FPBH, Inc.
Engineers • Surveyors • Planners • Inspectors
Offices in North Vernon, Seymour, and New Castle

72 Henry Street, PO Box 47
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Toll Free:1-866-ENG-FPBH

TECHNICAL SPECIFICATIONS

PARKING ADDITION

Located at
CLIFTY FALLS STATE PARK
Jefferson County, Indiana

PUBLIC WORKS PROJECT NUMBER:
ENG2301725230

FOR

DEPARTMENT OF NATURAL RESOURCES

BIDDING DOCUMENTS

ISSUE DATE: SEPTEMBER 27, 2022

FILE NUMBER 21-12426

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DIVISION 1
GENERAL REQUIREMENTS

DIVISION 2
SITE WORK

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DIVISION 3
CONCRETE

DIVISION 4
MASONRY

Not Used

DIVISION 5
METALS

Not Used

DIVISION 6
WOOD AND PLASTIC

Not Used

DIVISION 7
THERMAL AND MOISTURE PROTECTION

Not Used

DIVISION 8
DOORS AND WINDOWS

Not Used

DIVISION 9
FINISHES

Not Used

DIVISION 10
SPECIALTIES

Not Used

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DIVISION 11
EQUIPMENT

Not Used

DIVISION 12
FURNISHINGS

Not Used

DIVISION 13
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Not Used

DIVISION 14
CONVEYING SYSTEMS

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Not Used

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DIVISION 1
GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK COVERED BY THE CONTRACT

A. These specifications and accompanying drawings describe the work to be done and the materials to be furnished for the Parking Addition Project to be constructed in Clifty Falls State Park in Jefferson County, Indiana.
B. This is a LUMP SUM project - where INDOT specifications are referenced in these project specifications, they are referenced for material identification and for means of execution, installation and construction. The Method of Measurement and Basis of Payment listed in the INDOT Specifications do not apply. The Project generally consists of the construction of the following:

1.02 BASE BID
All work is on previously disturbed ground

A. This Project generally includes but is not limited to the construction of the following:

1. Install barricades and traffic signage, etc.
2. Excavate to grade for parking and walk areas. Provide excavation or fill as needed to meet subgrade elevations.
3. Install geogrid and aggregate in areas for pavement and walk operations. Compact and roll aggregate subgrade prior to HMA paving.
4. Place base over aggregate
5. Prep tie in and new base for surface paving
6. Place surface paving
7. Grade earthen shoulders or place existing aggregate to within 1 vertical inch of edge of pavement. Add fill or take excess spoil material to permitted spoil site. Stabilize disturbed areas with mulched seeding.
8. Paint white lines and striping
9. Install signage
10. Add wheel stops
11. Remove all Maintenance of Traffic Items
12. Perform all punch list items

Contractor shall be expected to commit all resources, equipment, manpower, and overtime needed to complete the project on time.
No extra compensation will be made to the contractor for schedule implications.
Substantial completion for this project is defined as having all paving in place.
Minor grading, seeding and restoration items, wheel stops, pavement markings, and any punchlist items may be completed within the period following substantial completion.

1.03 THIS SECTION NOT USED

1.04 SITE:

A. The work shall be performed at various locations as shown on the plans for Clifty Falls Parking Addition in Jefferson County, Indiana.

1.05 ALTERNATE BIDS:

A. This project consists of a base bid only.

1.06 SALES TAX:

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

1.07 COMPLETION OF WORK:

A. All work required by the Contract Documents shall be completed within 120 days from the date of the contract.

1.08 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 obtained:

1. None Applicable.

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.

1.09 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:

Phone: 812-273-8885
Address: Madison, IN 47250
Property Manager Natalie Brinson Email: NBrinson@dnr.IN.gov
Project Manager Todd Stearns Phone: 317-499-2714 Email: tstearns@dnr.IN.gov

1.10 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 Project Manager or his representative.

B. All work performed at other times shall only by the approval of the Project 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.

1.11 PRE-CONSTRUCTION / SERVICE MEETING:

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

1.12 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.

1.13 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 Project Manager.

B. The Contractor SHALL confine his/her operations and the storage of materials and equipment within an area approved by the Project 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.

1.14 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.

1.15 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.

1.16 RELATED REQUIREMENTS

A. Refer to the Agreement for an enumeration of the Contract Documents.

B. The CONTRACTOR is responsible for coordination with other Contractors and subcontractors, and coordination with park personnel for the operation of existing facilities.

1.17 WORK SEQUENCE

A. This Project involves work within a State Property owned by the Indiana Department of Natural Resources. Work activities of the CONTRACTOR shall be properly sequenced and coordinated to allow the OWNER to operate the existing facilities as required and to provide access to the public per the directives of the management. Unscheduled closure of roadways will not be permitted.

B. Interruption of Existing Facilities

1. The CONTRACTOR shall plan, schedule and accomplish the work of this Contract to avoid interruption of operation and traffic flow for the park. All road closures shall be scheduled well in advance and only with the approval of the OWNER. The CONTRACTOR shall notify the ENGINEER in writing of such need as far ahead of the interruption as possible, but in no case less than one (1) week prior to the closure. Items to be included in the notification are as follows:

   a. Construction sequence to minimize existing park traffic flow interruption time, and proposed time of day that work would be accomplished.

   b. Expected length of time of the interruption.

   c. Alternate procedures in the event the expected time is exceeded.

   d. List of all equipment and material that must be on hand to complete the work.

   Additional requirements for Road Closures are listed in SECTION 02500 - PARK UTILITY & TRAFFIC COORDINATION of these specifications.

2. The ENGINEER shall review the Contractor's written notification, and the ENGINEER and OWNER will determine that the proposed interruption is acceptable.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

END OF SECTION

-

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCES

A. Prior to commencing the work, a preconstruction conference will be held at the job site and the following organizations shall have at least one representative in attendance: OWNER, ENGINEER, CONTRACTOR, Indiana Department of Natural Resources Division Project Manager, major Subcontractors, and Utility representatives (as needed).

B. The preconstruction conference will be for the purpose of reviewing procedures to be followed concerning the orderly flow of required paperwork, coordination of the various parties involved with the project, park access requirements, review of shop drawing submittals, contract time, liquidated damages, payment estimates, change orders, regulatory requirements, labor requirements and other items of interest to the parties involved.

1.02 PROGRESS MEETINGS

A. A progress meeting will be held at least twice each month to review progress of the work, discuss problems encountered or foreseen, coordinate the work and answer any questions as they arise, and administer changes.

B. The organizations listed under 1.01 above shall be given advance notification, and shall have at least one representative in attendance at each meeting.

C. Minutes of each progress meeting will be kept by the ENGINEER and a typed copy shall be distributed to all parties after the progress meeting. All parties shall review these minutes and shall in writing, within seven days of receipt, inform the ENGINEER if there are errors or changes to be made. If no response is received within this time period it shall be assumed that there are no corrections and the record of the minutes shall become a part of the construction documents as are change orders, work directives, etc.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

-END OF SECTION-

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This section specifies the general methods and requirements of submissions applicable to, the following work related submittals: (a) construction schedule, (b) schedule of submittals, (c) shop drawings, product data, and samples, (d) mock-ups, (e) construction photographs, and (f) Contractor's record drawings.

1.02 CONSTRUCTION SCHEDULE

A. The CONTRACTOR shall submit to the ENGINEER the construction schedule. The schedule shall account for all work of the CONTRACTOR and his Sub-Contractors.

B. The CONTRACTOR shall update the construction schedule information monthly and submit the update information to the ENGINEER at the same time the pay estimate is prepared. The schedule shall contain all of the items of the periodic estimate and pay schedule.

C. The CONTRACTOR bears full responsibility for scheduling all phases and stages of the work including his subcontractors work to insure its successful prosecution and completion within the time specified in accordance with all provisions of the Contract Documents.

1.03 SHOP DRAWINGS, PRODUCT DATA, SAMPLES, O&M INSTRUCTIONS

A. Shop Drawings

1. Shop drawings include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation drawings, schedule information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system of equipment inspection and test reports including performance curves and certifications, as applicable to the work.

2. All details on shop drawings submitted for review shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field

measurements; such measurements shall be made and noted on the shop drawings before being submitted for review.

B. Product Data

1. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors. and patterns, manufacturer's printed statements of compliances and applicability, roughing in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the Work. The CONTRACTOR shall ensure that the product data submitted has adequate cross reference information that relates to how the specifications identify the product so that the ENGINEER will be able to make the determination that the project is “equal” to what is specified.

C. Samples

1. Samples specified in individual sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units-of work that can be used by the ENGINEER or OWNER for independent inspection and testing and to determine their applicability to the project work.

D. Operation and Maintenance Instructions

1. O&M instructions shall conform to the particular requirements of the individual sections.

1.04 CONTRACTOR'S RESPONSIBILITY

A. The CONTRACTOR shall provide a submittal schedule for shop drawings.

B. The CONTRACTOR shall review shop drawings, product data and samples prior to submission to determine and verify the following:

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance with the Specifications

C. All shop drawings submitted by the subcontractors for review shall be sent directly to the CONTRACTOR for preliminary checking. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

D. The CONTRACTOR shall check all shop drawings including subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Drawings found to be inaccurate or otherwise in error shall be corrected before submission thereof.

E. Each shop drawing, working drawing, sample and catalog data submitted by the CONTRACTOR shall have affixed to it the following certification statement, signed by the CONTRACTOR: "Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable reviewed shop drawings and all Contract requirements."

F. The CONTRACTOR shall notify the OWNER in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

G. The CONTRACTOR should include the notation "Critical Path" on critical path submittals.

H. The review of shop drawings, samples or, catalog data by the ENGINEER shall not relieve the CONTRACTOR from his responsibility with regard to the fulfillment of the terms of the Contract.

I. No portion of the work requiring a shop drawing, working drawing, sample, or catalog data shall be started nor shall any materials be fabricated or installed prior to the review or qualified review of such item. Fabrication performed, materials purchased or on site construction accomplished which does not conform to reviewed shop drawings and data shall be at the Contractor's risk. The OWNER will not be liable for any expense or delay due to the corrections or remedies required to accomplish conformity.

J. Project work, materials, fabrication, and installation shall conform with reviewed shop drawings, working drawings, applicable samples, and catalog data.

1.05 SUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make submittals promptly in accordance with the accepted shop drawing submittal schedule, and in such sequence as to cause no delay in the work or in the Work of any other CONTRACTOR.

B. Number of submittals required for initial review :

1. Shop Drawings: Submit one (1) copies.
2. Product Data: Submit one (1) copies.
3. Samples: Submit number stated in the respective specification sections.
4. O&M Instructions: Submit one (1) copies in accordance with the respective Specifications to which they apply.

After final approval, Five sets shall be submitted, three will be returned to the Contractor. If more than three sets are needed for return then the contractor shall submit additional sets as needed.
The contractor shall also include a transmittal that includes the project information and their standard certification for the item.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The project title, contract number, and submittal number.
3. CONTRACTOR identification.
4. The names of:
   a. CONTRACTOR
   b. Supplier
   c. Manufacturer
5. Identification of the product, with the specification section number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Identification of deviations from contract documents.
10. Identification of revisions on resubmittals.
11. An 8 in. x 3 in. blank space for Contractor's and Engineer's stamps.
12. Critical path notation as required.

D. ALTERNATE PROCEDURE:

Electronic, paperless submission and return is an acceptable alternative. Items shall be presented only in searchable pdf format. The contractor shall also include a transmittal that includes the project information and their standard certification for the item. The engineer has the option to electronically mark the submission or only respond with a written transmittal and comments.
If contractor elects to submit by the alternate electronic procedure, then he shall notify the engineer at the pre construction conference prior to any submission. If elected then every effort shall be made to submit all items in this manner, and only to mix and match the systems when items are not available electronically.

1.06 RESUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make any corrections or changes in the submittals required by the ENGINEER and resubmit until accepted, in accordance with the following:

1. Shop drawings and product data:

a. Revise initial drawings or data, and resubmit as specified for the initial submittal.
b. Indicate any changes which have been made other than those requested by the ENGINEER.

2. Samples: Submit new samples as required for initial submittal.

B. The CONTRACTOR shall bear the cost for all review and processing of initial and any subsequent resubmittals.

1.07 DISTRIBUTION

A. The CONTRACTOR shall distribute reproductions of reviewed shop drawings and copies of reviewed product data and samples, where required, to the job site file and elsewhere/as directed by the ENGINEER. Number of copies shall be as directed by the ENGINEER but shall not exceed five (5) unless the contractor requires extra sets or copies.

1.08 MOCK-UPS

A. Mock-up units as specified in individual sections include but are not necessarily limited to, complete units of the standard of acceptance for that type of work to be used on the project. They shall be removed by CONTRACTOR at the completion of the Work or when directed.

1.09 CONSTRUCTION PHOTOGRAPHS

A. The CONTRACTOR shall be responsible for digital video of all alignments, roadways to be used by construction vehicles, and site locations over the entire project and shall provide a copy of this videotape prior to beginning any work. This shall include a complete digital video of the roadway routes to be used for equipment access and materials hauling within the park. This videotape will be used in the instance of any dispute over restoration, or damage to public or private property. The videotape shall be standard color with "voice-over" commentary on stations, locations, existing features, and proposed improvement locations. Each alignment will be filmed in order from the lowest station to the highest station with pauses at the proposed location of each structure and provides a 360 degree look at the area to be disturbed. It is recommended but not required that the CONTRACTOR utilize a subcontractor for this operation that specializes in such services.

B. The CONTRACTOR shall provide photographs and / or digital photographs, and / or digital videos of site and construction during the progress of work. The photographs shall be taken monthly on the cutoff date for each Application for Payment and routinely throughout the project to document work status, problems, and potential changes. Two sets shall be produced; one for the site, and one for the owner. Identify each print on front or digital folders and filenames. List name of project, date and name of photographer in the submittal.

1.10 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: The CONTRACTOR shall prepare and transmit each submittal sufficiently in advance of performing the related Work or other applicable activities, or within the time specified in the individual Work section of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

1.11 SCHEDULE OF VALUES AND PAYMENTS

A. Within ten (10) days after award of the Contract, the CONTRACTOR shall submit to the OWNER in triplicate, a breakdown of the lump sum items, including a schedule of values and an estimated schedule of payments. This breakdown shall be subject to approval by the OWNER, and when so approved shall become the basis for determining progress payments and for negotiation of change orders, if required.

B. The schedule of values submitted by the CONTRACTOR to the OWNER for approval must include a cost for providing approved O&M manuals for all equipment. The cost finally used in the schedule of values will be established by mutual agreement between the OWNER and the CONTRACTOR on a per item basis. Regardless of the cost in the schedule of values for O&M manuals, payments in excess of 75% of the equipment cost will not be made until receipt of approved O&M Manuals.

1.12 CONTRACTOR'S RECORD DRAWINGS

A. The format of these drawings shall be similar to the Contract Drawings.

B. Within 60 days after the Notice to Proceed is issued, the CONTRACTOR shall submit to the OWNER a written description of his procedure and format for record drawings. The CONTRACTOR, OWNER, ENGINEER shall meet to assure mutual acceptance of the procedure.

C. The CONTRACTOR shall keep his record drawings up to date at the job site, and shall make them available for review by the ENGINEER or his representatives when requested.

D. The CONTRACTOR shall submit two (2) sets of his construction record drawings to the ENGINEER upon completion of the work, and prior to final payment.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

-END OF SECTION-

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 QUALITY CONTROL - GENERAL

A. Work of all crafts and trades shall be laid out to lines and elevations as established by the CONTRACTOR from the Drawings or from instructions by the ENGINEER.

B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.

C. All equipment, materials and articles incorporated into the work shall be new and of comparable quality as specified. All workmanship shall be first-class and shall be performed by mechanics skilled and regularly employed in their respective trades.

D. The CONTRACTOR shall determine that the equipment he proposes to furnish can be brought into the site and installed in the space available. Equipment shall be installed so that all parts are readily accessible for inspection and maintenance as applicable.

1.02 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

1.03 MANUFACTURERS INSTRUCTIONS

A. Comply with instructions in full detail.

1.04 MANUFACTURERS' FIELD SERVICES

A. The CONTRACTOR shall arrange for the services of qualified service representatives from the companies manufacturing or supplying each type of equipment described in the -specification sections.

B. The manufacturer or supplier shall provide sufficient Engineering and technician man-hours to satisfactorily complete supervision of installation, equipment check-out, and field acceptance tests.

1.05 TESTING SERVICES

A. Tests, inspections and certifications of materials, equipment, subcontractors or completed work, as required by the various sections of the Specifications shall be obtained by the CONTRACTOR and all costs shall be included in the Contract Price.

B. The CONTRACTOR shall submit to the ENGINEER the name of testing laboratory(s) to be used.

C. CONTRACTOR shall deliver written notice to the, ENGINEER at least 48 hours in advance of any inspections or tests to be made at the Project site. All inspections or tests to be conducted in the field shall be done in the presence of the ENGINEER or his representative.

D. Certifications by independent testing laboratories may be by copy of the attestation(s) and shall give scientific procedures and results of tests. Certifications by persons having interest in the matter shall be by original attest properly sworn to and notarized.

-END OF SECTION-

SECTION 01500
CONSTRUCTION FACILITIES AND SITE MAINTENANCE

PART 1 - GENERAL

1.01 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain and pay for all permits required by governing authorities that are not enclosed as part of these documents.

B. Obtain and pay for any required temporary easements, etc. required across property (other than easements or lands furnished by OWNER).

C. Comply with applicable codes.

D. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.

E. Comply with the conditions set forth in the attached permits.

1.02 PROPERTY PROTECTION

A. Care is to be exercised by the CONTRACTOR in all phases of construction, to prevent damage and/or injury to the Owner's and/or other property. Payments for the repair and restoration are limited as set forth in General Conditions.

B. All exposed existing piping must be immediately supported to prevent damage. Prior to completion of each day's work, such piping must be adequately covered by the CONTRACTOR and approved by the OWNER'S representative.

C. The CONTRACTOR shall avoid unnecessary injury to trees and shall remove only those authorized to be removed as detailed on the plans and otherwise by written consent of the OWNER. Fences, gates and terrain damaged or disarranged by the Contractor's forces shall be immediately restored in their original condition or better.

1.03 CONSTRUCTION WARNING SIGNS

A. If required by the work, the CONTRACTOR shall provide construction warning signs for each location where he is working. He will further provide flagmen as required and shall abide by all applicable safety rules, including size, type and

placement of construction signs. All signs shall be of professional quality. SECTION 02500 provides additional information.

B. Provide barricades, barrier fences, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions.

C. Provide an adequate and approved system to secure the project area at all times, especially during non-construction periods; CONTRACTOR shall be solely responsible for taking proper security measures.

D. CONTRACTOR shall pay all costs for protection and security systems.

1.04 WASTE DISPOSAL

A. The CONTRACTOR shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

B. Broken up concrete shall not be used as riprap.

1.05 CONTRACTOR STAGING AREA

A. The CONTRACTOR and his subcontractors shall provide site offices(s), tool trailers and storage as needed by each trade during the duration of this project. Off site staging is the responsibility of the CONTRACTOR. It shall be of sufficient size to accommodate all trades involved and include room for field office(s), storage and tool trailers and materials.

B. Limited on site storage for materials on Park property shall be coordinated between the Contractor and the OWNER. If any park areas are agreed upon and used by the contractor, then he shall be responsible for erecting and installing an eight foot tall chain link fence completely surrounding each facility. Fence shall be gated, and locked at all times except when contractor is directly within the fencing. The fence shall be removed and the area restored to a pre-construction condition upon completion of the work.

C. Sufficient temporary stone drives, parking, etc. shall be provided to minimize mud tracking.

D. If offsite staging area land disturbance exceeds 0.5 acre Contractor shall be responsible for Rule 5 permitting.

E. Security of the staging area shall be the responsibility of the CONTRACTOR.

F. Temporary utilities shall be the responsibility of the CONTRACTOR.

G. The cost of this item shall be considered incidental to the project.

1.06 MAINTENANCE OF OPERATIONS

A. During the course of the work, streets and roads will remain open to the public per the project phasing requirements. The CONTRACTOR, through his operations, will in no manner hinder the operation of the facility except in those instances which are approved by the OWNER.

The CONTRACTOR shall endeavor to assist the staff in the maintenance of operations affected by the work. The CONTRACTOR shall in no way:

1. Permit excavation adjacent to roadways which could jeopardize the road's stability.

2. Construct structures, temporary, or permanent, which place the public at risk, or prevent personnel from completing job functions.

3. Introduce any substance into the local ditches and streams which are not authorized in the applicable permits.

4. Cause any unscheduled interruption of the local traffic flow or access.

5. Place excavated, stored, or purchased materials on or near park roadways when these roadways remain open to traffic in such a manner as to present a hazard to motorists.

Excavate, pour concrete or flowable fill, provide crane operations, truck hauling operations or headwall or wingwall or other plan related work installation in such a manner as to endanger the integrity of any structure or road that is to remain in place.

1.07 SCHEDULED ROAD CLOSURES

A. Due to the nature of the work to be completed, interruptions to public roads are expected. Full road closures are not allowed for this project.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 SEQUENCE OF CONSTRUCTION

Prior to beginning construction, the CONTRACTOR shall develop and submit a phasing plan to the ENGINEER for review and approval. The approved phasing plan shall allow for continuous traffic as much as possible.

-END OF SECTION-

SECTION 01535
PROTECTION OF INSTALLED WORK

PART 1 - GENERAL

1.01 DESCRIPTION

Related Requirements Specified Elsewhere:

Project Closeout: Section 01700.

Cleaning for Specific Products or Work: Specification Section for that work.

On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.

At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.02 SAFETY REQUIREMENTS

Hazards Control:

Store volatile wastes in covered metal containers, and remove from premises daily.

Prevent accumulation of wastes which create hazardous conditions.

Provide adequate ventilation during use of volatile or noxious substances.

Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.

Do not dispose of volatile wastes such and mineral spirits, oil, or paint thinner in storm or sanitary drains.

Do not dispose of wastes into streams or waterways.

1.01 REQUIREMENTS INCLUDED

A. Protection for products, including owner-provided products, after installation.

1.02 RELATED REQUIREMENTS

A. Division 1 - General Requirements.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 PROTECTION AFTER INSTALLATION

A. Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.

B. Provide protective coverings at all structures as required.

C. Restrict traffic of any kind across planted and landscaped areas. Water and maintain as needed.

D. Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.

3.01 DURING CONSTRUCTION

Execute cleaning to ensure that building, grounds and public properties are maintained free from accumulations of waste materials and rubbish.

Wet down dry materials and rubbish to lay dust and prevent blowing dust.

At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste of waste materials, debris and rubbish.

Provide on-site containers for collection of waste materials, debris and rubbish.

Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.

Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted areas or interfere with the operations of the park except as allowed by these plans and specifications .

The Contractor shall thoroughly clean all materials and equipment installed.

3.02 FINAL CLEANING

Employ experienced workmen, or professional cleaners, for final cleaning.

In preparation for substantial completion, conduct final inspection of site.

Remove all debris and silt from swales.

Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

Broom clean paved surfaces; rake clean other surfaces of grounds.

Maintain cleaning until Project, or portion thereof, is occupied by Owner.

The Contractor shall restore or replace existing property or structures as promptly and practicable as work progresses.

-END OF SECTION-

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. All Contract documents, and GENERAL CONDITIONS.

B. Final Cleaning of structures.

C. Contractor's Record Documents.

1.02 SUBSTANTIAL COMPLETION

A. Contractor:

1. Submit written certification to Engineer that project is substantially complete.

2. Submit list of major items to be completed or corrected.

B. Engineer will make an inspection within seven days after receipt of certification.

C. Should Engineer consider that work is substantially complete:

1. Contractor shall prepare, and submit to Engineer, a list of items to be completed or corrected, as determined by the inspection.

2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:

a. Date of Substantial Completion.

b. Contractor's list of items to be completed or corrected verified and amended by Engineer.

c. The time within which Contractor shall complete or correct work of listed items.

d. Time and date Owner will assume possession of work or designated portion thereof.

e. Signatures of:

(1) Engineer.

(2) Contractor.

(3) Owner.

3. Contractor: Complete work listed for completion or correction, within designated time.

D. Should Engineer consider that work is not substantially complete:

1. He shall notify Contractor, in writing, stating reasons.

2. Contractor: Complete work, and send second written notice to Engineer, certifying that Project or designated portion of Project is substantially complete.

3. Engineer will re-inspect work.

1.03 FINAL INSPECTION

A. Contractor shall submit written certification that:

1. Contract Documents have been reviewed.

2. Project has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract documents.

4. Project is completed and ready for final inspection.

B. Engineer will make final inspection within seven (7) days after receipt of certification.

C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Close-out submittals.

D. Should Engineer consider that work is not finally complete:

1. He shall notify Contractor, in writing, stating reasons.

2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.

3. Engineer will re-inspect work.

1.04 FINAL CLEANING UP

A. The work will not be considered as completed and final payment made until all final cleaning has been completed by the Contractor in a manner satisfactory to the Engineer. See Section 3.02 for detailed requirements.

1.05 FINAL APPLICATION FOR PAYMENT

Contractor shall submit final applications in accordance with requirements of General Conditions.

1.06 FINAL CERTIFICATE FOR PAYMENT

Engineer will issue final certificate in accordance with provisions of General Conditions.

Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

PART 2 - PRODUCTS

2.01 MATERIALS

Not applicable

2.02 SAFETY REQUIREMENTS

Hazards Control:

Store volatile wastes in covered metal containers, and remove from premises daily.

Prevent accumulation of wastes which create hazardous conditions.

Provide adequate ventilation during use of volatile or noxious substances.

Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

Do not burn or bury rubbish and waste materials on Project site without written permission from the OWNER and only after obtaining any required permits to conduct such work.

Do not dispose of volatile wastes such and mineral spirits, oil, or paint thinner in storm or sanitary drains, ditches, or anywhere else on the park grounds.

Do not dispose of wastes into streams or waterways.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

Execute cleaning to ensure that structures, grounds and park properties are maintained free from accumulations of waste materials and rubbish.

Wet down dry materials and rubbish to lay dust and prevent blowing dust.

At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste of waste materials, debris and rubbish.

Provide on-site containers for collection of waste materials, debris and rubbish.

Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off of the OWNER's property.

Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall into any waterways or ditch lines.

The CONTRACTOR shall thoroughly clean all materials and equipment installed.

Provide necessary containment to prevent the inadvertant discharge of any materials into ditchlines or any other waterways. All spills regardless of

location shall also be properly contained and cleaned up in accordance with all local, state and federal requirements.

3.02 FINAL CLEANING

At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

In preparation for substantial use of the structures, conduct final inspection of sight-exposed interior and exterior surface, and of any accessible structure interiors.

Remove grease, dust, dirt, stains, labels, fingerprints, leaves, woody debris and other foreign materials, from sight-exposed interior and exterior surfaces, and of concealed spaces.

Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

Broom clean paved surfaces; rake clean other surfaces of grounds.

Remove wheel tracked or other dirt caused by hauling and construction operations from all paved roadway surfaces.

Maintain cleaning until Project, or portion thereof, is accepted by the OWNER.

The CONTRACTOR shall restore or replace existing property or structures as promptly and practicable as work progresses.

-END OF SECTION-

DIVISION 2
SITE WORK

SECTION 02070
GEOTEXTILES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all materials and labor as needed to install geotextile material for new parking additions as shown on the plans.

1.02 RELATED WORK

Section 02160 – EARTHWORK

Section 02255 – CRUSHED STONE, RIPRAP & STRUCTURE BACKFILL

1.03 SUBMITTALS

A. Submit Geotextiles to be used on the project in accordance with 01300.

1. Certification: The contractor shall provide to the Engineer a certificate stating the name of the manufacturer, product name, style number, chemical composition of the filaments or yarns and other pertinent information to fully describe the geosynthetic. The Certification shall state that the furnished geosynthetic meets MARV requirements of the specification as evaluated under the Manufacturer's quality control program. The Certification shall be attested to by a person having legal authority to bind the Manufacturer.

2. Quality Standards: The contractor shall provide to the Engineer the manufacturer's Quality Control Plan along with their current A2LA, GAI-LAP, and ISO 9001:2000 certificates.

1.04 DEFINITIONS

A. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1.The geotextile manufacturer shall have all of the following credentials:

a.Geosynthetic Accreditation Institute (GAI)- Laboratory Accreditation Program (LAP)

b.American Association for Laboratory Accreditation (A2LA) c.ISO 9001:2000 Quality Management System

B. The geotextile manufacturer shall have a GAI-LAP accredited laboratory at the location of production capable of performing the ASTM tests as outlined in the specification.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Geosynthetic labeling, shipment, and storage shall follow ASTM D 4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

B. Each geosynthetic roll shall be wrapped with a material that will protect the geosynthetic from damage due to shipment, water, sunlight, and contaminants.

C. During storage, geosynthetic rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geosynthetic.

PART 2 – PRODUCTS

2.01 MATERIALS

A. US 4800/30 by US FABRICS or approved equal.

B. Geotextile shall be composed of high molecular weight, high tenacity polyester multifilament yarns woven in tension and finished with a PVC coating. Geotextile is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids. Geotextile is used as soil reinforcement in parking and traveled way additions.

C. The geosynthetic shall be manufactured with fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyesters. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvage.

PART 3 – EXECUTION

3.1 PREPARATION

A. Foundation soil shall be excavated to the line and grades as shown on the construction drawings or as directed by the Engineer. Over-excavated areas shall be filled with compacted backfill material as per project specifications or as directed by the Engineer.

3.2 INSTALLATION

A. Geosynthetic shall be laid at the proper elevation and orientation as shown on the construction drawings or as directed by the Engineer. Correct orientation of the geosynthetic shall be verified by Contractor.

B. Geosynthetic may be temporarily secured in-place with staples, pins, sand bags or backfill as required by fill properties, fill placement procedure or weather condition, or as directed by the Engineer.

C. Primary geosynthetic may not be overlapped or connected mechanically to form splices in the primary strength direction. Single panel lengths are required in the primary strength direction. No overlapping is required between adjacent rolls unless specified by the Engineer.

D. Backfill material shall be placed in lifts and compacted as directed under project specifications. Backfill shall be placed, spread and compacted in such a manner as to minimize the development of wrinkles in and/or movement of the geosynthetic. A minimum fill thickness of 150 mm (6 in) is required prior to the operation of tracked vehicles over the geosynthetic.

E. Turning of tracked vehicles should be kept to minimum to prevent tracks from displacing the fill and damaging the geosynthetic. Rubber tired equipment may pass over the geosynthetic reinforcement at low speeds, less than 16 km/hr (10 mph). Sudden braking and sharp turns shall be avoided. Any geosynthetic damaged during installation shall be replaced by the Contractor at no additional cost to the Owner.

-END OF SECTION -

SECTION 02160
EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Preparation of subgrade for pavement patching is included as part of this work.

B. Backfilling around structures and wingwalls within the construction limits is included as part of this work.

C. Install safety measures required to protect personnel in accordance with OSHA requirements.

D. This work shall also include all Rock Excavation. Blasting is NOT allowed as a means of removing rock.

1.02 DEFINITIONS

A. Excavation consists of removal of all material encountered to subgrade elevations and subsequent disposal or reuse of materials removed.

B. Backfill shall consist of material used to replace excavated material after the facilities have been constructed as shown in the plan details or as directed by the Engineer. Previously excavated material may be used as Borrow for fill if approved by the Engineer.

1.03 RELATED WORK

Section 02170 - EROSION AND SEDIMENT CONTROL

Section 02923 - LANDSCAPE GRADING

1.04 QUALITY ASSURANCE

A. The Contractor shall perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.05 SUBMITTALS

A. None Required

1.06 SITE CONDITIONS

1. Site Information:
    1. Data on indicated subsurface conditions is not available.
    2. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.
2. Existing Utilities: Prior to commencement or work, the Contractor shall locate existing underground utilities in areas of the work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. In addition to Holey Moley, the Contractor shall coordinate with the Park Manager concerning the location of underground park owned utilities that may not be listed with Holey Moley.
3. Protection of Persons and Property:
    1. Barricade open excavations occurring as part of this work and post with warning lights. Comply with Traffic Control requirements of these plans
        a. Operate warning lights as recommended by authorities having jurisdiction.
        b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
    2. The Contractor shall place Orange snow fence or an equal type of construction fencing around all work areas to prevent park patron access to the construction area and construction equipment.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Definitions:

1. Subbase material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand meeting INDOT requirements.
2. Drainage fill: Indiana Department of Highways No. 5 stone.
3. Backfill and fill materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

4. Trench Encasement fill shall consist of silty clay, free of organic material, with a plasticity index of 10. Clay with a liquid limit in excess of 60 shall not be used.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation includes excavation to subgrade elevations including excavation of earth, rock, bricks, wood, cinders, and other debris. All excavation of materials shall be included in the lump sum portion of the work and will be UNCLASSIFIED. NO ADDITIONAL PAYMENT WILL BE MADE REGARDLESS OF TYPE OF MATERIAL ENCOUNTERED. Rock is not expected to be encountered on this project.

B. Exploratory Excavation and Potholing:

1. Provide potholing if utility crossing is suspected.

C. Differing Site Conditions:

1. The Contractor shall promptly, and before such conditions are disturbed, notify the Owner in writing of subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract. The Owner shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.
2. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in (a) above; provided, however, the time prescribed therefore may be extended by the Owner.
3. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

D. Additional Excavation:

1. When excavation has reached required subgrade elevations, notify the Engineer who will make an inspection of conditions. The surface of the excavated area shall be "proofrolled" with a loaded truck or other heavy construction equipment.
   a. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed in writing by the Engineer.
   b. Removal of unsuitable material and its replacement as directed will be included in the cost of the project.

E. Stability of Excavations:

1. Slope sides of excavations to comply with federal, state and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
2. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

F. Material Storage:

1. The Contractor is responsible for obtaining their own stockpile area. Any area of the park used shall gain the approval of the Park Property Manager prior to its use. Stockpile satisfactory excavated material until required for backfill of fill. Place, grade, and shape stockpiles for proper drainage. Dispose of excess soil material and waste materials as herein specified. The Contractor is responsible for submitting and obtaining a Construction Stormwater General Permit if required for offsite borrow pits and stockpile areas.

G. Cold Weather Protection:

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F(1°C).

3.02 COMPACTION

A. General:

1. Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

   a. Percentage of maximum density requirements: Compact soil to not less than the following percentages of maximum density for soils

which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698; and not less than the following percentages of relative density, determined in accordance with ASTM D4253 and D4254, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

b. Compact top 12-inches of subgrade and each layer of backfill or fill material in accordance with the following schedule.

PLACEMENT OF BACKFILL OR FILL MATERIAL			
Location	Minimum Compaction	Maximum Lift Thickness (Loose) (in.)	Moisture Content Relative To Optimum Moisture
Subgrade for Footings	100%	8	-2% to +2%
Subgrade for Floor Slabs Steps & Embankments	98%	8	-2% to +2%
Subgrade for Pavements and Walkways	95%	6”	-2% to +2%
Backfill for Walls & Piping	95%	6	-2% to +2%
Landscape Areas	90%	12	-2% to +2%
Note: Minimum compaction refers to percent of Maximum Dry Density as Determined by ASTM D-698.			

A. Moisture Control:

1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface or subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to the optimum moisture for compaction.

3.03 BACKFILL AND FILL

A. General:

1. With the exception of the organic debris, existing fill material, topsoil, and backfill materials, which are specifically designated per the plan details could be used as on site soil fill or backfill material, provided the moisture content of the soil is acceptable.
2. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below. Backfill material shall be no larger than the specified depth of the layer to be placed and/or compacted.
    a. In excavations, use satisfactory excavated or borrow material.
    b. Under grassed areas, use satisfactory excavated or borrow material.
    c. Under walks and pavements, use structure backfill as detailed on the plans.
    d. Under steps, use subbase material.

B. Backfill excavation as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of trash and debris.
5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation:

1. Strip the site as discussed in paragraph 3.01. Plow, strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
2. When existing ground surface has a density less than that specified under “Compaction” for particular area classification, break up ground surface, pulverize, bring moisture condition to optimum moisture

content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction:

1. Place backfill and fill materials in layers as indicated in paragraph 3.02 A.1.b. for material compacted by heavy compaction equipment, and not more than 4-inches in loose depth for material compacted by hand-operated tampers. Crushed stone shall be installed in accordance with Section 02255.

a. Before compaction, add moisture or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

b. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

2. On completion of the project, all backfill shall be dressed; holes filled; and surplus material hauled away. All permanent walks, street paving, roadway, etc., shall be restored and seeding and sodding performed as required.

3.04 GRADING

A. General:

1. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

B. Grading:

1. All materials used for backfill around structures shall be of a quality acceptable to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. All spaces excavated and not occupied by footings, foundations, walls or other permanent work shall be refilled with earth up to the surface of the surrounding ground,

unless otherwise specified, with sufficient allowance for settlement. In making the fills and terraces around the structures, the fill shall be placed in layers not exceeding 12-inches in depth and shall be kept smooth as the work progresses. Each layer of the fill shall be rolled with an approved type roller and/or be compacted. When it is not practicable to compact sections of the fill immediately adjacent to buildings or structures by rolling, then such sections shall be thoroughly compacted by means of mechanical tamping or hand tamping as may be required by the conditions encountered. All fills shall be placed so as to load structures symmetrically.

2. As set out hereinbefore, rough grading shall be held below finished grade and then the topsoil which has been stockpiled shall be evenly spread over the surface. The grading shall be brought to the levels shown on the Drawings. Final dressing shall be accomplished by hand work or machine work, or a combination of these methods as may be necessary to produce a uniform and smooth finish to all parts of the regrade. The surface shall be free from clods greater than 2-inches in diameter. Excavated rock may be placed in the fills, but it shall be thoroughly covered. Rock placed in fills shall no be closer than 12-inches from finished grade.

3. Grade areas adjacent to drain away from structures and to prevent ponding.

    a. Finish surfaces free from irregular surface changes, and as follows:

        1) Lawn or unpaved areas: Finish areas to receive top soil to within not more than 0.10 ft. above or below required subgrade elevation.

        2) Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.0 inch above or 1.0 inch below required subgrade elevation.

        3) Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1.0 in. above or 1 in. below required subgrade elevation.

C. Compaction:

1. After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or standard proctor density for each area classification.

3.05 PAVEMENT SUBBASE COURSE

A. If unsuitable subbase soils are encountered, the Contractor shall consult the Engineer for direction.

3.06 MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas:

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Settling:

1. Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.07 DISPOSAL OF EXCESS NONORGANIC SOIL AND ROCK

A. General:

1. All excess excavated material shall become the property of the Contractor and shall be disposed of by him outside the project limits. It is the Contractor's responsibility to locate a suitable waste area off-site, re-vegetate it after use, obtain necessary permits for use of the waste area and be in compliance with applicable laws and regulations.

B. Placement:

1. The distribution and gradation of material throughout the fill shall be such that the fill will be free from lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material. The combined excavation and placing operations shall be such that the materials when compacted in fill will be blended

sufficiently to secure the best practicable degree of compaction and stability.

2. Successive loads of material shall be placed on the fill so as to produce the best practicable distribution of the material.
3. The material shall not be dumped into final position but shall be distributed by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets and bridging will not occur.
4. No fills shall be placed upon a frozen surface, nor shall snow, ice or frozen materials be incorporated in the fill.

C. Spreading and Compacting:

1. The material shall be spread in uncompacted lifts with thickness as required in paragraph 3.02 A.1b. of this Section, depending on the amount of earth, over the entire length and width of the specified area. The material shall then be compacted by a minimum of 6 passes of a smooth drum vibratory roller. The roller shall have a total static weight of not less than 20,000 pounds. The diameter of the drum shall be between 5.0 and 5.5 feet and the width between 6.0 and 6.5 feet. The frequency of vibration during operation shall be between 1,200 and 1,500 vibrations per minute and the dynamic force at 1,400 vibrations per minute shall not be less than 16,000 pounds. Rollers shall be operated at speeds not to exceed 1.5 miles per hour.

D. Earth Cover:

1. The material shall be placed and spread in accordance with this Specification.

-END OF SECTION -

SECTION 02170
EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.01 WORK INCLUDED

Description.

The work consists of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air from construction activities.

PART 2 – PRODUCTS

A. Mulch and fertilizer shall be as specified in Sections 02936.

B. Erosion control blanket shall be Curlex Type "1" or equal. Erosion control blanket shall be coordinated with DNR F&W for compliance.

C. Temporary silt fence fabric shall be provided per the plan details.

D. Concrete Washouts shall be provided per the plan details.

PART 3 - EXECUTION

3.01 GENERAL

A. Silt Fence. Prior to construction, Contractor shall install silt fence or equivalent where the berm slope is steeper than 4:1 ratio and at the staging area as specified in the plans.

1. Silt fence shall be installed down-slope of all areas to be protected and installed as shown on the plans.

2. Silt fence shall remain in place until permanent soil stabilization has become established.

B. General Erosion Control. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills to prevent erosion and sedimentation. Keep to a minimum, the area of bare soil exposed at one time.

1. Seeding to protect disturbed areas shall occur as soon as reasonably possible following completion of earthwork activity.

2 Provide methods to control surface water, runoff, subsurface water, and water from excavations to prevent damage to the Work, the site, or adjoining areas.

3 The Contractor has full reasonability of inspecting the erosion control measures on a daily basis. At a minimum, practices need to be inspected weekly, within 24 hours after each storm event over ½ inch and daily during prolonged storm events. Failing practices shall be repaired or replaced immediately.

4 Comply with all federal, state, and local statutes, rules and regulations associated with control of storm water run-off from construction activities.

C. Other Pollutants. Vehicle fluids, including oil, grease, petroleum, and coolants

1. Drip pans and/or absorbent pads should be used during vehicle and equipment maintenance work that involved fluids, unless the maintenance work is perform over an impermeable surface in a dedicated maintenance area. Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately. Properly dispose of used oils, fluids, lubricants and spill cleanup materials. Do not place used oil in a dumpster or pour into a storm drain or watercourse.

2 In regards to fuel storage, material storage, equipment parking, etc. the contractor will be responsible to comply with (CSGP) requirements. All pollutants shall be contained on site and properly disposed of.

3 Trash cans shall be utilized on site for general litter during and after construction.

-END OF SECTION -

SECTION 02255
CRUSHED STONE, RIPRAP & STRUCTURE BACKFILL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish and install crushed stone, riprap and structure backfill for miscellaneous uses as shown on the Drawings, and as called for in the Specifications.

B. Sizes, types, and quality of crushed stone, riprap and structure backfill are specified in this Section and as noted in the plan details, but its use for replacement of unsuitable material, pavement base, and similar uses is specified in detail elsewhere in the Specifications. The Engineer may order the use of crushed stone for purposes other than those specified in other Sections, if, in his opinion, such use is advisable. Payment for same will be subject to negotiation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregate: When referred to in these Specifications, compacted aggregate shall be Compacted Aggregate # 8, #9, #11 or # 53 of the specific size as required by the plans and plan details. Aggregate gradation shall be in accordance with the following gradation chart.

Sieve Sizes	COARSE AGGREGATE SIZES (PERCENT PASSING)									
	COARSE GRADED								DENSE GRADED	
	2	5	8	9	11	12	43[1]	91	53[1]	73[1]
4 in. (100 mm)										
3 1/2 in. (90 mm)										
2 1/2 in. (63 mm)	100									
2 in. (50 mm)	80-100									
1 1/2 in. (37.5 mm)		100					100		100	
1 in. (25 mm)	0-25	85-98	100				70-90	100	80-100	100
3/4 in. (19 mm)	0-10	60-85	75-95	100			50-70		70-90	90-100
1/2 in. (12.5 mm)	0-7	30-60	40-70	60-85	100	100	35-50		55-80	60-90
3/8 in. (9.5 mm)		15-45	20-50	30-60	75-95	95-100				
No. 4 (4.75 mm)		0-15	0-15	0-15	10-30	50-80	20-40		35-60	35-60
No. 8 (2.36 mm)		0-10	0-10	0-10	0-10	0-35	15-35		25-50	
No. 30 (600 µm)						0-4	5-20		12-30	12-30
No. 200 (75 µm)[2]							0-6.0		5.0-10.0[4]	5.0-12.0
Decant (PCC)[3]		0-1.5	0-1.5	0-1.5	0-1.5	0-1.5		0-1.5		
Decant (Non-PCC)	0-2.5	0-2.5	0-3.0	0-2.5	0-2.5	0-2.0		0-2.5		

Notes:
1. The liquid limit shall not exceed 25 (35 if slag) and the plasticity index shall not exceed 5. The liquid limit shall be determined in accordance with AASHTO T 89 and the plasticity index in accordance with AASHTO T 90.
2. Includes the total amount passing the No. 200 (75 µm) sieve as determined by AASHTO T 11 and T 27.
3. Decant may be 0-2.5 for stone and slag.
4. When slag is used for separation layers as defined in 302.01, the total amount passing the No. 200 (75 µm) sieve shall be 10.0 to 12.0.

All aggregate and crushed stone under paved surfaces or within 5 feet of paved surfaces shall be compacted to 95% standard proctor. All aggregate in non paved areas shall be compacted to a minimum of 90% standard proctor. The procedure for determining maximum densities for compaction control shall be in accordance with AASHTO T 99. The size and type of stone to be used shall be as shown on the plan details.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Crushed stone shall be placed and compacted in accordance with INDOT Specification 211 and related specifications.

B. Crushed stone shall be placed in those areas as shown on the Drawings.

3.02 BROKEN CONCRETE RESTRICTION

A. Broken Concrete shall NOT be used as riprap.

-END OF SECTION –

SECTION 02500
PARK UTILITY AND TRAFFIC COORDINATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide coordination with existing utility companies and the Park, which have facilities within the existing project limits of the project.

B. Determine existing utility, size and type at potential crossings of the proposed construction with the existing utilities .

C. Provide Traffic Control for the constructions sites and coordinate with the Park Manager as to the time of work, road closures and lane restrictions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide equipment necessary to coordinate, excavate and/or pothole existing utility crossings as needed to determine potential conflicts.

B. Provide traffic control signage and traffic control devices in accordance with INDOT Specifications Section 801 and related material referenced specifications as referenced in 801.

a. Type C Construction signs as noted in the MOT plan sheets shall have the lettering FONTS and colors equal to standard R11-3 series signs.

PART 3 - EXECUTION

3.01 EXECUTION

A. UTILITIES

a. The Contractor shall coordinate with existing utilities and the Park Manager prior to any excavation near, exploratory excavation or potholing of their facilities. The Contractor shall pothole or exploratory excavate potential utility crossings to determine the extent of conflicts prior to ordering any materials.

b. The Contractor shall comply with Indiana law and shall also call Indiana Underground Plant Protection Services (Holey Moley) prior to conducting any excavation or other underground related work.

c. Existing utility line locations as noted on the plans are based on the best data available.

d. All crossing utilities shall be field verified for clearances with construction prior to the start of digging operations and prior to ordering any materials which could be affected such as manholes, inlets, etc.. Conflicts should be immediately noted to the Engineer in writing. Utility conflicts during construction will be the responsibility of the Contractor to correct.

e. The Contractor shall provide a minimum of 5 business days notice to any utility companies prior to excavation which is expected to uncover any given utility.

B. MAINTENANCE OF TRAFFIC

a. The Contractor shall fully coordinate with the Property Manager for all work to be conducted. The Contractor shall ensure that all traffic restrictions and road closures are coordinated with the Property Manager prior to putting any traffic control measures in place.

-END OF SECTION

SECTION 02502
ASPHALT PAVEMENT

PART 1 -- GENERAL

1.1 DEFINITIONS

A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.

B. RAP: Reclaimed asphalt pavement.

C. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements in accordance with the Indiana Department of Transportation (INDOT) Standard Specifications latest edition, Section 402.

D. Related Sections:
1. Section 02160 Earthwork.

1.2 MEASUREMENT AND PAYMENT

A. Hot Mix Asphalt Paving

1. Work Item Title and Number
a HMA Paving, INDOT TYPE 'B'

2. The payment for HMA asphalt pavement shall be based on lump sum bid and shall include tack coat.

3. The limits will be field determined by the ENGINEER or their representative.

1.3 REFERENCES

A. Standards referenced in this Section are listed below:

1. ASTM International:
a. ASTM D242, Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
b. ASTM D692, Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.

c. ASTM D1073, Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.

d. ASTM D3666, Standard Specification for Minimum Requirements for Agencies Testing and Inspection Road and Paving Materials.

e. ASTM D3910, Standard Practices for Design, Testing, and Construction of Slurry Seal.

2. Asphalt Institute (AI):

a. MS-22, Construction of Hot Mix Asphalt Pavements

3. Indiana Department of Transportation (INDOT) - Standard Specifications:

a. Section 402, Hot Mix Asphalt, HMA, Pavement.

b. Section 406, Tack Coat.

c. Section 808, Pavement Traffic Markings.

d. Section 904, Aggregates.

e. Section 916, Materials Certifications.

4. Indiana Department of Transportation (INDOT) – Design Manual:

a. Chapter 17, Quantity Estimating.

1.4 SUBMITTALS

A. Job Mix Designs: For each asphalt mix design the Contractor shall submit a copy of the following INDOT Material and Test Division standard forms:

1. HMA Design Mix Formula form

2. HMA Mix Design Approval Log

B. Provide a copy of the INDOT list of certified hot mix asphalt producers, dated within the last 12 months and highlight the plant name and certification number, on the list.

C. Provide a copy of the INDOT list of approved HMA mix design laboratories, dated within the last 12 months and highlight the laboratory name and certification number, on the list.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be an INDOT certified hot mix asphalt producer and shall be listed on the most recent version of the INDOT list of certified hot mix asphalt producers, unless otherwise approved by the Owner.

B. Laboratory Qualifications: Testing laboratory shall be an INDOT certified hot mix asphalt laboratory and shall be listed on the most recent version of the INDOT list of certified hot mix asphalt laboratories, unless otherwise approved by the Owner.

C. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

D. Regulatory Requirements: Comply with INDOT Standard Specifications latest edition, Section 402 and provisions thereto for asphalt paving work.

1. Asphalt-Paving Publication: Comply with Asphalt Institute (AI) MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

E. Pre-construction Meeting: Conduct conference at Project site. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

1. Review condition of subgrade and preparatory work.
2. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coats: Minimum surface temperature of 60 deg F (15.5 deg C).
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.5 deg C) at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: All aggregates used in asphalt mixture shall be in accordance with INDOT Standard Specifications latest edition, Section 904. Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, hard, strong; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.

D. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. All Hot Mix Asphalt (HMA) material shall conform to applicable requirements of the INDOT Standard Specification latest edition, Sections 402.

B. Tack Coat: Rapid-curve liquid asphalt conforming to INDOT Standard Specification latest edition, Section 406.

C. Water: Potable.

D. Recycled materials (RAP): Per INDOT Standard Specifications latest edition, Section 402.08 for Recycled Materials not to exceed 25% by weight (mass) of the total mixture.

PART 3 - EXECUTION

3.1 GENERAL

A. Traffic Control:

1. In accordance with Section 104.04, Maintenance of Traffic.
2. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.

B. Driveways: Re-pave driveways as specified on the construction documents. Leave driveways in as good or better condition than before start of construction.

3.2 LINE AND GRADE

A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

B. Shoulders: Construct to line, grade, and cross-section shown.

3.3 PREPARATION

A. Prepare subgrade as specified in INDOT Standard Specifications latest edition, Section 402.11.

B. Existing Roadway:

1. Modify profile by grinding, milling, or overlay methods as approved, to provide transition to existing adjacent pavement and surfaces and to produce smooth riding connection to existing facility.

2. Remove existing material to a minimum depth of 38.1 millimeters (1 1/2 inch).

3. Paint edges of existing adjacent pavement with tack coat prior to placing new pavement.

C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.4 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

3.5 PATCHING

A. Hot-Mix Asphalt (HMA) Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement,

unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.000251 Ton/Syd (0.06 Gal/Syd) per INDOT Design Manual latest edition, Chapter 17 – Quantity Estimating.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.6 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.00251 Ton/Syd (0.06 gal/Syd) per INDOT Design Manual latest edition, Chapter 17 – Quantity Estimating.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.7 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner

that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt surface course in single lift.
2. Spread mix at minimum temperature of 250 deg F (121 deg C).
3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints as described in INDOT Standard Specifications latest edition, Section 402.14.
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Compaction shall conform to INDOT Standard Specifications latest edition, Section 402.15 for the minimum number of rollers and coverage. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still at the highest temperature where the mixture does not exhibit any possibility for distortions.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled sufficiently to prevent distortions.

3.10 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).

2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10 foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm)
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.11 PAVEMENT OVERLAY

A. Preparation:

1. Remove fatty asphalt, grease drippings, dust, and other deleterious matter.
2. Surface Depressions: Fill with asphalt concrete mix, and thoroughly compact.
3. Damaged Areas: Remove broken or deteriorated asphalt concrete and patch as specified in Article Patching.
4. Portland Cement Concrete Joints: Remove joint filler to minimum 1/2 inch (12 millimeters) below surface.

B. Application:

1. Tack Coat: As specified in this section.
2. Place and compact asphalt concrete as specified in Article Pavement Application.
3. Place first layer to include widening of pavement and leveling of irregularities in surface of existing pavement.
4. When leveling irregular surfaces and raising low areas, the actual compacted thickness of any one lift shall not exceed 2 inches (50 millimeters).
5. Actual compacted thickness of intermittent areas of 120 square yards (100 square meters) or less may exceed 2 inches (50 millimeters), but not 4 inches (100 millimeters).

6. Final wearing layer shall be of uniform thickness, and meet grade and cross section as shown.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to INDOT Standard Specifications latest edition, Sections 402.13 and 402.15.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

F. All required testing must be witnessed and approved by the Resident Project Representative, assigned by Owner.

3.13 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from project site and legally dispose of them in an EPA-approved landfill.

3.14 TESTING FREQUENCY

A. Quality Control Tests:

1. Asphalt Content, Aggregate Gradation: Once per every 500 Tons (400 mg) of mix or once every 4 hours, whichever is greater.

2. Mix Design Properties, Measured Maximum (Rice's) Specific Gravity: Once every 1,000 Tons (900 mg) or once every 8 hours, whichever is greater.

B. Density Tests: Once every 500 Tons (450 mg) of mix or once every 4 hours, whichever is greater.

- END OF SECTION -

SECTION 02720
PAVEMENT MARKINGS AND STRIPING

PART 1 - GENERAL

1.01 WORK INCLUDED

Providing and placing durable pavement markings.

1.02 RELATED SECTIONS

Section 02502 – ASPHALT PAVEMENT

PART 2 - PRODUCTS

2.01 Durable marking material shall be thermoplastic, preformed plastic or multi-component pavement markings. The materials shall not contain any toxic heavy metals above the limits of the regulatory levels of 40 CFR 261.24, table 1, when tested in accordance with EPA TCLP, or contain any other material which will require characterization as a hazardous waste when removed from the pavement surface.

(a) Thermoplastic

This material shall be in solid form in accordance with AASHTO M 249 or supplied in a preformed state and shall not contain lead chromate pigments. Heat bonded preformed thermoplastic shall be in accordance with AASHTO M 249 with the exception of the application properties outlined in section 5 of AASHTO M 249 shall not apply. Drying time and short term and long term flowability requirements are not applicable at time of installation. The material shall be capable of fusing to itself and previously applied thermoplastic pavement markings when heated. The material shall contain a minimum of 30% beads by weight. The beads shall be homogeneously blended throughout the material. The marking thickness throughout its width, before the material is heated up, shall be supplied at a minimum average thickness of 90 mils.

(b) Preformed Plastic

This material shall consist of a homogeneous preformed plastic film with a width as specified. Dimensional requirements shall meet one of the following:

1. Preformed plastic material shall have a smooth plane surface, with a minimum thickness of 60 mils throughout the entire cross section, or

2. Preformed plastic material shall have an embossed patterned surface with 35% to 65% of the surface area raised. The edges of the raised areas shall present a near vertical face to traffic from any direction. The minimum thickness of the raised area shall be 60 mils. The area between the raised areas shall be a minimum of 20 mils measured at the thinnest section of the cross section.

The material shall have a precoated adhesive. The adhesive shall allow the preformed plastic material to be repositioned on the pavement surface to which it is applied before permanently fixing it in its final position with downward pressure.

The material shall be capable of being affixed to either HMA or PCCP by means of the precoated adhesive and, following the initial application of pressure, shall mold itself to pavement contours, breaks, and faults by traffic action at normal pavement temperatures.

The near vertical faces of patterned preformed plastic shall be coated with a layer of beads.

Packaging

Each package shall be marked to indicate the color of the material, specific symbol or word message, the batch number, the manufacturer's name, address, and the date of manufacture.

(c) Multi-Component

The material shall be for use on both HMA and PCC pavements. The material shall consist of a pigmented resin system of epoxy. The multi-component pavement markings shall be ultra-violet light resistant and shall not darken during the heating conditions of application, chalk, crack, show appreciable degradation or discoloration due to sunlight exposure and aging of the markings. The cured multi-component pavement markings shall be impervious to salts, grease, oil, fuels, acids, alkalies and other common chemicals that may be found in or on HMA and PCC pavements. The pigment in the white material shall contain titanium dioxide in accordance with ASTM D 476. The material shall be provided in containers, which are in accordance with current Federal DOT regulations. Each container shall be labeled in accordance with 29 CFR 1910.1200 and include the trade name or trade mark, formulation or product identification, date of manufacturer, color, batch or lot number, component identification and mixing instructions.

1. Standard Beads

Beads shall be glass in accordance with AASHTO M 247, Type 1. The beads 110 shall have a moisture resistant coating.

2. Modified Standard Beads

The modified standard beads shall be glass in accordance with AASHTO M 247, Type 2. These beads shall have a moisture resistant coating and may have an adhesion promoting coating.

3. Supplemental Beads

The supplemental beads shall be glass in accordance with AASHTO M 247, Type 4 except the beads shall have a minimum roundness of 80% by weight. These beads shall a have a moisture resistant coating and may have an adhesion promoting coating.

4. Supplemental Elements

These shall be for color, skid resistance, or wet weather retro-reflectivity and may be used provided they do not exhibit a characteristic of toxicity referenced in AASHTO M 247. A type D certification in accordance with 916 shall be furnished for the supplemental elements.

PART 3 - EXECUTION

3.1 GENERAL

2. Thermoplastic

a. Application

Thermoplastic marking shall be applied in molten form by conventional extrusion when the pavement and ambient air temperatures are a minimum of 50°F and rising; or by ribbon type extrusion or spray when the pavement and ambient air temperatures are 50°F and rising. Heat bonded preformed thermoplastic may be used for transverse or message markings. The average final thickness of each 36 in. length of thermoplastic marking shall be no less than 90 mils and no more than 125 mils.

Immediately following the application of the thermoplastic markings, additional retro-reflectorization shall be provided by applying beads to the surface of the molten material at a uniform minimum rate of 8 lb/100 sq ft of marking. Individual passes of markings shall not overlap or be separated by gaps greater than 1/4 in. longitudinally.

b. Equipment

The equipment used for the application of thermoplastic markings shall consist of a kettle for melting the material and an applicator for applying the markings. All of the equipment required for melting and applying the material shall maintain a uniform material temperature within the manufacturer specified limits, without scorching, discoloring or overheating any portion of the material.

A truck-mounted machine shall be equipped with the following: an air blast device for cleaning the pavement ahead of the marking operation; a guide pointer to keep the machine on an accurate line; at least two spray guns which can be operated individually or simultaneously; agitators; a control device to maintain uniform flow and application; an automatic device which will provide a broken line of the required length; and an automatic bead dispenser which is synchronized with the marking application.

A hand-propelled machine may be used to apply markings.

The equipment for applying heat bonded preformed plastic shall be in accordance with the manufacturer's recommendations. An open flame shall not come into direct contact with the pavement.

c. Performance Requirements

When the initial average retro-reflectivity measurement is below the required minimum the segment of line shall be removed and replaced with no additional payment. Pavement markings segments which have more than five of 20 individual readings below the minimum required shall be removed and replaced with no additional payment.

3. Preformed Plastic

a. Application

The markings shall be applied when the air temperature is a minimum of 40°F and rising. A primer is required if the ambient air temperature is below 50°F. The pavement surface shall be primed with a binder material in accordance with the manufacturer's recommendations.

If there is a dispute regarding installation, the manufacturer shall provide a trained representative to ensure that the installation is properly performed.

b. Performance Requirements

When the initial average retro-reflectivity measurement is below the required minimum the segment of line shall be removed and replaced with

no additional payment. Pavement markings segments which have more than five of 20 individual readings below the minimum required shall be removed and replaced with no additional payment.

4. Multi-Component

a. Application

This material shall be applied only when the pavement and ambient air temperatures are 40°F and rising. The wet film thickness of the marking material shall be a minimum of 20 mils. Immediately following the application of the markings, additional reflectorization shall be provided by applying beads to the surface of the wet marking at a uniform minimum rate of 20 lb/gal. of marking.

b. Equipment

The machine used to apply the marking material shall precisely meter each component, and produce and maintain the necessary mixing head temperature within the required tolerances.

c. Performance Requirements

Pavement marking segments which are found to have an average retro-reflectivity reading below the required minimum shall be re-striped with no additional payment. Pavement markings segments which have more than five of 20 individual readings below the minimum required shall be re-striped with no additional payment. The re-striping shall begin within 14 calendar days of the completion of the retro-reflectivity measurement. Line segments may be re-striped.

-END OF SECTION -

SECTION 02923
LANDSCAPE GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

Final grading of topsoil for finish landscaping.

1.02 RELATED SECTIONS

Section 02160 - EARTHWORK

Section 02936 - SEEDING

PART 2 - PRODUCTS

A. Topsoil: Excavated Material free of rocks, roots larger than 1/2-inch, subsoil, debris and large weeds.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that trench backfilling has been inspected.

B. Verify substrate base has been contoured and compacted.

3.02 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1/2-inch in size. Remove subsoil.

C. Scarify subgrade to depth of 3-inches where topsoil is scheduled. Scarify in areas where equipment is used for hauling and spreading topsoil and has compacted subsoil.

3.03 PLACING TOPSOIL

A. Place topsoil in areas where seeding, planting are to occur to the thickness as scheduled. Place topsoil during dry weather.

B. Fine grade topsoil eliminating rough or low areas. Maintain profile and contour of subgrade.

C. Remove roots, weeds, rocks and foreign material while spreading.

D. Manually spread topsoil close to trees, plants and building to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

G. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.04 TOLERANCES

A. Top of topsoil; Plus or minus 1/2-inch.

3.05 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect utilities and paving.

3.06 SCHEDULES

A. Compacted topsoil thickness at the following areas:

1. Seeded Grass: 3-inches.
2. Sod: 2-inches.

-END OF SECTION -

SECTION 02936
SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Seeding, mulching.

B. Maintenance.

1.02 RELATED SECTIONS

A. Section 02160 - EARTHWORK

B. Section 02923 - LANDSCAPE GRADING

1.03 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimber Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 MAINTENANCE DATA

A. Includes maintenance instructions, cutting method and maximum grass height.

1.05 QUALITY ASSURANCE

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

1.06 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division I.

B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.08 MAINTENANCE SERVICE

Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for two cuttings.

PART 2 - PRODUCTS

2.01 SEED MIXTURES

A. Permanent Seed Mixture:

INDOT mixes Type R and U

B. Temporary Seed Mixture: (Refer to Erosion & Sediment Control Specifications)

2.02 ACCESSORIES

Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

Water: Clean, fresh and free of substance of water or matter which could inhibit vigorous growth of grass.

Erosion Fabric: Jute matting, open weave.

Stakes: Softwood lumber, chisel pointed.

String: Inorganic fiber.

Fertilizer: 12-12-12 Commercial Mixture.

PART 3 - EXECUTION

3.01 PREPARATION

Lawn: Till soil thoroughly to a minimum depth of 2".

Apply fertilizer to soil at rate of 20 pounds per 1000 square feet immediately prior to seeding.

Rake or lightly till fertilizer into soil.

When topsoil is exceedingly dry, moisten to a depth of 4", 48 to 72 hours prior to start of seeding.

Perform watering to prevent run off.

3.02 SEEDING:

Sow seed uniformly over entire area in 2 operations at rate of 3 lbs. per 1000 sq.ft.

Apply second seeding at right angles over the first.

Seeding operation may be by broadcast method or drill equipment.

Lightly cover seed by hand raking or dragging lawn areas to depth of 1/4".

Smooth and firm seeded areas with a 200# roller and water with a fine spray.

Cover all sloped areas (greater than 3 to 1 slopes) and other areas where erosion may occur with burlap erosion mat. Anchor securely in place.

Mulch all seeded areas at a minimum rate of 1 Ton/acre. Mulch shall be held in place as contractor will be responsible for replacing mulch which has blown away prior to adequate seeding germination. Mulch shall be held in place by one of the following methods.

1. Tilling or punching mulch into the soil.

2. Commercially produced mulch binder.

3. Binder twine fastened down with pegs spaced 6 feet or less apart.

4. Commercially produced polymetric plastic net held in place with wire staples.

3.03 LAWN ESTABLISHMENT

Provide daily maintenance until lawn is well established.

Provide necessary lawn care including fertilizing, weed eradication, watering, mowing, removal of excess clippings and replacement of unsuitable sod.

Establishment period for lawns:

Seeded Lawns: extend until uniform stand of grass established over entire area.

-END OF SECTION-

DIVISION 3
CONCRETE

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1- GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to place all cast-in-place concrete, reinforcing steel, forms, and miscellaneous related items, including sleeves, ringlets, anchor bolts, stone veneer anchors, inserts and embedded items, as shown on the Drawings and specified herein.

1.02 RELATED WORK

A. Section 03345 - Concrete Finishing

1.03 DESCRIPTION

A. Concrete shall be of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be ready-mixed, or transit-mixed concrete produced by a plant acceptable to the Engineer. All constituents, including admixture, shall be batched at the central batch plant.

B. Reinforced concrete shall conform to INDOT Specification 702, Concrete, Class "A". Admixture shall be added for Anti Corrosion without lowering strength requirements. Strength of Concrete shall be 4000 psi.

C. All testing and inspection services required will be provided by the Contractor. Cost of such work, except as specifically stated otherwise, will be paid for by the Contractor. Methods of test will comply in detail with the latest applicable ASTM Methods of Test.

D. Samples of constituents and of concrete as placed will be subjected to laboratory tests. All materials incorporated in the work shall conform to accepted samples.

E. Under special circumstances, the Engineer may allow minor deviations from the material requirements specified, provided the resulting concrete quality is not adversely affected or provided a suitable adjustment in cement content is made to compensate for such deviations without cost to the Owner.

1.04 SUBMITTALS

A. The Contractor shall submit to the Engineer for approval a proposed design mix for each concrete strength and type required by this Specification. See Paragraph 1.05 for additional information required. An additional mix design for each type and strength of concrete to be placed by pumping shall be submitted to the Engineer for acceptance.

B. The Contractor shall submit to the Engineer for acceptance, as provided in Section 01300, shop drawings showing placement of all joints of plywood forms, and rustications. Contractor shall specify what methods of form bracing he intends to use.

1.05 QUALITY ASSURANCE

A. The actual acceptance of aggregates and development of mix proportions to produce concrete conforming to the specific requirements shall be determined by means of prior laboratory tests made with the constituents to be used on the work.

B. Well in advance of placing concrete, the Contractor shall discuss with the Engineer the proposed source of materials and concrete mixture which he proposes to use. He shall furnish samples of aggregate and cement for testing, deliver them to the organization designated by the Engineer, and shall permit ample time for the laboratory to develop a proposed design mix to modify the design of the mix within the limits of these specifications.

C. The limiting strengths, water contents and cement factors of INDOT Specification 702.02 shall apply.

High early strength Portland cement is allowed as an option on this project. When high early strength Portland cement is permitted, the same strength requirements shall apply except that the indicated strengths shall be attained at seven (7) days instead of twenty-eight (28) days.

C. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.

D. If the materials from the sources originally accepted change in characteristics, the Contractor shall, at his expense, have made new acceptance tests of aggregates and establishment of new basic mixtures by the acceptable testing laboratory being employed on the work.

E. Concrete shall be of such consistency and mix composition that it can be readily worked into the corners and angles of the forms and around the reinforcement, inserts, and wall castings without permitting materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting.

1.06 ACCEPTANCE TESTS

A. Conformity of aggregates to these Specifications, and the actual proportions of cement, aggregates, and water necessary to produce concrete conforming to the requirements set forth herein, shall be determined by tests made with representative samples of the materials to be used on the work. Tests will be made by the laboratory selected by the Engineer and shall comply with ASTM Specification C-39.

B. Cement shall be subject to testing to determine that it conforms to the requirements of this Specification. Methods of testing shall conform to the appropriate specification, but the place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular need.

C. Samples of fine and coarse aggregates shall be furnished for examination and testing at least three weeks before the Contractor proposes to use them in the work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall conform to INDOT Specification 702, Class “A” Concrete.

B. Grout shall be non-shrink epoxy and be proportioned with sand in strict accordance with the manufacturer's instructions for the use intended. Non-shrink grout shall conform with the Corps of Engineers Specification for Non-Shrink Grout, CRD-C621-82B. The mixed epoxy grout system shall have a minimum "working life" of 45 minutes at 75^{o}F.

C. Flowable Fill used on the project shall conform to INDOT Specification 213 and referenced specifications.

PART 3 EXECUTION

3.01 MEASURING MATERIALS

A. Materials shall be measured by weighing except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Scales shall have been certified by the local Sealer of Weights and Measures within one year of use. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one per cent of the desired amount. Cement in standard packages (sacks) need not be weighed, but bulk cement and fractional packages shall be weighed.

B. Water shall be measured by volume or by weight. The water-measuring devices shall be capable of control to 1/2% accuracy. All measuring devices shall be subject to approval. Admixtures shall be dispensed either manually with use of calibrated containers or measuring tanks, or by means of an approved automatic dispenser designed by the manufacturer of the specific admixture.

3.02 MIXING

A. Concrete shall be ready-mixed, or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and under the direction of the Engineer.

B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1 1/2 hours after water was first introduced to the mix. Central mixed concrete shall be plant-mixed a minimum of 1 1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharged. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.

C. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck mixer manufactures,

Bureau of the National Ready-Mixed Concrete Association, as well as ACI Standard 318, Chapter 5, and ASTM Specification C94.

D. The retempering of concrete or mortar which has partially hardened, that is mixing with or without additional cement, aggregate, or water, will not be permitted.

E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

3.03 FIELD TESTS

A. Sets of three field control cylinder specimens will be taken at random by the Contractor during the progress of the work, in conformity with ASTM Designation C31; the total number of specimens taken on the project may average one set per 20 cu yds, and in general not less than one set of specimens will be taken on any one day. When average ultimate 28-day strength of control cylinders in any set falls below the required ultimate strength or below proportional minimum 7-day strengths where proper relation between 7- and 28-day strengths have been established by tests, proportions, water content, or temperature conditions shall be changed to secure the required strengths. See also Section 03300, paragraph 3.10, Failure to Meet Requirements.

B. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through his operations, and furnishing material and labor required for the purpose of taking concrete cylinder samples, curing boxes, and shipping boxes. All shipping of specimens will be paid for by the Contractor. Curing boxes shall be acceptable to the Engineer.

C. Slump tests will be made in the field by the Contractor and observed by the Engineer.

3.04 INSPECTION AND CONTROL

A. The preparation of forms, placing of reinforcing steel, conduits, pipes, and sleeve, batching, mixing, transportation, placing and curing of concrete shall be at all times under the inspection of the Engineer.

B. The Contractor will also engage the services of an independent testing laboratory to establish the basic mixtures of concrete as required by the specifications and shall complete the testing.

C. Air entrainment shall be measured by the Engineer or his representative at the time of concrete deposit in accordance with ASTM Designation C231.

3.05 CONCRETE APPEARANCE

A. Concrete for every part of the work shall be of homogeneous structure which, when hardened, will have the required strengths, durability and appearance.

B. Forms, mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing.

C. When concrete surfaces are stripped, the concrete when viewed in good lighting from 10 ft away shall be pleasing in appearance, and at 20 ft shall show no visible defects.

3.06 FORMS

A. Forms shall be used for all concrete masonry, including footings. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance, and to the elevations indicated on the Drawings.

B. Forms for all exposed exterior and interior concrete walls shall be Type A-C exterior grade plywood with "A" veneer exterior on casting side. Rusticiations shall be at the location and to the details shown on the Drawings. Moldings for chamfers and rustications shall be milled and planed smooth.

C. Forms for all other cast-in-place concrete shall be made of wood, metal, or other accepted material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

D. Edges of all form panels in contact with concrete shall be flush within 1/32-in. and forms for plane surfaces shall be such that the concrete will be plane within 1/16-in. in 4 ft. Forms shall be tight to prevent the passage of mortar and water and grout.

E. Forms for walls shall have removable panels at the bottom for cleaning, inspection, and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcements above the fresh concrete.

F. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting 90° corners. Similar chamfers strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Drawings.

G. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports, and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

H. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved non-staining oil or liquid form coating not having a paraffin base.

I. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and, in the case of wood forms, preoiled.

J. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch diameter and 1-inch long. Form ties in concrete exposed to view shall be the Richmond "Tyscru" cone-washer type, or approved equal.

Throughbolts or common wire shall not be used for form ties.

3.07 PLACING AND COMPACTING

A. Unless otherwise permitted, the work begun on any day shall be completed in daylight of the same day.

B. Place no concrete until reinforcing, steel, pipes, conduits, sleeves, hangers, anchors, and other work required to be built into concrete have been inspected and approved by the Engineer. Remove water and foreign matter from forms and excavation. Place no concrete on frozen soil, and provide adequate protection against frost action during freezing weather. All soil preparation

below slabs and footings shall be approved by the Engineer before placing concrete.

C. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Deposit no partially hardened concrete.

D. "Cold joints" are to be avoided unless called for on the Drawings. If they occur they are to be treated as bonded construction joints.

E. At construction joints the surfaces of the concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials, laitance, and weak concrete and roughened with suitable tools to expose a fresh face. At least two hours before and again shortly before the new concrete is deposited, the joints shall be saturated with water. After glistening water disappears, the joints shall be given a thorough coating of neat cement slurry mixed to the consistency of very heavy paste. The surfaces shall receive a coating at least 1/8-inch thick, well scrubbed-in by means of stiff bristle brushes whenever possible. New concrete shall be deposited before the neat cement dries.

F. Deposit concrete to maintain, until the completion of the unit, a horizontal plastic surface, vertical lifts of deposited concrete shall not exceed 24-inches and preferably 18-inches.

G. Chutes for conveying concrete shall be of U-shaped design and sized to ensure a continuous flow of concrete. Flat (coal) chutes shall be not employed. Chutes shall be metal or metal-lined and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees to the horizon and shall be such as to prevent the segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used, and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally over distances exceeding 5 feet. Concrete Washouts as provided in the plans shall be provided and used for the cleaning of all concrete equipment. The Contractor shall ensure that concrete is not washed onto the ground or drainage ways of the park.

H. The pumping of concrete is an acceptable method. The proposed equipment and concrete mix shall be submitted to the Engineer prior to usage for approval.

I. In thin sections of considerable height, concrete shall be placed using suitable hoppers, spouts with restricted outlets, or otherwise, as required or approved.

J. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade to prevent puddling adjacent to forms and to remove bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cu. yds. of concrete placed per hour. In addition, one spare vibrator in operating condition shall be on the site.

K. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet tamped, and rolled until thoroughly compacted prior to placing concrete.

L. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the Drawings or as acceptable to the Engineer.

M. Concrete Repair as noted in the plans shall include the filling of all voids behind the apparent failure of the existing concrete with a concrete mixture as noted in these specifications.

3.08 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.

B. Concrete placed at air temperature below 40^{o} F shall have a minimum temperature of 60^{o} F. When the air temperature is below 40^{o} F or near 40^{o} F and falling, the water and aggregates shall be heated before mixing. Accelerating chemicals shall be so protected that the temperature at the surface will not fall below 50^{o} F for at least 7 days after placing. The Contractor shall

submit for acceptance by the Engineer the methods he proposes to use against low temperatures. No salt, manure, or other chemicals shall be used for protection.

C. All concrete, particularly exposed surfaces, shall be treated immediately after concreting or cement finishing is completed to provide continuous moist curing above 50° F for at least 7 days, regardless of the ambient air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or other approved means; horizontal surfaces, slabs, etc. in the liquid retaining structures shall be ponded to a depth of 1/2-inch or kept continuously wet by use of sprinklers.

D. In cold weather supplementary continuous warm curing (above 50° F) shall provide a total of 350-day degrees (i.e., 5 days 70° F, etc.) of heat.

E. Wherever practicable, finished surface and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

F. Concrete deposited in hot weather shall have a placing temperature which will not cause a difficulty from loss of slump, flash set or cold joints, and in any case the temperature of concrete being placed shall not exceed 90° F. If necessary the Engineer may direct the Contractor to immediately cover plastic concrete with polyethylene sheeting to prevent rapid loss of moisture due to excessive ambient temperature and/or low humidity. This work will be part of the Contract price and not an extra.

3.09 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 30 percent of the ultimate strength prescribed by the design, and not before reaching the following number of day-degrees (whichever is the longer):

Beams and slabs	500
Walls and vertical surfaces	100

*Day-degree: Total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily weighted average temperature of 60° F equal 300 day-degrees. Temperatures below 50° F not to be included.

B. Shores shall not be removed until the concrete has attained at least 60% of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it.

3.10 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and tested in accordance with the above provisions fall below the values required, the Engineer shall have the right to require changes in proportions as outlined above to apply on the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed, the cost of such additional curing to be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in conformity with Sections 15 and 17 of ASTM Specification C94 for Ready-mixed Concrete.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in accordance with ASTM Methods C42 and C39. In case of failure of the latter, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on anyone of the slabs, beams, foundations, walls, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.

C. Slabs or beams, under load test, shall be loaded with their own weights plus a superimposed load of 2 times design live load. The load shall be applied uniformly over portion being tested in acceptable manner, and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period does not exceed value:

   D equals 0.001 (L x L)/t, in which "L" is span in feet, "t" is depth of slab or beam in inches.

D. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, slab or beam under test recovers at least 75% of observed deflection.

E. Should the strength of test cylinders fall below 60% of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.11 PATCHING AND REPAIRS

A. It is the intent of these Specification to require forms, mixture of concrete and workmanship so that concrete surfaces, when exposed, will require no patching.

B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

C. Immediately after removal of forms remove plugs and break off metal ties as required by Paragraph 3.06. Holes are then to be promptly filled upon stripping as follows: moisten the hole with water, followed by a 1/16-inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1-1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spiderweb. Trowel smooth with heavy pressure. Avoid burnishing.

D. When patching or repairing exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine carborundum stone at an age of 1 to 5 days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

E. Defective concrete and honeycombed areas as determined by the Engineer shall be chipped down reasonably square and at least 1-inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly imbedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-inch wide all around the steel. For areas less than 1-1/2-inch deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1-1/2-

inch layers on successive days, each layer being applied (with slurry, etc.) as described above. To aid strength and bonding of the multiple layer repairs, the Engineer may order the use of non-shrink, non-metallic grout.

Additives for non-shrink grout shall be as recommended by the manufacturer but shall conform to the Corps of Engineers Specification for Non-Shrink Grout, CRO-C621-82B. The grout shall consist of the following minimum cement/sand proportions:

Material	Volumes	Weights
Cement	1.0	1.0
Sand	1.5	1.5

F. For very heavy (generally formed) patches, the Engineer may order the addition of pea gravel to the mixture and the proportions modified as follows: (Non-shrink additives by manufacturer)

Material	Volumes	Weights
Cement	1.0	1.0
Sand	1.0	1.0
Pea Gravel	1.5	1.5

3.12 MODIFICATION AND REPAIR TO EXISTING CONCRETE

A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Contract Drawings, specified, or necessary to permit completion of the work. Finishes, joints, reinforcements, sealants, etc. are specified under respective sections of Specification. All work shall conform with other requirements of this Section and details shown on the Drawings or within this section.

B. Mix proportions of materials used in the modifications and repair to existing concrete as indicated on the drawings shall be:

1. When new material other than non-shrink grout is shown to be connected to existing concrete, use the following cement mixtures depending on the depths called for on the drawings:

a. Less than 2" in depth

Material	Volume
Cement	1.0
Sand	2.0
Water = 5 gals/100 lbs cement	

b. From 2" to 12” in depth

Material	Volume
Cement	1.0
Pea Gravel	2.5
Sand	2.0
Water = 5 gals/100 lbs cement	

c. Greater than 12 " in depth

Material

Concrete as specified under 2.01-MATERIALS in this section

2. Non-Shrink Grout - As specified under 3.11 "Patching and Repairs (E) or (F) in this section.

3. Epoxy Bonding Agent

   a. Epoxy bonding agent shall be used on all repairs and shall be a two component epoxy adhesive specifically formulated for bonding old concrete to new (plastic) cement. Component A shall be an epoxy resin and Component B shall be an epoxy hardener. The epoxy bonding agent shall be "Sikastix 370, Sikadur Hi-Mod", by Sika Corporation, Lyndhurst NJ; "Pro bond 821 or 822" by Protex Industries, Denver, CO; "Concresive 1170" by Adhesive Engineering company, San Carlos, CA; or approved equal.

   b. The mixing ratio shall be as recommended by the manufacturer for the ambient temperature when placed. Furnish manufacturer's specific instruction for specific job application and obtain Engineer's review prior to purchase.

   c. Epoxy bonding agent shall conform to ASTM C-881 and corresponding tests for bond strength and shrinkage as specified in ASTM C-882, C-883, and C-884.

d. The properties of the cured material shall meet the following.

Compressive Strength (ASTM D-695)
48 hour - 1,000 psi
28 day - 8,500 psi

Tensile Strength (ASTM D-638)
14 day - 4,000 psi

Bond Strength (ASTM C-882 or C-884) - 1,500 psi

e. Approval requirements: The Contractor must furnish notarized certification that the material proposed for use meets all of the above requirements and that the material has been previously used successfully for the purpose described.

C. Demolition of Existing Concrete or Stone

1. Concrete shown to be removed on the Drawings shall be done by line drilling or saw cutting at limits on concrete to be removed, followed by jack-hammering in areas where concrete is to be taken out. The Contractor shall be responsible for removing concrete in such a manner that surrounding concrete or existing reinforcing to be left in place, and existing in-place equipment, is not damaged. Sawcutting at limits of concrete to be removed shall be done if indicated on the Drawings, or otherwise approved by the Engineer. The Contractor shall be responsible for the means and methods used, and for temporary support where needed.
2. If rebar is cut, new Rebar shall be installed with epoxy ¾" from the existing cutoff reinforcement.

D. Connection to Existing Concrete

1. Roughen surface of existing concrete to be connected to new materials by sand-blasting, chipping, or scarifying. Thoroughly clean area of concrete, to receive new materials, of loose particles and dust or other contamination objects.

2. Existing reinforcing as shown on the Drawings to be left in place shall be wire brushed to remove rust or concrete on the bar. The existing reinforcing shall be cut, if lapped rebar limits are reached and tied to new rebar. New rebar shall be provided with a minimum of one inch of cover all around and at ends of the bar. The reinforcing shall be thoroughly cleaned of loose- particles and dust before incorporating in new materials.

3. New steel shall be added with existing at 12" max c-c all ways unless otherwise noted on the plans. See Section 3200 for additional information. If not shown on the plans the minimum size of the rebar shall be No. 5.

Connection Methods:

Method A: After existing concrete surface has been roughened and cleaned as specified above, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall conform strictly with the manufacturer's recommendations. Immediately pour new cement mixture or non-shrink grout as detailed on the drawings.

Method B: Drill holes for dowels to the diameter recommended by the epoxy bonding agent manufacturer. The drilled hole shall first be filled with epoxy bonding agent, then dowels shall be inserted by tapping. These holes shall be blown clear of loose particles and dust prior to installing epoxy bonding agent. Where shown on the Drawings, expansion bolts shall be installed in place of bonded dowels. Pour new cement mixture as detailed on the drawings.

E. Where existing reinforcing is exposed due to saw cutting and existing concrete is removed, a coating or surface treatment of epoxy protectorant shall be applied to the entire cut surface. The protectorant shall be Sikagard 62 by Sika Corporation, Duralprep A.C. by Euclid Chemical, or an approved equal. The epoxy protectorant shall be formulated for the intended application, and applied according to manufacturer's recommendations.

3.13 INSTALLATION SCHEDULE

A. Concrete for all structures shall have minimum compressive strength at 28 days of 4,000 psi.

B. Concrete fill and duct encasement- shall have a minimum compressive strength at 28 days of 2,500 psi.

3.14 FIELD CONTROL

A. The Contractor shall advise the Engineer of his readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed

concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.

B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.

C. The Contractor shall cooperate in the obtaining of cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. The Contractor shall repair all core holes to the satisfaction of the Engineer. The work of cutting and testing the cores will be at the expense of the Contractor.

-END OF SECTION-

SECTION 03345
CONCRETE FINISHING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to finish cast-in-place concrete surfaces as specified herein.

1.02 RELATED WORK

A. Section 03300 Cast In Place Concrete

1.03 SCHEDULE OF FINISHES

A. Concrete for the project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another section.

B. The base concrete for the following conditions shall be finished as noted and as further specified herein:

1. Exterior concrete excluding slabs and walking surfaces, and exposed interior concrete; Rubbed Finish.

2. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material; off-form finish.

1.04 RESPONSIBILITY FOR CHANGING FINISHES

PART 2 - PRODUCTS

2.01 MATERIALS

A. Not used.

PART 3 - EXECUTION

3.01 FORMED SURFACES

A. Forms shall not be stripped before the concrete has attained a strength as specified in Section 03300.

B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

D. Concrete not exposed or to be buried in the finished work shall have off-form finish with fins and other projections removed and tie cones and defects filled as specified under Section 03300. This shall include all headwall faces of headwalls that are to receive a stone veneer. However, the faces of such stone veneer headwall backers shall receive surface finish bonding agent at the time that mortar is added for the stone veneer.

E. Rubbed Finish (to be used on all exposed headwall and wingwall faces and culvert interior surfaces);

1. Immediately upon stripping forms and before concrete has changed in color, all fins shall be carefully removed with a hammer. While the wall is still damp apply a thin coat of medium consistency neat cement slurry be means of bristle brushes to provide a bonding coat within all pits, air holes or blemishes in the parent concrete; avoid coating large areas of the finished surface with this slurry.

2. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout consisting of one volume cement to 1-1/2 volumes of clean masonry sand having a fineness modulus of approximately 2.25 and complying with the gradation requirements of the ASTM for such a material. Grout shall be uniformly applied by means of damp (neither dripping wet nor dry) pads of coarse burlap approximately 6-in. square used as a float. Grout shall be well scrubbed into the pits and air holes to provide a dense mortar in the imperfections to be patched.

3. Allow the mortar to partially harden for one or two hours depending upon the weather. If the air is hot and dry, keep the wall damp during this period using a fine, fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the perpendicular edge of a steel trowel without damaging the grout in the small pits or holes, cut off all that can be removed with a trowel. Grout allowed to remain on the wall too long will get too hard and will be difficult to remove.

4. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout should remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cut with the trowel so it can be wiped off clean with the burlap.

5. On the day following the repair, of pits, air holes and blemishes, the walls again shall be wiped off clean with dry, used pieces of burlap containing old hardened mortar which will act as a mild abrasive. After this treatment, there shall be no built-up film remaining on the parent surface. If, however, such is present a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the original concrete. Such scrubbing shall be light and sufficient only to remove excess material without working up a lather or mortar or change the texture of the concrete.

6. A thorough wash-down with stiff bristle brushes shall follow the final bagging or stoning operation in order that no extraneous materials remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.

3.02 FLOORS AND SLABS

Not used

3.03 APPROVAL OF FINISHES

A. All concrete surfaces, when finished, will be inspected by the Engineer.

B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked until accepted by the Engineer.

-END OF SECTION-

SECTION 03360
PRE-CAST WHEEL STOPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section includes specifications for precast concrete wheel stops for vehicular parking stalls in parking structures and parking lots as indicated.

1.02 SUBMITTALS

A. Shop Drawings: Submit shop drawings of stops, including installation details and attachment details to at-grade concrete and asphalt pavement, for approval.

B. Product Data: Submit manufacturers' product data of precast stops and epoxy adhesive for approval.

1.04 QUALITY ASSURANCE:

A. Precast wheel stops shall be manufactured for the intended purpose by a company or firm specializing in the manufacture of precast concrete parking appurtenances.

B. When resetting existing wheel stops, verify each one is suitable for reuse, complete and whole, and without major spalling, or cracking.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wheel Stops: Precast, 3.5% minimum air-entrained concrete; 4000 psi minimum compressive strength. Each stop shall be reinforced with two No. 4 deformed steel reinforcing bars, minimum. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate. Unless indicated otherwise, provide stops of half octoganal configuration and 72- inch length.

B. Adhesive for Anchoring Stops to Parking Structure Slabs, At-Grade Concrete Pavements, and At-Grade Asphalt Pavements: Epoxy adhesive manufactured for the purpose.

C. Adhesive for Bonding Dowel to Wheel Stop: As proposed by Contractor and approved by the Engineer, suitable for application.

D. Steel Bars for Installation: 1/2" diameter steel dowels or No. 4 steel reinforcing bars.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Securely attach wheel stops into at-grade concrete and at-grade asphalt pavement with not less than two steel dowels embedded in holes cast into wheel stops. All dowels to be driven flush or recessed to top of wheel stop.

B. At concrete pavement, drill holes in pavement for dowels.

C. At parking structure slabs, epoxy to slab.

-END OF SECTION-