of each branch, and at 500-foot intervals.
 - b) During construction, place 5 gram calcium hypochlorite tables in each section of pipe. Also, place 1 tablet in each hydrant, hydrant branch, and other appurtenances. Attach tablets using a food grade adhesive.
 - 5) After installation is complete, fill the water main slowly and ensure that all air pockets are eliminated.

DISINFECTION

- 6) The chlorinated water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41 degrees Fahrenheit, the chlorinated water shall remain in the pipe for at least 48 hours. Operate valves and hydrants during this time to ensure disinfection of appurtenances.
- 7) At the end of the retention period, the chlorine residual shall not be less than 10 mg/L.
- b. Continuous-Feed Method
 - 1) Perform in accordance with AWWA C651.
 - 2) During water main installation, place calcium hypochlorite granules in accordance with the procedures described in the Tablet method.
 - 3) Perform a preliminary flushing of the water main to eliminate air pockets and remove particulates. The flushing velocity shall be not less than 2.5 feet per second.
 - 4) Provide a water supply through a temporary connection from a backflow protected source at a constant, measured rate.
 - 5) Chlorine Solution shall be prepared based on a chlorine gas-water solution or 1 percent chlorine solution prepared with calcium hypochlorite-water or sodium hypochlorite-water mixture.
 - 6) Direct-feed chlorinators, which operate from the gas pressure in the chlorine cylinder, shall not be used for the application of liquid chlorine. Apply liquid chlorine with a solution feed, vacuum operated chlorinator and booster pump.
 - 7) Hypochlorite solutions may be fed using a powered chemical feed pump designed for feeding chlorine solution.
 - 8) At a point not more than 10 feet downstream from the beginning of the new main, feed the new water main with a dose of chlorine at a constant rate such that the feed water will have not less than 25 mg/L free chlorine.
 - 9) Chlorine application shall not cease until the entire main is filled with heavily chlorinated water.
 - 10) The chlorinated water shall remain in the pipe for at least 24 hours.
 - 11) Operate valves and hydrants during this time to ensure disinfection of appurtenances.
 - 12) At the end of the retention period, the chlorine residual shall not be less than 10 mg/L.
- c. Slug Method
 - 1) Perform in accordance with AWWA C651.
 - 2) During water main installation, place calcium hypochlorite granules in accordance with the procedures described in the Tablet method.
 - 3) Perform a preliminary flushing of the water main to eliminate air pockets and remove particulates. The flushing velocity shall be not less than 2.5 feet per second.
 - 4) Provide a water supply through a temporary connection from a backflow protected source at a constant, measured rate.
 - 5) At a point not more than 10 feet downstream from the beginning of the new main, feed the new water main with a dose of chlorine at a constant rate such that the feed water will have not less than 100 mg/L free

chlorine. Measure the chlorine feed at regular intervals to verify the feed concentration.

- 6) The free chlorine residual shall be measured in the slug as it moves through the main and shall not drop below 50 mg/L at any time during the 3-hour testing period.
- 7) All interior surfaces shall be exposed to the heavily chlorinated water for at least 3 hours.
- 8) Operate valves and hydrants during this time to ensure disinfection of appurtenances.
- 2. To prevent damage, the heavily chlorinated water shall be flushed from the system as quickly as possible following the applicable retention period. The piping system shall be flushed until the water is found to be comparable to that of the Utility or not less than 1 mg/L.
- 3. Do not permit flushing water to discharge into existing water mains.
- B. Disinfection of Service Lines and Accessories
 - 1. Perform in accordance with the Indiana Plumbing Code.
 - 2. Flush the piping with clean, potable water until only potable water appears at the points of outlet.
 - 3. Disinfect the system according to one of the following procedures:
 - a. Fill the system with a water chlorine solution containing at least 50 mg/L of free chlorine. Retain the heavily chlorinated water in the system for at least 24 hours.
 - Fill the system with a water chlorine solution containing at least 300 mg/L of free chlorine. Retain the heavily chlorinated water in the system for at least 3 hours.
 - 4. Following disinfection, flush the system with clean, potable water until the chlorine in the water coming from the system does not exceed the chlorine residual in the flushing water.
 - 5. Verification of disinfection for service lines is not required.

3.03 Verification of Disinfection

- A. After application of disinfection is complete, perform final flushing of heavily chlorinated water, unless specified otherwise.
- B. Before the system, structure or well is placed in service, the Town will obtain 2 successive water samples 24 hours apart with the Contractor present and have them tested for bacteriological analysis by a State-approved laboratory at the Contractor's expense. Samples shall be drawn in accordance with the State's procedure.
- C. If samples do not prove satisfactory, the system, structure or well shall be rechlorinated and re-sampled until 2 successive water samples taken 24 hours apart have tested satisfactory.
- D. Contractor shall be responsible for the expense of taking and testing additional samples until satisfactory samples are obtained.

- E. Contractor shall be responsible for the expense of all water for subsequent fillings of the pipelines.
- 3.04 Disposal of Waste
 - A. Properly dispose of all heavily chlorinated water by neutralization and in accordance with the regulations of the local health department, Indiana Department of Environmental Management, and AWWA standards.
 - B. Dispose of heavily chlorinated water as required by Section 02102 Material Handling and Spill Prevention Plan and AWWA C651, Appendix C.
 - C. Obtain written authorization from the Town before discharging any water to the sanitary sewer system. Do not discharge heavily chlorinated water to sanitary sewer system without neutralizing the chlorine.

-END-
SECTION 02530 – GRAVITY SANITARY SEWER SYSTEMS

PART 1 - GENERAL

1.01 Summary

- A. Furnish and install all gravity sanitary sewers, manholes and appurtenances as specified herein.
- B. Before installing piping, carefully verify location, depth, type of joint needed and size of pipe to which connection is proposed and that the sewers can be installed as planned. Any deviation shall be submitted to the Town for approval before sewers are run.
- C. All lengths of pipe shall be dimensioned to allow the pipe to be worked into place without forcing. Cut sections of pipe using proper equipment such as a chop saw to provide a straight and clean cuts. Bevel the ends.
- 1.02 Related Work Specified Elsewhere
 - A. Section 02320 Trenching, Backfilling and Compacting for Utilities
 - B. Section 02340 Trenchless Excavation Horizontal Borings
 - C. Section 02350 Trenchless Excavation Directional Drilling
 - D. Section 02535 Force Main Sewer Systems
 - E. Section 02545 Testing Sanitary Sewers And Sanitary Force Mains
- 1.03 Quality Assurance
 - A. Test all sanitary sewer systems installed in accordance with Section 02545.
- 1.04 Material Delivery, Storage and Handling
 - A. Contractor shall be responsible for the delivery, storage and handling of all materials. Load and unload all pipe, fittings, manhole sections and appurtenances in a manner to avoid shock and damage. Do not drop materials. Lifting shall be by hoists or skids when hand lifting is not feasible. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground. Replace damaged or defective pipe and appurtenances. Store materials in an area safe from damage and deterioration. Keep the interior of pipe, fittings, manhole sections and appurtenances free from dirt and foreign matter. Store gaskets in a cool location out of direct sunlight and free from contact with petroleum products.

1.05 Domestic Product Requirements

All steel and foundry products provided for in this project, including ferrous and nonferrous metals, piping, fittings, and piping-related products, shall be manufactured in the United States.

PART 2 - PRODUCTS

2.01 General

- A. All pipe, fittings, manholes, and appurtenances shall be as specified herein. Each length of pipe and fitting shall be plainly stamped, marked or color coded to an acceptable standard as to weight, class, and type thereof, and the manufacturer's trademark or name.
- B. Alternate sewer pipe materials consisting of ductile iron, concrete encased pipe, or PVC conforming to ASTM D2241 SDR-21 pipe must be used when one or both of the following conditions apply:
 - 1. Where sewers or laterals cross under existing water mains and cannot achieve or maintain 18-inch of clearance. Use alternate pipe materials for at least one full pipe length centered under the crossing.
 - 2. Where sewers or laterals must be located horizontally closer than ten (10) feet from existing water mains.

2.02 Polyvinyl Chloride (PVC) Pipe

- A. Polyvinyl Chloride (PVC) gravity sewer pipe shall be solid wall PVC gravity sewer pipe. Joints shall be bell and spigot type with elastomeric seals per ASTM D3212, with gaskets conforming to ASTM F-477.
- B. Gravity sewer pipe sizes 48-inch and less shall be solid wall PVC with SDR ratings determined by the Designer. For pipe sizes 15-inch and less, provide gravity sewer pipe with not less than an SDR-35 rating and conforming to ASTM D3034. For pipe sizes 18-inch to 48-inch provide gravity sewer pipe with not less than an SDR-26 rating and conforming to ASTM F679.
- C. Fittings such as wyes, tees, and bends shall be made in such a manner as will provide strength and watertightness at least equal to the class of the adjacent main line pipe to which they are jointed and shall conform to all other requirements specified for pipe corresponding class and internal diameter. Joints shall be of the same type as used on the adjoining pipe. Fabricated branches for wyes and tees shall be securely attached to the wall of the pipe in a watertight manner and shall be flush with the inside surface of the pipe.
- D. Single family service laterals shall be a minimum of 4-inch diameter PVC SDR-35 conforming to ASTM D3034.

- E. Building service laterals shall be a minimum of 6-inch diameter PVC SDR-35 conforming to ASTM D3034.
- 2.03 Ductile Iron Pipe (DIP)

Ductile iron pipe and fittings shall conform to the requirements of ANSI/AWWA A21.51/C151 and ASTM A746, Ductile Iron Gravity Sewer Pipe.

- A. Thickness class requirements of ductile iron pipe to be used in conveyance of sanitary sewage by gravity shall be Pressure Class 350 for pipe sizes 12 inches and smaller, and a minimum of Pressure Class 250 for pipe sizes larger than 12 inches.
- B. Outside surfaces of the pipe and fittings shall be bituminous-coated complying with ANSI/AWWA A21.51/C151 and ANSI/AWWA A21.10/C110.
- C. Inside surfaces of all pipes, fittings and adapters shall be lined with cement mortar and a bituminous seal coat. Cement mortar lining and bituminous seal coat shall meet the requirements of ANSI/AWWA A21.4/C104.
- D. Ductile iron pipe joints shall be push-on type conforming to ANSI A21.11 (AWWA C111), latest revision. Fittings shall be ductile iron and shall comply with ANSI Specification A21.10, latest revision, with push-on or mechanical joints rated for 150 psi working pressure.

2.04 Manhole and Accessories

- A. Manholes shall be constructed of reinforced precast concrete sections conforming to ASTM C478. Base sections shall be a minimum 6-inch thick for 48-inch diameter manholes and minimum 8-inch thick for greater than 48-inch diameter. The bottom invert of all pipe entering manholes shall be at least three (3) inches above the top of the base slab. Manhole cones shall be of eccentric cone type. Manhole risers shall be at least 48-inch internal diameter. Eccentric cone sections shall have a 24-inch opening.
- B. Joints for manhole sections shall include a flexible butyl rubber joint gasket conforming to ASTM C-443, and a pre-formed butyl-based flexible rope sealant, Kent Seal or approved equal
- C. Manhole frames and lids shall have machined horizontal and vertical bearing surfaces. Watertight frames and lids for sanitary sewers shall have a grooved rubber gasket with concealed pick holes and shall be as manufactured by East Jordan Iron Works, No. 1022-1AGSMD, Neenah R-1772-C or approved equal. All manhole frames and lids shall be watertight. Bolt-down frames and lids shall be East Jordan Model No. 1040WT, Neenah R-1916-F1, or approved equal. Lids shall be imprinted with the words "SANITARY SEWER" in raised letters at least two (2) inches in height. All frames and lids shall be products of one manufacturer.
- D. Precast concrete adjusting rings conforming to ASTM C-478 may be used to adjust the elevation of manhole frame and cover. Provide adjusting rings with a nominal

thickness of not less than four (4) inches. Do not use more than 12 inches of total adjusting ring height to adjust manhole frame and cover. Provide a watertight seal and place gasket material in keyways and all cavities.

- E. Steps for manholes shall be made from steel reinforcing rod encapsulated in a copolymer polypropylene resin as manufacturer by M.A. Industries, Inc., American Step Company, Inc. or approved equal. Manhole steps shall have a minimum of ten (10) inches clear step width, 12-inch on center, and not more than 24-inch from the top or invert.
- F. Each manhole shall have precast openings where the pipes enter the manhole. Field core drilled openings for pipe penetrations may be allowed on a case-bycase basis with the written authorization of the Town. A flexible neoprene molded boot or resilient seal shall be installed to secure the pipe. The boot shall be Kor-N-Seal as manufactured by National Pollution Control Systems Inc. or approved equal. The resilient seal shall be A-Lok or approved equal.
- G. Where a connection is made to an existing manhole, rehabilitate the existing manhole to meet the current standards of the Town including rehabilitating the flow channel and other repair measures to reduce infiltration. Provide a watertight seal between the pipe and manhole. A flexible neoprene molded boot or resilient seal shall be installed to secure the pipe. The boot shall be Kor-N-Seal as manufactured by National Pollution Control Systems Inc. or approved equal. The resilient seal shall be A-Lok or approved equal.
- H. Manhole benchwalls shall be precast or constructed using a concrete mixture with a low cure time and the ability to be troweled to a smooth finish. The benchwall shall exhibit a 28-day compressive strength of no less than 4,000 psi. The slope of the bench wall shall be a minimum of 1/2 inch per foot.
- I. No inside drop manholes are allowed for new sewer construction. Obtain prior written approval from the Town prior to installing inside drop connections to existing connections.
- J. Connect incoming sewers to the manhole via an outside drop connection when the sewer enters a manhole 24 inches or more above the invert of the outgoing sewer. Connect the footing for the portion of the manhole under the drop to the manhole base. Provide a minimum of three 1/2 inch diameter reinforcing rods placed as dowels into the manhole base.
- K. Doghouse Manholes shall consist of reinforced precast concrete manhole riser and cone meeting the requirements of ASTM C-478, frame and cover, and a cast in place concrete base section with steel reinforcement. Concrete shall have a slump of 3 to 5 inches, and shall attain a minimum 28-day compressive strength of 4,000 psi. Steel reinforcement shall meet the requirements of ASTM C-478 for materials and base sections.

- 2.05 Building Sewers
 - A. Provide SDR-35 conforming to ASTM D2241, Schedule 40 or Schedule 80 PVC conforming to ASTM D1785. Provide pipe with bell and spigot, push-on compression type joints with flexible gasket. Assemble and install the pipe in accordance with the manufacturer's recommendations.
 - B. Furnish water works grade pressure pipe for all building sewers located within 10 feet of a water service line.

2.06 Casing Pipe

A. Casing Pipe for jack and bore pipe installation shall be in accordance with Section 02340.

PART 3 - EXECUTION

3.01 General

- A. Provide all tools, labor and equipment necessary for the safe and expeditious installation of all sanitary sewers, manholes, and appurtenances as specified herein.
- B. Inspect sewer pipe, manhole sections and appurtenances prior to installation and promptly remove damaged or unsuitable materials with new and unused materials.
- C. The Town reserves the right to reject any precast manhole section due to any of the following conditions:
 - 1. Fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint
 - 2. Defects that indicate imperfect proportioning, mixing, and molding
 - 3. Surface defects indicating honeycombed or open texture
 - 4. Damaged ends, where such damage would prevent making a satisfactory joint
 - 5. Infiltration into manhole exceeding allowed limits
 - 6. The internal diameter of the manhole section varying by more than one percent from the nominal diameter
 - 7. Not installed in conformance with these Standards
 - 8. Not clearly marked as of date of manufacturer, trade name, size designation part number, and ASTM number
 - 9. Having a deviation more than 1/4-inch from the straight edge at any point across the top of manhole cone section or riser ring
 - 10. Having any visible steel bars along the inside or outside surface of the manhole except for reinforcement stirrups or spacers used to position the cage during manufacture

3.02 Installation of Sewer Pipe

- A. The Town reserves the right to order the discontinuation of pipe installation during times of cold weather. During cold weather heat the pipe and jointing material to keep joints from freezing. Do not lay the pipe on frozen ground. Do not lay flexible or semi-rigid pipe when the air temperature is less than 32 degrees Fahrenheit unless proper precautions per the manufacturer's recommendations are taken by the Contractor and the method is approved by the Town.
- B. Lay sewer pipe uniformly to line and grade so that the finished sewer will have a uniform bore.
- C. Set line and grade by means of laser beam and target for alignment and grade.
- D. Lay sewer pipe progressively upgrade with bell upstream in a manner to form close, concentric joints with smooth bottom inverts.
- E. After the joint is made, place sufficient bedding material along each side of the pipe to prevent conditions that might tend to move the pipe off line or grade.
- F. Temporarily plug installed piping systems at the end of each day's work, or other interruption of progress on a given line. Plugging shall be installed in a manner satisfactory to the Town, and it shall be adequate to prevent entry of animals into the pipe or the entrance or insertion of deleterious materials.
- G. Where applicable, install laterals at a normal slope of 1/4" per foot. Minimum slope shall be 1/8" per foot. Install a mechanical plug at the end of each lateral and at the end of all sewer stubs. Install the lateral at a depth to allow each customer to connect to the end of the lateral. Extend the building wye lateral to the Right-of-Way line and place a #10 magnetic locator wire above the end of the pipe to within three feet of the ground surface. For new construction, install manufactured fittings for laterals during construction of the sanitary sewer main. Do not cut in fittings or use saddles after the new sanitary sewer is installed.
- H. Install a treated wood 2 x 4 at the end of each sewer lateral for marking. Protect these markers and to verify that all laterals have been properly marked.
- I. Remove all debris and excess soil from all pipe installed under this Contract by flushing with clean water. If flushing is not adequate to clean the pipes, the Contractor shall clean the pipes by jetting. Obtain necessary water and equipment to flush the pipes to the satisfaction of the Town.

3.03 Installation of Construction Bulkheads

A. Before extending a sanitary sewer, provide a watertight bulkhead in the existing sewer immediately downstream of the point of connection. Leave the bulkhead in place until the new sanitary sewer has been cleaned of all accumulated water and debris and accepted by the Town. During all intermissions in construction of the sanitary sewer pipe, plug, cover, or bulkhead the open face of the last pipe so as to prevent sand, water, earth or other materials from entering the pipe.

B. Whenever pipe and special castings are required to be cut, the cutting shall be done by skilled workmen in such a manner as to leave a smooth end at right angles to the axis of the pipe without damage to the pipe casting or cement lining. Do not use cutting torches.

3.04 Installation of Manholes

- A. Install manholes at the end of each line segment, at all changes in grade, size, materials, alignment, intersections, and at distances not greater than 400 feet for sewers 18 inches or less in diameter and 600 feet for sewers greater than 18 inches in diameter.
- B. Keep manhole excavation free from water during construction. Backfill excavations below the depth required for the manhole base with compacted sand or crushed stone at the Contractor's expense.
- C. Benchwalls shall have a minimum 1/2-inch per foot slope starting at the manhole wall/benchwall interface and then slope towards the top of the trough. The trough shall have a minimum depth equal to the diameter of the incoming and exiting sewers.
- D. Use precast concrete risers and adjusting rings in such combination that the top of the eccentric cone section, when installed, will be at proper elevation for the manhole frame. Concrete adjusting rings shall be allowed up to a maximum of 12-inch height adjustment. Manholes needing more than 12-inch adjustment shall have a concrete riser section installed to the proper elevation. Use flattop sections in lieu of cone sections where approved by the Town.
- E. Bring manhole frames to grade, leveled and centered.
- F. Build steps into all manholes 4-feet in depth or greater. Locate the first step 8-inches below the bottom of the chimney. Install steps at 12-inches on center minimum to 16-inches on center maximum. Install steps with minimum 3-inch wall embedment and project a minimum clear distance of 4-inches from the wall measured from the point of embedment.
- G. Install precast concrete risers and cone sections so that the axis of the manhole is vertical. Install gaskets for riser joints in accordance with the manufacturer's recommendations. Apply a trowelable grade butyl rubber base exterior backplaster material 1/4-inch minimum thickness, when dry, on the outside of the manhole at each joint.
- H. Set castings for manholes at finish grade level. Adjust the casting to the satisfaction of the Town.
- I. Wrap manhole frames located in pavement in minimum 3/8-inch preformed joint filler. Extend the joint filler from the top to the bottom of the frame.
- J. Remove all debris and excess soil from manhole after construction and prior to flushing the sewer pipes, to the satisfaction of the Town.

- 3.05 Construction of Doghouse Manholes
 - A. Excavate sufficiently below existing pipe where doghouse manhole is to be placed, in order to allow for placement of crushed stone bedding and minimum base section thickness. Use forms for pouring concrete base; do not use earth trench in lieu of forms. Pour concrete base and install steel reinforcement as specified herein. Pour concrete around existing pipe. Sawcut cleanly and remove the top half of existing pipe after manhole is constructed. Install gasket meeting the requirements of ASTM C443 between cast in place manhole base and precast sections.
- 3.06 Installation of Casing
 - A. Install steel casing pipe by boring and/or jacking under highways and railroads in accordance with Section 02340.

-END-

SECTION 02535 - FORCE MAIN SEWER SYSTEMS

PART 1 - GENERAL

1.01 Summary

- A. Furnish and install all force mains, air release valves and appurtenances as specified herein.
- B. Before installing piping, carefully verify location, depth, type of joint needed and size of pipe to which connection is proposed, confirm that the mains can be installed as planned. Submit any deviation to the Town for approval before mains are run.
- C. All lengths of pipe shall be dimensioned accurately to measurements established at the site, and shall be worked into place without forcing. Cut sections of pipe using pipe cutters to obtain square ends.
- 1.02 Related Work Specified Elsewhere
 - A. Section 02320 Trenching, Backfilling and Compacting for Utilities
 - B. Section 02340 Trenchless Excavation Horizontal Borings
 - C. Section 02350 Trenchless Excavation Directional Drilling
 - D. Section 02545 Testing Sanitary Sewers And Sanitary Force Mains

1.03 System Description

- A. Design Requirements
 - 1. Locate and size the air and vacuum release valves required for the proper operation of the force mains and sewage pumping systems.
- 1.04 Material Delivery, Storage and Handling
 - A. Contractor shall be responsible for the delivery, storage and handling of all materials. Load and unload all pipe, fittings, manhole sections and appurtenances in a manner to avoid shock and damage. Do not drop materials. Lifting shall be by hoists or skids when hand lifting is not feasible. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground. Damaged or defective pipe and appurtenances shall be replaced. Store materials in an area safe from damage and deterioration. Keep the interior of pipe, fittings, manhole sections and appurtenances free from dirt and foreign matter. Store gaskets in a cool location out of direct sunlight and free from contact with petroleum products.
- 1.05 Related Work Specified Elsewhere
 - A. Section 02340 Trenchless Excavation Horizontal Borings

B. Section 02350 - Trenchless Excavation – Directional Drilling

PART 2 - PRODUCTS

2.01 General

All pipe, fittings, and appurtenances shall be as specified herein. Each length of pipe and fitting shall be plainly stamped, marked or color coded to an acceptable standard as to weight, class, and type thereof, and the manufacturer's trademark or name.

- 2.02 High Density Polyethylene (HDPE) Pipe Force Main
 - A. Pipe
 - Materials used for the manufacture of polyethylene pipe and fittings shall be extra high molecular weight, high density PE 4710 polyethylene resin. Polyethylene pipe shall meet the requirements of ASTM D3035/F714. Cell classification shall be 445574C per ASTM D3350. Design and manufacturer pipe for working pressure of 80 psi, 120 psi surge pressure, and a depth of cover indicated on the Drawings and specified in this section.
 - 2. Polyethylene pipe shall have DR (Dimension Ratio) as determined by Designer for each application, and a nominal IPS (Iron Pipe Size) outside diameter.
 - B. Fittings
 - 1. Fittings shall be manufactured in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabrication from HDPE pipe listed in this specification.
 - 2. Fittings shall be manufactured by the same manufacturer as the pipe to which fusion bonding is intended, using identical materials.
 - 3. Fittings shall be manufactured to meet the same pressure rating as the pipe with an included 2:1 safety factor. The pipe DR (Dimension Ratio) shall be used to determine the fitting pressure rating requirements.
 - 4. Fitting shall be manufactured in facilities designed for that purpose. Field-fabricated fitting shall not be allowed.
 - 5. Branch Saddle Reducing Tees shall be used to connect Air Release Valves to the force mains. Saddles shall be main line size by 4-inch with 4-inch flange adapter and back-up ring, and 4-inch x 2-inch NPT companion flange.
 - C. Flange Backup Rings and Gaskets
 - 1. Flange backup rings shall be of the type and pressure rating shown on the piping spool drawings.
 - 2. Ductile iron backup rings shall be of the convoluted type, fabricated from ductile iron per ASTM A536, grade range 60/40/18 to 65/45/12. Ductile iron flange backup ring bolting dimension shall conform to ANSI B16.5 Class 150.
 - 3. Backup rings shall be finished as cast with flash removed from all edges and bolt holes to the specified dimensions. Additional finish requirements, if any, shall be as noted on the piping spool drawings and in accordance with the following:

- a. Epoxy coated, with Bitumastic 300M High Build Coal Tar Epoxy per manufacturer's recommendations.
- b. Gaskets shall be of the type and thickness shown on the piping spool drawings. Gasket materials shall be compatible with the service of the piping system. Asbestos gaskets will not be allowed.
- D. Fusion Bonding Procedure
 - 1. Piping joints other than those shown as flanged or otherwise mechanically connected shall be butt fusion bonded in accordance with a written bonding procedure specification (BPS) as required by ANSI/ASME B31.3, Chapter VII, paragraph A-328. BPS shall include cutting and facing requirements and shall utilize a data logger.
 - 2. Materials to be fusion bonded shall be from the same manufacturer.
 - 3. Bonders and bonding operators shall be qualified in the use of the BPS as required by ANSI/ASME B31.3, Chapter VII, paragraph A-328. Qualification records certifying that borders and bonding operators employed to complete fusion bonding are qualified in the BPS shall be submitted prior to commencement of fusion bonding work.
 - 4. Bonding equipment specified in the BPS shall be in proper operating condition. Equipment heater performance shall be tested and certified prior to use for fusion bonding. Bonders and bonding operators shall be qualified for the specific bonding equipment utilized in the fusion bonding work.
 - 5. The joining method shall be performed in strict accordance with the pipe manufacturer's requirements. The butt fusion equipment used in the jointing procedure shall be capable of meeting all conditions required by the pipe manufacturer, including temperature, alignment and fusion pressure. Heat fusion joining shall be 100-percent efficient offering a joint weld strength at least equal to the tensile strength of the pipe. Each butt fusion joint shall be logged electronically by the butt fusion unit, for quality control, by such equipment as The Data Logger manufactured by McElroy Manufacturing, Inc. Logged fusion joints shall be stored in the Data Logger unit, such that it can be downloaded and printed weekly for submittal to the Town.
- E. Quality Assurance
 - The pipe and fittings manufacturer shall have an established quality control program responsible for inspecting incoming materials and outgoing pipe and fittings and components. Incoming polyethylene materials shall be inspected for density per ASTM D1505 and melt flow rate per ASTM D1238, and contamination. All incoming materials shall be certified by the supplier. Certifications shall be verified by the pipe manufacturer and submitted to the Town.
- 2.03 Polyvinyl Chloride (PVC) Pipe Force Main
 - A. Pipe shall conform to ASTM D2241, SDR 21 for force mains 4-inch or greater and SDR 26 for force mains smaller than 4-inch. Pipe materials shall conform to ASTM D1784, Type 1, Grade 1, 2,000 psi design stress. Pipe joints shall be single gasket bell and spigot type, the bells being formed integrally with the pipe.

B. Fittings shall be mechanical joint iron or ductile iron conforming to ANSI A21.10/AWWA C110 and ANSI A21.11/AWWA C111. Restrained joints must be used in addition to thrust blocking..

2.04 Ductile Iron Pipe (DIP) Force Main

- A. Pipe shall be centrifugally cast in metal or sandlined molds and shall conform to ANSI A21.51/AWWA C151. Minimum thickness class shall be Class 50 for all sizes. Each length of pipe shall be marked to show manufacturer's name or trademark, pipe class, and year of manufacture. Pipe joints shall be push-on type and conform to ANSI A21.11/AWWA C 111. Fittings shall be mechanical joint and iron or ductile iron conforming to ANSI A 21.10/AWWA C110 and ANSI A21.11/AWWA C 111.
- B. Fittings shall be mechanical joint and iron or ductile iron conforming to ANSI A 21.10/AWWA C 110 and ANSI A21.11/AWWA C 111. Restrained joints must be used in addition to reaction thrust blocking and shall be Lok-Tyte, Loc-Fast, or approved equal.
- C. Coatings all pipe and fittings shall have a standard thickness cement mortar lining as specified in ANSI A 21.4/AWWA C 104 and an outside coating as specified in ANSI A 21.51/AWWA C 151.
- D. Gaskets for mechanical joints and push-on joints shall conform to ANSI A 21.11/AWWA C 111.
- 2.05 Sewage Air and Vacuum Valves
 - A. Force Mains (less than 6 inches in diameter):

Sewage Air Release and Air Vacuum Valve shall have cast iron body and Neenah R-1915F2 or approved equal cover with an N.P.T. inlet and N.P.T. outlet. Provide with stainless steel float and float guide. Valve shall be as manufactured by Val-Matic Valve and Manufacturing Co., Model VM-801 ABW, or approved equal.

B. Force Mains (6-10 inches in diameter):

Sewage Air Release and Air Vacuum Valve shall have cast iron body and Neenah R-1915F2 or approved equal cover with an N.P.T. inlet and N.P.T. outlet. Provide with stainless steel float and float guide. Valve shall be as manufactured by Val-Matic Valve and Manufacturing Co., Model VM-802 ABW, or approved equal.

2.06 Steel Casing

- A. Steel Casings shall be as specified in Section 02340.
- 2.07 Tracer Wire
 - A. Install tracer wire with all pipe.

- B. Provide direct burial 10-gauge AWG solid, steel core soft drawn high strength, 684# tensile break load, 30 mil high molecular weight-high density blue polyethylene jacket complying with ASTM D-1248, 30 volt rating tracer wire as manufactured by Copperhead Industries, Inc. or approved equal.
- C. Supply 3M Direct Bury splice kits (KIK 3M) consisting of tubes prefilled with silicone electrical insulating gel or approved equal. Use splice kits on open cut installations only.
- D. On pipe installed by trenchless methods, pull two (2) strands of continuous tracer wire with the pipe. Do not splice the tracer wire to be installed. Provide direct burial #10 AWG solid, steel core hard drawn extra high strength, 2032# average tensile break load, 45 mil high molecular weight-high density blue polyethylene jacket complying with ASTM D-1248, 30 volt rating as manufactured by Copperhead Industries, Inc. or approved equal.
- 2.08 Service Valve Assemblies
 - A. Service valve assemblies shall include all fittings, brass curb stop with 100-percent port opening, and curb box.
 - B. Curb box shall be cast iron, extension type with slide or screw type adjustment to permit movement of the top section without transmitting forces onto the valve body. The curb box shall rest on the valve bonnet and be centered over the valve, and the top of the section shall be approximately on line with nut at top of valve stem. The entire assembly shall be plumb. Covers for curb boxes shall be painted cast iron and labeled "SEWER".

PART 3 - EXECUTION

3.01 General

- A. All connections to forced mains must be approved beforehand by the Town in writing.
- B. Provide all tools, labor and equipment necessary for the safe and expeditious installation of all force mains, and appurtenances as specified herein.
- C. Inspect sewer pipe, and appurtenances prior to installation and promptly remove damaged or unsuitable materials with new and unused materials.
- D. Lay force main uniformly to line and grade so that the finished mains are sloped uniformly to the high points along the alignment. Set force main alignment and grades on all mains to minimize the number of air release valves.
- E. Install the air and vacuum release valves where required for the proper operation of the force main. Provide and install additional air release valves at no additional cost to the Town where and when required to release all of the air required for the force main to properly function.

- F. Install tracer wire on all pipe by taping to pipe in 15- to 20-foot intervals. Do not wrap wire around pipe. Install tracer wire on inside of all valve boxes. Seal splices and branch connections with epoxy and wrap with tape. Provide a continuity test on all tracer wire installed.
- G. Assemble tracer wire splices and branch connections with splice kits. Remove 1/2 inch of insulation from wire. Tie together wires using an overhand knot to prevent pull apart and use a split bolt connector or solder to connect for electrical continuity. Seal connection with epoxy contained in splice kit and wrap with tape.
- H. Install service valve assemblies within right of way. Set valve vertically and bed curb box solidly on trench bottom. Set curb boxes plumb and center over operating nut. Tamp backfill on all sides of each curb box to the undisturbed trench face. Leave curb box flush with finish grade and readjust as necessary until final settling is complete.
- I. Installed piping systems must be temporarily plugged at the end of each day's work, or other interruption of progress on a given line. Plugging shall be installed in a manner satisfactory to the Town, and it shall be adequate to prevent entry of animals into the pipe or the entrance or insertion of deleterious materials.
- J. Remove all debris and excess soil from all pipe installed under this Contract by flushing with clean water. Obtain necessary water and equipment to flush the pipes to the satisfaction of the Town.
- 3.02 Installation of Force Main Pipe HDPE
 - A. HDPE Pipe installed by open cut shall be butt fusion bonded at grade level and lowered into the trench using nylon slings to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting sections of pipe. Provide a minimum of 60 inches of cover.
 - B. Horizontal directional drilling of HDPE pipe shall be as specified in Section 02340.
- 3.03 Installation of Force Main Pipe DI & PVC
 - A. Sewer pipe shall be laid progressively upgrade with bell upstream in a manner to form close, concentric joints with smooth bottom inverts. Provide a minimum of 60 inches of cover.
 - B. After the main is installed, sufficient bedding material shall be placed along each side of the pipe to prevent conditions that might tend to move the pipe off line or grade.
- 3.04 Installation of Casing
 - A. Install steel casing pipe by boring and/or jacking under highways, roadways, and railroad tracks at the required locations and elevations and as specified in Section 02340.

-END-

FORCE MAIN SEWER SYSTEMS

SECTION 02540 - SUBMERSIBLE LIFT STATION

PART 1 - GENERAL

1.01 Summary

- A. Work under this section includes, but is not limited to, the provision and installation of submersible pump station including concrete structure, pumps, motor base elbow, rail system, hatches, piping, valves, electrical service, control panel and station controls, and other appurtenances. All work in this section shall comply with the National Electric Code for Class I, Division 1, Group D location.
- B. Provide the rating of equipment and control components required to control and protect the actual pumps provided. Provide motor overload thermal units and other pump motor protective devices. Confirm all protective devices are functional.
- C. Adjust and commission pumps and control panel necessary to place the lift station into service, including proper pump protective device adjustments and programming all controls and alarms.

1.02 System Description

- A. Design Requirements
 - 1. Design the lift station in accordance with the 10 State Standards.
 - 2. Comply with all associated requirements of IDEM and other applicable regulatory agencies.

1.03 Quality Assurance

- A. Standardization All equipment shall be of the latest and most modern design. The pumping equipment and accessories shall be an integral package supplied by the pump manufacturer with local representation so as to provide undivided responsibility. All similar components shall be manufactured and furnished by one manufacturer unless specifically otherwise allowed in writing by the Designer.
- B. Provide manufacturer's warranty as specified in this Section.
- C. Provide field test results in Start-Up Certification Report as specified in this section.
- D. Equipment specified herein shall meet applicable standards of the following agencies and associations:
 - 1. Underwriters' Laboratories, UL.
 - 2. National Electrical Manufacturers Association, NEMA.

1.04 Submittals

A. Submit the following:

- 1. Hydraulic calculations prepared by a professional engineer licensed in the State of Indiana that are the basis for the sizing of the sewage pumps and wet well. The static head used in the hydraulic calculations must be based on the highest elevation of the force main along its entire alignment.
- 2. Certified copies of factory tests and reports, if specified in this Section or required by the referenced standards.
- 3. Descriptive information including catalogue cuts and manufacturer's specifications for all components.
- 4. Copy of manufacturer's standard warranty for each type of equipment provided.
- 5. Shop drawings with performance data, descriptive literature, weights and dimensions, and other physical characteristics verifying compliance with this Section including certified pump curves, motor starting and full-load amps, and motor horsepower and data, and other specific pump information. When numerous options and sizes are shown, the shop drawings shall be marked to clearly indicate the size and types specific to this Section and project.
- 6. Electrical:
 - a. Submit all electrical requirements for each piece of equipment including voltage, phase, and load data.
 - b. Provide wiring diagrams for each piece of equipment. For example, submitting one diagram for all pumps is not acceptable.
 - c. "Typical" diagrams are not acceptable. Manufacturer's standard diagrams may be submitted if they are made specific for this project by:
 - 1) Showing all included options, special items, etc.
 - 2) Unused options or features shall be crossed out or deleted.
 - 3) Identify the drawing with project name, equipment name, and tag number.
- 7. Control Panel:
 - a. All pump control panel components.
 - b. Pump control panel enclosure.
 - c. Level control float switches.
 - d. Pump motor power and control cables.
 - e. Mounting rack and installation details.
- 8. A bill of material indicating items to be furnished by the equipment manufacturer.
- 9. List of which components and materials shall be shipped preassembled and parts list for the other components and materials. Weights and physical dimensions shall be indicated for each part, assembly, and/or package to be shipped.
- 10. Manufacturer's installation instructions and recommended testing procedures.
- 11. Manufacturer's operation and maintenance (O & M) manuals and materials. When numerous types and sizes are shown, the manuals shall be marked to clearly indicate the sizes and type specific to this project. O&M manuals must be received and reviewed by the Designer and Town prior to the equipment being put into permanent operation.
- 12. Provide start-up certification report specified in this Section.

1.05 Warranty

- A. The manufacturer of the equipment furnished under this Section shall be responsible for the proper operation of the system when installed according to his instructions.
- B. Pump warranty provided by the pump manufacturer shall warrant the units being supplied to the Town against defects in workmanship and materials for a period of five (5) years prorated under normal use, operation and service. The warranty shall be in printed form and apply to all similar units. A copy of the warranty statement shall be submitted with the shop drawings.
- C. The Contractor shall guarantee all Work covered by this Section to be free from defective material and workmanship for a period of one year from the date of acceptance of the equipment by the Town. The Contractor shall replace any defective materials, components, or workmanship during this time, including but not limited to all materials, labor, shipping, and transportation, at no additional cost to the Town. Any repair work performed during this one year period shall also be guaranteed to be free from defective material or workmanship for a period of one year from the date the work is complete and shall be addressed in this same manner at no additional cost to the Town.
- 1.06 Spare Parts and Special Tools
 - A. Furnish one set of all special tools necessary for normal operation, maintenance and calibration of the equipment specified in this Section.
 - B. Provide padlocks and keys for all access hatches and control panels. All padlocks shall be manufactured to be opened by the master key.
 - C. Provide all manufacturer's recommended spare parts for each unit, as well as any spare parts identified in this specification section or the special requirements. As a minimum, a spare O-Ring Kit package shall be supplied with each pump.

1.07 Product Delivery, Storage and Handling

- A. Deliver, store, and handle products in accordance with the manufacturers recommended procedures.
- B. Load and unload all pumps, motors, and appurtenances by hoists or skidding. Do no drop products. Do not skid or roll products on or against other products. Attach slings and hooks in such a manner to prevent damage to products.
- C. The pumps furnished shall be packaged in such a manner as to provide ample protection from damage during handling, shipment, and outdoor storage at the station site. All openings shall be capped with dustproof closures and all edges sealed or taped to provide a dust-tight closure.
- D. Promptly remove damaged products from the job site. Replace damaged products with undamaged products.

PART 2 - PRODUCTS

2.01 Submersible Non-Clog Pumps

- A. Requirements
 - 1. Furnish and install submersible non-clog wastewater pumps. Pumps shall meet the requirements of Hydraulic Institute Standards.
 - Pumps shall be equipped with submersible cable (SUBCAB) suitable for submersible pump applications of length necessary from each pump to its respective local control panel. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA approval.
 - 3. The pumps shall be supplied with mating cast iron discharge connections.
- B. Pump Design
 - 1. The pumps shall be automatically and firmly connected to the discharge connection, guided by no less than two (2) guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well.
 - 2. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm, o-ring or profile gasket is not acceptable. No portion of the pump shall bear directly on the sump floor.
- C. Pump Construction
 - 1. Major pump components shall be ductile cast iron, Class 125, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 304 stainless steel.
 - 2. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of 5-8 mils of epoxy paint finish on the exterior of the pump.
 - 3. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Viton rubber o-rings. The seal shall be pre-assembled and pre-tested so that no seal settings or adjustments are required from the Contractor.
- D. Pump Shaft
 - 1. The pump shaft shall be heat treated alloy steel, with a minimum diameter of 1.5 inches in order to minimize deflection during solids chopping.
- E. Impeller
 - 1. The impellers shall be cast alloy steel heat treated to minimum Rockwell C 60, dynamically balanced, semi-open, multi-vane, non-clog design.
 - 2. Chopping/maceration of materials shall be accomplished by the action of the cupped and sharpened leading edges of the impeller blades moving across

the cutter bar at the intake openings, with a maximum set clearance between the impeller and cutter bar of 0.015-0.025" cold.

- 3. Impellers shall be keyed to the shaft and shall have no axial adjustments and no set screws.
- F. Volute Bottom/Insert Ring
 - 1. The pump volutes shall be of Class 125 ductile cast iron.
- G. Bearings
 - 1. Shaft thrust in both directions shall be taken up by two (2) back-to-back mounted single-row angular contact ball bearings, or a matched set of face to face tapered roller bearings, with a minimum L-10 rated life of 100,000 hours.
 - 2. Overhang from the centerline of the lower thrust bearing to the seal faces shall be a maximum of 1.7 inches.
 - 3. A third mechanical seal (two in motor) shall also be provided to isolate the bearings from the pumped media. The third seal, as well as the thrust bearings shall be oil bath lubricated in the bearing housing by ISO Grade 46 oil.
 - 4. Shaft overhang exceeding 1.7 inches from the center of the lowest thrust bearing to the seal faces shall be considered unacceptable.
- H. Mechanical Seal
 - 1. The mechanical seal shall be located immediately behind the impeller hub to maximize the flushing available from the impeller pump-out vanes.
 - 2. The seal shall be a cartridge-type mechanical seal with Viton O-rings and silicon carbide (or tungsten carbide) faces.
 - 3. This cartridge seal shall be pre-assembled and pre-tested so that no seal settings or adjustments are required from the installer.
 - 4. Any springs used to push the seal faces together must be shielded from the fluid to be pumped.
 - 5. The cartridge shall also include a 17-4PH, heat-treated seal sleeve and a ductile cast iron seal gland.
- I. Cooling System
 - 1. Motor shall be sufficiently cooled by the surrounding environment or pumped media. No water jacket will be required.
- J. Motor
 - 1. The submersible motor shall be U/L and CSA listed and suitable for Class I, Group C & D, Division I hazardous locations, 60 Hertz and 3 phase, 1.15 service factor (1.0 for Continuous In-Air) with Class F insulation.
 - 2. Motor shall have tandem mechanical seals in oil bath and dual moisture sensing probes.
 - 3. The lower motor seal shall be exposed only to the lubricant in the bearing housing, with no exposure to the pumped media.

- 4. Motor shall include two (2) normally closed automatic resetting thermostats connected in series and embedded in adjoining phases.
- 5. Motor frame shall be cast iron, and all external hardware and shaft shall be stainless steel.
- K. Automatic Oil Level Monitor
 - 1. An oil level switch shall be mounted at the top of the wet well, with a hose feeding down to the side of the bearing housing to monitor oil level and shut off the motor in event of low oil level. A relay shall be included for mounting in the motor control panel.
- L. Cable Entry Seal
 - 1. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal.
 - 2. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top.
 - 3. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.
- M. Protection
 - 1. All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor, and activate the alarm.
 - 2. A leakage sensor shall be available to detect water in the stator chamber. When activated, the Float Leakage Sensor will stop the motor and send and alarm to both local and remote monitoring.
 - 3. The thermal switches and moisture sensing probes shall be connected to intrinsic safety relays as indicated in the control wiring diagrams and control panel details. Mini CAS relays shall not be used.
 - 4. Use of voltage sensitive solid state sensors and trip temperature above 125°C (260°F) shall not be allowed.
- 2.02 Piping and Valves
 - A. Ductile iron pipe shall meet the requirements in Section 02535.
 - B. Coating Exposed Piping and Valves
 - 1. Surface Preparation Blast clean in accordance with NAPF Standards 500-03-04 for D.I. pipe and 500-03-05 for D.I. fittings.
 - 2. Primer Coat One (1) coat of Tnemec Omnithane Series 1 (2.5-3.5 mils DFT) to be applied in shop. Assemble in field and apply touch up coat of

Tnemec Omnithane Series 1 (2.5-3.5 mils DFT) to any abrasions, seams, bolted connections, etc.

- 3. Final Coat One (1) coat of Perma-Glaze Series 435 (15-20 mils DFT).
- C. Flange Joint Accessories
 - 1. Gaskets for flange joints shall meet ANSI/AWWA C110, full face rubber or other material approved by the Designer and must have minimum 1/8-inch thickness.
 - 2. Nuts and bolts shall conform to ANSI/AWWA C110 and be zinc-coated alloy steel.
- D. Plug Valves
 - Eccentric Plug Valves for water and wastewater service shall be non-lubricated with a resilient sealing surface. Valves shall have screwed, flanged or mechanical joint ends conforming to ANSI/AWWA C110 requirements. Port areas shall be at least 80 percent of full pipe area. Valves shall have permanently lubricated stainless steel slave-type bearings, or other lubricated type bearings, in the upper and lower stem journals. Valve seats shall be corrosion resistant, having a high nickel content.
 - 2. Bonnet shaft seals shall be capable of being replaced while line and valve remain in service, thereby eliminating the need to take process treatment units out of service. All exposed nuts, bolts, springs and washers shall be stainless steel. Means of actuation shall be by handwheel.
 - 3. The valves shall be capable of providing drop-tight shutoff with flow in either direction up to the valve's rated operating pressure. Flanged valves shall be faced and drilled to ANSI B.16.1, Class 125 standard. Flanges of valves through 12 inches shall have face-to-face dimensions of ANSI/AWWA standard gate valves.
 - 4. The plug face material shall be nitrile-butadiene, Neoprene or as approved by the Designer.
 - 5. Each actuator or operator shall be capable of seating and unseating the valve and have a maximum torque 50 foot-pounds on operating nuts.
 - 6. Valves shall be DeZurik, Series 100; Val-Matic, Cam-Centric, or approved equal.
- E. Check Valves
 - 1. Rubber flapper check valves for wastewater service shall be of the Swing Flex full body flange type, with domed access cover and only one moving part, the valve disc.
 - 2. The valve body shall have full flow equal to nominal pipe diameter at any point through the valve. The seating surface shall be on a 45 degree angle to minimize disc travel. The top access port shall be full size, allowing removal of the disc without removing the valve from the pipeline.
 - 3. Valve body and cover shall be ASTM A126, Class B cast iron. The disc shall be Buna-N (NBR) ASTM D2000-BG. The exterior shall be coated with a universal primer.

- 4. Backflow capabilities shall be furnished by means of a screw type backflow actuator. The actuator shall be field installable without modification to the valve, a need for special tools, or removal of the valve from line.
- 5. The disc shall be of one-piece construction, precision-molded with an integral o-ring sealing surface and contain steel and nylon reinforcements in both the flexible and central disc areas. The flexible portion of the disc shall be warranted for 25 years. Non-slam closing characteristics shall be provided through a short 35-degree disc stroke and memory flex disc return action.
- 6. The valve shall be cycle tested 1,000,000 times with no signs of wear or distribution to the valve disc or seat and shall remain drop-tight at both high and low pressures. The test results shall be independently certified.
- 7. Rubber flapper check valves shall be suitable for sewage and sludge service and be manufactured by Val-Matic, Series 500; APCO; or approved equal.

2.03 Accessories

- A. Concrete Wet Well, Valve Vault, and Meter Pit
 - 1. Provide a monolithic concrete or precast manhole type wet well. Pump and related equipment shall be installed and/or mounted as shown.
 - 2. Provide a concrete vault to house the valves and appurtenances. Provide an aluminum access ladder in the valve vault.
 - 3. Provide a flow meter for all lift stations with a capacity greater than or equal to 350 gpm, and a concrete vault to house the flow meter and appurtenances. Provide an aluminum access ladder in the meter vault. Per the *Recommended Standards for Wastewater* Facilities, provide
 - 4. Precast manhole sections shall conform to requirements of ASTM C478. Wet well and valve vault shall be constructed same as described for manholes in Section 02530 with resilient seals for pipe penetrations.
 - 5. Precast manhole sections shall be designed to resist both hydrostatic and lateral earth pressures, at an equivalent fluid pressure of 90 lbs/cubic foot (pcf).
 - 6. Joints for manhole sections shall have a flexible Butyl Rubber Joint Gasket conforming to ASTM C-443.
- B. Access Hatches and Safety Grating
 - 1. Frame shall be 1/4-inch extruded aluminum with built-in neoprene cushion and with strap anchors bolted to exterior. Cover leaf shall be 1/4-inch aluminum reinforced with aluminum stiffeners as required. Stainless steel hinges shall be bolted to underside and pivot on all stainless bolts and hardware shall be used. The cover shall open to 90 degrees and lock automatically in that position. A vinyl grip handle shall be provided to release and close the cover with one hand. Covers shall be built to withstand a live load of 300 pounds per square foot, and equipped with a snap lock and removable handle. When closed, covers shall not protrude above the operating surface in which they are installed. Factory finish shall be aluminum lacquer. Surface contacting concrete shall have bituminous coating.
 - 2. Covers shall be diamond pattern plate.

- 3. When flush mounted covers are furnished, provide two (2) wrenches at each lift station for opening covers.
- 4. Valve vault cover shall be water tight with drain system.
- 5. Aluminum covers shall be Bilco, USEMCO, USF, Halliday Series W1C for valve vaults, Series 52S for wet wells, or approved equal.
- 6. Safety Grating
 - a. A safety grating shall be furnished integral with each hatch for each wet well to prevent falling into pit when the main hatch lid is opened. The wet well access hatch shall be equipped with a safety grating panel, molded in one piece. The grating shall be designed to withstand a minimum live load of 300 psf. Deflection shall not exceed 1/150th of the span.
 - b. Grate openings shall allow for visual inspection, limited maintenance, and float adjustments while the safety grate is closed. The design of the hatch must assure that the grate is closed prior to the hatch doors being closed.
 - c. Each grate shall be equipped with torsion rod lift assistance for ease of operation and a hold open arm shall be included which will lock the grate in the 90° position once opened. Hold open arm shall be aluminum with a stainless steel release handle. All other hardware included shall be Type 316 stainless steel. The grate shall be coated with a high visibility safety color coating.
 - d. Design of the system must assure fall-through protection is in place after the door has been closed, thereby protecting the next operator.
 - e. The opening arm shall be equipped with a controlled confined space entry locking device that will prevent unauthorized entry to the confined space.
 - f. The safety grating shall be furnished by the same manufacturer as the aluminum hatch to assure compatibility.
- C. Slide Rail System
 - 1. Provide a non-sparking guide rail system consisting of two (2) galvanized or stainless steel guide rails, cast bronze pump guide bracket, cast ductile iron discharge elbow with mounting feet and Class 125 flanges, Type 316 stainless steel upper guide rail mounting bracket, and Type 316 stainless steel intermediate guide bracket every 10 feet. System design shall prevent spark ignition of explosive gases during pump installation and removal.
- D. Portable Hoist
 - 1. Furnish and install one (1) portable hoist socket per lift station compatible with the Town's hoist hook. The socket shall have a minimum capacity of 50% greater than the weight of the pumps.
 - 2. A recessed socket(s) shall be provided and cast into the top of the concrete slab over the wet well to facilitate removal of each pump. Any additional reinforcing and appurtenances required to install the socket(s) assembly shall be provided by the manufacturer or Contractor. Drill a drain hole in the bottom of each socket and concrete slab under each socket.
 - 3. The hoist shall be provided with a pump lift grip-eye as a means to easily connect the hook, hoist the pump, and disconnect the hook without needless intermediate reconnecting.

- E. Cable Holder
 - 1. Provide a stainless steel cable and chain holder to be mounted inside the hatch opening of the top slab of the wet well to support the pump power and control cables and lifting cable.
- 2.04 Duplex Control Panel
 - A. The Motor Control Panel shall be assembled, tested and listed by a panel shop meeting U.L. Standard 698A for industrial control panels related to hazardous (classified) locations. The Motor Control Panel shall be supplied by the same manufacturer as the pumps to ensure suitability and assurance of experience in matching controls to motors and to also insure single source responsibility for the equipment.
 - B. Control and operation shall be from a submersible pressure transducer located in the wet well. There shall also be a five (5) float operating system integral to the controller. The Contractor shall install the floats as per the Designer's Drawings or as suggested by the Manufacturer. Contractor shall also provide the wiring of the floats and pumps between the pump basin and the control panel.
 - C. Install the Control Panel as indicated on the Contract Drawings. All equipment shall be mounted in a NEMA 4X stainless steel enclosure. Provide 480 volt, 3 phase power for powering the pumps unless otherwise authorized. Control power shall be 120 volts supplied from an accessory circuit breaker mounted inside the control panel.
 - D. The enclosure shall be a NEMA 4X stainless steel. The enclosure shall be sized to accommodate all control components and have an additional 10% spare space for future use. The outer door of the enclosure shall be able to accommodate a padlock. The enclosure shall be fabricated of Type 304 Stainless Steel with a white-painted steel removable sub-panel. There shall also be an aluminum inner swing-out panel for mounting the Operator devices on. Circuit breaker handles shall also protrude through the inner door for ease of access.
 - E. A two-pole main circuit breaker and a two-pole emergency circuit breaker shall be provided. The circuit breakers shall be of the walking beam type to prevent turning both on simultaneously. Operator handles shall be mounted through the inner door.
 - F. A generator disconnect switch shall be mounted to the side of the enclosure. The disconnect switch shall be in a NEMA 4X, stainless steel enclosure and compatible with the Town's equipment.
 - G. Each pump shall have a hand-off-auto (HOA) selector switch mounted on the inner door. The run lights, seal failure lights, elapsed time meters, and flow meter indication of instantaneous and totalized flow shall also be mounted on the inner door. All switches and lights shall be corrosion resistant and be of the 30.5 MM Type, as manufactured by Eaton Cutler-Hammer, Square D, or equal.

- H. A seal failure relay shall be installed to monitor the seals in the pumps. It shall be as required by the pump manufacturer. Upon failure, the relay shall energize an alarm indicator light and not shut the pump off. The pump shall also have over-temp protection in the windings of the motor. These shall be wired to shut the pump off and be automatic reset. The over-temp protection shall be wired into the level controller to automatically switch over to the stand-by pump.
- I. There shall be a termination strip with box type connectors to make all power and control connections for the pumps, floats and transducer. All terminals shall be marked for easy identification. A ground terminal strip shall be provided also.
- J. Provide accessory circuit breakers for 120VAC and power supplies 24VAC control wiring. Power supplies shall be sized to meet the requirements of the control circuit involved.
- K. Provide the following accessories: a convenience receptacle, and a 100W lighting fixture on the site. Locate the lighting fixture to illuminate the lift station area and control panel. Locate the light fixture switch on the inner door of the control panel for on/off control. Locate the convenience receptacle outside of the control panel on the electrical equipment rack.
- L. The float switches and seal fail relay cables shall be operated off an intrinsically safe relay within the panel.
- 2.05 Level Controller
 - A. The pump control device shall be able to control up to two (2) pumps to perform liquid level control. The device must be capable of controlling any mix of constant speed. It shall be capable of alternating the pumps, and must provide lag pump delays and high and low level alarms.
 - B. The pump control device shall be standard "off the shelf" equipment with published literature and fully tested hardware and operating program. The device must be field configurable from the front of the unit, and require no special tools or software to set-up and operate. It shall be a microprocessor-based device and not require a battery to maintain the operating program. All set-up values shall be stored in non-volatile memory.
 - C. The pump control device shall be UL listed as Industrial Control Equipment, UL 508.
 - D. The pump control device must have at least 18 discrete inputs. The inputs must be optically isolated, transient protected and be programmable for the following functions:
 - 1. Pump disable with HOA in off, or pump fault
 - 2. External alternator selector switch
 - 3. All pump disable for connection to phase monitor
 - 4. Limit number of pumps called while on emergency power
 - 5. Alternation by external time clock

- 6. Float switch control for low level cutoff, lead pump run, lag pump run, lag pump off, high level alarm and high-high level alarm.
- E. Status of the discrete inputs must also be viewable from the front of the pump control device.
- F. Menu selectable first-on/first-off or first-on/last-off alternation sequences must be available.
- G. Menu selectable alternation modes must include: jockey pump (Pump 1 always lead), and split alternation.
- H. Menu selectable alternation by external time clock must also be available.
- I. Pump disable discrete inputs must cause the alternator to skip over disabled pumps.
- J. The pump control device shall be as manufactured by MPE, Inc., Model SC2000.

2.06 Description of Operation

- A. Wet Well Tank
 - 1. There are five (5) levels within the wet well for normal operation of the system. The first level is for low level alarm and shut off. The next two levels are for starting and stopping the pumps. When the level reaches the pump "on" level, the "lead" pump shall start and continue to run until the "off" level is reached. The two pumps shall alternate on each on/off cycle.
 - 2. The fourth level is to turn on the "lag" pump should the lead pump fail to start or cannot keep up with the influent flow.
 - 3. The fifth level is to alert the Operator that the wet well is at a high water level and shall activate the alarm system.
 - 4. All levels shall be as indicated on the Plan Drawings at startup of the system and shall be adjusted during the manufacturer's start up assistance.
- B. Alarm System
 - 1. The control panel shall contain a flashing "High Water" alarm light mounted on the top of the enclosure with red shatter-resistant lens and 40 watt bulb.
 - 2. There shall also be provided a "dry" normally open auxiliary contact for future remote alarm signal.
 - 3. Provide alarm system as manufactured by OmniSite and compatible with the Town's existing alarm system.
- C. Wiring
 - 1. All wiring shall be minimum 600 volt UL Type MTW or AWM and have a current carrying capacity of not less than 125 percent of the full load current. The conductors shall be in complete conformity with the National Electric Code, State, Local and NEMA Electrical Standards. For ease of servicing and maintenance, all wiring shall be color coded or numbered on each end.

The wire color or number shall be clearly indicated on all submittal and asbuilt drawings, with color indicated.

2. All control wiring shall be contained within wiring duct with covers as manufactured by Panduit or Equal. Where dimensional constraints prevent the use of wiring duct, wires shall be trained to panel components in groupings.

PART 3 - EXECUTION

3.01 Installation

- A. All equipment shall be installed in accordance with the manufacturer's published instructions and in accordance with all state and local codes, ordinances and regulations.
- B. Adjust, lubricate and leave the pumping system in proper working condition. Wrap excess cable in a neat, orderly fashion within the wet well.
- C. Provide spare parts to the Town as described herein.
- D. Provide and install all necessary bracket mounting devices, structural pieces and anchors necessary for this purpose.
 - 1. For this project, provide a heavy duty welded aluminum mounting frame, set in concrete or bolted to a concrete foundation. Provide corrosion protection coating for any portion of aluminum frame in direct contact with concrete.
 - 2. Provide 5'-6" to top general mounting height for control panels, unless otherwise specified.
- E. All control devices, motor starters, and relays inside the pump control panel shall be identified with engraved laminate nameplate.
- F. Pump control panel shall have engraved laminate nameplate on exterior.
- G. Install and connect pump control cables furnished with each pump.
- H. Furnish, install and connect control cables for each level float.
- I. Furnish and install strain relief mesh grips and anchors for each cable installed in the wet well as required.
- 3.02 Cleaning Up
 - A. Upon completion of work, the Contractor shall remove all construction equipment and temporary materials, and he shall also dispose of all rubbish and other unsightly debris caused by operations and shall leave the premises in as good or better condition than found.

3.03 Testing and Commissioning

- A. After the wet well has been assembled in place, fill all lifting holes with an approved non-shrink mortar. Conduct a water-tightness test on the wet well prior to placing any fill material. Pump down the ground water table below the bottom of the wet well. Fill the wet well with water and leave in for one (1) hour. If no visible leakage has occurred, the wet well can be considered satisfactorily water tight. If the wet well has been backfilled, the leakage shall not exceed one (1) gallon per vertical foot for a 24-hour period. Repair and retest the wet well if the test fails.
- B. The manufacturer's representative shall perform a pumping test (utilizing water) of each new pump as soon as practical after the pumping equipment is installed. The Contractor is responsible for coordinating the testing of the pumps. The pumping test shall determine the capacity, discharge pressure, horsepower draw, and efficiency of each pumping unit under actual operating conditions. The duration of each pump test shall be at least ten (10) minutes of continuous operation. Include all as-installed test data and pump curves in Start-Up Certification Report.
- C. Flow meters and pressure gauges installed as a part of the project shall be used to determine the pumping rates and pressures. The Contractor will not be required to install temporary flow meters and gauges for pump testing. Where flow meters are not provided, a wet-well draw down test shall be performed to verify pump performance.
- D. Any defects in the new equipment or failure to meet the specified performance shall be corrected by the Contractor. The Project Owner reserves the right to reject the pump if the Contractor fails or refuses to make the corrections required to meet the specified performance; or the improved pumping units, when tested, fail to meet the specified performance.
- E. Once the system is in place and installed, all alarms and failures shall be modeled to insure all fail safe and notification mechanisms are properly operating. Test each alarm/failure a minimum of three (3) iterations. Include the following:
 - 1. System power failure.
 - 2. TVSS activated.
 - 3. Phase failure relay activated.
 - 4. Station controller failure.
 - 5. Motor high temperature alarm.
 - 6. Motor seal fail alarm.
 - 7. Motor overload failure.
- 3.04 Manufacturer's Service and Start-Up Certification Report
 - A. The Contractor shall provide the services of a qualified representative of the pump manufacturer for a minimum of one (1) day per pump station to perform the following tasks:

- 1. Inspect the installation of the equipment.
- 2. Place the equipment in operation and make any necessary adjustments.
- 3. Perform Field Tests specified above.
- 4. Perform tests specified in this Section and recommended by the equipment manufacturer.
- 5. Instruct Town's personnel in the proper operation and maintenance (O & M) of the equipment (training).
- B. Provide the following pump test equipment and materials:
 - 1. Water to conduct test
 - 2. Amp/volt meter
 - 3. Stop watch
 - 4. Tape or level rod to measure float settings
 - 5. Keel to mark float settings on lift station wall
 - 6. Calibrated test gauge to measure operating head. The gauge shall be calibrated in feet of water from 0 to 100 feet in one foot increments.
 - 7. Manufacturer's performance pump curves
- C. Training will not be permitted without proper start-up and testing tasks. An abstract or outline of the start-up, testing, and training procedures shall be provided to the Town at least five (5) days prior to the scheduled visit. Manufacturer's operation and maintenance manuals and materials and DVD, when included under submittal requirements, shall be incorporated in the training procedures, with emphasis on items or materials of greatest importance.
- D. Two (2) copies of a typed, bound report covering the manufacturer's representative's findings shall be submitted to the Designer for review and approval. The report shall (1) describe the start-up procedures taken; (2) include any inspections performed; (3) outline in detail any deficiencies observed along with the corrective measures taken; and (4) include the results of all field tests, including necessary graphs, charts, tables, etc., specified in this Section or required by the referenced standards. The report shall certify that the equipment is properly installed and functioning for the purpose intended. The report must be received and reviewed by the Designer prior to the equipment being put into permanent operation. One copy of the report shall be submitted to the Town.
- E. Bear all expenses associated with the start-up, testing, and training procedures and report described above, including labor, transportation, lodging, and material costs.

-END-

SECTION 02545 - TESTING SANITARY SEWERS AND SANITARY FORCE MAINS

PART 1 - GENERAL

- 1.01 Scope
 - A. Work under this section includes testing of installed manholes, gravity sewers and force mains.
 - B. Provide all necessary equipment and instrumentation required for proper flushing and testing of manholes and piping systems. Source and quality of water, test procedures, and disposal of water shall be approved by the Town.
 - C. All tests shall be made in the presence of the Town. Preliminary tests made by the Contractor without being observed by the Town will not be accepted. Notify the Town at least 36 hours before any work is to be inspected or tested.
 - D. Repair and/or replace all defects in piping systems and retest until the piping system passes. Make all repairs to the standard of quality specified for the entire system.
 - E. Sections of the system may be tested separately, but any defect which may develop in a section previously tested and accepted shall be promptly corrected and retested at no cost to the Town.
 - F. All manholes and piping systems shall be tested in accordance with these test methods in addition to any test required by Indiana Department of Environmental Management, State or Local plumbing codes and/or building authorities.

1.02 Related Sections

- A. Section 02530 Gravity Sanitary Sewer Systems
- B. Section 02535 Force Main Sewer Systems

1.03 Submittals

- A. Submit all test procedures to the Town for approval prior to testing.
- B. Submit all test data sheets to the Town after completion of each test.
- 1.04 Quality Assurance
 - A. Standards (As Applicable, Latest Revision)
 - 1. ASTM E103 Standard Method for Hydrostatic Leak Testing
 - 2. ASTM F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 Sanitary Sewer Testing

A. Flush all piping systems with water to remove dirt and debris prior to testing.

B. Gravity Sewers

- 1. General: After backfill has been placed, the Town may visually inspect all gravity flow lines to check alignment and grade. Remove all obstructions. Any sewer in which the direct light of a lamp cannot be viewed in either direction between adjacent manholes shall be considered unsatisfactory and shall be repaired by the Contractor without additional compensation.
- 2. Tests: Unless otherwise directed by the Town, all underground sewer system piping for gravity flow shall be subjected to an air test rather than an infiltration or exfiltration tests, however, infiltration and exfiltration test are to be performed if requested by the Town during construction. No extra compensation will be allowed if such tests are required. When leakage occurs in excess of the specified limits, defective pipe or joints shall be located and repaired. The Contractor, at his own expense, shall remove and reconstruct, along with retesting, as much of the original work as necessary to obtain a sewer test results within the allowable leakage limits.
 - a. Air Test: Furnish all equipment and personnel required to make all tests including pipe stoppers, air compressor, air storage tank, pressure regulating valves, pressure gauges, stopwatch, etc. Take all measures precautions necessary, including blocking of stoppers or plugs, to prevent property damage and protect the safety of personnel and the public. Test sewers individually from manhole to manhole. Seal the sewers at each end. Provide on seal with a threaded connection through which to pass air into the sewer. Connect an air supply line with an on-off gas valve and a pressure gauge having a range of 0 to 5 psi, minimum divisions of 0.10 psi, and an accuracy of ± 0.04 psi to the threaded connection. Pressurize the sewer being tested to 4 psig. Allow the pressure in the sewer to stabilize between 4 psig and 3.5 psig for a period of not less than 5 minutes. If necessary, add air to the sewer to maintain the pressure above 3.5 psig. After the stabilization period, close the gas valve and commence timing with a stop watch. Allow the stop watch to run until the pressure drops 1.0 psig or the allowable time in Table 1 is exceeded. If the test time is greater than the allowable time for a pressure drop of 1.0 psig given in Table 1, the sewer will have passed the pressure test. If the test time is less than the allowable time for a pressure drop of 1.0 psig given in Table 1, the sewer will have failed the pressure test. On sewers that fail make all repairs and retest. If the sewer being tested is below the ground water level, increase the test

pressure 0.433 psi for each foot the ground water level is above the crown of the pipe. Do not raise the test pressure above 9.0 psig.

Pipe	Minimum	Length for	Time for	Specification Time for Length(L) Shown, min:s							
Dia.,	· ·		LUNGEI								
In.	min:s	l ime, ft.	Length, s								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.864 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	189	3.418 L	11:20	11:20	11:20	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	66:22	79:45	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106.50	124:38	142:26	60:15
33	31:10	72	26.852 L	43:06	64:38	86:10	107:48	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 1Minimum Specified Time Required for a 1.0 psig Pressure DropFor Size and Length of Pipe Indicated, Q=0.0015

- b. Infiltration Tests: When the groundwater level is more than four (4) feet above the top of the sewer, use infiltration tests to test the sewer. Conduct the tests by sealing off the sewer being tested and determining the amount of water that infiltrates into the sewer by measuring the water that flows out of the sewer using a weir, or by pumping the water out of the sewer into containers for measurement. Conduct the tests for a minimum of four (4) hours. Infiltration shall not exceed 100 gallons per 24 hours per inch diameter, per mile of sewer.
- c. Exfiltration Tests: When the groundwater level is four (4) feet or less above the top of the pipe, use exfiltration tests to test the sewer. Conduct the tests by sealing off the sewer being tested and filling it with water to a level four (4) feet above the ground water level in the upper manhole and allowing it to stand for not less than four (4) hours. Refill the sewer with water up to the original level and allow the sewer to stand for not less than two (2) hours. Determine the amount of water that leaks out of the sewer either by measuring the drop in water surface or by measuring how much water it takes to refill the sewer to the original level at the end of the two (2) hour period. The computed leakage shall not exceed 100 gallons per inch diameter, per 24 hours, per mile of sewer.
- 3. Perform deflection tests on all flexible pipe after the final backfill has been in place at least 30 days. No pipe shall exceed a vertical deflection of 5 percent. Perform deflection testing using a 9 or 10 arm mandrel pulled by hand. Use mandrel with arms that are evenly spaced and with diameter dimension "D"

equal to the inside diameter of the sewer being tested ± 0.01 inch. Provide proving rings to check the mandrel.

The following are considered nonflexible pipes:

- a. Vitrified Clay Pipe
- b. Concrete Pipe
- c. Ductile Iron Pipe
- d. Cast Iron Pipe
- e. Asbestos Cement Pipe
- C. Force Mains
 - 1. General: Hydrostatic pressure test all sewage force mains. Leakage test all buried piping with slip-type or mechanical joints. No leakage is allowed in exposed piping or buried piping with flanged, threaded, welded or mechanical joints.
 - 2. Perform tests on interior piping systems before covering them with insulation or concealing them within the structure.
 - 3. Perform pressure and leakage tests for buried piping after all jointing operations and backfilling are completed, and concrete reaction blocks and restraints have cured at least 14 days. Retest piping tested before backfill is in place after compacted backfill is placed.
 - 4. Sections of piping between valves, and other short sections of line may be isolated for testing. If shorter sections are tested, furnish and install test plugs or bulkheads at the ends of the test section, together with all anchors, braces, and other devices required to withstand the hydrostatic pressure without imposing any thrust on the pipe line. The Contractor shall be solely responsible for any damage which may result from the failure of test plugs or supports.
 - 5. Hydrostatic Tests: Perform hydrostatic tests in accordance with applicable AWWA standards for the force main material to be tested and in accordance with ASTM E103. Slowly fill piping systems with water and expel all air from the pipe. Install and open air valves where required to expel all of the air. Fill the pipe system slowly so as not to exceed the venting capacity of the air valves. Install bulkheads and thrust blocking as necessary to test the pipelines. After the section of line to be tested has been filled with water, apply and maintain the specified test pressure for a minimum period of two (2) hours and for such additional period necessary for the Town to complete the inspection of the line under test. If defects are noted, make repairs and the repeat the test until all parts of the line withstand the test pressure. Hydrostatic test pressures shall be 150 percent of design pressure, but not less than 100 psi.
 - 6. Leakage Test: After the piping system has passed the hydrostatic test, subject the piping system to leakage test. Raise the pressure in the piping system to the hydrostatic test pressure and maintain that pressure without varying it by more than 5 percent. Start the leakage test once the variation in the test pressure is constant and within the allowable limits. Conduct the test by measuring the amount of water required to maintain the hydrostatic pressure for not less than two (2) hours. Measure the volume of water required to maintain the test pressure using a water meter installed on the supply side of the pressure pump, or by some other method approved by the Town.

- a. The piping system will have failed the test if it has a leakage rate in excess of that rate obtained using the following formula:
 - L = 0.000135 ND(P)1/2 in which;
 - L = Maximum permissible leakage rate, in gallons per hour, throughout the entire length of line being tested.
 - N = Number of gasketed joints (two for each flexible coupling joint) in the line under test.
 - D = Nominal internal diameter (in inches) of the pipe.
 - P = The actual pressure in psig on all joints in the tested portion of the line. This actual pressure shall be determined by finding the difference between the average elevation of all tested pipe joints and the elevation of the pressure gauge and adding the difference in elevation head to the required pressure.
- b. When the leakage rate exceeds the permissible maximum, locate and repair leaking joints to the extent required to reduce the total leakage to the required amount.
- c. All leaks discovered within one year from the date of final acceptance of the work by the Town shall be located, repaired and retested by the Contractor, regardless of the total line leakage rate.
- 3.02 Manhole Vacuum Testing
 - A. Conduct a vacuum test on all manholes to verify water tightness and manhole integrity.
 - B. The equipment required to conduct a vacuum test on manholes includes inflatable pipe plugs, test head, vacuum pump, flexible air hose and a vacuum gage. The test equipment shall be capable of drawing a vacuum of 10-inch Hg. The equipment shall be designed specifically for the purpose of testing manholes and manufactured by P.A. Glazier, Inc., Worchester, Massachusetts, 10002 or by another manufacturer acceptable to the Town.
 - C. Conduct air tests on manholes in accordance with the following procedure:
 - 1. When possible, test each manhole immediately after assembly and prior to setting the casting or backfilling around the structure. If a test is performed after backfilling, Contractor shall be responsible for all re-excavation required to locate and correct all leaks that have been identified.
 - 2. Plug all lift holes with non-shrink grout.
 - 3. Securely plugged and adequately braced all pipes entering the manhole against the inside of the manhole to prevent them from being drawn out of the pipe.

- 4. Place the test head on the inside of the cone section and seal it with an inflatable seal.
- Draw a vacuum of ten (10) inches of mercury (Hg) on the manhole and shut off the vacuum pump. Measure the time it takes for the vacuum to drop to nine (9) inches. The manhole shall have passed the test if the time is greater than the following:

	Diameter (In)						
	48"	60"	72"				
Depth	Time in Seconds						
8	20	26	33				
10	25	33	41				
12	30	39	49				
14	35	46	57				
16	40	52	67				
18	45	59	73				
20	50	65	81				
22	55	72	89				
24	59	78	97				

- 3.03 Closed Circuit Television (CCTV)
 - A. Perform a CCTV inspection of all sanitary sewers that fail a mandrel or air test. Thoroughly clean the sewer before the camera is installed and televising is commenced.
 - B. Provide and use a camera equipped with remote control devices to adjust the light intensity, has a minimum of 1,000 lineal feet of sewer cable, and can transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable the Town representative and others viewing the monitor to easily evaluate the interior condition of the pipe. Provide a digital display for lineal footage and project number. Include an audio voice-over during the inspection identifying any problems encountered. Provide a DVD of the entire sewer line and reproduction map indicating the pipe segment identification numbers of all pipe that has been televised. Repair all defective pipe to the satisfaction and approval of the Town.

-END-
SECTION 02700 - PAVEMENT REPAIR AND RESURFACING

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Furnishing all labor, tools, equipment and materials necessary to restore all streets, roads and sidewalks to as good or better condition than existed prior to construction.
 - 2. Preparation for and resurfacing of existing paved areas including streets, drives, parking lots, etc.
 - 3. Cleaning areas to be paved or surfaced. Removing temporary pavement materials such as cold mix asphalt which are not a part of the permanent pavement, and all deleterious and unsuitable materials.
- B. Related Sections
 - 1. Section 02320 Trenching, Backfilling and Compaction for Utilities

1.02 References

- A. American Society for Testing and Materials (ASTM), latest editions
 - 1. ASTM C94 Standard Specification for Ready-Mixed Concrete
- B. Indiana Department of Transportation (INDOT) Standard Specifications, latest edition
 - 1. Section 203 Excavation and Embankment
 - 2. Section 207 Subgrade
 - 3. Section 402 Hot Mix Asphalt, HMA, Pavement
 - 4. Section 406 Tack Coat
 - 5. Section 409 Equipment
 - 6. Section 902 Asphalt Materials

1.03 Project Conditions

- A. Do not place asphalt pavement when the air temperature is less than 40 degrees Fahrenheit, nor when the surface on which pavement is to be placed is wet, nor when other conditions are deemed unsuitable.
- B. Do not apply Tack Coat to a wet surface, during wet weather, nor after sunset.

PART 2 - PRODUCTS

2.01 General

- A. Perform work and provide materials in accordance with INDOT Standard Specifications Sections 402, 406, and 409.
- B. The Mixing Plant shall be a plant approved by the Town.
- C. Obtain materials from the same source throughout.
- 2.02 Asphaltic Concrete Paving
 - A. Materials
 - 1. Tack Coat: Asphalt Emulsion, Tack AE-T, in accordance with INDOT Standard Specifications Section 902.
 - 2. Asphalt Cement: PG asphalt binder, Grade 64-22, in accordance with INDOT Specifications Section 902 and 402 for the hot mix asphalt type specified.
 - 3. Aggregate Base Compacted No. 53 aggregate, in accordance with INDOT Standard Specification Section 904.
 - 4. Hot Mix Asphalt (HMA) Mixture: As specified by the Designer in accordance with INDOT Standard Specifications
 - B. Asphalt Paving Mix
 - 1. Binder content and aggregate mix shall meet the requirements of INDOT Standard Specification Section 402.
- 2.03 Portland Cement Concrete
 - A. Provide ready-mixed concrete meeting the requirements of ASTM C94.
 - B. Concrete Mix Classes:
 - 1. Class A concrete (Concrete exposed to freezing and thawing):
 - a. Compressive strength at 28 days: 4000 psi.
 - b. Minimum cement content: 564 lb/cu yd.
 - c. Maximum water-cement ratio: 0.40.
 - d. Coarse aggregate: Crushed stone.
 - e. Air content: 6± 1 percent
 - f. High range water-reducing admixture required.
 - 2. Class B concrete (Foundations, supported slabs, slabs on grade):
 - a. Compressive strength at 28 days: 4000 psi.
 - b. Minimum cement content: 517 lb/cu yd.
 - c. Maximum water-cement ratio: 0.48.
 - d. Air content: 0 to 3 percent
 - e. High range water-reducing admixture required.
 - 3. Class D concrete:
 - a. Compressive strength at 28 days: 4000 psi.

PAVEMENT REPAIR AND RESURFACING

- b. Minimum cement content: 517 lb/cu yd.
- c. Maximum water-cement ratio: 0.48.
- d. Air content: 0 to 3 percent.
- e. High range water-reducing admixture required.
- f. Synthetic fibers required.
- 4. Concrete Mud Mat
 - a. Compressive strength at 28 days: 3000 psi. min.
 - b. Maximum water-cement ratio: 0.55.

PART 3 - EXECUTION

- 3.01 General
 - A. Clean areas to be paved or surfaced. Remove temporary pavement materials such as cold mix which are not part of the permanent pavement, and all deleterious and unsuitable materials.
 - B. Replace in kind all pavement encountered with respect to base courses, surface courses and thicknesses. Finish elevations, lines and grades of replacement pavement shall match original elevations, lines and grades unless otherwise noted.
 - C. Limit open pavement cuts to the minimum width which permits the trench to be safely excavated, affording sufficient room for proper efficiency and proper construction. Cuts shall have neat parallel cut lines. No uneven, jagged cuts will be allowed. Repair all roadway surfaces damage by construction equipment outside of this limit.
 - D. Any existing pavement surfaces or walks which are not broken or cut along straight lines shall be saw cut along straight lines prior to pavement or walk replacement.

3.02 Asphalt Pavement Replacement

- A. Inspection
 - The subgrade or aggregate base shall be dry. Compact all Compacted Aggregate Base, No. 53 to 100 percent Standard Proctor Dry Density. Proofroll in accordance with INDOT Standard Specifications Section 203 prior to application of asphalt materials.
 - 2. Verify the gradients and elevations of base or subgrade prior to placing asphalt pavement.
- B. Preparation
 - 1. Prepare the aggregate base for the application of asphalt pavement in accordance with INDOT Standard Specifications Section 207.
 - 2. Place Tack Coat on existing paved surfaces and between lifts in accordance with INDOT Standard Specifications Section 406 with a specified application rate of 0.05 gallons per square yard.
 - 3. Materials shall be dry to eliminate foaming. Thoroughly mix the materials.

PAVEMENT REPAIR AND RESURFACING

- C. Placement
 - 1. Place HMA course on previously placed course after pavement has cooled sufficiently to prevent distortions and withstand compaction.
 - 2. Spread and compact pavement in accordance with INDOT Standard Specifications Sections 402 and 409.
 - 3. The application rate of 110 pounds per square yard is equivalent to 1 inch of asphalt pavement, in place.
 - 4. Restore pavement markings to emulate existing pavement markings unless otherwise noted.
- D. Tolerances: The maximum tolerance shall be as defined in INDOT Standard Specifications Section 409.
- 3.03 Restoration of Concrete Sidewalk, Curb, and Driveways Disturbed by Construction
 - A. Replace in kind all removed and damaged sidewalks, curbs, and driveways with respect to material type and dimension. Finish elevations, lines, and grades of replacement work shall match original elevations, lines, and grades. Sidewalks shall have a light broom finish with edges and joints tooled with 1/4-inch radius. Install sidewalk, curb, and driveway joints to match the existing type and spacing.
 - B. Pavement, sidewalks and curbs shall be removed and replaced to a minimum of 12 inches beyond the sides of the trench in each direction or to the nearest construction or expansion joint (whichever is greater).
- 3.04 Construction of New Sidewalk, Curb, and Driveways
 - A. General
 - 1. Where shown, construct concrete sidewalk ramps including detectable warning elements.
 - 2. Replace all adjacent curbs, sidewalks and drives not shown or needed to be replaced that are damaged during construction.
 - B. Subgrade
 - 1. Shape and compact the subgrade to a firm, even surface. The upper 6 inches of subgrade shall comply with the density requirements immediately prior to placing the material thereon. Remove all soft, yielding, or other unsuitable material which cannot be compacted satisfactorily. Remove or break off all rock encountered to at least 6 inches below the subgrade surface. Fill any holes or depressions resulting from the removal of unsuitable material with satisfactory material and compact to conform with the surrounding subgrade surface.
 - 2. Thoroughly moisten the subgrade immediately prior to placing concrete. Spade concrete to avoid a honeycomb appearance, and float the surface with a wood float to prevent surface irregularities.

- C. Forms: Concrete forms shall be straight, free from warp, and shall extend for the full depth of concrete. Clean forms of foreign matter and oil forms before placing concrete.
- D. Joints
 - 1. Expansion Joints: Place preformed 1/2-inch joint filler around all appurtenances, such as manholes and utility poles which extend into and through the sidewalk, and between the sidewalk and any fixed structure such as a building and drives. Extend the joint filler the full depth of the concrete. Allow an adequate area for joint sealant. Form expansion joints transverse across sidewalk and curb and gutters with spacings of not more than 10 times the width for tangent sections and 20 feet for radial sections.
 - 2. Contraction Joints: Provide transverse contraction joints with spacings equal to the width of the pavement, formed by a jointing tool, trowel or similar means. Joint shall extend approximately 1/4 of the concrete depth and be approximately 1/8 inches wide.
 - 3. Expansion joints between the curb and the drive shall be doweled by 1/2-inch bars at three (3) feet on center.
 - 4. Expansion joints in the sidewalks, drives, ramps, and curbs require sealant.
- E. Sidewalk Adjacent to Curb
 - 1. Fill the space behind the curb with granular material to the required elevation and compact in layers not to exceed four (4) inches.
- F. Concrete Pavement Adjacent to Curb
 - 1. Where concrete pavement is constructed adjacent to the curb, place expansion and contraction joints at the same locations in the curb as the pavement slab.
 - 2. Dowel curb and gutter to the concrete pavement by 1/2-inch bars at 3 feet on center.
- G. Other Curb Installations
 - 1. Where sidewalk is not constructed adjacent to the curb, fill the space behind the curb with suitable material to the required elevation and compact in layers not to exceed four (4) inches.
 - 2. If no concrete pavement is being placed at the time of curb construction, place expansion joints at the ends of all returns and at intervals not to exceed 100 feet. Install contraction joints at maximum 20-foot spacing.
- H. Finish: Sidewalks shall have a light broom finish with edges and joints tooled with 1/4-inch radius.
- 3.05 Protection
 - A. General: Remove and replace any and all pavement, curb, and sidewalk damaged by rain or low temperatures for no additional payment.

- B. Asphalt Pavement
 - 1. Protect asphalt courses in accordance with INDOT Standard Specifications Section 402.
 - 2. Protect new asphalt pavement from traffic until the mixture has cooled sufficiently to prevent distortion.
- C. Concrete Sidewalk and Curb Ramps: Protect new concrete from traffic for curing for a minimum of 5 calendar days or until the minimum design compressive strength is attained, whichever is lesser.
- D. Concrete Curb and Gutter: Protect new concrete from traffic for curing for a minimum of 14 calendar days or until the minimum design compressive strength is attained, whichever is lesser.
- E. Concrete Pavement: Protect new concrete pavement from traffic for curing for a minimum of 7 calendar days.

-END-

CONSTRUCTION DETAILS

G - GENERAL DETAILS

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- 1. ALL BALES SHALL ALL BE EITHER WIRE-BOUND OR STRING-TIED. INSTALL BALES SO THAT BINDINGS ARE ORIENTED AROUND THE SIDES RATHER THAN ALONG THE TOPS AND BOTTOMS OF THE BALES (IN ORDER TO PREVENT DETERIORATION OF THE BINDINGS).
- 2. THE BARRIER SHALL BE ENTRENCHED AND BACKFILLED. EXCAVATE TRENCH THE WIDTH OF A BALE AND THE LENGTH OF THE PROPOSED BARRIER TO A MINIMUM DEPTH OF 4". AFTER THE BALES ARE STAKED AND CHINKED, BACKFILL THE EXCAVATED SOIL AGAINST THE BARRIER. BACKFILL SOIL SHALL CONFORM TO THE GROUND LEVEL ON THE DOWNHILL SIDE AND SHALL BE BUILT UP TO 4" AGAINST THE UPHILL SIDE OF THE BARRIER.
- 3. SECURELY ANCHOR EACH BALE BY AT LEAST TWO STAKES OF WOOD OR STEEL, WITH A LENGTH OF AT LEAST 36", DRIVEN THROUGH THE BALE. DRIVE THE FIRST STAKE IN EACH BALE TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN DEEP ENOUGH INTO THE GROUND TO SECURELY ANCHOR THE BALES.
- 4. CHINK (FILL BY WEDGING) THE GAPS BETWEEN BALES WITH STRAW TO PREVENT WATER FROM ESCAPING BETWEEN THE BALES.
- 5. IN SHEET FLOW APPLICATIONS, PLACE BALES IN A SINGLE ROW, LENGTHWISE ON THE CONTOUR, WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER.
- 6. IN CHANNEL FLOW APPLICATIONS, PLACE BALES IN A SINGLE ROW, LENGTHWISE, ORIENTED PERPENDICULAR TO THE DIRECTION OF FLOW, WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER. THE BARRIER SHALL BE EXTENDED TO SUCH A LENGTH THAT THE BOTTOMS OF THE END BALES ARE HIGHER IN ELEVATION THAN THE TOP OF THE LOWEST MIDDLE BALE TO ASSURE THAT SEDIMENT LADEN RUNOFF WILL BE TRAPPED.

MAINTENANCE:

- 1. REMOVE SEDIMENT DEPOSITS PROMPTLY (TO ENSURE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN), TAKING CARE NOT TO UNDERMINE THE ENTRENCHED BALES.
- 2. INSPECT WITHIN 24 HOURS OF A RAIN EVENT AND AT LEAST ONCE EVERY 7 CALENDAR DAYS FOR DETERIORATION OR DAMAGE FROM CONSTRUCTION ACTIVITIES REPLACE DAMAGED BALES IMMEDIATELY.
- 3. WHEN THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, REMOVE ALL STRAW BALES AND SEDIMENT DEPOSITS, GRADE THE SITE TO BLEND WITH THE SURROUNDING AREA, AND STABILIZE.

STRAW BALE FILTER

SCALE: NONE

DETAIL NO. G-01 DATE: JULY 2015



- 1. PLACE CONSTRUCTION ENTRANCE AS SHOWN ON THE PLANS AND AT ALL TEMPORARY CONSTRUCTION DRIVES THAT ARE INSTALLED.
- 2. FOR LARGE SITES (2 ACRES OR LARGER) THE MINIMUM LENGTH IS 150'. FOR SMALLER SITES (LESS THAN 2 ACRES) THE MINIMUM LENGTH IS 50'.
- 3. PROVIDE CULVERT OR OTHER METHODS AS NECESSARY TO MAINTAIN POSITIVE DRAINAGE.

MAINTENANCE:

- 1. INSPECT DAILY AND REPLACE DISPLACED STONE.
- 2. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED ONTO ADJACENT ROADWAY.
- 3. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
- 4. AT COMPLETION OF PROJECT COMPLETELY REMOVE AND RESTORE SITE TO ORIGINAL CONDITIONS, OR AS APPLICABLE USE FOR BASE OF NEW PERMANENT DRIVE, MAINTAINING DESIGN ELEVATIONS AND SECTION.

CONSTRUCTION ENTRANCE

SCALE: NONE

DETAIL NO. G-02 DATE: JULY 2015



- . SYNTHETIC FILTER FABRIC SHALL BE A PERVIOUS SHEET OF WOVEN OR NON-WOVEN GEOTEXTILE FABRIC AND SHALL BE CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE FOLLOWING REQUIREMENTS:
 - a. TEXTILE STRENGTH AT 20% (MAXIMUM) ELONGATION, PER ASTM D4632.
 - b. WOVEN EXTRA STRENGTH 50 LB/LINEAR INCH (MINIMUM), NON-WOVEN EXTRA STRENGTH 70 LB/INCH (MINIMUM).
 - c. WOVEN STANDARD STRENGTH 30 LB/LINEAR INCH (MINIMUM), NON-WOVEN STANDARD STRENGTH 50 LB/INCH (MINIMUM).
 - d. APPARENT OPENING SIZE (AOS) (U.S. SIEVE) NO. 30 PARTICLE SIZE OF 0.6 mm (MAXIMUM), ASTM D4751.
 - e. PERMITTIVITY 0.05 S^{-1} (MAXIMUM), ASTM D4491.
- 2. POSTS FOR SILT FENCES SHALL BE EITHER 2" DIAMETER WOOD OR EQUIVALENT METAL POSTS WITH A MINIMUM LENGTH OF 5'. METAL POSTS SHALL HAVE PROJECTIONS FOR FASTENING WIRE TO THEM.
- 3. ANCHOR STAKES FOR SILT FENCES SHALL BE 1"x2" WOOD (PREFERRED) OR EQUIVALENT METAL WITH A MINIMUM LENGTH OF 18".
- 4. WIRE FENCE REINFORCEMENT FOR SILT FENCES USING STANDARD STRENGTH FILTER CLOTH SHALL BE A MINIMUM OF 42" IN HEIGHT, A MINIMUM OF 14 GAUGE, AND SHALL HAVE A MAXIMUM MESH SPACING OF 6".
- 5. THE HEIGHT OF THE BARRIER SHALL BE A MINIMUM OF 18" AND A MAXIMUM OF 30".
- 6. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER FABRIC SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6" OVERLAP, AND SECURELY SEALED.
- 7. POSTS SHALL BE SPACED A MAXIMUM OF 6' APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 18"). WHEN STANDARD STRENGTH FABRIC IS USED WITH THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 8'.
- 8. THE SPACING OF TIEBACKS SHALL EQUAL THE SPACING OF THE POSTS. ADDITIONAL POST DEPTH OR TIEBACKS MAY BE REQUIRED IN UNSTABLE SOILS.
- 9. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4" WIDE AND A MINIMUM OF 8" DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
- 10. WHEN STANDARD STRENGTH FILTER FABRIC IS USED WITH A WIRE MESH SUPPORT FENCE IT SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY 1" WIRE STAPLES, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2" AND SHALL NOT EXTEND MORE THAN 36" ABOVE THE ORIGINAL GROUND SURFACE.
- 11. THE STANDARD STRENGTH FILTER FABRIC, WITHOUT A WIRE MESH SUPPORT FENCE, SHALL BE STAPLED OR WIRED TO THE FENCE, AND A MINIMUM 8" OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36" ABOVE THE ORIGINAL GROUND SURFACE. DO NOT STAPLE FILTER FABRIC TO EXISTING TREES.
- 12. WHEN EXTRA STRENGTH FILTER FABRIC OR BURLAP AND POST SPACING IS LESS THAN THE MAXIMUM SPECIFIED SPACING OF 6', THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED.
- 13. BACKFILL THE TRENCH AND COMPACT THE SOIL OVER THE FILTER FABRIC.
- 14. REMOVE SILT FENCES WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
- 15. SILT FENCE SHALL NOT BE USED AS A DIVERSION AND SHALL NOT BE INSTALLED ACROSS A STREAM, CHANNEL, DITCH, SWALE, ETC.

MAINTENANCE:

- 1. INSPECT AFTER EACH RAINFALL AND DAILY DURING PROLONGED RAINFALL. INSPECT AT LEAST ONCE EVERY 7 CALENDAR DAYS.
- 2. REPLACE OR REPAIR FABRIC IMMEDIATELY IF IT DECOMPOSES OR IS INEFFECTIVE.
- 3. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY HALF THE HEIGHT OF THE BARRIER.
- 4. SPREAD ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS NO LONGER REQUIRED AND DRESS TO CONFORM WITH THE FINISHED GRADING.

<u>SILT FENCE (2 OF 2)</u>

SCALE: NONE

(SHT 2 OF 2)

DETAIL NO. G-03 DATE: JULY 2015

CONSTRUCTION DETAILS

DW - DRINKING WATER SYSTEMS

TABLE OF CONTENTS

Rigid (DI) Pipe Trench	DW-01
Flexible (PVC, HDPE) Pipe Trench	DW-02
Gate Valve	DW-03
Air Release Valve	DW-04
Hydrant Assembly	DW-05
Tracer Wire Bolted Connection	DW-06
Water Main Reaction Blocking	DW-07
Water Meter	DW-08



DATE: JULY 2015





GATE VALVE

DETAIL NO. DW-03 DATE: JULY 2015



AIR RELEASE VALVE SCALE: NONE

> DETAIL NO. DW-04 DATE: JULY 2015





TOWN OF MORRISTOWN, INDIANA

DETAIL NO. DW-06 DATE: JULY 2015





	TE	ΞE	22	1/2*	4	5 °	9	0.	PL	UG
SIZE	W	D	W	D	W	D	W	D	W	D
3", 4"	2'-6"	1'-0"	1'-0"	0'-9"	1'-6"	1'-3"	2'-9"	1'–3"	1'-6"	1'-6"
6"	3'-3"	1'-6"	2'-0"	1'-0"	2'-6"	1'-6"	4'-3"	1'-6"	2'-3"	2'-3"
8"	4'-3"	2'-0"	2'-0"	1'-9"	3'-9"	1'-9"	6'-0"	2'-0"	3'-0"	3'-0"
10"	5'-3"	2'-6"	3'-0"	1'–9"	4'-0"	2'-6"	7'-3"	2'-6"	3'-9"	3'-9"
12"	6'-0"	3'-0"	3'-6"	2'-0"	4'-9"	3'-6"	7'-9"	3'-0"	4'-3"	4'-3"

- 1. CONCRETE REACTION BLOCKING SHALL NOT COVER PIPE JOINTS, BOLTS, OR GLANDS
- 2. CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH NOT LESS THAN 2000 PSI AFTER 28 DAYS.
- 3. WRAP D.I. FITTINGS WITH POLYETHELENE ENCASEMENT.

WATER MAIN REACTION BLOCKING

DETAIL NO. DW-07

DATE: JULY 2015

SCALE: NONE



CONSTRUCTION DETAILS

SS - SANITARY SEWER SYSTEMS

TABLE OF CONTENTS

Rigid (DI) Pipe Trench	SS-01
Flexible (PVC, HDPE) Pipe Trench	SS-02
Sanitary Lateral for Deep Sewers	SS-03
Sanitary Lateral for Shallow Sewers	SS-04
Type 1 Cleanout	SS-05
Type 2 Cleanout	SS-06
Type 3 Cleanout	SS-07
Standard Sanitary Manhole	SS-08
New Service Connection to Existing Sanitary Sewer	SS-09
Drop Manhole - Outside	SS-10
Existing Manhole Connection	SS-11
Air/Vacuum Release Valve & Vault Detail	SS-12
Lift Station Plan	SS-13
Lift Station Section	SS-14
Lift Station Electrical and Pump Control Mounting Detail	SS-15
Grease Trap	SS-16
Sanitary Sewer Over Existing Sanitary Sewer	SS-17





PIPE SIZE	8" TO 16"	18" TO 30"	33" AND OVER
BEDDING BELOW THE PIPE BARREL	4"	OD / 4	8"





4. PROVIDE MINIMUM 4" DIAMETER LATERAL FOR SINGLE FAMILY HOMES. PROVIDE 6" DIAMETER LATERAL FOR ALL OTHER BUILDINGS.

SANITARY LATERAL FOR SHALLOW SEWERS (LESS THAN 15' DEEP)

SCALE: NONE







TOWN OF MORRISTOWN, INDIANA

DATE: JULY 2015



TOWN OF MORRISTOWN, INDIANA



24**"**ø

FRAME & COVER,

AS SPECIFIED

FINISHED

GRADE

DATE: JULY 2015





SCALE: NONE

TOWN OF MORRISTOWN, INDIANA

DETAIL NO. SS-09 DATE: JULY 2015





EXISTING MANHOLE CONNECTION

SCALE: NONE

DETAIL NO. SS-11 DATE: JULY 2015



DATE: JULY 2015










APPENDIX A

FORMS AND CHECKLISTS

CONTRACTOR INFORMATION FORM

(To be submitted prior to the pre-construction conference)

Project Name/Location:	
Main Extension Agreement No.:	
Date: Received Date:	
Construction Schedule Start Date:	
Contractor Name:	
Address:	
Contact Person:	
Telephone: FAX:	
24-Hour Emergency Contact:	
Developer:	
Project Representative:	_ Telephone:
Internal Field Contact:	Telephone:
24-Hour Emergency Contact:	
Signature:	

EASEMENT EXHIBIT CHECKLIST

General

Sheet size: 8 %" x 11" or 8 %" x 14"	YES	NO	COMMENTS
Scale: 1=1 (digital): standard recognized engineering scale			
Scale: 1=1 (digital, registered to State Plane Coordinates (IN Fast			
NAD83 US FT); standard recognized engineering scale			
North Arrow			
Utility Job Number for which easement is being granted			
Utility Distribution Map where easement is located			
Utility Easement Number			
Adjoining Street Name (or Project Name)			
Grantor Name(s) and Addresses(s)			
Name and Title of person(s) authorized to sign easement documents if Grantor is a corporation, company, partnership, trust, or legal entity other than an individual			
Recording information for Last Deed of Record			
Name of engineer/engineering firm and contact information			
Telephone Number(s) where Grantor(s) can be reached			
Section Corner (quarter section corner, range point) tie			
Description of section quarter			
Directions and dimensions to Point of Beginning			
Street names adjacent to property (Place on Drawing) on which			
easement is being granted Outline of Property on which easement is being granted			
Parcel number			
Ecomont			
Easement	VES	NO	COMMENTS
Point of Beginning			comments
Dimensions (directions to the nearest second, distances to the nearest			
hundredth of a foot	_	_	
Facement lobal (temporary or permanent) and permisel width			
Logal Description of Ecompost			
Reference Lond Suprement			
The most recent deed of recent for each parcel involved			
Title Block	VES	NO	COMMENTS
Utility Job Number for which easement is being granted			CONNENTS
Utility Distribution Map where easement is located			
Utility Easement Number			
Adjoining Street Name (or Project Name)			
Brief Description of Easement location			
ADDITIONAL COMMENTS: (use back page, if		-	

necessary)

ENGINEER INFORMATION FORM

(To be submitted prior to the pre-construction conference)

Project Name/Location:		
Main Extension Agreement No.:		
Date:	Received Date:	
Construction Schedule Start Date:		
Engineer Name:		
Address:		
Contact Person:		
Telephone:	FAX:	
24-Hour Emergency Contact: _		
Developer:		
Project Representative:		Telephone:
Internal Field Contact:		Telephone:
24-Hour Emergency Contact: _		
Signature:		

RECORD DRAWINGS CHECKLIST

General

	YES	NO	COMMENTS
Registered to State Plane Coordinates (IN East NAD83 US FT)			
on Sheet size: 24" x 36" (only)			
Scale 1=1			
1 – PDF digital copy			
1- CAD digital copy (.dwg format)			
1 - shapefile (.shp format) or other file type compatible with			
the Town's GIS software			
1 – hard copy set of as-built drawings			
1" = 50' (max) Plan View (paper copy)			
1" = 50' (max) horizontal/1"=5' Vertical Profile View			
North Arrow			
Drawing sheet match lines with drawing sheet [if proposed			
development lies on more than one (1) sheet]			
Project Information Block			COMMENTS
	YES	NO	
Name of proposed project			
Project number			
Number of lots			
Tax code (leave blank)			
Name of engineer/engineering firm and contact information			
Date if submittal			
Date of revision			
County			
Township			
Sewer Utility serving the project			
Project Location Map Block			COMMENTS
	YES	NO	
North Arrow			
Scale 1"=2000'			
Cross Streets (label)			
Project Site Location (label)			

RECORD DRAWINGS CHECKLIST

Existing Information

ΈS	NO	COMMENTS
_		
	Π -	
	-	
'ES	NO	COMMENTS
′ES □	- NO □	COMMENTS
″ES □ □	NO	COMMENTS
″ES □ □	NO	COMMENTS
res	NO 	COMMENTS
res 		COMMENTS
		COMMENTS
		COMMENTS

RECORD DRAWINGS CHECKLIST

Water Mains and Appurtenances

	YES	NO	COMMENTS
Valves (do not label)			
Fittings (do not label)			
Bends (label degree), Blow-off valves (label as B.O.)			
Air Reliefs			
Sample Stations			
Hydrants			
Water main size, type and length			
Commercial, industrial building footprints			
Include all dimensions for items above			
Miscellaneous Information			
	YES	NO	COMMENTS
Dimension and label all above (although no drawing scale is required,			
should look proportional; 8 pt minimum text size)			

ADDITIONAL COMMENTS: (use back page, if

necessary)