INDIANA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENGINEERING
SPECIFICATIONS AND BIDDING DOCUMENTS
PAVING IMPROVEMENTS 2020

BLUE GRASS FWA
PARKING LOT PAVING
IN WARRICK COUNTY

PROJECT No. ENG2101871155

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PART 1 – GENERAL

1.1 WORK UNDER THIS CONTRACT

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

1. Blue Grass Fish and Wildlife Area Public Access Site, Warrick County: Prepare, repair, and patch existing aggregate parking lot for an asphalt overlay of HMA intermediate and surface paving. Undercut existing drive access area and prepare aggregate base for Indot Type II Access with HMA pavement. Paving shall conform with existing drainage patterns. Pavement Striping for parking stalls and two ADA stalls with unloading zone and signage shall be provided.

   Driving Directions: From Indianapolis, Take IN 37 South, becoming I-69 South. Follow I-69 South to Evansville and take exit 15 for Boonville New Harmony Road. Turn left onto Boonville New Harmony Road (East). Continue along Boonville New Harmony Road which then becomes New Harmony Road for 0.5 miles. Turn left onto Blue Grass Fish and Wildlife Area Public Access Site lot.

B. Remediation Allowance

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

C. Work to be performed shall be in accordance with drawings and specifications prepared by VS ENGINEERING, INC., 203 Main Street, Suite 102, Evansville, Indiana 47708.

1.2 COORDINATION OF PLANS, SPECIFICATIONS AND PAY ITEMS

A. These specifications, plans and pay items are essential parts of the contract. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of

discrepancy, calculated dimensions will govern over scaled dimensions; and the following relationships apply:

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

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

1.3 RIGHTS OF ACCESS

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

1.4 DISCOVERY OF HAZARDOUS MATERIAL

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

1.5 OPERATIONS WITHIN PROJECT PROPERTY LIMITS

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

The work shall be performed at*:*

1. Blue Grass Fish and Wildlife Area Public Acccess Site, Warrick County near Elberfeld, IN

1.6 ALTERNATE BIDS

A. Voluntary alternate bids will not be accepted.

1.7 SALES TAX

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

1.8 CONSTRUCTION PROGRESS SCHEDULE

A. The Contractor shall submit to the Engineer, prior to start of construction, a detailed schedule showing the order in which he proposes to carry on the work and estimated dates of completion of the various parts. The schedule shall be implemented upon approval of the Engineer.

B. The construction schedule shall be revised and updated monthly and submitted to the Engineer. It is the Contractor's responsibility to complete the work within the time allotted.

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

1.9 CODE REQUIREMENTS AND MANUFACTURER'S INSTRUCTIONS

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

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

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

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

B. The Contractor shall be required to comply with all OSHA or IOSHA regulations as may be applicable to this project and obtain all permits that may be required for compliance.

C. If the Contractor observes that any of the contract documents are at variance with the printed application instructions of any Manufacturer in any respect, he/she shall promptly notify the Project Manager in writing.

D. If the Contractor performs any work contrary to State Building and other Codes, Regulations, Ordinances, or Manufacturer's printed instructions without notice to the project Manager, the contractor shall bear the cost arising from such non-conformance.

1.10 NOTIFICATIONS

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

Project Manager: **Michael J. Mathias, P.E.**
Phone**:** **(317) 232.4155**
Address: **Indiana Governement Center South**
402 W Washington Stree, Room W299
Indianapolis, IN 46204
Email: **MMathias@dnr.in.gov**

1.11 WORKING HOURS

A. The Contractor shall perform all related activities on Monday through Friday excluding State holidays, between the hours of 7:00 a.m. and 6:00 p.m. local time, unless alternate arrangements are made and approved by the Property Manager or his representative.

B. All work performed at other times shall only by the approval of the Property Manager or his representative, confirmed in writing, and shall not constitute a change in the contract amount.

C. The Contractor shall plan all material deliveries during normal working hours, shall be responsible for receiving and deliveries, and shall properly protect delivered materials while being stored on the property. The Property Manager or his representative will not sign for any deliveries.

1.12 PRE-CONSTRUCTION / SERVICE MEETING

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

A. Tree Removal

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

B. Responsibility for Damage or Destruction as a Result Flooding

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

C. Emergency Access

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

1.13 SITE CONDITIONS

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

1.14 PROTECTION OF FACILITIES AND PREMISES

A. **The Contractor SHALL** be responsible for the protection of all facilities during the entire period of service. Any damages to the existing facilities, roads, lawns, driveways, or other State owned property caused by the contractor SHALL be repaired by the Contractor at his/her expense and in a manner and schedule approved by the Property Manager.

B. **The contractor SHALL** confine his/her operations and the storage of materials and equipment within an area approved by the Property Manager or his representative.

C. **The Contractor SHALL**, at all times, keep the premises free from accumulation of waste materials or rubbish caused by his/her employees or work and prevent the spread of this debris during windy conditions. At the completion of the work, the Contractor SHALL leave the premises in a neat, clean, and orderly fashion.

D. **The Contractor SHALL power wash any mechanical equipment or vehicle to be used on the job site to remove all mud and debris prior to unloading on the site.** This is necessary to prevent contamination by invasive species seeds that may be attached to the equipment. The Contractor SHALL NOT unload the equipment on site without prior visual inspection by the Property Manager. No other vehicles/machines shall be

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

1.15 ACCESS ROADS AND PARKING AREAS

A. Provide and maintain vehicular access to the site and within the site for use by persons and equipment involved in the construction of the project. Maintain access roads and driveways with sufficient rock, stone, or gravel to provide a suitable support for vehicular traffic under anticipated loads.

B. Provide and maintain temporary parking facilities for use by construction personnel and the Engineer. Maintain parking facilities free of construction materials, mud, snow, ice and debris.

C. Restore areas to original or to specified conditions shown on the drawings at completion of the work.

1.16 UTILITIES

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

1.17 DUST AND NOISE CONTROL

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

1.18 SAFETY AND HEALTH PLAN

A. **The Contractor SHALL** be required to comply with all OSHA or IOSHA regulations as may be applicable to this project and obtain all permits that may be required for compliance.

B. **The Contractor SHALL** prepare a safety and health plan that identifies the safety requirements of the project, procedures to follow in case of an emergency, accident, injury, or illness and make this plan available to all employees, and sub-contractors complete with persons and/or phone numbers to call for all who are working at this site. This plan **SHALL** be given to the Project Manager or his representative prior to the start of work and posted at the job site.

C. **The Contractor SHALL** understand that the Property, DNR Engineering, nor the State of Indiana DOES NOT bare any responsibility for the cost of injuries to Contractor or

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

1.19 SUBSTITUTIONS

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

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Field engineering.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Comply with GENERAL CONDITIONS and Section 011000 SUMMARY OF WORK.

B. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

D. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

A. Employ Land Surveyor registered in State of Indiana and acceptable to Engineer and OWNER.

B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

C. Control datum for survey is that shown on Drawings.

D. Verify set-backs and easements; confirm drawing dimensions and elevations.

E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Maintain complete and accurate log of control and survey work as Work progresses.

G. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

H. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

I. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.4 PRECONSTRUCTION MEETING

A. Comply with GENERAL CONDITIONS and Section 011000 SUMMARY OF WORK.

1.5 PROGRESS MEETINGS

A. Comply with GENERAL CONDITIONS and Section 011000 SUMMARY OF WORK.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Product data.

E. Shop drawings.

F. Samples.

G. Design data.

H. Test reports.

I. Certificates.

J. Manufacturer's instructions.

K. Manufacturer's field reports.

L. Construction photographs.

1.2 GENERAL

A. A listing of required submittals for the various detailed specification items is presented within each section.

B. Under all circumstances shop drawings shall be submitted and approved by the Engineer prior to the initiation of construction of the particular item.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and

coordination of information is in accordance with requirements of the Work and Contract Documents.

D. Schedule submittals to expedite Project, and deliver to Engineer at business address. Coordinate submission of related items.

E. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.

F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

G. Allow space on submittals for Contractor and Engineer review stamps.

H. When revised for resubmission, identify changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

J. Submittals not requested will not be recognized or processed.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit as required in the GENERAL CONDITIONS and Section 011000 SUMMARY OF WORK.

B. Distribute copies of schedules to Project site file, subcontractors, suppliers, and other concerned parties.

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

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

E. Indicate estimated percentage of completion for each item of Work at each submission.

F. Submit separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.

G. Revisions To Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

1.5 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit number of copies Contractor requires, plus two copies Engineer will retain.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 SHOP DRAWINGS

A. Submit in accordance with the General Conditions and Supplemental Conditions.

B. Shop Drawings: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
   1. Include signed and sealed calculations to support design.
   2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.

3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Submit number of opaque reproductions Contractor requires, plus two copies Engineer will retain.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.8 SAMPLES

A. Submit in accordance with the General Conditions and Supplemental Conditions.

B. Samples: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

C. Samples For Selection as Specified in Product Sections:
1. Submit to Engineer for aesthetic, color, or finish selection.
2. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Engineer selection.

D. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit number of samples specified in individual specification sections; Engineer will retain one sample.

G. Reviewed samples which may be used in the Work are indicated in individual specification sections.

H. Samples will not be used for testing purposes unless specifically stated in specification section.

I. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00 - Execution and Closeout Requirements.

1.9 DESIGN DATA

A. Submit for Engineer's knowledge as contract administrator or for Owner.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator or for Owner.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's benefit as contract administrator or for Owner.

B. Submit report within 5 days of observation to Engineer for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.14 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of site and construction throughout progress of Work produced by photographer, acceptable to Engineer.

B. Each month submit photographs with Application for Payment.

C. Photographs: Digital submission on CD or DVD; minimum resolution 5 MG, color.

D. Provide photographs to document the start and stop of each major phase of construction.

E. Provide photographs documenting erosion control during construction.

F. Identify each print. Identify name of Project, orientation of view, date and time of view, name and address of photographer, and photographer's numbered identification of exposure.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 10 – SITE QUALITY REQUIREMENTS FOR EXTERIOR WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances.

C. References.

D. Labeling.

E. Testing and inspection services.

F. Examination.

G. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 LABELING

A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
   1. Model number.
   2. Serial number.
   3. Performance characteristics.

1.6 TESTING AND INSPECTION SERVICES

A. See General Conditions.

B. All tests to determine compliance with the Specifications shall be performed by an independent commercial testing firm. The testing firm’s laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.

C. Employ and pay for services of an independent testing firm or laboratory acceptable to Owner to perform specified testing.
   1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Laboratory: Authorized to operate in State of Indiana.

3. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
4. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standard or accepted values of natural physical constants.

D. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Owner.
   1. Materials testing services provided by Contractor. Unless otherwise specified, Contractor shall provide all materials testing services in connection with the following:
      a. Concrete materials and design mixtures.
      b. Masonry units and masonry grout and mortar materials and design mixtures.
      c. Asphaltic concrete materials and design mixtures.
      d. Embedment, fill, and backfill materials.
      e. All other tests and engineering data required for Engineer's review of materials and equipment proposed to be used in the Work.
   2. Field testing services provided by Contractor. Unless otherwise specified, Contractor shall provide for field tests made on the following materials and equipment:
      a. Concrete.
      b. Field control test of masonry.
      c. Asphaltic concrete.
      d. Moisture-density and relative density tests on embedment, fill, and backfill materials.
      e. In-place field density test on embedment's, fills and backfill.
      f. Other materials and equipment at the discretion of Contractor.

E. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer or Owner.

F. Reports will be submitted by independent firm to Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
   1. Submit final report indicating correction of Work previously reported as non-compliant.

G. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

H. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

I. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Engineer. Payment for re-testing or re-inspection will be charged to Contractor.

J. Agency Responsibilities:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
   6. Perform additional tests required by Engineer.
   7. Attend preconstruction meetings and progress meetings.

K. Agency Reports: After each test, promptly submit two copies of report to Engineer and Contractor. When requested by Engineer, provide interpretation of test results. Include the following:
   1. Date issued.
   2. Project title and number.
   3. Name of inspector.
   4. Date and time of sampling or inspection.
   5. Identification of product and specifications section.
   6. Location in Project.
   7. Type of inspection or test.
   8. Date of test.
   9. Results of tests.
   10. Conformance with Contract Documents.

L. Limits On Testing Authority:
   1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency or laboratory may not approve or accept any portion of the Work.
   3. Agency or laboratory may not assume duties of Contractor.
   4. Agency or laboratory has no authority to stop the Work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 55 10 – TRAFFIC CONTROL AND MAINTENANCE OF TRAFFIC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Traffic Control for Construction and Maintenance Operations

1.2 TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

A. Authority having jurisdiction: - All streets are within Indiana Department of Natural Resources properties, State, County, and City jurisdiction right-of-ways.

B. The Contractor shall carry out the Work in a manner which will cause a minimum of interruption to traffic. Where traffic must cross open trenches, the Contractor shall provide suitable bridges to street intersections and driveways. The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets the Contractor shall notify and obtain approval from responsible municipal authorities.

C. The Contractor shall plan construction activities to minimize impact to traffic. Local traffic access must be maintained at all times. To maintain traffic movement, appropriate traffic control devices shall be used. Such traffic control devices shall comply with the latest edition of the Indiana Manual on Uniform Traffic Control Devices as well as all Indiana Department of Transportation Standard Specifications, Drawings and Special Provisions (Latest Revisions).

1.3 SUBMITTALS

A. Maintenance of Traffic Plan – Contractor shall submit a detailed Maintenance of Traffic Plan to Engineer for review and approval prior to submitting to responsible municipal authorities for final approval. The detailed Maintenance of Traffic Plan shall be submitted to the Engineer for approval a minimum of 2 weeks prior to requesting approval from the IDNR Property Manager.

B. Contractor shall be responsible for obtaining approval from the IDNR Property Manager, State, County, and/or City jurisdictions for all lane and road closures. Written approval from the IDNR Property Manager, State, County, and/or City jurisdictions shall be provided to the Engineering prior to implementing lane and road closures.

C. Contractor shall provide detailed information on how local traffic will be maintained to all properties during specific stages of work. This information shall be submitted to the Engineer, for review and approval, a minimum of one week prior to seeking the IDNR Property Manager Safety approval. The Contractor may not submit for the

IDNR Property Manager approval until Engineer has reviewed and approved schemes for maintaining local traffic.

D. Contractor shall be responsible for providing a schedule identifying expected dates and durations of road and lane closures to the Engineer during the pre-construction meeting. An updated schedule identifying the actual date and expected duration of all road closures shall be submitted to the Engineer a minimum of one week prior to seeking Board of Public Works and Safety approval.

PART 2 PRODUCTS

2.1 MATERIALS AND SPECIFICATIONS

A. All signage, barricades and safety gear shall comply with the Indiana Department of Transportation Standard Specifications and the Indiana Manual on Uniform Traffic Control Devices.

PART 3 EXECUTION

3.1 TRAFFIC REGULATION

A. Signs, Signals and Devices:

1. Post Mounted and Overhead Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
2. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction
3. Flagperson Equipment: As required by authority having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.2 TRAFFIC CONTROL – GENERAL

A. Roads shall be kept open to all traffic while undergoing improvements. Maintenance of traffic shall be in accordance with the approved Maintenance of Traffic Plan. In the event an alternate plan for maintaining traffic is requested, it shall be submitted in writing as soon as possible for consideration. If approved, the alternate plan shall not increase the cost of maintaining traffic to the Owner.

B. The portion of the roadway being used by public traffic shall be kept in such condition that such traffic will be adequately accommodated. Drums in accordance with Section 801 of the Indiana Department of Transportation Standard Specifications, Latest

Revision shall be placed at 200 foot intervals where drop-offs of greater than 3 inches are adjacent to the shoulder until the aggregate or earth wedge is placed. Temporary approaches to businesses, parking lots, residences, garages, farm, crossings, intersections with trails, roads, and streets shall be provided in a safe condition. All traffic control devices shall be maintained with no additional payment.

C. Regulatory controls shall not be changed without prior approval. Regulatory control devices may be relocated in order to permit necessary construction, providing these control devices remain effective and convey the intended meaning after relocation to a position, which complies with the requirements of MUTCD. After completion of the construction, regulatory control devices, which were relocate to facilitate construction shall be permanently installed with no additional payment, in accordance with the plans, or as otherwise directed. Any traffic control devices damaged, while being moved or handled, shall be replaced with no additional payment. All other traffic control devices necessary to maintain safe traffic operations and routings shall not be removed, changed, or relocated, except as authorized. Traffic control devices removed without authorization shall be replaced with no additional payment.

3.3 TRAFFIC CONTROL FOR PATCHING ON A 2-LANE ROADWAY

A. Unless otherwise directed or permitted, the Work specified shall be arranged and prosecuted in accordance with the applicable requirements of the Contract Documents and Section 801 of the INDOT Standard Specifications as set out herein.

B. Only one lane may be closed at a time.

C. A minimum of two (2) drums shall be placed on the traffic approach side of each patch or opened hole.

D. Traffic restrictions will be permitted during daylight hours only. If the Contractor is unable to fill an area to be patched during the daylight hours, the patch shall be filled with Coarse Aggregate Type A2 or A3 for the times other than daylight hours. Drums in accordance with Section 801 of the INDOT Standard Specifications shall be placed at the side of the roadway at the patch location. The Contractor shall maintain temporary aggregate fill flush with the existing pavement surface until permanent patch is placed. Temporary aggregate fill shall be utilized no more than 14 days.

3.4 MAINTAINING TRAFFIC – PROSECUTION AND PROGRESS

A. Maintenance of traffic shall be the sole responsibility of the Contractor. Access and traffic to all businesses, residences, for all postal deliveries and all emergency traffic such as police, fire, medical, etc. within the project limits, shall be maintained at all times.

B. Unless otherwise directed, or permitted, the Work specified shall be arranged and prosecuted in accordance with all applicable provisions of this Specification, the

Contract Documents, and Section 801 of the INDOT Standard Specifications, approved permits and as set out herein.

C. The names and telephone numbers of the Contractor's Superintendent and two other responsible employees shall be furnished at the pre-construction conference.

D. These employees shall be on call and available at nights, weekends, or during other non-working periods to repair or replace all traffic control devices, which may become damaged or inoperative.

E. In the event the Contractor desires not to perform traffic maintenance in accordance with the sequence of operations as called for within the Contract Documents, Contractor shall submit his alternate plan in writing to the Engineer and obtain acceptance at least 2 weeks prior to the commencement of any construction activities.

F. Should the Contractor propose a street closure not otherwise identified within the Contract Documents, he shall submit a written request to the Engineer for review and acceptance at least three (3) weeks prior to the planned closure.

G. The Engineer will give written notification of the acceptance or denial of any maintenance of traffic proposals and, if approved, Engineer will inform the County Highway Department to allow notice to be given to all public agencies and businesses within the project area. The failure to accept the request, as long as the decision is reasonable, shall not entitle the Contractor to an extension in contract time or to an increase in contract price.

H. Prior to actual closure of a street, the Contractor shall notify Owner 48 hours prior to closure taking affect.

I. When conduit or cable is being placed between 7:00 a.m. and 6:00 p.m. steel plating shall be utilized in order to ensure that movement through the intersection is not deterred.

J. Pedestrian traffic also shall be maintained and disruption thereof kept to a minimum.

K. Open trenches, if permitted by the Engineer, shall be spanned per current OSHA requirements and with the concurrence of the Engineer.

L. Any trenching areas adjacent to a sidewalk shall be barricaded. If adequate sidewalk area is not available, the Contractor shall divert pedestrian traffic across the street and shall provide all materials necessary to provide for the crossover.

M. Trenching in the streets shall not be left open during off-working hours. The trenches shall be either backfilled with crushed stone or steel plated per current Owner's ordinances and regulations or instructions.

END OF SECTION

SECTION 01 60 10 – SITE PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

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

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

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

D. Products shall not be delivered to the project site until related shop drawings have been reviewed and approved by the Design Engineer and until appropriate storage facilities are in place and approved by the ENGINEER.

E. Products shall be delivered to the site in manufacturer’s original, unopened, labeled containers.

F. The Contractor shall not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. GENERAL

1. The Contractor shall store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein. No on-site existing storage facilities are available for use by the Contractor. All on-site facilities for storage shall be furnished by the Contractor.
2. The Contractor shall not block or restrict the use of Public Rights-of-Way, access roads, or private property with stored materials, except where indicated on the Contract Documents.
3. The Contractor shall not store products where they will interfere with operations of the Owner or other contractors.
4. The Contractor shall protect all products from damage or deterioration by weather.
5. The Contractor shall not store any products directly on the ground.
6. Provide off-site storage and protection when site does not permit on-site storage or protection.
7. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

B. UNCOVERED STORAGE

1. Materials not subject to deterioration or contamination by weather may be stored uncovered at the project site. Such materials may include concrete masonry units, reinforcing steel, piping, precast concrete, and castings. All such materials shall be stored on wood blocking where practical. Aggregates and sand may be stored uncovered provided that they are protected by contamination by other materials.

C. COVERED STORAGE

1. The following types of material my be stored out-of-doors if covered with material impervious to water:

    a. Rough Lumber
    b. Equipment as specifically allowed by the Engineer

2. The Contractor shall tie down covers with rope and slope to prevent accumulation of water on covers. All materials shall be stored on wood blocking or pallets.

D. FULLY PROTECTED STORAGE

1. The Contractor shall store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof, and fully enclosed walls on all sides.
2. The Contractor shall provided heated storage space for materials which would be damaged by freezing.
3. The Contractor shall protect mechanical and electrical equipment from being contaminated by dust and dirt.
4. The Contractor shall maintain temperature and humidity at levels recommended by manufacturer(s) for electrical and electronic equipment.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Protecting installed construction.

D. Project record documents.

E. Product warranties.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

C. Clean debris from roofs, gutters, downspouts, and drainage systems.

D. Clean site; sweep paved areas, rake clean landscaped surfaces.

E. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

1.5 PROJECT RECORD DOCUMENTS

A. As required in General Conditions and Supplemental Conditions.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Record information concurrent with construction progress, not less than weekly.

D. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

E. Submit documents to Engineer with claim for final Application for Payment.

1.6 PRODUCT WARRANTIES

A. If there are any warranties or manufactured services offered longer than three (3) years from Substantial Completion, Contractor shall provide all warranty certificates and documentation for these.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General Requirements

B. Scheduling of Shutdown

1.2 RELATED SECTIONS

Related Work Specified in Other Sections Includes, but is Not Limited to, the Following

A. Section 010100 - Summary of Work

1.3 GENERAL REQUIREMENTS

A. Coordination: Perform all cutting, fitting or patching of the Work that may be required to make the several parts thereof join in accordance with the Contract Documents. Perform restoration with competent workmen skilled in the trade.

B. Improperly Timed Work: Perform all cutting and patching required to install improperly timed work, to remove samples of installed materials for testing, and to provide for alteration of existing facilities or for the installation of new Work in the existing construction.

C. Limitations: Except when the cutting or removal of existing construction is specified or indicated, do not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without the ENGINEER's concurrence.

1.4 SCHEDULING OF SHUTDOWN

A. Connections to Existing Facilities: If any connections, replacement, or other work requiring the shutdown of an existing facility is necessary, schedule such work at times when the impact on the OWNER's normal operation is minimal. Overtime, night and weekend work without additional compensation from the OWNER, may be required to make these connections, especially if the connections are made at times other than those specified.

B. Request for Shutdowns: Submit a written request for each shutdown to the OWNER and the ENGINEER sufficiently in advance of any required shutdown.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. Safeguards: Provide all shoring, bracing, supports, and protective devices necessary to safeguard all work and existing facilities during cutting and patching operations.

B. Location of Embedments: Employ impulse radar (non x-ray type) nondestructive testing prior to core drilling or cutting of existing walls, floors and ceilings to identify location of embedded pipes or conduits.

C. Material Removal: Cut and remove all materials to the extent shown or as required to complete the Work. Remove materials in a careful manner with no damage to adjacent facilities. Remove materials which are not salvageable from the site.

3.2 RESTORATION

A. Final Appearance and Finish: Restore all work and existing facilities affected by cutting operations, with new materials, or with salvaged materials acceptable to the ENGINEER, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, patch and refinish entire surfaces.

END OF SECTION

SECTION 02 10 00 - SITE PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. The Work of this Section includes measures required during the Contractor's initial move onto the Site to protect existing fences, structures and associated improvements, streets, and utilities from damage; clearing, grubbing and stripping of plant material other than shrubbery and trees.

1.2 SITE INSPECTION

A. Prior to moving onto the Site, the Contractor shall inspect the Site conditions and review the existing site and utility routes and facilities delineating the Owner's property and any easements.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 PRIMARY SITE ACCESS

A. The Contractor shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.

B. Utility Interference: Where existing utilities interfere with the Work, the Contractor shall notify the Owner and the Engineer before proceeding in accordance with the General Conditions and Supplemental Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches masonry debris, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the Work, create a hazard to safety, or impair the subsequent usefulness of the Work, or obstruct its operation. Loose boulders within 10-feet of the top of cut lines shall be incorporated in landscaping or removed from the Site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction, as directed by the Engineer, unless otherwise specified.

B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Septic tanks, drain fields, and connection lines and any other underground structures, debris or waste shall be removed if found on the Site. All

objectionable material from the clearing and grubbing process shall be removed from the Site and disposal at approved safe locations.

C. Unless otherwise indicated, native trees larger than 3-inches in diameter at the base shall not be removed without the Engineer's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary for the Contractor's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, at no additional cost to the Owner.

D. Unless otherwise provided, any existing structure or parts thereof, fence, building, or other encumbrance or obstruction upon or within the limits of construction which interferes in any way with the new construction shall be removed with no additional payment. Materials belonging to owners of abutting property shall be stockpiled neatly and in an acceptable manner upon their property or otherwise disposed of as required.

E. Materials not specifically reserved for use by the Owner shall become the property of the Contractor. Such materials shall be removed or disposed of as specified or directed. Materials reserved for use by the Owner shall be removed without damage in sections which can be readily transported. Such materials shall be stockpiled neatly at accessible points. No material shall be disposed of except as provided herein.

F. Owner reserves the right to all manhole frames and castings removed as part of the project. Existing items specified or directed to be removed by the Engineer or elsewhere in these Contract Documents shall be salvaged and stockpiled at the job site by the Contractor. Those items designated by the Engineer shall be delivered by the Contractor to the Owner at a location specified by Owner.

3.3 PREPARATION PRIOR TO FILL OR MATERIAL PLACEMENT

A. After areas to receive fill have been cleared, grubbed, and excavated fill shall be placed in accordance with other appropriate specification section.

END OF SECTION

SECTION 02 41 19 – SITE SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cutting and alterations for completion of the Work.
   2. Removing designated items.
   3. Removing demolished materials.
   4. Plugging of Pipes

B. Related Sections:
   1. Section 33 41 00 – Storm Drainage Piping

1.2 SITE SELECTIVE DEMOLITION

A. Comply with Section 02 41 19 SELECTIVE STRUCTURE DEMOLITION.

1.3 SUBMITTALS

A. Pipe Plug product data

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

1.5 SCHEDULING

A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.

B. Schedule Work to coincide with new construction.

PART 2 PRODUCTS

2.1 PIPE PLUGS

A. Pipe plugs shall be of the manufactured mechanical variety and shall not rely on inflatable means to form positive seal.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

3.2 PLUGGING OF EXISTING PIPES

A. Pipes shall be plugged in accordance with the written instructions of the selected and approved aforementioned pipe plug system.

3.3 DEMOLITION

A. Disconnect and remove designated utilities within demolition areas.

B. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

D. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

E. Remove temporary Work.

END OF SECTION

SECTION 036000 – SITE GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Portland cement grout.
   2. Rapid curing epoxy grout.
   3. Non-shrink cementitious grout.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 318 - Building Code Requirements for Structural Concrete.

B. American Society of Testing and Materials:
   1. ASTM C33 - Standard Specification for Concrete Aggregates.
   2. ASTM C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
   3. ASTM C150 - Standard Specification for Portland Cement.
   4. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
   5. ASTM C307 - Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.
   6. ASTM C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
   7. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, monolithic Surfacings and Polymer Concretes.
   8. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit product data on grout.

C. Manufacturer's Installation Instructions: Submit manufacturer’s instructions for mixing, handling, surface preparation and placing epoxy type and non-shrink type grouts.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Maintain one copy copies of each document on site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver grout in manufacturer's unopened containers with proper labels intact.

C. Store grout in a dry shelter, protect from moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not perform grouting if temperatures exceed 90 degrees F.

C. Maintain minimum temperature of 50 degrees F before, during, and after grouting, until grout has set.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I and II.

B. Water:
   1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
      a. Corrosion of steel.
      b. Volume change increasing shrinkage cracking.
      c. Efflorescence.
      d. Excess air entraining.

C. Fine Aggregate:
   1. Washed natural sand.
   2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
   3. Free from injurious amounts of organic impurities as determined by ASTM C40.

D. Mix:
   1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID CURING EPOXY GROUT

A. Manufacturers:
   1. Sika.
   2. L & M Construction Chemicals Inc.
   3. Engineer Approved Equal

B. Rapid Curing Epoxy Grout: High strength, three component epoxy grout formulated with thermosetting resins and inert fillers. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids and alkalies.

Property	Test	Result
Compressive Strength	ASTM C579	12,000 psi at 7 days
Tensile Strength	ASTM C307	2,000 psi minimum
Coefficient of Expansion	ASTM C531	30x10-6 in per degree F
Shrinkage	ASTM C827	None

2.3 NON-SHRINK CEMENTITIOUS GROUT

A. Manufacturers:
   1. Sika.
   2. L & M Construction Chemicals, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Non-shrink Cementitious Grout: Pre-mixed ready for use formulation requiring only addition of water; non-shrink, non-corrosive, non-metallic, non-gas forming, no chlorides.

C. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)
		Final	3 hours (Approx)
Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.4 CURING

A. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or with use of wet burlap method.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 Administrative Requirements: Verification of existing conditions before starting work.

B. Verify areas to receive grout.

3.2 PREPARATION

A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.

B. Rough concrete lightly, but not enough to interfere with placement of grout.

C. Remove foreign materials from metal surfaces in contact with grout.

D. Align, level and maintain final positioning of components to be grouted.

E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.3 INSTALLATION - FORMWORK

A. Construct leakproof forms anchored and shored to withstand grout pressures.

B. Install formwork with clearances to permit proper placement of grout.

3.4 MIXING

A. Portland Cement Grout:
   1. Use proportions of 2 parts sand and 1 part cement, measured by volume.
   2. Prepare grout with water to obtain consistency to permit placing and packing.
   3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.
   4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
   5. Do not add additional water after grout has been mixed.

6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

B. Mix and prepare rapid curing epoxy grout in accordance with manufacturer's instructions.
   1. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

C. Mix and prepare non-shrink cementitious grout in accordance with manufacturer's instructions.
   1. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

D. Mix grout components in proximity to work area and transport mixture quickly and in manner not permitting segregation of materials.

3.5 PLACING GROUT

A. Place grout material quickly and continuously.

B. Do not use pneumatic-pressure or dry-packing methods.

C. Apply grout from one side only to avoid entrapping air.

D. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.

E. Thoroughly compact final installation and eliminate air pockets.

F. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.6 CURING

A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. After grout has attained its initial set, keep damp for minimum of 3 days.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 77 00 – Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

B. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01 40 10 Site Quality Requirements For Exterior Work.

C. Submit proposed mix design of each class of grout to testing firm for review prior to commencement of Work.

D. Tests of grout components may be performed to ensure conformance with specified requirements.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing designated paving and curbs.
2. Removing designated trees, shrubs, and other plant life.
3. Removing abandoned utilities.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittals.

B. Product Data: Submit data for herbicide. Indicate compliance with applicable local, state and federal codes for environmental protection.

C. Utility Protection Plan: Describe methods to be used in order to protect existing and relocated utilities from being damaged during construction. Identify points of potential conflict and indicate measures taken to mitigate potential conflicts. A listing of all applicable requirements from each utility owner shall be included in the Utility Protection Plan.

1.3 QUALITY ASSURANCE

A. Conform to all applicable local, state and federal codes for disposal of debris and use of herbicides.

B. Perform work in accordance with all applicable requirements and standards set forth by each respective utility owner.

C. Perform work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Herbicide: shall be of the type, approved by authority having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Contractor shall be responsible for verifying all existing conditions prior to beginning work. In the event that existing conditions encountered in the field are different from those represented in the plans and specifications, the Contractor shall notify the Owner, Owner's Authorized Representative and Engineer immediately. Contractor shall be responsible for restoring all items damaged or destroyed during construction to a condition equal or better than existing conditions at no additional cost to the owner.

C. Verify site conditions and note subsurface irregularities affecting Work of this section.

D. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

A. Call Local Utility Line Information service (Indiana811) at 811 or 800-382-5544 in accordance with Indiana Code prior to beginning construction.

1. All requests for utility locates shall adhere to Indiana Code. Additional information can be found at www.indiana811.org

3.3 PROTECTION

A. Locate, identify, and protect utilities indicated to remain, from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping.

C. Protect bench marks, survey control points and existing structures from damage or displacement.

3.4 TREE AND SHRUB REMOVAL

A. Clear areas required for access to site and execution of Work.

B. Remove trees and shrubs indicated on drawings. Remove stumps, main root ball and surface rock.

C. Clear undergrowth and deadwood, without disturbing subsoil.

D. Apply herbicide to remaining stumps to inhibit growth.

E. Remove all vegetative material, including root ball, in areas indicated for pavement, trenches, or structural improvements.

3.5 REMOVAL

A. Remove concrete paving, asphalt paving, guardrail and curbs as indicated on Drawings. Neatly saw cut edges at right angle to surface.

1. All concrete pavements, curbing and sidewalk shall be removed to the nearest joint regardless of removal location shown on drawings.

2. Removal of existing concrete paving, asphalt paving and curbs shall include the removal of aggregate base material when encountered.

B. Remove abandoned utilities or fill with non-excavatable flowable fill. Indicated removal termination point for underground utilities on Record Documents.

C. In utility trenches, remove all abandoned subgrade improvements to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter. See Section 31 23 17 Site Trenching.

D. Under pavement areas, remove all abandoned subgrade improvements to 12 inches below subbase elevation of pavement section. See Section 32 11 23 Site Aggregate Base Courses.

E. Remove excavated materials from site.

F. Continuously clean-up and remove waste materials from site. Do not allow waste materials or construction materials to unnecessarily accumulate on site.

G. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 312317 – SITE TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavating trenches for utilities from 5 feet outside building to utility service point.
   2. Compacted fill from top of initial backfill to subgrade elevations
   3. Compacted fill within trenches of removed utilities
   4. Backfilling and compaction.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
   3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

A. See General Conditions and Supplemental Conditions for additional requirements for submittals.

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

C. Utility Protection Plan: Describe methods to be used in order to protect existing and relocated utilities from being damaged during construction. Identify points of potential conflict and indicate measures taken to mitigate potential conflicts. A listing of all applicable requirements from each utility owner shall be included in the Utility Protection Plan.

D. Samples: Upon request of Engineer, Owner or Owner's Authorized representative, Contractor shall submit, in air-tight containers, 10 lb sample of requested product to testing laboratory.

E. Materials Source: Submit name of imported fill materials suppliers.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

G. Products: Submit data for aggregate materials.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.6 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Indiana.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Granular Soil Fill: Granular Soil Fill as specified in Section 32 05 13.

B. Structural Fill: Coarse Aggregate Type A3 as specified in Section 32 05 16.

C. Flowable Fill: Excavatable flowable fill as specified under Section 31 23 24

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Establish lines and grades as indicated on Plans.
   1. Architect/Engineer or Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service (Indiana811) at 811 or 800-382-5544 in accordance with Indiana Code prior to beginning construction.
   1. All requests for utility locates shall adhere to Indiana Code. Additional information can be found at www.indiana811.org

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way in accordance with Section 01 50 10 Maintenance of Traffic. Relocate temporary traffic controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume. Remove larger material as specified in Section 31 23 18.

C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements as described in the approved Utility Protection Plan.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches to width indicated on Plans. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches to width indicated on Plans.

G. Excavate trenches to depth indicated on Plans. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation as indicated on Plans. When side walls cannot be sloped, provide sheeting and shoring to protect excavation in accordance with approved Excavation Protection Plan.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Architect/Engineer until suitable material is encountered.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill (as defined by this section) and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation and remove loose matter.

M. Correct areas over excavated areas as specified in Section 31 23 23 Site Fill or as directed by Architect/ Engineer.

N. Remove excavated material from site and dispose of in an approved landfill.

O. Repair or replace items indicated to remain damaged by excavation.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil as indicated on Plans.

B. Design sheeting and shoring to be removed at completion of excavation work.

C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

D. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact in accordance with schedule at end of this section.

D. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, and wall backfill.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave any trench open at end of working day.

G. Protect open trench with fencing or other measures as directed by Owner, Owner's Authorized Representative or Engineer in order to prevent danger to Owner, Contractor's forces and the public.

3.6 TOLERANCES

A. Section 01 40 10 Site Quality Requirements For Exterior Work: Tolerances.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 inch from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:
   1. Density Tests: ASTM D1556
   2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

E. Frequency of Tests. Complete tests for every for each run of pipe or as otherwise directed by the Owner, Owner's Authorized Representative, Architect or Engineer. Owner, Owner's Authorized Representative, Architect or Engineer reserve the right to request additional testing without notice at no additional cost to the Owner.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 Execution And Closeout Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

A. Trenching Backfill
   1. Complete final backfill with fill type as indicated on Plans.
   2. Compact uniformly to minimum percent of maximum dry density as indicated on plans.
   3. Fill shall be placed in 6 inch maximum lifts

END OF SECTION

SECTION 31 23 18 - SITE ROCK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing identified and discovered rock during excavation.
2. Expansive tools to assist rock removal.

1.2 DEFINITIONS

A. Rock: Solid mineral material with volume in excess of 1/3 cu yd or solid material that cannot be removed with 3/4 cu yd capacity excavator without drilling.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals.

B. Shop Drawings: Indicate intended rock removal method.

C. Survey Report: Submit survey report on conditions of buildings near locations of rock removal.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.6 SCHEDULING

A. Section 01 30 00 - Administrative Requirements.

B. Schedule Work to avoid disruption to occupied buildings nearby.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor shall be responsible for verifying all existing conditions prior to beginning work. In the event that existing conditions encountered in the field are different from those represented in the plans and specifications, the Contractor shall notify the Owner, Owner's Authorized Representative and Engineer immediately. Contractor shall be responsible for restoring all items damaged or destroyed during construction to a condition equal or better than existing conditions at no additional cost to the owner.

B. Verify site conditions and note subsurface irregularities affecting Work of this section.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.3 ROCK REMOVAL BY MECHANICAL METHOD

A. Excavate and remove rock by mechanical method.

B. Drill holes and use expansive tools or wedges to fracture rock.

C. Cut away rock at bottom of excavation to form level bearing.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove excavated materials from site.

F. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 31 23 23 or as directed by Architect/Engineer.

G. Under no circumstances shall blasting be used to excavate rock.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements.

END OF SECTION

SECTION 31 23 19 - SITE DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. System operation and maintenance.
4. Water disposal.

1.2 REFERENCES

A. ASTM International:

1. ASTM C33 - Standard Specification for Concrete Aggregates.

1.3 DEFINITIONS

A. Dewatering includes the following:

1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.

2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations and trenches.

3. Disposing of removed water.

B. Surface Water Control: Removal of surface water within open excavations.

1.4 SYSTEM DESCRIPTION

A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.

1.5 PERFORMANCE REQUIREMENTS

A. Design dewatering systems to:

1. Lower water table within areas of excavation to elevation to permit Work to be completed on dry and stable subgrade.

2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.

3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.

4. Prevent loss of fines, quick condition, or softening of foundation subgrade.

5. Maintain stability of sides and bottoms of excavations.

B. Design surface water control systems to collect and remove surface water and seepage entering excavation.

1.6 SUBMITTALS

A. Submit all shop drawings as instructed by Owner, Owner's Authorized Representative or Engineer.

B. Section 01 33 00 - Submittals.

C. Shop Drawings: Signed and sealed by professional engineer.

1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.

2. Indicate primary and standby power system location and capacity.

3. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.

4. Include description of emergency procedures to follow when problems arise.

1.7 CLOSEOUT SUBMITTALS

A. Section 01 70 00 Execution And Closeout Requirements.

B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.8 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction for the following:

1. Drilling and abandoning of wells used for dewatering systems.

2. Water discharge and disposal from pumping operations.

B. Perform Work in accordance with Indiana Department of Environmental Management (IDEM) and Indiana Department of Natural Resources (IDNR) standards.

C. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.9 COORDINATION

A. Coordinate work to permit the following construction operations to be completed on dry stable substrate.

1. Excavation, as specified in Section 31 23 16.

2. Trenching and Backfill, as specified in Section 31 23 17.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

B. See Section 31 25 13 - Site Erosion Controls for additional information.

2.2 ACCESSORIES

A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.

B. Filter Sand: ASTM C33; natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded to suit well screen.

C. Grout: Mixture of portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor shall be responsible for verifying all existing conditions prior to beginning work. In the event that existing conditions encountered in the field are different from those represented in the plans and specifications, the Contractor shall notify the

Owner, Owner's Authorized Representative and Engineer immediately. Contractor shall be responsible for restoring all items damaged or destroyed during construction to a condition equal or better than existing conditions at no additional cost to the owner.

B. Call Local Utility Line Information service (Indiana811) at 811 or 800-382-5544 in accordance with Indiana Code prior to beginning construction.

1. All requests for utility locates shall adhere to Indiana Code. Additional information can be found at www.indiana811.org

3.2 PREPARATION

A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 DEWATERING SYSTEM

A. Install dewatering system in accordance with shop drawings.

B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.

3.4 SURFACE WATER CONTROL SYSTEM

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as required.

1. Contractor shall ensure all temporary ditches, berms or other devices constructed to divert and drain surface water from excavations include all necessary temporary erosion control measures.

2. Contractor shall consult local officials to determine which, if any, temporary erosion control measures are required.

B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels or storm drains in accordance with requirements of agencies having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

A. Provide continuous supervision of dewatering system when operating by personnel skilled in operation, maintenance, and replacement of system components.

B. Conduct daily observation of dewatering system. Make required repairs and perform scheduled maintenance.

C. Fill fuel tanks before tanks reach 25 percent capacity.

D. Start emergency generators at least twice each week to check operating condition.

E. When dewatering system cannot control water within excavation, notify Engineer and stop excavation work.

1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.

2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

F. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

G. Correct unanticipated pressure conditions affecting dewatering system performance.

3.6 WATER DISPOSAL

A. Discharge water into existing storm sewer system in location as coordinated with the Owner, Owner’s Authorized Representative or Engineer.

3.7 SYSTEM REMOVAL

A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

B. Fill abandoned wells with non-excavatable flowable fill.

C. Fill abandoned piping with non-excavatable flowable fill.

D. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

3.8 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements.

B. Survey existing adjacent buildings, structures, and improvements weekly to detect movement in comparison to original elevations during dewatering operations.

1. Notify Engineer immediately of measured movement.

END OF SECTION

SECTION 31 23 23 - SITE FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fill under lawn and landscaping sections.
2. Fill under paving sections.
3. Fill for over-excavation.
4. Fill underneath retaining walls.
5. Fill underneath building slabs.

B. Section does not Include:

1. Fill underneath building foundations
2. Backfill within trenches
3. Topsoil or other amended fills for landscaping / planting purposes

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 – Submittals.

B. See specification sections 32 05 13 Site Soils For Fill and 32 05 16 Site Aggregates For Backfill for material submittal requirements.

C. Proof rolling: Submit documentation stating dates, times and weather conditions of proof rolling operations. Documentation shall state equipment used and locations of all encountered soft spots and measures used to mitigate soft spots.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

B. Contractor shall provide all necessary compaction equipment and other grading equipment that may be required to obtain the specified compaction. Compaction by travel of grading equipment will not be considered adequate for uniform compaction. Hand guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, and columns or in confined areas.

C. Field density tests for determining the compaction of the fill shall be performed by a qualified testing laboratory in accordance with standard recognized procedures for making such tests.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Granular Soil Fill: Granular Soil Fill as specified in Section 32 05 13 Site Soils For Fill.

B. Structural Fill: Coarse Aggregate Type A3 as specified in Section 32 05 16 Site Aggregates For Backfill.

C. Drainage Subbase: Coarse Aggregate Type A4 as specified in Section 32 05 16 Site Aggregates For Backfill.

D. Drainage Backfill: Coarse Aggregate Type A2 as specified in Section 32 05 16 Site Aggregates For Backfill.

E. Flowable Fill: Excavatable Flowable Fill as specified under Section 31 23 24 Site Flowable Fill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements.

B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

D. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent fill materials.

B. Cut out soft areas of subgrade not capable of compaction in place. Use structural fill to re-establish grades and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify subgrade surface to depth of 6 inches.

D. Proof roll with heavy rubber tired vehicle to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

1. Geotechnical Engineer shall be present during all subgrade proofrolling operations.

2. Mitigation of areas failing proof roll shall be in accordance with Geotechnical Engineer’s instructions.

3.3 FILLING AND BACKFILLING

A. Fill areas to contours and elevations with unfrozen materials.

B. Systematically place fill to allow maximum time for natural settlement. Do not place fill over porous, wet, frozen or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact in accordance with schedule at end of this section

D. Employ placement method that does not disturb or damage other work.

E. Moisture shall be added or material shall be dried as required to permit proper compaction. Moisture content at compaction shall be within 2% of optimum moisture content unless otherwise approved, in writing, by a Geotechnical Engineer.

F. Backfill against supported foundation walls in accordance with written instructions from a licensed Structural Engineer. Do not backfill against unsupported foundation walls.

G. Backfill simultaneously on each side of unsupported foundation walls in accordance with written instructions from a licensed Structural Engineer.

H. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

I. Make gradual grade changes. Blend slope into level areas.

J. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.4 TOLERANCES

A. Section 01 40 10 Site Quality Requirements For Exterior Work.

B. Top Surface of Backfilling Under Paved Areas, Building Slabs or Retaining Walls: Plus or minus 1/2 inch from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements.

B. Perform laboratory material tests to determine maximum dry density in accordance with ASTM D 1557.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556.

2. Moisture Tests: ASTM D3017.

D. Frequency of tests shall be as indicated in schedule below.

E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.6 PROTECTION OF FINISHED WORK

A. 01 70 00 Execution And Closeout Requirements.

B. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

A. Fill Under Landscaped Areas and over 5 feet from Paved Areas and Sidewalks

1. Granular Soil fill to elevations indicated on plans, compact uniformly to 93 percent of maximum dry density as determined ASTM D 1557.

2. Coordinate fill lines and grades of fill with planting soil requirements specified in other sections.

3. Fill shall be placed in 8 inch maximum lifts.

B. Fill Under or within 5 feet of Paved Areas and Sidewalks

1. Granular Soil fill to elevations indicated on plans, compact uniformly to 95 percent of maximum dry density as determined ASTM D 1557.

2. Fill shall be placed in 6 inch maximum lifts.

C. Fill to Correct Over-excavation:

1. Granular soil fill or structural fill depending on fill material above, flush to required elevation, compact uniformly to density requirements for subsequent backfill materials.

a. Over-excavation in trenches shall be backfilled utilizing structural fill.

2. Fill shall be placed in 6 inch maximum lifts.

D. Fill Over Drainage or Sanitary Piping initial backfill (not in a trench condition) and under or within 5 feet of Paved Areas and Sidewalks

1. Granular soil fill to bottom of paving section or to elevations indicated on plans, compact uniformly to 95 percent of maximum dry density as determined ASTM D 1557.

2. Fill shall be placed in 6 inch maximum lifts.

3. Fill for trench conditions shall be as shown on plans and in accordance with Section 312317 Site Trenching.

E. Fill Over Drainage or Sanitary Piping initial backfill (not in a trench condition)and over 5 feet from Asphalt or Concrete Paving:

1. Granular soil fill to bottom of paving section or to elevations indicated on plans, compact uniformly to 93 percent of maximum dry density as determined ASTM D 1557.

2. Fill shall be placed in 8 inch maximum lifts.

3. Fill for trench conditions shall be as shown on plans and in accordance with Section 312317 Site Trenching.

END OF SECTION

SECTION 312324 – SITE FLOWABLE FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Flowable fill for:
      a. Structure backfill.
      b. Utility bedding.
      c. Utility backfill.
      d. Filling abandoned utilities.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C33 - Standard Specification for Concrete Aggregates.
   2. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
   3. ASTM C150 - Standard Specification for Portland Cement.
   4. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
   5. ASTM C403/C403M - Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
   6. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
   7. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
   8. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
   9. ASTM C1040 - Standard Test Methods for Density of Unhardened and Hardened Concrete In Place By Nuclear Methods.
   10. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, manhole, tank or cable.

B. Excavatable Flowable Fill: Lean cement concrete fill used where future excavation may be required such as fill for utility trenches, bridge abutments, and culverts.

C. Non-Excavatable Flowable Fill: Lean cement concrete fill used where future excavation is not anticipated such as fill below structure foundations and filling abandoned utilities.

1.4 SUBMITTALS

A. Submit all shop drawings as instructed by Owner, Owner’s Authorized Representative or Engineer.

B. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

C. Materials Source: Submit name of flowable fill materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

E. Mix Design:
   1. Submit flowable fill mix design for each specified strength. Submit separate mix designs when admixtures are require for the following:
      a. Flowable fill work during hot and cold weather.
      b. Air entrained flowable fill work.
   2. Identify design mix ingredients, proportions, properties, admixtures, and tests.
   3. Submit test results to certify flowable fill mix design properties meet or exceed specified requirements.

F. Delivery Tickets:
   1. Submit duplicate delivery tickets indicating actual materials delivered to Project site.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Adhere to Manufacturer’s requirements regarding environmental conditions affecting products on site.

B. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

C. Do not install flowable fill during inclement weather or when ambient temperature is less than 40 degrees F.

1.8 FIELD MEASUREMENTS

A. Verify field measurements before installing flowable fill to establish quantities required to complete the Work.

PART 2 PRODUCTS

2.1 FLOWABLE FILL

A. Furnish materials in accordance with the Indiana Department of Transportation, Standard Specifications, Latest Revision.

B. Flowable Fill type (excavatable or non-excavatable) shall be as indicated on plans.

2.2 MATERIALS

A. Furnish materials in accordance with the Indiana Department of Transportation, Standard Specifications, Latest Revision, unless otherwise directed by this specification.

B. Air Entrainment: ASTM C260.

C. Chemical Admixture: ASTM C494/C494M.

D. Fly Ash: ASTM C618 Class C or F obtained from residue of electric generating plant using ground or powdered coal.

E. Plasticizing: ASTM C1017/C1017M Type I, plasticizing. Type II, plasticizing and retarding.

2.3 MIXES

A. Mix and deliver flowable fill in accordance with ASTM C94/C94M, Option C.

B. Flowable Fill Design Mixes shall ben in accordance with the Indiana Department of Transportation, Standard Specifications, Latest Revision.

C. Provide water content in design mix to produce self-leveling, flowable fill material at time of placement.

D. Design mix air entrainment and unit mass are for laboratory design mix and source quality control only.

2.4 SOURCE QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work: Testing, inspection and analysis requirements.

B. Test properties of flowable fill design mix and certify results for the following:
   1. Design mix proportions by weight of each material.
   2. Aggregate: ASTM C33 for material properties and gradation.
   3. Properties of plastic flowable fill design mix including:
      a. Temperature.
      b. Slump.
      c. Air entrainment.
      d. Wet unit mass.
      e. Yield.
      f. Cement factor.
   4. Properties of hardened flowable fill design mix including:
      a. Compressive strength at 1 day, 7 days, and 28 days. Report compressive strength of each specimen and average specimen compressive strength.
      b. Unit mass for each specimen and average specimen unit mass at time of compressive strength testing.

C. Prepare delivery tickets containing the following information:

1. Project Designation.
2. Date.
3. Time.
4. Class and Quantity of flowable fill.
5. Actual batch proportions.
6. Free moisture content of aggregate.
7. Quantity of water withheld.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 Administrative Requirements: Verification of existing conditions before starting work.

B. Verify trenching specified in Section 31 23 17 Site Trenching is complete.

C. Verify utility installation is complete and tested before placing flowable fill.

D. Verify excavation is dry.

3.2 PREPARATION

A. Support and restrain utilities to prevent movement and flotation during installation of flowable fill.

B. Protect structures and utilities from damage caused by hydraulic pressure of flowable fill before fill hardens.

C. Protect utilities and foundation drains to prevent intrusion of flowable fill.

3.3 INSTALLATION - FILL, BEDDING, AND BACKFILL

A. Place flowable fill by chute, pumping or other methods approved by Architect/Engineer

B. Place flowable fill in lifts to prevent lateral pressures from exceeding structural capacity of structures and utilities.

C. Place flowable fill evenly on both sides of utilities to maintain alignment.

D. Place flowable fill to elevations indicated on Drawings without vibration or other means of compaction.

3.4 INSTALLATION - FILLING ABANDONED UTILITIES

A. Verify pipes and conduits are not clogged and are sufficiently empty to permit gravity installation of flowable fill for entire length indicated to be filled.

B. Seal lower end of pipes and conduits by method to contain flowable fill and to vent trapped air caused by filling operations.

C. Place flowable fill using method to ensure there are no voids.
   1. Fill pipes and conduits from high end.
   2. Fill manholes, tanks, and other structures from grade level access points.

D. After filling pipes and conduits seal both ends.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Upon request by Owner, Owner's Authorized Representative, Contractor shall perform inspection and testing in accordance with ASTM C94/C94M.
   1. Take samples for tests for every 150 cu yd of flowable fill, or fraction thereof, installed each day.
   2. Sample, prepare and test four compressive strength test cylinders in accordance with ASTM D4832. Test one specimen at 3 days, one at 7 days, and two at 28 days.
   3. Measure temperature at point of delivery when samples are prepared.

C. Defective Flowable Fill: Fill failing to meet the following test requirements or fill delivered without the following documentation.
   1. Test Requirements:
      a. Minimum temperature at point of delivery.
      b. Compressive strength requirements for each type of fill.
   2. Documentation: Duplicate delivery tickets.

3.6 CLEANING

A. Section 01 70 00 Execution And Closeout Requirements: Requirements for cleaning.

B. Remove spilled and excess flowable fill from Project site.

C. Restore facilities and site areas damaged or contaminated by flowable fill installation to existing condition before installation.

END OF SECTION

SECTION 31 25 13 - SITE EROSION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. Silt Fence
2. Inlet Protection
3. Temporary Seeding
4. Temporary Mulch
5. Stabilized Construction Entrance
6. Concrete Washout Basin

1.2 SUBMITTALS

A. Section 01 33 00 - Submittals.

B. Product Data: Submit data on all products.

C. Coordination Drawings: Show locations where each type of inlet protection measure, perimeter protection measure and ditch check dam is to be installed.

1.3 CLOSEOUT SUBMITTALS

A. 01 70 00 Execution And Closeout Requirements.

1.4 QUALITY ASSURANCE

A. Accordance with the Indiana Department of Transportation Standard Specifications, Drawings and Special Provisions, Latest Revision and the Indiana Department of Environmental Management, Indiana Storm Water Quality Manual, Latest Edition, unless otherwise directed by these specifications

B. All work shall be in accordance with requirements in Indiana Administrative Code 27 IAC-15-1 and 327 IAC-15-5 “Rule 5 Storm Water Run-off Associated with Construction Activity” and any and all subsequent additions and revisions.

C. Temporary sediment and erosion control may also include work outside the known construction limits such as borrow pit and disposal operations, equipment, and material storage sites, waste areas, and temporary plant sites. Once established, The CONTRACTOR shall incorporate these areas into the Revised Erosion and Sediment Control Plan.

D. Temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective and continuous erosion control throughout the construction period.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Engineer no fewer than seven days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Engineer's written permission.

PART 2 PRODUCTS

2.1 TEMPORARY SILT FENCE, TYPE A

A. Geotextile Fabric is 36-inches wide, may be woven or non-woven, made from polypropylene, polyethylene, or polyamide, and shall contain sufficient UV inhibitors so that it will last for 6 months in outdoor exposure at temperatures between zero and 120 degrees F.

The manufacturer shall have either an approved color mark yarn in the fabric or label the fabricated silt fence with both the manufacturer and fabric name every 100 feet.

Fabric shall have the following properties:

1. Grab tensile strength: 90 lbs, ASTM D4632

2. Elongation at 45lbs: 50% maximum, ASTM D-4632

3. Burst strength: 175psi, ASTM D3786

4. Apparent opening size: #20 sieve size, ASTM D4751

5. Water Flow Rate: 0.00016 GPM (gallons per minute)

6. UV Degradation: 70% at 500 hours, ASTM D 4355

7. Filtration Efficiency: 85%

2.2 TEMPORARY SILT FENCE, TYPE B

A. Geotextile Fabric is 36-inches wide, may be woven or non-woven, made from polypropylene, polyethylene, or polyamide, and shall contain sufficient UV inhibitors so that it will last for 6 months in outdoor exposure at temperatures between zero and 120 degrees F.

The manufacturer shall have either an approved color mark yarn in the fabric or label the fabricated silt fence with both the manufacturer and fabric name every 100 feet.

Fabric shall have the following properties:

1. Grab tensile strength: Warp x Fill = 120 lbs x 100 lbs, ASTM D4632
2. Elongation at 45lbs: 40% maximum, ASTM D-4632
3. Burst strength: 175psi, ASTM D3786
4. Apparent opening size: #30 sieve size, ASTM D4751
5. Water Flow Rate: 25 GPM (gallons per minute)
6. UV Degradation: 80% at 300 hours, ASTM D 4355
7. Filtration Efficiency: 75%

2.3 TEMPORARY SILT FENCE, TYPE C

A. Geotextile Fence is 36-inches wide with wire reinforcement. The wire reinforcement is necessary because this fabric allows almost three times the flow rate as Type B silt fence. Type C silt fence shall be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10 feet. Minimum 2 rows of silt fence within 36 inches apart are required for this sediment control device.

The manufacturer shall have either an approved color mark yarn in the fabric or label the fabricated silt fence with both the manufacturer and fabric name every 100 feet.

Fabric shall have the following properties:

1. Grab tensile strength: Warp x Fill = 260 lbs x 180 lbs, ASTM D4632
2. Elongation at 45lbs: 25% maximum, ASTM D-4632
3. Burst strength: 175psi, ASTM D3786

4. Apparent opening size: #30 sieve size, ASTM D4751

5. Water Flow Rate: 70 GPM (gallons per minute)

6. UV Degradation: 80% at 300 hours, ASTM D 4355

7. Filtration Efficiency: 75%

2.4 FABRIC DROP INLET PROTECTION, TYPE A

A. FlexStorm Catch It Inlet Filters, as manufactured by Inlet & Pipe Protection, Inc., 24137 W. 111th St – Unit, Naperville, IL 60564, Telephone: (866) 287-8655 or ENGINEER approved equal.

Geotextile fabric for inlet protection shall conform to accepted industry standards for pre-fabricated geotextile filter fabric used as inlet protection. The Owner reserves the right to deny use of geotextile filter fabric for inlet protection if it does not conform to accepted industry standards.

2.5 FABRIC INLET PROTECTION, TYPE B

100% coir fiber matting bonded to fiberglass mesh backing.

Fabric shall have the following properties:

1. Apparent opening size: #10 sieve size, ASTM D5141

2. Water Flow Rate: 39 GPM (gallons per minute)

3. Filtration Efficiency: 59%

2.6 GEOTEXTILE CHECK DAM, TYPE A

A. Erosion Eels ™ *FRIENDLY ENVIRONMENT*, 335 Squire Hall Road, Shelbyville, TN 37160, Toll Free: (866)-426-3357 or ENGINEER approved equal, may be used as a project phase storm water control, diversion control, or temporary settlement ponding protection.

Woven, polypropylene geotextile with UV-stabilizers and inert to biological decay and chemically resistant to naturally occurring chemicals, alkalis, and acids. Minimum fabric permeability shall be equal to 0.0008 gallons per minute (GPM) per ASTM D 4491. Minimum strength retained relative to UV exposure shall be 70% when tested per ASTM D 4355 for 500 hours. Size shall be produced with a nominal diameter of

+/-9.5 inches and standard nominal lengths of +/-10 feet (approximately 150lbs per 10 feet).

Mixture Specification 1.0 - A filter mixture comprised of 100% shredded rubber that has been washed and processed to remove most, if not all, metal components. The material shall be derived from recycled tires and shall be shredded to produce a maximum particle size of +/- 3/4- inch.

2.7 GEOTEXTILE CHECK DAM, TYPE B

A. Filtrexx Sediment Control ™ *FILTREXX INTERNATIONAL*, 61 N Cleveland Massillon Rd, Suite E, Akron, Ohio 44333 Toll Free: 877-542-7699 or ENGINEER approved equal, may be used as a project phase storm water control, diversion control, or temporary settlement ponding protection.

Filtrexx Sediment Control use only Multi-Filament Polypropylene SafetySoxx™ netting materials available from Filtrexx® International, LLC and are the only mesh materials accepted in creating Sediment control for any purpose. Photodegradable with a functional longevity of 2 to 5 years

Minimum fabric permeability shall be equal to or greater than 5 gallons per minute per foot. Minimum strength retained relative to UV exposure shall be 100% when tested per ASTM G-155 for 1000 hours.

Size shall be produced with a nominal diameter of +/-12 inches and standard nominal lengths of +/-25 feet (approximately 32 lbs per foot). Maximum continuous length is unlimited, therefore longer lengths may be ordered.

Filtrexx Sediment Control use only Certified Filtrexx® Filter Media™ which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from storm water runoff. Performance parameters to include hydraulic flow through rate (≥5gpm/ft), total solids removal efficiency, total suspended solids removal efficiency (≥78%), turbidity reduction (≥63%).

2.8 DEWATERING SEDIMENT FILTER BAGS

A. Tencate GeoTube GT 500, TenCate, 365 South Holland Drive, Pendergrass, Georgia 30567, Phone # 706-693-2226 or ENGINEER approved equal.

Fabric shall have the following properties:

1. Grab tensile strength: 200lbs, ASTM D4632

2. Elongation at 45lbs: 50% maximum ASTM4632

3. Puncture strength: 2000 lbs, ASTM D6241

4. Apparent opening size: #80 sieve size, ASTM D4751

5. Water Flow Rate: 20 GPM (gallons per minute) ASTM D4491

6. UV Degradation: 70% at 500 hours, ASTM D 4355

Woven, polypropylene geotextile with UV-stabilizers and inert to biological decay and chemically resistant to naturally occurring chemicals, alkalis, and acids.

2.9 GEOTEXTILES UNDER STABLE CONSTRUCTION ENTRANCES

A. Geotextiles under stable construction entrances shall meet the physical properties per INDOT Section 918.02, Geotextile for Use Under Rip Rap. Geotextiles to be used will be selected from the INDOT approved Geotextiles for Use Under Rip Rap.

2.10 SILT FENCE POSTS & STAKES

A. Type ‘A’ and Type ‘B’ Silt Fence posts shall be made from oak or approved hardwood, at least 1-1/4-inch by 1- 3/4-inch and minimum 48-inches long; or steel 1-1/2-inch, 1.33 lbs per foot, T-shaped with hot-dip galvanized protective coating, and minimum 48-inches long.

B. Type ‘C’ Silt Fence posts shall be steel 1-1/2-inch, 1.33 lbs per foot, T-shaped with hot-dip galvanized protective coating, and minimum 48-inches long.

C. Erosion Eels & Filtrexx Sediment Control logs stakes made from oak or approved hardwood, at least 2-inch by 2-inch and minimum 36-inches long.

D. Steel t-post Cap with safety yellow T-Post Safety Top, Dare Product, Inc., 860 Betterly Road, Springfield, MI 46037 Phone: (269) 965-2307 or Engineer approved equal.

E. Manufactured Surface Protection Products, RECP Staples shall be made from No. 11 gage (3 mm) or heavier wire, 1 or 2 in. wide at the throat and 8 in. from top to bottom after bending. The staples shall be packaged in cartons.

2.11 REINFORCEMENT FENCING

A. Woven wire fabric fencing shall be galvanized, mesh spacing of six-inches, maximum 14 gauge, and a minimum 30-inches tall.

2.12 FASTENERS

A. Type ‘A’ & ‘B’ Silt Fence: Fasteners to wood posts shall be steel staples, at least 1 1/2-inch long.

B. Type ‘C’ Silt Fence: Fasteners to steel posts shall be galvanized steel clips.

C. Erosion Control Blanket: Staples shall be steel 9 gauge wire U-shaped staples at least 8-inch in length for non-cohesive soils.

D. Zip Ties (Utility): Fasteners of Coir Mat to storm inlet grates.

2.13 MANUAFACTURED SURFACE PROTECTION PRODUCTS, ROLLED EROSION CONTROL PRODUCTS (RECP)

A. Erosion control blankets: Shall be in accordance with applicable section so the Indiana Department of Transportation Standard Specifications, Latest Revision.

2.14 TEMPORARY SEED MIXTURE, TYPE T

A. Temporary Seeding: Shall be in accordance with Section 205.04 of the Indiana Department of Transportation Standard Specifications, Latest Revision and with the Indiana Department of Environmental Management, Indiana Storm Water Quality Manual, Latest Edition.

Seed mixture T shall be used for surface stabilization and temporary ground cover. The mix shall be ROLLED EROSION CONTROL PRODUCTS, RECP where the slopes are steeper than 3:1.

No surface application of fertilizer shall be applied on the project site for the duration of construction.

2.15 TEMPORARY MULCH

A. Temporary Mulching: Shall be in accordance with Section 205.04 of the Indiana Department of Transportation Standard Specifications, Latest Revision and with the Indiana Department of Environmental Management, Indiana Storm Water Quality Manual, Latest Edition.

2.16 CONCRETE WASHOUT BASIN

A. Shall be in accordance with applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision and with the Indiana Department of Environmental Management, Indiana Storm Water Quality Manual, Latest Edition.

B. Small amounts of excess or residual concrete (not washout water) may be disposed of in areas that will not result in flow to an area that is to be protected.

C. Locate concrete washout systems at least 50 feet from any creeks, wetlands, ditches karst features, or storm drains/man made conveyance systems.

D. The structure or system shall be designed to contain the anticipated washout water associated with construction activities.

E. A system designed and built above grade shall be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled clean out periods. The size of the containment system may be limited by the size of polyethylene available. The polyethylene lining shall be of adequate size to extend over the berm or containment system.

F. Polyethylene sheeting shall be a minimum of ten mills that is free of holes, tears, and other defects. The sheeting selected shall be of an appropriate size to fit the washout system without seams or overlap of the lining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements.

B. Verify gradients and elevations of base or foundation for other work are correct.

C. Verify length of measure and quantities of sediment & erosion control measures are correct before ordering materials.

D. Conduct Inspect of sediment and erosion control devices once every seven (7) days and within 24 hours after each 1/2 inch storm rainfall event.

3.2 DELIVERY, STORAGE, AND HANDLING

A. During shipment and storage, wrap the geotextile fabric in a heavy-duty covering that will protect the cloth from sunlight, mud, dust, dirt, and debris. Do not expose the geotextile fabric to temperatures greater than 140 °F (60 °C). When installed, the Contractor/Engineer/Owner will reject the fabric if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage.

3.3 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.

B. Install concrete washout basin into the Project before concrete activities begin.

C. Sediment and erosion control measures may be adjusted to meet field conditions. If adjustments in the field are necessary, the Contractor shall submit the nature of the adjustments, and locations of the adjustments to the Engineer/Owner, in writing.

D. Before any earth moving activities commence, all perimeter protection measures, inlet protection measures and stabilized construction entrances shall be installed.

E. When there are established lawns in the work area, the turf shall be covered and/or protected or replaced after construction operations. Identify existing trees, shrubs, plant beds, and landscape features that are to be preserved on site by appropriate tags and protect in accordance with the details shown on the drawings.

F. All mud/dirt and other construction debris tracked on existing city/state/county roads from this site, due to construction, shall be promptly removed by the Contractor at minimum of twice daily.

G. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 14 days in accordance with all applicable portions of the Indiana Department of Transportation Standard Specifications, Latest Revision.

H. Perform work in accordance with the Indiana Department of Environmental Management, Indiana Storm Water Quality Manual, Latest Edition, unless otherwise directed by these specifications.

I. Manufactured Surface Protection Products, RECP shall be utilized in locations where grass stabilization has been directed as Post Construction Stabilization and in temporary locations where the slopes are 3:1 or steeper.

3.4 INSTALLATION OF EROSION CONTROL MEASURES

A. All erosion control measures shall be installed in accordance with applicable portions of Sections 205 and 621 of the Indiana Department of Transportation Standard Specification, Latest Revision.

B. All erosion control measures shall be installed in accordance with Manufacturer’s recommendations, specifications and installation guidance manuals.

C. Legible copies of all necessary current manufacturers’ installation manuals shall be provided prior to installation. Required warning systems shall be in accordance with applicable local and federal laws and regulations.

3.5 PLACEMENT - DEWATERING SEDIMENT FILTER BAGS

A. The dewatering sediment filter bags will be impossible to move when full. CONTRACTOR shall provide a plan for the placement of dewatering sediment filter bags before using this method. Do not place this sediment control device within 50 feet of Top of Bank of a stream or storm sewer system.

B. All dewatering sediment filter bags shall be located within project limits and behind installed Check Dams, Diversion Dams, Silt Fence barriers, and turbidity curtain. Do not allow water discharging from dewatering sediment filter bags to develop a concentrated flow or to cause sheet flow erosion. Additional Geotextile Check Dams, Type A or B shall be required to pond the discharge water and reduce sheet flow erosion.

3.6 FIELD QUALITY CONTROL

The accepted quantities of Temporary Erosion & Sediment Control items will be paid for per INDOT Pay Items Section 205.04 of the Indiana Department of Transportation Standard Specification, Latest Revision unless otherwise described below.

All work shall be in accordance with requirements in Indiana Administrative Code 27 IAC-15-1 and 327 IAC-15-5 “Rule 5 Storm Water Run-off Associated with Construction Activity” and any and all subsequent additions and revisions.

CONTRACTOR shall develop a Self-Monitoring Program plan and procedures for inspections, evaluating, and reporting of all Temporary Erosion & Sediment Control Measures installed on the project and monitor construction site activities for evidence of active erosion.

"Trained individual" means an individual who is trained and experienced in the principles of storm water quality, including erosion and sediment control as may be demonstrated by state registration, professional certification, experience, or completion of coursework that enable the individual to make judgments regarding storm water control or treatment and monitoring as defined in 327 IAC 15-5-4 Definitions.

The Self-Monitoring Program that includes the following shall be implemented:

A. A trained individual shall perform a written evaluation of the project site once every seven (7) days and within 24 hours after each 1/2” storm rainfall event.

B. The evaluation must address the maintenance of Temporary Erosion & Sediment Control Measures to ensure they are functioning properly and identify additional measures necessary to remain in compliance with all applicable statutes and rules.

C. Provide Inspection report

Inspections shall be documented and records shall be maintained by the CONTRACTOR until the project is complete. The sediment and erosion control devices shall be returned to working conditions within 48 hours after inspection. The CONTRACTOR shall inspect, rebuild, and/or repair damaged sediment and erosion control devices. Follow Manufacturer's recommendations for any inspection and repair recommendations.

Inspection report shall include:

1. Name of Project Manager/Inspector
2. Date and Time of Inspection
3. Locations of sediment and erosion control devices
4. Check all geotextiles for rips, holes, flaws, deterioration, or damage
5. Check all posts and fasteners for failure
6. Undermined sediment and erosion control barrier
7. Distance of sediment past the barrier
8. Depth of sediment in front of the barrier
9. Note plan of required action for repair, replacement, cleaning, and removal
10. Note dates for plan of required actions
11. Statements & Dates of completed required actions

All inspection reports for the project site must be made available to the inspecting authority within forty-eight (48) hours of a request. Inspection reports shall be maintained by CONTRACTOR until the end of the project. The CONTRACTOR at that time will then hand over the inspection reports to the OWNER.

3.7 CONTRACTOR WARRANTY AND MAINTENANCE

A. Maintain the sediment and erosion control measures until the Project is accepted or until an approved 327 IAC-15-5 (Rule 5) Notice of Termination (NOT). Also, remove and dispose of the silt accumulations at the sediment and erosion control measures at an Engineer approved disposal site/facility.

B. Remove and replace any deteriorated geotextile fabrics that reduces the effectiveness of the sediment and erosion control measures.

C. Repair or replace any undermined sediment and erosion control measures at no additional cost to the Owner.

3.8 CLEANING

A. When sediment accumulation in sedimentation structures has reached a point one-quarter depth of sediment structure or device, unless otherwise directed on the plans or instructed by regulatory agencies, remove and dispose of sediment at an Engineer approved disposal site/facility.

B. Replace the Dewatering Sediment Filter Bag when 1/2 full of sediment or when the pump discharge has reduced to an impractical rate.

C. Geotextile Check Dams shall be inspected to ensure that it is holding its shape and allowing adequate flow. Eroded and damaged areas shall be repaired.

D. Coir Mat Inlet Filters and surrounding areas shall be inspected following each rain event. Inlet Filter will collect a lot of sediment. Sweep top and sides of Inlet Filter to remove sediment and debris. Do not damage sediment and erosion control measures during cleaning operations. Replace Coir Mat if damaged to ensure inlet protection and adequate flowrate.

E. Type A, B, and C Silt Fence shall be inspected daily and following each rain event. Sediment is to be removed once it has accumulated to 1/3 design depth (4 inches). The CONTRACTOR shall replace all sections of fence if the ponded water does not drain within 72 hours following a stormwater runoff event.

F. Do not permit sediment to erode from construction or site areas into the onsite stream.

G. Deposition and Removal of sediment from Waters of the United States has not been authorized/ permitted to date. Additional authorization and/or Federal, State, and Local permits shall be gained by Contractor at no additional cost to owner prior to proceeding.

3.9 QUALITY ADJUSTMENTS

A. Maintenance deficiencies will be handled in accordance with Section 205.08 of the Indiana Department of Transportation Standard Specification, Latest Revision.

3.10 ENFORCEMENT

A. All work shall be in accordance with requirements in Indiana Administrative Code 27 IAC-15-5-10 and any and all subsequent additions and revisions.

B. All persons engaging in construction activities on this project site shall be responsible for complying with the Temporary Erosion & Sediment Control plan and the provisions of 327 IAC-15-5 (Rule 5).

C. FEDERAL, STATE, OR LOCAL AGENCY, the OWNER, shall investigate potential violations of this rule to determine which person may be responsible for the violation. The department shall, if appropriate, consider public records of ownership, building permits issued by local units of government, and other relevant information, which may include site inspections, storm water pollution prevention plans, notices of intent, and other information related to the specific facts and circumstances of the potential violation. Any person causing or contributing to a violation of any provisions of 327 IAC-15-5 (Rule 5) shall be subject to enforcement and penalty.

D. If remaining storm water quality measures are not properly maintained by the CONTRACTOR, the FEDERAL, STATE, OR LOCAL AGENCY, the OWNER, may pursue enforcement against that person for correction of deficiencies.

3.11 REMOVAL OF SEDIMENT AND EROSION CONTROL MEASURES

A. Keep the sediment and erosion control measures in place until construction and all land-disturbing activities have been completed and the area has been stabilized, as directed by the Engineer/Owner, Project is accepted, and/or until approved 327 IAC-15-5 (Rule 5) Notice of Termination (NOT).

B. The dewatering sediment filter bag will be impossible to move once full. CONTRACTOR shall have disposal plan of action for the sediment and bag in place that describes actions, procedures, control techniques, management practices and equipment available to prevent illegal discharge of pollutants into waterways before using this method.

C. Remove all temporary erosion and sediment control measures in a manner that minimizes land disturbance. Areas left void of protective cover due to the removal of a measure shall be permanently stabilized immediately.

D. All parts of the sediment and erosion control measures and silt accumulations shall be removed in accordance with applicable portions of Section 202 and 205 of the Indiana Department of Transportation Standard Specification, Latest Revision.

3.12 QUALITY ACCEPTANCE

A. Approved geotextile fabrics are listed above in MATERIALS FOR SEDIMENT AND EROSION CONTROL. Approved fabrics must consistently exceed the minimum requirements of this Specification with applicable portions of Sections 205 and 621 of the Indiana Department of Transportation Standard Specification, Latest Revision.

B. Remove geotextile fabric that fails to meet the minimum requirements of this specification.

C. At the time of installation, the Contractor/Engineer/ Owner will reject the fabric if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage.

END OF SECTION

SECTION 320513- SITE SOILS FOR FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Granular soil materials for fill

B. Section does not Include:
1. Topsoil or other amended soils for landscaping / planting purposes.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3. (2,700 kN-m/m3)).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 SUBMITTALS

A. See General Conditions and Supplemental Conditions for additional requirements for submittals.

B. Samples: Fifty (50) pound representative samples of proposed soil fill materials shall be submitted to an independent laboratory for particle size analysis / Atterberg limits testing and optimum moisture / maximum density determinations prior to the start of any filling operations. Only upon completion of tests by an independent testing laboratory and written approval by a Geotechnical Engineer may soils be brought on-site for use.

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Furnish soil material from single source throughout the Work.

B. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

C. Products specified in this section shall not be used under building slabs, retaining walls or foundations unless placement and compaction is supervised by a licensed Geotechnical Engineer.

PART 2 PRODUCTS

2.1 SOIL FILL MATERIALS

A. Granular Soil Fill: Granular soil meeting the Unified Soil Classification System (USCS) designation SP, SP-SM, SW or SW-SM.
   1. Materials shall contain no vegetation, ash, wood, frozen material, organic soils or any material which by decay or otherwise might cause settlement.
   2. Materials shall be free from rock, stone or broken concrete larger than 4 inches in the largest dimension.

2.2 SOURCE QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work: Testing and Inspection Services Testing and analysis of soil material.

B. When tests indicate materials do not meet specified requirements, change material and retest.

C. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

A. All excavated materials shall be removed from the site and disposed of in an approved landfill. No excavated materials may be re-used on-site.

3.2 STOCKPILING

A. Stockpile materials on site at locations designated by Architect/Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 8 feet high maximum.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

G. Cover Stockpiles with impervious material cover to prevent saturation from rain events and from freezing during calendar months were freezing temperatures can be expected.

H. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

I. Protection of existing and proposed drainage areas from sediment shall remain in full effect during stockpile phase of work. See Section 31 25 13 Site Erosion Controls for additional information.

3.3 STOCKPILE CLEANUP

A. Remove stockpiles as work progresses. Upon completion of Work, leave areas in clean and neat condition. Grade site surface to prevent free standing surface water.

B. Tracked soils and sedimentation within adjacent storm structures, sewers, and paved surface areas caused from stockpiled materials or erosion from jobsite areas will be cleaned immediately by Contractor with no additional expense to the Owner.

END OF SECTION

SECTION 32 05 16 - SITE AGGREGATES FOR BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coarse aggregate materials for utility trench backfill
2. Coarse aggregate material for pavement base and subbase
3. Coarse aggregate material for fill

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.

2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

2. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

3. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

5. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

6. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 SUBMITTALS

A. See General Conditions and Supplemental Conditions for additional requirements for submittals.

B. Samples: Upon request of Engineer, Owner or Owner's Authorized representative, Contractor shall submit, in air-tight containers, 10 lb sample of requested product to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

E. Products: Submit data for aggregate materials.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. All aggregates shall be obtained from an Aggregate Producer certified by the Indiana Department of Transportation.

C. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

D. Products specified in this section shall not be used under building slabs, retaining walls or foundations unless placement and compaction is supervised by a licensed Geotechnical Engineer.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1 (No. 8's): Coarse Aggregate, No. 8 conforming to Indiana Department of Transportation Standard Specifications, Latest Revision.

B. Coarse Aggregate Type A2 (No. 11's): Coarse Aggregate, No. 11, conforming to Indiana Department of Transportation Standard Specifications, Latest Revision.

C. Coarse Aggregate Type A3 (No. 53's): Coarse Aggregate, No. 53, conforming to Indiana Department of Transportation Standard Specifications, Latest Revision.

D. Coarse Aggregate Type A4 (No. 2's): Coarse Aggregate, No. 2, conforming to Indiana Department of Transportation Standard Specifications, Latest Revision.

2.2 SOURCE QUALITY CONTROL

A. See 01 40 10 Site Quality Requirements For Exterior Work.

B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698.

C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D698.

D. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavated aggregates may not be re-used on-site.

3.2 PLACEMENT OF AGGREGATES

A. Place coarse aggregates in accordance with applicable specification sections.

3.3 STOCKPILING

A. Stockpile materials on site at locations designated by Architect/Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.4 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 32 11 23 - SITE AGGREGATE SUBBASE AND BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aggregate subbase.
2. Aggregate base course.
3. Geotextiles
4. Geogrid

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1.	AASHTO M288	-	Standard Specification for Geotextile Specification for Highway Applications.

B. ASTM International:

1.	ASTM D1556	-	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
2.	ASTM D2167	-	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
3.	ASTM D2922	-	Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4.	ASTM D2940	-	Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
5.	ASTM D3017	-	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals.

B. Product Data:

1. Submit data for geogrid and geotextile fabrics

C. Samples: Upon request of Engineer, Owner or Owner's Authorized representative, Contractor shall submit, in air-tight containers, 10 lb sample of requested product to testing laboratory.

D. Materials Source: Submit name of aggregate materials suppliers.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

F. Proof rolling: Submit documentation stating dates, times and weather conditions of proof rolling operations. Documentation shall state equipment used and locations of all encountered soft spots and measures used to mitigate soft spots.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

A. Aggregate Subbase: Coarse Aggregate Type A4 as specified in Section 32 05 16 Site Aggregates for Backfill.

B. Aggregate Base: Coarse Aggregate Type A3 as specified in Section 32 05 16 Site Aggregates for Backfill.

2.2 GEOGRID AND GEOTEXTILES

A. Geogrid: Geogrid shall be Geogrid Type IB conforming to Indiana Department of Transportation Standard Specifications, Latest Revision and provided by a manufacturer on the Indiana Department of Transportation's approved list.

B. Geotextiles for Separation: Geotextiles for Separation shall conform to Indiana Department of Transportation, Standard Specifications, Section 918.02 (Geotextiles for Use Under Riprap), Latest Revision and provided by a manufacturer on Indiana Department of Transportation's approved list.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify compacted subgrade is dry and ready to support paving and imposed loads.

1. Proof roll subgrade as specified in Section 31 23 23 Site Fill in order to identify any soft spots within subgrade.

2. Mitigate areas failing proof roll as specified in Section 31 23 23 Site Fill.

C. Verify subgrade has been inspected, gradients and elevations are correct.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. When called for by plans or by the instructions of a licensed Geotechnical Engineer, install geogrid or geotextile fabric over subgrade in accordance with manufacturer's instructions and the Indiana Department of Transportation, Standard Specifications, Latest Revision.

1. Anchor geogrid or geotextile fabric to subgrade when required to prevent displacement until aggregate is installed.

B. Place aggregate in equal thickness layers to the total compacted thickness indicated on Drawings.

1. Maximum Layer Compacted Thickness: 6 inches.

2. Minimum Layer Compacted Thickness: 3 inches.

C. Level and contour surfaces to elevations, profiles, and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.

E. Maintain optimum moisture content of fill materials to attain specified compaction density.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Section 01 40 10 Site Quality Requirements For Exterior Work

B. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.

C. Maximum Variation From Thickness: 1/4 inch.

D. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements.

B. Compaction testing will be performed in accordance with ASTM D1556.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: One test for every 250 square yards of each layer compacted aggregate.

3.6 COMPACTION

A. Compact materials to 100 percent of maximum density as determined from test strip, in accordance with AASHTO T99.

END OF SECTION

SECTION 32 12 16 - SITE ASPHALT PAVING

PART 1 GENERAL

1.1 GENERAL

A. SUMMARY

1. Section Includes:
   a. Hot Mix Asphalt (HMA) Paving

B. Definitions

1. Abbreviations

   a. AASHTO - American Association of State Highway and Transportation Officials.

   b. ASTM - American Society for Testing and Materials

2. Subgrade: The prepared and compacted soil immediately below the pavement or walk system and extending to such depth as will affect the structural design.

3. Subbase: The layer of specified or selected material of designed thickness placed on a subgrade to support a base course, intermediate course, and/or surface course.

4. Base Course: The layer of specified or selected material of designated thickness placed on a subgrade or subbase to support an intermediate and/or surface course.

5. Intermediate Course: The layer of specified or selected material of designated thickness placed on a base course or subbase to support a surface course.

6. Surface Course: The layer of specified or selected material of designed thickness placed on an intermediate or base course to support the traffic load.

1.2 SUBMITTALS

A. See 01 33 00 Submittal Procedures.

B. Submittals shall be made by the Contractor and approval obtained from the Engineer prior to commencement of work.

C. The Contractor shall submit copies of current materials certificates signed by the material producer and the Contractor certifying that each pavement material item complies with, or exceeds, the specified requirements.

D. The Contractor shall submit hot mix asphalt mix designs for this item.

E. Submit (5) five copies of the following:

1. Name and location of bituminous mixing plant.

2. Type and composition of proposed materials and mixes.

3. Certified copies of test reports specified in this Section and required by the referenced standards.

4. Certificates of Compliance certifying compliance with the referenced specifications and standards.

F. Proof rolling: Submit documentation stating dates, times and weather conditions of proof rolling operations. Documentation shall state equipment used and locations of all encountered soft spots and measures used to mitigate soft spots.

1.3 QUALITY ASSURANCE

A. The Contractor shall employ and pay for the services of an independent testing laboratory to perform specific services and necessary field density tests to demonstrate to the satisfaction of the Engineer that proper compaction is obtained and that the proper asphalt mix designs are in compliance with the specifications.

B. Mixing Plant and Equipment

1. Prior to placing any hot asphalt concrete pavement, the Contractor shall provide the Engineer the name and location of the bituminous mixing plant and the type and composition of mixes the Contractor proposes to use in the work. Mixing plants and equipment shall meet the requirements of Indiana Department of Transportation Standard Specifications, Latest Revision.

C. Tolerances

1. Bituminous paving and surfacing shall comply with the tolerances as per Indiana Department of Transportation Standard Specifications, Latest Revision.

2. Subgrade and subbase shall be within 1/2 inch of dimensions indicated on drawings.

3. Certified copies of test reports specified in this Section and required by the referenced standards.

4. Certified copies of test reports specified in this Section and required by the referenced standards.

D. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.4 DELIVERY

A. The mixture shall be transported from the mixer to spreader in trucks that have tight, clean, smooth beds. A minimum amount of approved anti-adhesive agent may be used to prevent mixtures adhering to the beds. Kerosene fuel oil, gasoline, or other materials which may harm the mixture shall not be used.

B. When air temperature is less than sixty (60) degrees Fahrenheit, each load shall be covered entirely with a waterproof cover before leaving the plant unless otherwise permitted by Engineer. Truck tailgates shall be equipped with restraining chains in order to provide for uniform loading of the hopper.

PART 2 PRODUCTS

2.1 GENERAL

A. Materials used for paving shall conform to the applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision, AASHTO, and as specified. Pavement materials shall be obtained from established sources or suppliers whose products are commonly used and accepted.

2.2 HOT MIX ASPHALT (HMA) PAVEMENT

A. The Indiana Department of Transportation (INDOT) Standard Specifications, Section 402, shall apply with the exceptions as noted herein. The current version of the INDOT Specifications, Recurring Special Provisions, and Supplemental Specifications are applicable.

B. Description:

1. This work shall consist of one or more courses of HMA base, intermediate, surface mixtures or other miscellaneous HMA material, produced from an INDOT Certified HMA plant, in accordance with Indiana Test Method (ITM) 583.

C. Design Mix Formula and Mixture Type:

1. The design mix formula, prepared in accordance with Section 402 of the Indiana Department of Transportation Standard Specifications, Latest Revision, shall be based on the following table:

Mixture Type:	Type B	Type C	Type D
Design ESAL	<3,000,000	3,000,000 to <10,000,000	≥10,000,000
Surface	9.5, 12.5 mm	9.5, 12.5 mm	9.5, 12.5 mm
Surface - PG Binder	64-22	70-22	70-22
Intermediate	9.5, 12.5,19.0 mm	9.5, 12.5,19.0 mm	9.5, 12.5,19.0 mm
Intermediate - PG Binder	64-22	64-22	70-22
Base	25.0 mm	25.0 mm	25.0 mm
Base - PG Binder	64-22	64-22	64-22

D. Recycled Asphalt Pavement (RAP):

1. Recycled materials, up to 25%, may be used as a substitute for a portion of the new material required to produce HMA mixtures in accordance with 401.06 except Type B mixtures shall correspond to category 2 mixtures, Type C mixtures shall correspond to category 3 mixtures, and Type D mixtures shall correspond to category 4 mixtures.

E. Surface Aggregate Type:

For Type C mixtures, surface aggregates shall meet the requirements for less than 10,000,000 ESAL in Section 904 of the Indiana Department of Transportation Standard Specifications, Latest Revision.

F. Acceptance of Mixtures:

1. Acceptance shall be based on Section 402 of the Indiana Department of Transportation Standard Specifications, Latest Revision. The Type D Certification shall include the PG Binder Grade sent to the project.

G. Tack coat between asphalt courses shall meet the applicable portions of Section 406 of the Indiana Department of Transportation Standard Specifications, Latest Revision.

H. Asphaltic Material for Tack Coat:

1. A tack coat in accordance with applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision shall be applied on a clean surface before placing the surface course. All HMA or concrete pavements

shall be tacked at a rate of no less then 0.05 to 0.10 gallons per square yard prior to placement of subsequent HMA mixtures.

2.3 AGGREGATE SUBBASE AND BASE

A. Aggregate subbase and base materials shall be as specified in Sections 32 05 16 Site Aggregates For Backfill and 32 11 23 Site Aggregate Subbase And Base Courses.

PART 3 EXECUTION

3.1 LIMITING CONDITIONS

A. The aggregate base shall not be placed on a frozen or muddy subgrade. The bituminous courses shall be constructed only when the surface is dry and the weather is not foggy or rainy.

B. Atmospheric temperature limitations for concrete placement shall be in accordance with Section 402 of the Indiana Department of Transportation Standard Specifications, Latest Revision.

3.2 EXISTING PAVEMENT REMOVAL

A. Removal of existing pavements shall be as specified in Section 31 10 00 Site Clearing.

B. If, after saw-cutting, the exposed pavement becomes cracked as a result of construction loads, additional saw-cutting and removal or milling will be required

3.3 SUBGRADE

A. The subgrade shall be shaped to true lines and elevations and as specified in Section 31 23 23 Site Fill. Adequate drainage facilities shall be installed to provide for the disposition of underground seepage and the percolation of surface water.
   1. The subgrade shall be compacted to at least 98 percent of the maximum standard dry density as determined from test strip, in accordance with ASTM D2940.

B. All soft, yield, or other unsuitable material, which will not compact readily when at optimum moisture, shall be removed and replaced with suitable material in accordance with Section 31 23 23 Site Fill. Any rock (or concrete foundation) encountered shall either be removed or broken off to conform to the required cross section.

C. The prepared subgrade shall be protected by the Contractor to prevent undue rutting from truck or other equipment. If such damage does occur, the subgrade shall be reshaped and compacted prior to placing the aggregate courses.

D. Any subgrade treatments as deemed necessary by a licensed Geotechnical Engineer shall be in accordance with Section 207 and all other applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision

3.4 AGGREGATE SUBBASE AND BASE COURSES

A. Construction of aggregate subbase and base courses shall be as specified in Sections 32 05 16 Site Aggregates For Backfill And 32 11 23 Site Aggregate Subbase And Base Courses.

B. The thickness and materials of aggregate subbase and base courses shall be as shown on the plans.

3.5 PROOF ROLLING BEFORE FINAL PAVING

A. Before placement of any hard surfaced materials subgrade, aggregate subbase and aggregate base (as shown on drawings) shall be verified to ensure dryness and readiness to support paving and imposed loads.

1. Proof roll subgrade, aggregate subbase and aggregate base as specified in Section 31 23 23 Site Fill in order to identify any soft spots.

2. Mitigate areas failing proof rolling as specified in Section 31 23 23 Site Fill.

B. Verify subgrade, aggregate subbase and aggregate base has been inspected, gradients and elevations are correct.

3.6 ROADWAY CUTS

A. HMA pavements shall be prepared, placed, compacted, and finished in accordance with Section 402 and all other applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision.

B. The thickness of all pavements to be placed under this specification shall be as shown on the plans.

1. In the event that existing pavements are found to be thicker than the replacement pavements shown on the plans, the replacement pavement thickness shall be increased to match that of the existing pavement.

3.7 NEW CONSTRUCTION

A. HMA pavements shall be prepared, placed, compacted, and finished in accordance with Section 402 and all other applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision.

B. The thickness of all pavements to be placed under this specification shall be as shown on the plans.

C. Application of Tack Coats:

1. Asphalt material for tack coat shall be applied to existing pavement prior to the placing of base, intermediate or surface course under applicable provision of Section 406 of the Indiana Department of Transportation Standard Specifications, Latest Revision

2. If work is conducted in the public right-of-way, the tack coat shall be applied in such a manner as to minimize inconvenience to traffic and to permit one-lane traffic without pick-up or tracking of the asphalt material. Under no circumstances shall the Contractor leave tack coated areas unpaved at the end of a working day.

3.8 EXISTING CONDITIONS AND ACCESS

A. The prepared subgrade shall be protected by the Contractor to prevent undue rutting from truck or other equipment. If such damage does occur, the subgrade shall be reshaped and compacted prior to placing the aggregate courses.

B. The Contractor shall be responsible for maintaining safe access to the facility for the Owner and Engineer during construction for the purpose of performing day-to-day operation.

C. All new construction, driveways and parking areas damaged during construction shall be restored to the original or better condition at no additional cost to the Owner.

D. Contractor shall be responsible for ensuring that sidewalks within public right-of-way are maintained throughout construction. If a sidewalk needs to be taken out of service, Contractor shall be responsible for providing an appropriate route meeting all ADA accessibility requirements, which bypasses the sidewalk taken out of service.

E. Additional aggregate required in trenches to maintain safe traffic flow, before placement of pavement shall be at the Contractor's expense. All excess aggregate removed to fit the placement of pavement shall be hauled from the site.

3.9 TESTING

A. All materials provided under this Specification shall meet the requirements of the applicable standards of the Indiana Department of Transportation Standard Specifications, Latest Revision. The Contractor shall provide current certifications of such compliance, and the cost for such testing shall be borne by the Contractor.

3.10 CLEAN-UP

A. Upon completion of paving operations, the Contractor shall remove all equipment and excess paving materials from the entire area paved; and all adjacent areas shall be restored to a condition equal to or better than that at commencement of this work.

B. When restoration work is completed, unless specifically directed to the contrary, the Contractor shall place barricades on the new pavement to restrict traffic and protect pavement from possible damage prior to final inspection for acceptance.

END OF SECTION

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Traffic lines and markings.
2. Paint.

1.2 QUALITY ASSURANCE

A. Perform work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

B. The conditions of INDOT Standard Specification 808 shall govern, except as modified herein. The Contractor shall apply a water-based Section 808.07 (a) Traffic Paint without beads

1.3 SUBMITTALS

A. Section 01 33 00 - Submittals

1.4 REQUIREMENTS

A. Contractor shall replace pavement markings removed as part of pavement patching operations with new pavement markings of the same color and width in accordance with these specifications.

B. Traffic Paint without beads – “BLUE” and “YELLOW” paint to all new longitudinal markings that delineate parking stalls as identified on the plans or as required by the Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Traffic Line Paint: Provide paint in accordance with all applicable sections of the Indiana Department of Transportation Standard Specifications, Latest Revision.

1. No glass beads required for parking stall delineation.
2. Paint shall be designed for outdoor pavement, parking lots, streets, or curbs and shall be applied per the manufacturer’s directions. Sidewalk and pavement shall

be trimmed or masked to create a neat and crisp finish.

PART 3 EXECUTION

3.1 APPLICATION

A. Applied traffic striping shall be of the color and width as indicated on the Plans.

B. Provide traffic striping and control markings on pavement and parking stalls in accordance with the layout, configurations, and dimensions indicated on the Plans or to replace any disturbed or removed during construction, and approved Shop Drawings (if required).

C. Paint application equipment shall conform to the applicable requirements of the INDOTSS.

D. Traffic control markings and parking stalls shall be applied with the use of substantial cutout patterns and templates, or with striping equipment that applies straight, uniform width, sharp lines. Coverage of paint shall be thorough and complete in accordance with the paint manufacturer's instructions and recommendations.

E. Traffic control markings and parking stalls shall be sharp and accurate, straight where required, without fuzziness at edges of lines.

F. At completion, the Contractor shall check the work thoroughly and shall touchup traffic control markings and parking stalls that are not distinct or thorough in coverage, or are not uniform in color.

END OF SECTION

SECTION 32 92 19 - SITE FINISH GRADING AND PERMANENT SEEDING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Turf renovation.
4. Finish Grading

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For existing native surface topsoil and imported or manufactured topsoil.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and prairie establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Experience: Five years' experience in turf installation.

3. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended planting soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for turf growth.

a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: April 1 — May 31.

2. Fall Planting: August 15 — October 15.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.
   a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 PRODUCTS

2.1 PERMANENT SEEDING

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Proportioned by weight as follows:

   a. 95 percent Turf Type Tall fescue blend with minimum of three top rated varieties.

   b. 5 percent Kentucky bluegrass (Poa pratensis).

2.2 INORGANIC SOIL AMENDMENTS

A. Provide soil amendments in forms and quantities recommended by qualified soils testing reports.

B. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: 0, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60(0.25-mm) sieve.

2. Provide lime in form of ground dolomitic limestone.

C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

A. Provide soil amendments in forms and rates recommended by qualified soils testing reports.

B. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING AND TOPSOILS

A. Planting Soil (Topsoil Type S3): Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1/4 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when

moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2. Mix imported topsoil or manufactured topsoil with soil amendments and fertilizers as required to produce planting soil.

B. Planting Soil (Topsoil Type S4): Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil per Paragraph 1.5. Clean soil of roots, plants, sod, stones, rocks clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with another specified planting soil when quantities are insufficient.

2. Mix existing, native surface topsoil with soil amendments and fertilizers as required to produce planting soil:

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.7 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by ENGINEER and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures as indicated on plans.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1/4 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off OWNER'S property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

    b. Mix time with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

    1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

    2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

        a. Apply superphosphate fertilizer directly to surface soil before loosening.

    3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.

    4. Legally dispose of waste material, including grass, vegetation, and turf, off OWNER'S property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PERMANENT SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a minimum total rate of 3 to 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 6 (horizontal) to 1 (vertical) with erosion-control blankets installed as indicated on plans.

E. Protect seeded areas with slopes not exceeding 6 (horizontal) to 1 (vertical) by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1 inch in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

F. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

G. In lieu of straw mulch, seeded areas may be hydromulched at Contractor's discretion. Apply slurry coat of fiber much at a rate of 1000 lb/acre. Protect adjacent structures, pavements and plantings from overspray.

3.5 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by CONTRACTOR'S operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.

2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR'S operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off OWNER'S property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch or hydromulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.6 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Provide tanker for landscape watering or install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow to a height of 2 to 3 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.7 SATISFACTORY TURF

A. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

3.8 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner’s operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.9 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 334100 – SITE STORM DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Storm drainage pipe and fittings.
   2. Bedding, haunching and initial backfill materials.
   3. Miscellaneous storm sewerage accessories

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
   2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
   4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   5. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
   6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   8. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 TEMPORARY STORM SEWER SERVICES FOR CONSTRUCTION PURPOSES

A. Provide and maintain required facilities and enclosures.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit catalog cuts and other pertinent data indicating proposed products, accessories, details, and construction information.

C. Submit reports indicating field tests made and results obtained.

D. Manufacturer's Installation Instructions:
   1. Indicate special procedures required to install Products specified.
   2. Submit detailed description of procedures for connecting new sewer to existing sewer lines

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 Execution And Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record location of pipe runs, connections, manholes, and invert elevations.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with Indiana Department of Transportation Standard Specifications, Latest Revision unless otherwise directed by these specifications.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 10 – Site Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Block individual and stockpiled pipe lengths to prevent moving.

1.8 FIELD MEASUREMENTS

A. Verify field measurements and elevations are as indicated on Drawings.

1.9 COORDINATION

A. Section 01 30 00 Administrative Requirements: Requirements for coordination.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPE AND FITTINGS

A. Round Reinforced Concrete Pipe: ASTM C76, Class III (unless otherwise noted) with Wall Type B. Bell and spigot ends.
   1. Steel reinforcement: Shall be in accordance with and placed to the requirements of ASTM C507 and AASHTO M207. The RCP shall be manufactured to provide a sacrificial depth of concrete cover over the reinforcing steel of not less than ½-inch in addition to the 1-inch cover requirements.

2. Joints: ASTM C443 rubber compression gasket. All joints and gaskets shall be designed per ASTM C361.
3. Rejection of Damaged Pipe: RCP pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape, illegible markings as required; deep or excessive gouges or spalling of the pipe wall; fractures, punctures, or cracks passing through the pipe wall; and damaged ends where such damage would prevent making a satisfactory joint.
4. Pipe Markings: for RCP pipe, each length of pipe shall be marked per ASTM requirements and at a minimum with the following: name of manufacturer, trade name or trademark, nominal pipe size and ASTM designation. In addition, the plain end of each pipe length shall have rings painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell.
5. Manufacturer and Construction: Pipes shall be manufactured and tested in accordance with appropriate ASTM standards
6. Material Markings: Each length of pipe and each manhole or other structure shall be marked per the requirements of each respective ASTM Standard referenced within this Section.
7. Certification of Materials
    a. The Owner reserves the right to require material certification from the manufacturer prior to construction to ensure the material supplied conforms to the prescribed requirements.
    b. Upon request, the Contractor shall furnish a certificate of conformance to the required ASTM Standards, this Specification, and other conformance certifications in the form of affidavits of conformance, test results, and/or copies of test reports.
    c. Provisions for obtaining this certification shall be the responsibility of the Contractor. The Owner does not assume the responsibility for the expense of obtaining material certification:
8. Handling, Storage and Color
    a. The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project site neatly, intact and without physical damage. The transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked and restrained during transport. On-site, the pipe shall be stored on clean, level ground to prevent undue scratching or gouging. Pipe color shall be white.

B. Standard Dimension Ratio Polyvinyl Chloride Pipe (SDR PVC)
1. Polyvinyl Chloride (PVC) storm drainage pipe and fittings four (4) inches through fifteen (15) inches in diameter shall be the integral wall bell and spigot-type with elastomeric seal joints and smooth walls conforming to ASTM D3034 and a minimum of SDR 35.
2. PVC storm drainage pipe and fittings eighteen (18) inches in diameter and larger shall be smooth wall conforming to ASTM F679. All fittings shall be heavy walled fittings. Pipe shall have a minimum pipe stiffness of 46 psi when

measured at 5% vertical ring deflection and tested in accordance with ASTM D 2412 and a minimum tensile strength of 34.5 MPa.

3. Joints and Gaskets
   a. Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a watertight seal.
   b. For pipe conforming to ASTM D3034 and F 679, the joint shall meet the requirements of ASTM D 3212.
   c. The assembly of joints shall be in accordance with the pipe manufacturer's recommendations.
   d. All gaskets shall meet the requirements of ASTM F 477.
4. Field Cutting of Pipe
   a. All field-cutting of pipe shall be done in a neat, trim manner using a hand or power saw, and the cut end shall be beveled using a file or wheel to produce a smooth bevel of approximately 15 degrees and be a minimum depth of one-third (1/3) the pipe wall thickness or beveled as specifically recommended by the pipe manufacturer. Field cut pipe will only be allowed to be installed at manholes, at prefabricated tees and wyes, and at the connection of new sanitary to existing sanitary sewer.
5. Rejection of Damaged Pipe
   a. PVC pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape, illegible markings as required; deep or excessive gouges or scratches of the pipe wall; fractures, punctures, or cracks passing through the pipe wall; and damaged ends where such damage would prevent making a satisfactory joint.
6. Pipe Markings
   a. For PVC pipe, each length of pipe must be marked per ASTM requirements and at a minimum with the following: name of manufacturer, trade name or trademark, nominal pipe size, production/extrusion code, material and cell class designation, ASTM designation, and SDR number. In addition, the plain end of each pipe length shall have rings painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell.
7. Manufacturer and Construction
   a. Pipes shall be manufactured and tested in accordance with appropriate ASTM standards to result in a solid wall pipe.
   b. Tees, wyes, and other fittings shall be heavy-walled and capable of withstanding the same stresses as the pipe to which they are connected. All fittings shall be fabricated from pipe meeting the requirements of these standards.
8. Material Markings
   a. Each length of pipe and each manhole or other structure shall be marked per the requirements of each respective ASTM Standard referenced within this Section.
9. Certification of Materials

a. The Owner reserves the right to require material certification from the manufacturer prior to construction to ensure the material supplied conforms to the prescribed requirements.
b. Upon request, the Contractor shall furnish a certificate of conformance to the required ASTM Standards, this Specification, and other conformance certifications in the form of affidavits of conformance, test results, and/or copies of test reports.
c. Provisions for obtaining this certification shall be the responsibility of the Contractor The Owner does not assume the responsibility for the expense of obtaining material certification.

10. Handling, Storage, and Color
    a. The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project site neatly, intact, and without physical damage. The transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. On-site, the pipe shall be stored on clean, level ground to prevent undue scratching or gouging. Color of pipe shall be white.

C. High Density Polyethylene Pipe (HDPE Pipe)
1. All HDPE pipe shall be considered "flexible" and shall be installed as such. HDPE pipe shall not be installed where exposed to sunlight unless current material certifications guarantee that it will not be subject to ultraviolet degredation.
2. The drain pipe for the various pipe diameters may be "Sure-Lok" High Density Polyethylene (HDPE) pipe as manufactured by Hancor of Findley, Ohio, N-12 HDPE pipe as manufactured by ADS, Inc. of Columbus, Ohio or Eagle Corr PE (Dual Wall) HDPE pipe as manufactured by JM Eagle of Los Angeles, California or approved equal.
3. Production and Material Standards for HDPE
    a. Corrugated High Density Polyethylene (HDPE) pipe shall be manufactured in accordance with AASHTO M 294 Type S. Pipe manufactured under this specification shall have a minimum cell class of 335420C in accordance with ASTM D-3350.
    b. Smooth wall Polyethylene pipe shall be in accordance with ASTM F-714 for the specified sized. Pipe manufactured under this specification shall have a minimum cell class of 335420C in accordance with ASTM D-3350.
    c. All polyethylene pipe and fittings shall be made from high molecular weight high density polyethylene material meeting the application cell class requirements. All polyethylene material used in drain pipe manufacture shall be virgin resin.
4. HDPE Joints
    a. High-density polyethylene pipe shall possess male and female pipe ends or molded HDPE or PVC couplers that allow the construction of overlapping, gasketed pipe joints in accordance with the requirements of ASTM D-3212 for a gasketed joint. The gasket material shall conform to all requirements of ASTM F-477.

5. Rejection of Damaged HDPE Pipe and Fittings
   a. High density polyethylene pipe and fittings possessing the following defects may be rejected for installation: variations from straight centerline; elliptical shape in pipe intended to be round; illegible or improper markings as required herein; deep or excessive gouges or scratches on the pipe wall; fractures, punctures, or cracks; damaged or cracked ends where such damage would prevent making a satisfactory joint.
6. HDPE Pipe Markings
   a. For high density polyethylene pipe products, each length of pipe shall be clearly marked with the following information as a minimum: manufacturer's name or identification symbol; nominal pipe size; and production/extrusion code.

D. LOCATION WIRE & CONNECTORS

1. Location wire shall be a 12 gauge insulated, solid copper wire. The wire shall be contiguous with no fabricated or field constructed connections interrupting the wires continuity from valve box to valve box. Wire insulation shall be highly resistant to alkalis, acid and other destructive agents found in soil. Wire shall be Copperhead #12 Superflex Soft Drawn #250 or approved equal.

2. Wire connectors shall be Copperhead Snake Bite corrosion proof wire connectors for direct bury by Copperhead Industries, LLC or approved equal.

2.2 CONCRETE ENCASEMENT AND CRADLES

A. Concrete: Class "A" Concrete conforming to Indiana Department of Transportation Standard Specification, Latest Revision, 4,000 psi 28 day compressive strength, rough troweled finish.

B. Concrete Reinforcement Bars: Bar reinforcement shall be ASTM A 615, grade 40, deformed.

2.3 ACCESSORIES

A. Grout: As specified by Section 03 60 00 Site Grouting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify trench cut/excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Correct over excavation per Specification Section 32 05 16 Site Aggregates For Backfill and 31 23 23 SITE FILL.

B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.

C. Protect and support existing sewer lines, utilities and appurtenances.

D. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify Architect/Engineer where crossing conflicts occur.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 31 23 17 Site Trenching.

B. Excavate to lines and grades shown on Drawings or required to accommodate installation of encasement.

C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation in accordance with Specification Section 31 23 19 Site Dewatering.

D. Provide sheeting and shoring in accordance with Section 31 23 17 Site Trenching.

E. Place bedding material as indicated on the drawings and compact to 98 percent maximum dry density.
   1. In the event of soft or unsuitable soils, cut out soft areas and reestablish grade in accordance with Section 31 23 23 SITE FILL.

F. Bedding and Haunching: Coarse Aggregate Type A1 in accordance with Specification Section 32 05 16 Site Aggregates For Backfill.

G. Initial Backfill: Coarse Aggregate Type A1 in accordance with Specification Section 32 05 16 Site Aggregates For Backfill.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.

B. Lay pipe to slope gradients noted on Drawings. Begin at downstream end and progress upstream.

C. Assemble and handle pipe in accordance with manufacturer's instructions except as modified on the Drawings or by Architect/Engineer.

D. Keep pipe and fittings clean until work is completed and accepted by Architect/Engineer. Cap open ends during periods of work stoppage.

E. Lay bell and spigot pipe with bells upstream.

F. Connections to manholes shall be made using non-shrink grout in accordance with Section 03 60 00 Site Grouting.

3.5 INSTALLATION - MANHOLES

A. NOT USED IN THIS PROJECT.

3.6 BACKFILLING

A. Place haunching and initial backfill as shown on Drawings, in maximum lifts of 6 inches, tamp in place and compact to 98 percent maximum standard proctor dry density (ASTM D-698). Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.

B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 10 Site Quality Requirements For Exterior Work and 01 70 00 Execution And Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Test in accordance with Section 31 23 17 Site Trenching.

C. Request inspection prior to and immediately after placing bedding.

D. Compaction Testing: In accordance with Section 31 23 17 Site Trenching.

E. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 Execution And Closeout Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

3.9 TEMPORARY STORMWATER CONTROL FOR CONSTRUCTION PURPOSES

A. Provide and maintain stormwater control devices for construction operations. Coordination with Owner, Owner’s Authorized Representative or Engineer as required before shutting off existing services or extending new services.

B. Use Owner's existing stormwater system, extended and supplemented with temporary devices as needed to maintain specified conditions for construction operations.

C. Extend downspout outlets with piping to stabilized outlets located onsite so that the construction site stormwater outlet control and erosion control is maintained at all times.

END OF SECTION