A. SCOPE OF WORK

- 1. The work required under this section includes all exterior concrete and bituminous paving and related items necessary to complete the work indicated on drawings and described in the specifications, including but not limited to:
- All drives, parking areas within contract limits
- Curbs and autters Sidewalks, concrete slabs, exterior steps

B. MATERIALS

- 1. Concrete: Concrete shall be ready-mixed and shall be a mix of proportioned fine and coarse aggregates with Portland cement and water. Minimum cement content shall be 6 bags per cubic yard of concrete and maximum water content shall be 5.5 U.S. gallons per sack of cement, including moisture in the aggregate. Slump for normal weight concrete shall be a maximum of 4 inches and a minimum of 2 inches. The slump of machine placed concrete shall be no less than 1-1/4 inches or more than 3 inches. Standard test ASTM C-143 shall be used to measure slump. Minimum compressive strength of concrete at 28 days shall be 4000 psi. All exterior concrete shall have air entrainment of 5% to 8% by volume per ASTM C-260. Re-tempering of delivered concrete shall not be permitted. Concrete shall be composed of:
- a. Portland cement: conforming to ASTM C-150, Type IA or type IIIA.
- b. Aggregates: conforming to ASTM C-33. c. Water: Shall be clear and free from injurious amounts of oils, acids, alkalics organic materials or other deleterious substances.
- 2. Pre-molded Joint Filler: Shall be non-extruding type meeting ASTM D-544, except that pre-molded joint filler used in concrete walk construction may be either non-extruding or resilient.
- 3. Bituminous Pavement Materials: All materials proposed for the construction of bituminous pavements shall comply with the Indiana Department of Transportation Standard Specifications, latest revisions.
- 4. Compacted Aggregate Sub-base:
- If a certain type of aggregate is specified and labeled per the plans and/or details, than that aggregate shall meet and be in accordance with the INDOT Standard Specifications.
- If the aggregate is not specified or labeled than it shall be crushed stone or gravel meeting the following requirements. Crushed gravel shall be a minimum of 35% crushed material. Fines shall be limited to a maximum of 8% of the total. Material shall be free from an excess of flat, elongated, thinly laminated soft or disintegrated pieces, and shall be free from fragments coated with dirt. Compacted aggregate shall have a gradation as presented below.

SIEVE SIZE	% PASSIN
1 - 1/2"	100
1"	80 - 100

"	80-100
5/4"	70-90
/2"	55-80
4	35-60
8	25-50
30	2-30
200	5-10

C. APPLICATION

- 1. Grading: Do any necessary grading in addition to that performed in accordance with EARTHWORK Section, to bring sub-grades, after final compaction, to the required grades and sections for site improvement.
- 2. Preparation of Sub-grade: Remove spongy and otherwise unsuitable material and replace with stable material. No traffic shall be allowed on prepared sub-grade prior to paving.
- 3. Compaction of Sub-grade: Refer to Section 207 of the INDOT Standard Specification Manual.
- 4. Utility Structures: Check for correct elevation of all manhole covers, inlets, valve boxes and similar structures located within areas to be paved and mark, or have made any necessary adjustments to such structures.
- 5. Placina Concrete:
- a. Sub-grade: Place concrete only on a moist, compacted sub-grade of base free from loose material. No concrete shall be placed on a muddy or frozen subarade.
- b. Forms: All forms shall be free from warp, tight enough to prevent leakage and substantial enough to maintain their shape and position without springing or settling when concrete is placed. Forms shall be clean and smooth immediately before concreting.
- c. Placing Concrete: Concrete shall be deposited so as to require as little handling as practicable. When concrete is to be placed at an atmospheric temperature of 35 degrees (F) or less, the Indiana Department of Transportation Standard Specifications, latest revision shall be followed.
- 6. Concrete Curb and Gutter:
- a. Expansion Joints: Shall be 1/2 inch thick pre-moulded at ends of all returns and a maximum spacing of 100 feet.
- b. Contraction Joints: Unless otherwise provided, contraction joints shall be joints spaced 10 feet on center.
- c. Finish: Tamp and spread concrete as soon as placed, and fill any honeycombed places. Finish square corners to 1/4 inch radius or as otherwise required.
- 7. Concrete Walks and Exterior Steps:
- a. Slopes: Provide 1/4 inch per foot cross slope. Contractor shall make field adjustments in slopes at walk intersections as necessary to provide proper drainaae.
- b. Dimensions: Walks and steps shall be one course construction and of widths and thickness shown on the drawings. c. Finish: Spread concrete and trowel with a steel trowel to a hard dense
- surface after surface water has disappeared. Apply medium broom finish and scribe control joints at 6 foot spacing. Provide 1/2 inch expansion joints where sidewalks intersect and at a maximum spacing of 48 feet along walks.
- 8. Curing Concrete: Except as otherwise specified, cure all concrete by one of the methods described in the Indiana Department of Transportation Standard Specifications, latest revision.
- 9. Bituminous Pavement: Hot asphalt concrete pavement shall be as specified in the Indiana Department of Transportation Standard Specifications, latest revisions. Paving will not be permitted during unfavorable weather or when the temperature is 40 degrees (F) or below and falling.
- 10. Compacted Aggregate Sub-base: The thickness shown on the drawings is the minimum thickness of the fully compacted sub-base: Compaction shall be accomplished by rolling with a smooth wheeled roller weighing 8 to 10 tons. Compact to 95% compaction using Standard Testing Procedures. Along curbs, headers and walls and at all places not accessible to the roller, the aggregate material shall be tamped with mechanical tampers.

A. SCOPE OF WORK

- before work is started or resumed.

- responsibility

- other sections of these specifications.
- b. Storm drainage systems.
- c. Sanitary sewer systems. d. Water supply systems. e. Drives and paving.
- B. BENCHMARKS

C. REMOVAL OF TREES

- approved by the Owner.

D. PROTECTION OF TREES

- E. STRIPPING OF TOPSOIL
 - than 2 inches.

F. DISPOSITION OF UTILITIES

- work under this section.

G. SITE GRADING

- 4" for topsoil.
- slope

- content

- H. SEEDING PREPARATION
 - permanent erosion control structures.
- specifications on the plans.

- Engineer prior to work commencing. the Engineer and/or Utility Company.

EARTHWORK

1. Extent: The work required under this section consists of all excavating, filling, rough grading and related items necessary to complete the work indicated on the drawings and described in the specifications. The Contractor shall notify in writing the Owners and the Engineer of any changes, errors, or omissions found on the plans or in the field,

a. In general, the items of work to be performed under this section shall include clearing and grubbing, removal of trees and stumps (where required), protection of trees to remain, stripping and storage of topsoil, fill, compaction and rough grading of entire site as indicated on the drawings. b. Excavated material that is suitable may be used for fill. All unsuitable material and all surplus excavated material not required shall be removed from the site by the Contractor. The location of dump and length of haul shall be the Contractor's

c. Provide and place any additional fill material from off the site as may be necessary to produce the grades required. Fill obtained from offsite shall be of kind and quality as specified herein, and as approved by the Engineer & Owner.

2. The Contractor shall accept the site as he finds it and shall remove all trash, rubbish and debris from the site prior to starting excavation.

3. Work not included: The following items of related work are specified and included in

a. Excavation, grading and backfilling for utility lines.

1. Maintain carefully all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed by the Engineer.

1. Remove all trees and stumps from area to be occupied by road and surfaced areas. Removal of trees outside these areas shall only be done as noted on drawings or

2. All brush, stumps, wood and other refuse from the trees shall be removed from the site or burned with proper permits (where applicable).

1. General Protection: the Contractor shall be responsible for the protection of tops, trunks and roots of existing trees on the project site that are to remain. Existing trees subject to construction damage shall be boxed, fenced or otherwise protected before any work is started; do not stockpile within branch spread. Remove interfering branches without injury to trunks and cover scars with tree paint.

1. Remove topsoil to a depth of 6 inches (or as indicated by Owner's Geotechnical Engineer) from the areas to be occupied by roads, walks, buildings, and parking areas. Pile and store topsoil at a location where it will not interfere with construction operations. Top soil shall be reasonably free from subsoil, debris and stones larger

1. Rules and regulations governing the respective utilities shall be observed in executing all

2. It shall be the responsibility of each contractor to verify all existing utilities and conditions pertaining to his phase of the work. It shall be the contractor's responsibility to contact the owners of the various utilities before work is started. The contractor shall notify in writing the owners or the engineers of any changes, errors or omissions found on these plans, and/or in the field before work is started or resumes.

3. Where active utilities are encountered but not shown on the drawings, the Contractor shall notify the Utility Company, Owner and Engineer prior to proceeding with any work. An appropriate course of action shall be agreed upon by the Utility Company, Owner and

4. Inactive and abandoned utilities encountered in excavating and grading operations shall be reported to the Engineer. They shall be removed, plugged or capped as directed by

1. Grades: Perform all cutting, filling, compacting of fills and rough grading required to bring entire project area to subgrade as shown on the drawings. Undercut open areas

2. Rough grading: the tolerance for paved areas shall not exceed 0.10 feet above established subgrade. All other areas shall not exceed 0.10 feet plus or minus the established grade. Provide roundings at top and bottom of banks and other breaks in grade. All open areas shall be graded a minimum of 0.5% and a maximum of 3H:1V

3. Sub-grade shall be proof rolled with suitable equipment and all spongy and otherwise unsuitable material shall be removed and replaced with suitable material. Contractor shall coordinate the proof roll procedure with the agency having jurisdiction to ensure proper representation is in attendance for the test.

4. Sub-grade for building areas shall be compacted to a minimum compaction of 95% Modified Proctor Density or per the Archetectual/Structural Construction Plans for the corresponding building area. The Archetectual/Structural plans shall govern.

5. Sub-grade for streets and paved areas - See PAVEMENT specifications.

6. See PAVEMENT section for additional information.

7. All fill material shall be formed from soil free of deleterious material. Prior to placement of fill, a sample of the proposed material shall be submitted to the Owner's Geotechnical Engineer for approval. The fill material shall be placed in layers not to exceed 8" in loose thickness and shall be spread and compacted at the proper moisture

8. All fill material in areas outside of building and pavement areas shall be compacted lightly with each lift and protected from erosion. Areas of building construction shall have suitable fill material placed and compacted in accordance with the Soils Engineer's report and per sub-section 4 described above in this Section.

9. The Contractor shall verify all earthwork quantities prior to the start of construction. The Contractor shall notify the Owner and Engineer in writing if excess or shortage of earth quantities is encountered and verify requirements for stockpiling, removal or importing earth. Owner and Engineer hereby reserve the right to allow minor adjustments in proposed grades to reduce an earth quantity disparity.

1. Contractor shall resolve any surface or subsurface drainage problems and construct

2. Remove all rocks, roots or other materials that may interfere with seedbed preparation.

3. Perform the major filling, shaping and smoothing of gullied or severely eroded areas.

4. Have soil tested to check pH and fertility levels. Apply lime at rate specified in seeding

5. Work all lime and fertilizer into the soil to a depth of 2-3 inches with a small disk, harrow or rake operated across the slope as much as possible.

6. Firm the soil bed where possible. Do not over pack the soil to ensure compacting does not restrict water and root penetration into the soil.

STORM SEWER SYSTEMS

A. SCOPE OF WORK

1. The work under this section includes all storm sewers, storm manholes, storm water inlets, and related items, including excavating and backfilling, necessary to complete the work shown on the drawings.

2. All work under this section shall be in accordance with the Fisher's Stormwater Standards and Specifications unless specifically noted otherwise. In the event requirements provided herein conflict with the aforementioned Standards, the more stringent provisions shall be used.

B. MATERIALS

1. Storm Sewers:

a. Reinforced concrete sewer pipe shall conform to ASTM C-76 class 3 (unless otherwise noted) latest revision with joints and gaskets conforming to ASTM C-443 latest revision.

- b. High Density Polyethylene Pipe HDPE • Pipe shall meet Type S pipe under AASHTO M294 for sizes 12 inches to 36 inches, and AASHTO MP6 for 42 inches and 48 inches.
- Flexible gasket joints shall be compression type so that when assembled, the gasket inside the machined groove on the pipe spigot will be compressed radially in the pipe bell to form a soiltight seal for all soil types and groundwater conditions.
- Gaskets shall conform to all requirements of ASTM F-447

2 Manholes:

a. Precast reinforced concrete manhole sections shall conform to ASTM C-478 latest revision.

b. Castings shall be of uniform quality, free from blow holes, porosity, hard spots, shrinkage distortion or other defects. They shall be smooth and well-cleaned by shotblasting or by some other approved method. They shall be coated with asphalt paint which shall result in a smooth coating, tough and tenacious when cold, not tacky or brittle. They shall be gray iron meeting ASTM A-48 latest

revision. c. Joints - manhole sections shall be jointed with rubber type gaskets. The rubber type gaskets shall meet ASTM C-443 latest revision.

3. Sub-surface/Underdrains:

a. Perforated plastic pipe sub drains shall conform to ASTM D-3034 SDR 35, ASTM D-2729, or ASTM F-405.

4. PE Pipe and Fittings

- d. Corrugated PE Drainage Pipe and Fittings NPS 12 (DN 250) and smaller: AASHTO M 252M, for coupling joints.
- Silt-tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings. • Soil-tight Couplings: AASHTO M 252M, corrugated, matching tube and
- Type S, double walled with smooth waterway.
- b. Corrugated PE Pipe and Fittings NPS 12 to NPS 48 (DN 250 to DN 1200): AASHTO M 294M, Type S, with smooth waterway for coupling joints. • Silt-tight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 aasket material that mates with pipe and fittings

• Soil-tight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings

5. Manhole Steps

a. Manhole steps shall be polypropylene, polypropylene coated steel reinforcing, or an approved non-corrosive fiberglass material. the copolymer polypropylene shall meet the requirements of ASTM D-4101 reinforced with deformed $\frac{3}{8}$ inch minimum diameter reinforcing steel conforming to the requirements of ASTM 1-615, grade 60.

C. APPLICATION

- 1. Permits and Codes: This section is intended to provide the Contractor with a basis for bidding purposes and general information. The Contractor shall be responsible for ensuring their bids, materials and workmanship are in accordance with local jurisdictional requirements. Contractor shall furnish all bonds necessary to get permits for cuts and connections to existing sewers.
- 2. Local Standards: The term "Local Standards" as used herein means the standards of design and construction of the respective municipal department or utility company
- 3. Existing Improvements: The Contractor shall maintain in operating condition all active utilities, sewers and other drains encountered in the sewer installation. Contractor shall repair to the satisfaction of the Owner/Utility Company any damage to existing active improvements at no additional cost to Owner.
- 4. Workmanship: Shall conform to all local, state and national codes and to be approved by all local and state agencies having jurisdiction.
- 5. Trenching: Lay all pipe in open trenches, except when the local authority gives written permission for boring/tunneling. Open the trench sufficiently ahead of pipe-laying to reveal any obstructions. The minimum width of the trench shall be the outside pipe diameter multiplied by 1.25, plus 12 inches (min.). Sheet and brace trench as necessary to protect workmen and adjacent structures. All trenching to comply with Occupational Safety and Health Administration Standards. Keep trenches free from water while construction is in progress. Under no circumstances shall contruction activities commence in standing water. Conduct the discharge from trench dewatering to appropriate drains or natural drainage channels.
- 6. Special Supports: Whenever, in the opinion of the Engineer, the soil at or below the pipe grade is unsuitable for supporting sewers and appurtenances specified in this section, such special support, in addition to those shown or specified, shall be provided as the Engineer may direct, and the contract will be adjusted.
- 7. Bedding: Bedding material shall be compacted No.8 crushed stone or No.8 fractured face aggregate meeting INDOT Standard Specifications and shall be placed in the trench bottom such that after the pipe has been placed to grade and line, there remains a minimum depth of material below the outside pipe wall. Refer to the tables below.

a. HDPE / Flexible Pipe

- No.8 crushed stone or No.8 fractured face aggregate meeting INDOT specifications shall be placed around the sides of the pipe up to the sides of the pipe to the springline (1/2 the Outside Diameter). This material shall be shovel sliced or otherwise carefully placed and "walked" or hand tamped in to ensure compaction of the haunch area and complete filling of all voids. From the springline to twelve (12) inches above the top of the pipe, bedding shall be added in six (6) inchlifts "walked" in for compaction. Backfilling of the remainder of the trench shall be as specified in the next Section
- b. Reinforced Concrete Pipe (RCP) No.8 crushed stone or No.8 fractured face aggregate meeting INDOT specifications shall be placed around the sides of the pipe up to the sides of the pipe to the springline (1/2 the Outside Diameter). This material shall be shovel sliced or otherwise carefully placed and "walked" or hand tamped in to ensure compaction of the haunch area and complete filling of all voids. Backfilling of the remainder of the trench shall be as specified in the next Section.
- 8. Backfill: The following materials shall be used to backfill the trenches in accordance with and in the manner indicated by the requirements specified herein:
- a. Granular Backfill: Granular backfill material shall be B Borrow or Structural Backfill in accordance with Section 211 of INDOT Standard Specifications. Backfill under and within 5' of walks, parking areas, driveways, and streets shall be granular material only.
- b. Non-Granular Backfill: In areas not requiring granular backfill material, the trench shall be carefully backfilled with clean fill material free of rocks larger than 6-inches in diameter, frozen lumps of soil, wood or other extraneous material.

- STORM SEWER SYSTEMS (CONT.)
- 9. Compaction: Granular Backfill compaction shall be in accordance with Section 211 of the INDOT Standard Specifications. Bedding and haunching shall be compacted to 95% standard proctor density for the entire depth of excavation.
- 10. Manhole Inverts: Construct manhole flow channels of concrete, smoothly finished and if semi-circular section conforming to the inside diameter of the connecting sewers. Make changes in size or grade gradually and changes in direction by true curves.
- 11. Utilities: It shall be the responsibility of each contractor to verify all existing utilities and conditions pertaining to his phase of the work. It shall also, be the contractors responsibility to contact the owners of the various utilities before work is started. The contractor shall notify in writing the owners or the engineer of any changes, errors or omissions found on these plans or in the field before work is started or resumed.

SANITARY SEWER SYSTEMS

Sanitary construction procedures, materials, testing, details and specifications shall be in accordance with the Fall Creek Regional Waste District Standards (Latest Edition). Please refer to these standards, specifications, and details for all sanitary construction.

WATER LINE AND APPURTENANCES

Pendleton Water Utility Standard Practices and Engineering Requirements for the Installation of Water Mains, Services Lines, Meters, and Appurtenances (Latest Edition) to be used with these plans for all water line construction.

DEWATERING AND CONTROL OF SURFACE WATER

Whenever groundwater is encountered, the CONTRACTOR shall make every practical effort to secure a dry trench bottom before laying pipe. The CONTRACTOR shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, etc. to depress and maintain the groundwater level below the base of the excavation. If the CONTRACTOR is unable to remove the standing water in the trench, the CONTRACTOR shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of No. 8 crushed stone in the over-excavated area.

The CONTRACTOR shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps, and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface and/or aroundwater shall be performed in a manner which will prevent the accumulation of water within the construction area. UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF OR ALLOWED TO FLOW INTO AN ACTIVE SANITARY SEWER SYSTEM.

- 1. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE PENDLETON CONSTRUCTION STANDARDS AND SPECIFICATIONS (STANDARDS) UNLESS SPECIFICALLY NOTED OTHERWISE.
- 2. INDIANA STATE DEPARTMENT OF TRANSPORTATION (INDOT) STANDARD SPECIFICATIONS, LATEST EDITION, TO BE USED WITH THESE PLANS, (SUPPLEMENTAL SPECIFICATIONS)
- 3. IN THE EVENT THESE PLANS OR SUPPLEMENTAL SPECIFICATIONS ARE IN CONFLICT WITH SAID STANDARDS, THE MORE STRINGENT REQUIREMENTS SHALL BE USED.

