SECTION IX

SPECIFICATIONS

Indiana Department of Transportation Standard Specifications dated 2022 and current supplements thereto, to be used with this project.

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

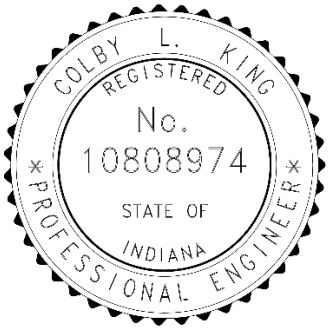
72 Henry Street, PO Box 47
North Vernon, IN 47265
P:(812) 346-2045 F:(812) 346-8045
Toll Free:1-866-ENG-FPBH

TECHNICAL SPECIFICATIONS

BLOOMINGTON DETENTION DESIGN PROJECTS SITES 1 & 2

Located at
SITE 1 – W FOUNTAIN DR, BLOOMINGTON, IN 47404
SITE 2 – W 7TH ST., BLOOMINGTON, IN 47404

MONROE COUNTY, INDIANA



FOR

THE CITY OF BLOOMINGTON UTILITIES DEPARTMENT
600 E MILLER DRIVE BLOOMINGTON, INDIANA

BIDDING DOCUMENTS

ISSUE DATE: JUNE 15, 2023

FILE NUMBER 21-12324

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

72 Henry Street, PO Box 47
North Vernon, IN 47265
P:(812) 346-2045 F:(812) 346-8045
Toll Free:1-866-ENG-FPBH

DIVISION 01	GENERAL REQUIREMENTS
01010	Summary of Work
01200	Project Meetings
01300	Submittals
01400	Quality Control
01410	Regulatory Requirements & References
01500	Temporary Facilities and Controls
01550	Traffic Control
01610	Product Requirements/Hydrodynamic Separator Alt.
01740	Site Maintenance and Final Cleaning
01770	Project Closeout
DIVISION 2	**SITE WORK**
02160	Earthwork
02170	Erosion and Sediment Control
02255	Crushed Stone, Riprap & Structure Backfill
02500	Utility Coordination & Exploratory Excavation
02502	Asphalt Paving
02923	Landscape Grading
02936	Seeding
DIVISION 3	**CONCRETE**
03200	Concrete Reinforcement
03300	Cast-In-Place Concrete
03345	Concrete Finishing

DIVISION 4 through 16
These sections/divisions not used

INDOT Standard Specifications Date 2022 and all amendments thereto are hereby made a part of the plans

-END OF TABLE OF CONTENTS-

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

72 Henry Street, PO Box 47
North Vernon, IN 47265
P:(812) 346-2045 F:(812) 346-8045
Toll Free:1-866-ENG-FPBH

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 installation and construction of storm water detention facilities and appurtenances for Sites 1 and 2.

B. In order to be able to bid on this project, the CONTRACTOR shall be prequalified in accordance with the Pre-Qualification of Contractors per Instructions to Bidders.

C. The Project generally includes but is not limited to the construction of the following:

1. Post maintenance of traffic signage and Establish Site Access.
2. Maintain road access through construction.
3. Coordinate and cooperate with utilities as needed to conduct utility relocations.
4. Install Erosion & Sediment Control.
5. Clear Right-of-Way, Clear and Grub Trees and Stumps.
6. Demolish and Remove Existing Structures.
7. Perform major excavation.
8. Install Storm structures and Cross-pipe as required.
9. Backfill structures and patch roadway as required.
10. Form and pour cast-in-place items as required.
11. Install guardrail as required.
12. Install Rip Rap and/or River rock.
13. Fine grade and seed (Refer to plans for seeding requirements).

14. Remove maintenance of traffic signage.

15. Demobilize, Clean site.

1.02 DEFINITIONS

SUBSTANTIAL COMPLETION:
Substantial Completion is defined as installed conditions that meet all of the following:

1. The detention facilities fully installed to include storm structures.
2. Roadway fully patched.
3. New guardrail fully installed.
4. All Permanent Channel Protection Measures, including riprap and River Rock installed along the flow lines.
5. The Certificate of Substantial Completion is agreed upon and is signed by all of the following:
   (1) OWNER
   (2) ENGINEER
   (3) CONTRACTOR.

1.03 RELATED REQUIREMENTS

A. Refer to the OWNER CONTRACTOR AGREEMENT for an enumeration of the Contract Documents.

B. The CONTRACTOR is responsible for coordination with operation of existing facilities.

C. OTHER SPECIFICATIONS

Items not covered in these division specifications are to be governed by the Indiana Department of Transportation (INDOT) 2022 Standard Specifications and applicable updates thereto. Any reference in those specifications to method of payment, method of measurement, and / or unit prices, is to be treated as and paid as lump sum. Site items not covered in detail in these project specifications (i.e. aggregate, asphalt, drainage, concrete, seed, sod, road bores and casings, materials, mixes, properties and methods of placement, methods of measurement for payment in unit price contracts, etc.) shall be governed by, furnished, and installed in accordance with the INDOT Standard Specifications, dated 2022, and interim revisions as applicable. Items specified as Unit Cost to be paid Lump Sum. All concrete shown in the plans shall be INDOT Class “A” concrete unless otherwise noted on the plans.

Where notes on the plans indicate that certain work, material, or equipment is to be furnished as part of the work, and the work, material, or equipment is not included in the specifications - this work, material, or equipment shall be included under the price specified for the contract as though it were actually written in the specifications.

In case of conflicts between the drawings, these specifications, or other specifications by reference, the highest quality specification shall prevail and be used. Plans hold over specifications with the INDOT specifications considered to be the highest quality specification.

D. ESTIMATED QUANTITIES

This is a Lump Sum bid, with unit prices submitted in order to verify a balanced bid, for use in Progress Payments, and to verify that proper quantities are used for the applicable items and to assist in establish pricing if changed work is required. Estimated quantities may be shown on the plans and the Bill of Materials of these specifications for most items. These are the ENGINEER's estimates of the quantities required to complete the work shown on the plans, the specifications, or both. Said quantities are intended to be true and correct but are not guaranteed. The CONTRACTOR is responsible for verifying ALL quantities for ALL items to conduct the work.

If there is a difference between the quantities shown on the Bid Sheet Form and the quantities actually required by the Plans and Specifications, the Plans and Specifications shall govern as noted above. If the Specifications are changed by the direction of the ENGINEER, the contract will be altered by change order to cover the necessary additions or deductions.

Insertion of the new items in the bid form by the Bidder may result in the Proposal being declared a counter-proposal and may result in its being rejected.

1.04 WORK SEQUENCE

A. The Project Work shall be as sequenced as listed above in the Subsection 1.01 SCOPE OF WORK COVERED BY THE CONTRACT.

B. The CONTRACTOR may propose alternate sequencing to that listed for approval by the ENGINEER, provided this alternate is requested in writing no later than the time of the Pre-Construction Conference.

C. This Project involves work on a public roadway. Work activities of the CONTRACTOR shall be properly sequenced to allow access to private property.

1.05 WORK RESTRICTIONS

- The CONTRACTOR shall maintain traffic for the duration of construction at both Project Sites.

1.06 PROJECT TIMING SUMMARY

Additional requirements may be needed as part of this project. The CONTRACTOR is responsible for verifying all submittal requirements within these specifications. The CONTRACTOR shall provide a schedule for both Project Sites at the Pre-Construction Conference.

PART 2 – PRODUCTS

2.01 MATERIALS

Materials shall be in accordance with the Materials sections of the INDOT Specifications unless otherwise noted in these specifications or the Plans.

PART 3 – EXECUTION

3.0 All construction shall be performed to current ISBH, IDEM, INDOT, OSHA, and MONROE COUNTY BOARD OF HEALTH and MONROE County Highway Department requirements and codes. All construction shall meet or exceed all local, state and federal codes and requirements.

The work shall be completed according to the plans and specifications, including the furnishing of all labor, materials, supplies and equipment to complete the work and be ready for satisfactory and continuous operation.

The CONTRACTOR is to inform himself of the conditions under which the work is to be performed, the site of the work, the obstacles which may be encountered, and any other relevant matters concerning the work to be performed. The CONTRACTOR will not be allowed any extra compensation by reason of any matter or thing concerning that which said CONTRACTOR might have so informed himself prior to the bidding.

The drawings & specifications that make up the work of this project are interrelated & dependent on every other drawing and specification section. The CONTRACTOR shall review all other specifications, drawings, & addendums (if applicable) to coordinate all work that relates to this project. If an item is drawn or specified on any specification section or drawing, it shall be as if it were part of this work and shall be provided for in the contract.

3.1 ROCK EXCAVATION

No rock excavation is expected as part of this project.

3.2 EXISTING SIGNAGE AND FEATURES

The CONTRACTOR is responsible for protecting or removing existing features, which shall include, but not be limited to any removal, replacement, or resetting/relocation, or the protection from damage to any and all utilities, mailboxes, signage, fences, ditch regrading, paved side ditches, riprap, guardrail reset, tree removals, sidewalk repair, and / or landscaping, and other miscellaneous items incidental to the small structure replacement. The cost of this work shall be included in the base bid.

The CONTRACTOR is responsible for examining the project prior to the bid to determine the quantities of these items that would be necessary to achieve the necessary alignment and structure installation.

3.3 UTILITIES

Indiana Underground Plant Protection (Holey Moley 1-800-382-5544 or 811) requires two days' notice prior to beginning excavation. CONTRACTOR is responsible for investigating and notifying any non-member utilities that would need to be contacted directly.

The CONTRACTOR is also responsible for having all utilities field located at appropriate intervals during construction. CONTRACTOR is also responsible for verifying horizontal and vertical alignment with OWNER's representative at least five (5) business days before beginning construction in accordance with SECTION 2500, Sub-Section 3.01.

Where it is necessary for utilities to be moved, this work shall be coordinated between the utility company and the CONTRACTOR to avoid delays or loss of service.

Utilities shown on the drawings are based upon information (maps, flags, paint marks etc.) supplied by others and there is no guarantee or warranty as to the accuracy or completeness of said locations. No direct evidence of other utilities was discovered; however, there is no guarantee that others do not exist.

The CONTRACTOR shall review and comply with the details of the needed Utility Relocations and Coordination as listed in SECTION 02500 UTILITY SERVICES.

3.4 SAFETY PRECAUTIONS

The CONTRACTOR shall be responsible for the performance of the work in such a manner as to comply with federal and state safety rules and regulations.

The CONTRACTOR shall be responsible for providing the necessary protection of motorist and pedestrians during the performance of the work specified in these specification documents. The CONTRACTOR shall provide traffic control, including flaggers, signs, and other devices required to meet Indiana Department of Transportation's recommendations for the proper and safe control of traffic in and around the work area.

Any and all trenching or excavation operations shall conform to all applicable federal OSHA rules. Trenching over five feet in depth shall also conform to IOSHA regulations 29 C.F.R. 1926, Subpart P. Cost for trench safety systems shall not be paid as

a separate item but incorporated in the pay item of the principal work with which the safety systems are associated.

The CONTRACTOR shall not be entitled to additional compensation for providing work site protection and safety in order to comply with federal and state safety regulations.

3.5 PRIVATE DRIVES AND ROAD REPAIRS

All private entrances are to remain open and accessible during construction. All disturbances shall be replaced with a similar surface and depth as the existing surface. Sawcuts required for concrete or asphalt drives shall be paid for under the cost of the new asphalt installation.

Existing driveway culverts, if disturbed, should be reused if they remain in good condition.

Driveway and road culvert headwalls that are disturbed shall be restored or reconstructed to their existing condition. The cost of this replacement, repairs of the sawcuts, pavement patching and headwall repair/ reconstruction shall be paid for as part of the contract.

The CONTRACTOR shall be responsible for repairing any damage to pavement on any county road or private driveways that occurs beyond the necessary widths of cuts required by the plans. Pavement patching and repairs shall be conducted with similar depths and materials as the existing surface.

The CONTRACTOR is responsible for examining the project prior to the bid to determine the quantities of these items that would be necessary to achieve the proposed alignment and structure installation.

The CONTRACTOR shall coordinate with all affected property owners prior to ALL short-term closures. Short Term being defined as a temporary closure of 15 minutes or less necessary to move equipment or materials or other undefined construction means and methods that are unexpected.

Should the CONTRACTOR determine that a longer-term driveway closure is absolutely necessary to affect the construction of the project; the CONTRACTOR shall provide the OWNER and affected residences at least two (2) weeks' notice prior to closing the driveway. In no case shall the driveway be closed without prior consent from the OWNER and the RESIDENT. The CONTRACTOR shall provide a temporary parking area for the affected resident's vehicle(s) and a walking access from that space to the affected residence, or other means of coordination that is mutually agreeable to the CONTRACTOR, OWNER and the affected RESIDENT.

3.6 MAINTENANCE OF OPERATIONS

A. CONTRACTOR shall take special note that they may have limited access and operations during weather events. CONTRACTOR shall note that no additional work

days or time will be given for events that interrupt their operations. Time extension will not be automatic, CONTRACTOR shall request these based on schedule impact. In requesting a time extension, CONTRACTOR is solely responsible for proof that events have exceeded a normal duration or frequency, and that said event or events have been a cause for a time extension.

B. Access must be maintained to all existing buildings, private drives, etc.

1. CONTRACTOR shall not allow his operation to restrict the free movement of employees across the site in such a manner as to interrupt any present commercial operations.

2. CONTRACTOR shall not construct structures, temporary, or permanent, which place any persons at risk, or prevent personnel from completing job functions.

3. CONTRACTOR shall not place excavated, stored, or purchased materials on or near roadways or buildings in such a manner as to interrupt operation.

4. CONTRACTOR shall not remove livestock fencing, leaving an unclosed boundary unattended for any period of time.

C. Work restriction times shall be according to the Holiday restrictions as listed in INDOT Specification 108.08.

3.7 CONTRACTORS STAGING AREA

The CONTRACTOR will be allowed to utilize the existing roadway and right of way. The CONTRACTOR shall be responsible for the safe storage and protection of all equipment and materials. All items shall be stored in such a manner so that storage areas pose no hazard to adjacent traffic, with a minimum of 10 feet from the edge of the traveled way being observed for all storage.

3.8 SITE ACCESS

CONTRACTOR shall be responsible for any and all work and materials needed for their operation or benefit to bring material or equipment to the site, including but not limited to culverts, aggregate or crane pads.

3.9 ROAD CLOSURE

The CONTRACTOR shall provide the OWNER and affected residences at least two (2) weeks' notice prior to closing the road. In no case shall the road be closed without prior consent from the OWNER.

The CONTRACTOR is to notify the U.S. Post Office, fire departments, affected schools, local police agencies, the local Emergency Dispatch agency and the Monroe County Sheriff's Department a minimum of 5 business days prior to any road closures or the use of a temporary runaround, and shall copy to ENGINEER and the OWNER on all correspondence.

4.0 CLEARING RIGHT-OF-WAY

The CONTRACTOR is responsible for examining the project prior to the bid to determine the quantities of these items that would be necessary to achieve the necessary alignment and structure installation.

Clearing Right-of-Way, if noted in the schedule of values, shall be in accordance with the requirements of INDOT Section 201 except as follows: The initial payment for clearing right-of-way will be limited to 2 percent of the original total bid. If the contract schedule of value for clearing right-of-way is greater than 2 percent of the original total bid, the amount over 2 percent will not be paid until the contract has been completed and accepted.

Trees, brush, and other obstructions shall be cleared from the construction limits of the project except as noted on the plans. Tree and brush clearing shall be limited to the minimum necessary to construct the project in accordance with the plans. The cost of tree and stump removal shall be included in the cost of the clearing and the lump sum price for the project.

This item includes the removal of all existing pipes, box culverts, and all other drainage structures not included in the unit item list and items in accordance with INDOT Section 202 that require removal to accomplish the specified work.

4.1 ENVIRONMENTAL

In addition to the conditions as set forth in the projects permits, the CONTRACTOR shall observe the following environmental requirements:

a. Do not clear trees or understory vegetation outside the construction zone boundaries.
b. Restrict channel work and vegetation clearing to the minimum necessary for installation of the structure and the associated bank erosion protection.

c. Implement temporary erosion and sediment control methods within areas of disturbed soil. All disturbed soil areas upon project completion will be vegetated as shown on the plans.
d. For contracts requiring a DNR Construction in a Floodway Permit, the CONTRACTOR may apply for a fish spawning waiver through the IDNR Fish and Wildlife Division only if work during the fish spawning season is unavoidable and deemed necessary.
e. Do not cut any trees suitable for Indiana bat roosting (greater than 3 in. dbh, living or dead, with loose hanging bark) from April 1st thru September 30th.
f. The CONTRACTOR shall be responsible for obtaining any Construction Stormwater General Permits under 312 IAC 15-5 if any off site borrow pit disturbance, when added to the construction activity disturbance, will involve a total disturbance of 1 acre of land or greater.
g. The CONTRACTOR shall be responsible for following the requirements of any Construction Stormwater General Permits obtained.

4.2 DISPOSAL OF EXCESS MATERIAL

All excess material not to be salvaged (waste) shall be removed from the project site. Whether a private or public waste site is utilized, such disposal shall comply with all Federal, State and local ordinances and permit requirements. A copy of all applicable disposal permits obtained or applied for shall be copied to the ENGINEER prior to the material leaving the site.

The CONTRACTOR shall submit, in writing, the location of the proposed dump sites, prior to the commencement of construction.

4.3 OPEN BURNING OF NATURAL GROWTH

Open burning of natural growth will not be permitted on this contract.

4.4 AFTER OPENING ROADS TO TRAFFIC

The CONTRACTOR is to notify the U.S. Post Office, fire departments, affected schools, local police agencies, the local Emergency Dispatch agency and the Monroe County Sheriff's Department, copy to ENGINEER and OWNER when normal traffic patterns are reestablished.

4.5 TESTING OF MATERIALS

Refer to Plans.

4.6 STRUCTURE, REINFORCED CONCRETE STORM STRUCTURES

The description, materials, and construction requirements for Storm Structures shall be in accordance with INDOT Specification 720 unless noted otherwise in the plans. This is a lump sum bid; all quantities shall be included in the lump sum costs.

4.7 PRESENT STRUCTURES, REMOVE

The CONTRACTOR shall remove any present structures and any concrete removal required to build the proposed project in accordance with INDOT Specification 202.

The removal of the structures and any excess concrete in the project limits shall be included in the cost of the project.

Removed Concrete shall not be reused on site.

4.8 SIGN AND GUARDRAIL REMOVAL

All removed signs and guardrail shall become the property of the City of Bloomington. Delivery of the signs and guardrail shall be coordinated with the OWNER.

The cost of delivering the signs and guardrail shall be included in the project cost.

4.9 TEMPORARY CONSTRUCTION ACCESS

The CONTRACTOR shall factor in the construction and maintenance of a No.2 Stone Construction entrance driveway access into his bid for the cost of the project. The CONTRACTOR shall inform the ENGINEER when materials are being placed for this purpose. The exact location of the entrance will be determined by the CONTRACTOR with approval of the ENGINEER during the time of construction.

4.10 BILL OF MATERIALS

Quantities shown are for information only.
The CONTRACTOR shall verify all items and all quantities.

BLOOMINGTON - DRAINAGE PROJECT

SITE #1

ITEM	DIVISION	QUANTITY	UNIT	UNIT COST	TOTAL AMOUNT
1	MOBILIZATION / DEMOBILIZATION	1	LS		
2	MAINTENANCE of TRAFFIC	1	LS		
3	FINISH GRADING	1	LS		
4	DECORATIVE MULCH STRIP	1	LS		
5	FILL MATERIAL (SOIL PER SPECS ON PLANS)	54	CYS		
6	EXCAVATION	332	CYS		
7	SITE CLEARING	1	LS		
8	EROSION CONTROL (Entrance, Inlet Protection, Temp Seeding, Monitor/maintenance, etc.)	1	LS		
9	ROAD CUT/REPAIR	1	LS		
10	24" ADS STORM PIPE	15	FT		
11	30" ADS STORM PIPE	68	FT		
12	30" END SECTIONS	2	EACH		
13	12" ADS STORM PIPE	10	FT		
14	12" END SECTION	1	EACH		
15	MODIFIED TYPE F-7 INLETS	1	EACH		
16	MODIFIED TYPE E-7 INLETS	1	EACH		
17	UTILITY COORDINATION/WATER METER RESET	1	LS		
18	GAS MAIN RELOCATION	1	LS		
19	RIVER ROCK	12	TONS		
20	GEOTEXTILE - TYPE 3	40	SYS		
21	CONSTRUCTION STAKING	1	LS		
22	DECORATIVE ROCK ON GEOTEXTILE (6" THICK)	22	SYS		
23	EROSION CONTROL BLANKET	650	SYS		
	ALTERNATE 1				
24	ALTERNATE - HYDRODYNAMIC SEPARATOR	1	LS		
	Total				
	ITEMS (BY OWNER OR BY OTHERS)				
25	BASIN PERENNIAL PLANT MIX	160	SYS		
26	UPLAND GRASS MIX	650	SYS		

The schedule of values above is to assist the Contractor on preparing a lump sum bid for this project and may not be all inclusive. All work and incidentals necessary to complete the work shown on the plans shall be included in the Contractor's Lump Sum Bid. 2022 INDOT specifications shall govern any work not covered in the plans, plan details or plan specifications. Any reference in those specifications to method of payment, method of measurement, and / or unit prices, are to be treated as and paid as lump sum.

	SITE #2				
ITEM	**DIVISION**	QUAN	UNIT	COST	AMOUNT
1	MOBILIZATION / DEMOBILIZATION	1	LS		
2	MAINTENANCE of TRAFFIC	1	LS		
3	FINISH GRADING	1	LS		
4	GUARDRAIL W-BEAM	144	LFT		
5	GUARDRAIL W-BEAM TYPE 3 CURVED TERMINAL	2	LS		
6	FILL MATERIAL (SOIL PER SPECS ON PLANS)	38	CYS		
7	EXCAVATION	1,148	CYS		
8	CLEARING (GRUBBING, TREE/PIPE REMOVALS, ET	1	LS		
9	EROSION CONTROL (TEMP SEED, MONITORING, CONSTRUCTION ENTRANCE, ETC.)	1	LS		
10	36" X 36" CATCH BASIN (VERIFY MIN. SIZE NEEDED FOR PIPE CONNECTIONS)	1	LS		
11	30" ADS STORM PIPE	12	FT		
12	30" END SECTIONS	1	EACH		
13	12" ADS STORM PIPE	60	FT		
14	12" END SECTION	3	EACH		
15	REVETMENT RIP RAP	29	TONS		
16	RIVER ROCK	8	TONS		
17	GEOTEXTILE - TYPE 3	67	SYS		
18	UTILITY COORDINATION	1	LS		
19	CAP 20" DUCTILE IRON CASING PIPE	1	LS		
20	CONSTRUCTION STAKING	1	LS		
21	EROSION CONTROL BLANKET	1,050	SYS		
	Total				
	ITEMS (BY OWNER OR BY OTHERS)				
22	BASIN PERENNIAL PLANT MIX	100	SYS		
23	UPLAND GRASS MIX	1,050	SYS		

The schedule of values above is to assist the Contractor on preparing a lump sum bid for this project and may not be all inclusive. All work and incidentals necessary to complete the work shown on the plans shall be included in the Contractor's Lump Sum Bid. 2022 INDOT specifications shall govern any work not covered in the plans, plan details or plan specifications. Any reference in those specifications to method of payment, method of measurement, and / or unit prices, are to be treated as and paid as lump sum.

-END OF SECTION-

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCES

A. Prior to commencing the work, and after the Notice of Award is issued, a pre-construction conference will be held at the job site and the following organizations shall have at least one representative in attendance: OWNER, ENGINEER, CONTRACTOR, and major Sub-CONTRACTORs.

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, 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. CONTRACTOR shall submit a preliminary schedule of item completion at this meeting before beginning any other work. If the timing of the Pre-Construction Conference allows, this submitted schedule may be the same schedule as noted in Item C below.

C. Within ten (10) days after Notice to Proceed is issued for the Contract, the CONTRACTOR shall submit to the ENGINEER in triplicate, a detailed schedule. The schedule shall identify milestone dates, phased occupancy or partial acceptance, and phasing and sequencing of specific elements of the work showing the order in which he proposes to carry on the Work, including dates at which he will start various parts of the Work, and estimated date of completion of each part. This information will be reviewed for completeness with the ENGINEER and the OWNER. The schedule shall account for all work of the CONTRACTOR and his Sub-CONTRACTORs.

D. The meeting is mandatory and work shall not begin prior to the meeting being held. The ENGINEER will take and distribute minutes of the meeting. The CONTRACTOR shall review those notes and shall in writing, within 7 business 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.

1.02 PROGRESS MEETINGS

A. A progress meeting will be held once every 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.
CONTRACTOR shall supply an updated schedule with a three (3) week look ahead of work proposed to be performed for every progress meeting. This 3 week look ahead shall include an update status of all milestone dates that were listed on the original construction schedule submitted after the Notice to Proceed.

B. The organizations listed under 1.01 above shall be given advance notification, and shall have the opportunity to have at least one representative in attendance at each meeting. 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. The CONTRACTOR shall review those notes and shall in writing, within 7 business 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 values and payments

c. Construction photographs

d. Shop drawings, product data, samples, O&M instructions

e. Mock-ups

f. Contractor's record drawings

g. See SECTION 01770 for additional Closeout Submittals

1.02 SUBMITTALS

Submittals shall be submitted in accordance with PART 3 of this Section.

Electronic submittals and ftp sites are preferred for submittals. Traditional paper submittals are also acceptable and multiple copy submittals as noted herein apply should paper submittals be used. **The form of submittal shall be agreed upon between the CONTRACTOR and ENGINEER at the Pre-Construction Conference.**

Submittal timeframes listed are a general guide, and the ENGINEER understands fully that the timing may be dependent on material supplies and forces outside of the CONTRACTORs control, and every effort will be made on the part of all parties to expedite the process for the timely completion of the project.

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.

1.03 SUBSTITUTION PROCEDURES

The CONTRACTOR is responsible for following the procedures of EJCDC C-700 if "or equals" or substitute materials are proposed to those as listed in these specification.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 CONSTRUCTION SCHEDULE

A. Within ten (10) days after Notice to Proceed is issued for the Contract, the CONTRACTOR shall submit to the ENGINEER the construction schedule in accordance with SECTION 01200. The schedule shall account for all work of the CONTRACTOR and his Sub-CONTRACTORs.

B. The CONTRACTOR shall update the construction schedule 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 sub-CONTRACTORs work to ensure its successful prosecution and completion within the time specified in accordance with all provisions of the Contract Documents.

3.02 SCHEDULE OF VALUES AND PAYMENTS

A. Within ten (10) days after Notice to Proceed is issued for the Contract, the CONTRACTOR shall submit to the ENGINEER 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 ENGINEER, 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 ENGINEER 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 ENGINEER 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.

3.03 CONSTRUCTION PHOTOGRAPHS

A. The CONTRACTOR shall be responsible for photographing all alignments and locations over the entire project and shall provide a copy of this videotape a minimum of 7 calendar days before beginning any work.
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. It is recommended but not required that the CONTRACTOR utilize a Sub-CONTRACTOR 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 ENGINEER. Identify each print on front or digital folders and filenames. List name of project, date and name of photographer in the submittal.

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

A. Shop Drawings

1. The CONTRACTOR shall comply with EJCDC C-700 for all submittals with additional requirements as set forth herein.

2. 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.

3. 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.

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 to be used by the ENGINEER or OWNER for independent inspection and testing, as applicable to the work.

2. When samples are to be submitted, the CONTRACTOR shall provide a minimum of two (2) samples for the ENGINEER's Review.

D. Operation and Maintenance Instructions

1. O&M instructions shall be provided as needed and shall include the following as a minimum:

2. Structure Manufacturers recommended schedule of Structure Maintenance and types of maintenance to be performed (Surface Seal schedules and type of seal to be used, etc.…).

3. Guardrail manufacturer's installation and repair instructions for both the W-Beam and End Treatment components as well as points of contact information for repairs as applicable.

3.04.1 CONTRACTOR'S RESPONSIBILITY

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

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 sub-CONTRACTORs 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 Sub-CONTRACTOR'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 ENGINEER 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 ENGINEER 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 to reviewed shop drawings, working drawings, applicable samples, and catalog data.

3.04.2 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.

Within 10 calendar days after the issuance of the Notice to Proceed, CONTRACTOR shall submit to ENGINEER a preliminary schedule of submittals. The schedule shall list the items to be submitted for the project in the order of desired approval. CONTRACTOR shall take into account lead time for delivery as part of this document. ENGINEER will respond to this document within 5 business days, noting if any other work items need to be included.

Individual submittals shall be turned in for review a minimum of 15 calendar days prior to planned item installation or construction. The ENGINEER will return submittals to the CONTRACTOR within 5 business days.

Submittals shall be numbered sequentially by the CONTRACTOR in this schedule and as they are initially sent to the ENGINEER. The ENGINEERs response shall

reflect this numbering. For tracking purposes, the CONTRACTOR shall add a letter suffix to all resubmittals or request for additional information as each occurs for any previously submitted item. The ENGINEER will maintain a log showing item and number, date of receipt, date returned, comments and disposition.

B. Number of hard copy submittals required (when electronic submittals are not being used):

1. Shop Drawings: Submit four (4) copies.
2. Product Data: Submit four (4) copies.
3. Samples: Submit number stated in the respective specification sections.
4. O&M Instructions: Submit four (4) copies.

Four sets shall be submitted, two will be returned to the CONTRACTOR. If more than two 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. CONTRACTOR’s Certification Statement
12. An 8 in. x 3 in. blank space for the ENGINEER's stamps.
13. Critical path notation as required.

D. ALTERNATE PROCEDURE:

Electronic, paperless submission and return, and the use of ftp sites are an acceptable and preferred alternative for submittal. 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 selected 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.

3.04.3 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. All revisions shall be clearly marked.
b. Indicate any changes which have been made other than those requested by the ENGINEER.

2. Samples: Submit new samples as required for re-submittals.

B. The CONTRACTOR shall bear the cost for all review and processing for all submittals including all the second and subsequent revised submittals.

3.04.5 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 the number of required submittal copies noted in these specifications unless agreed to by the ENGINEER and the CONTRACTOR.

3.05 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.

3.06 CONTRACTOR'S RECORD DRAWINGS

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

B. Within 10 calendar days after the Notice to Proceed is issued, the CONTRACTOR shall submit to the ENGINEER a written description of his procedure and format for record drawings. The CONTRACTOR, ENGINEER, and OWNER shall meet to assure mutual acceptance of the procedure.

C. An extra set of plans will be provided to the CONTRACTOR and he shall record and "red line" any and all deviations from the APPROVED plans, any significant changes in elevations, grades, or length of the mains, all sewer service lateral locations or any other pertinent changes to the project, and deliver these to the ENGINEER after completion of the project. Retainage will not be paid until these "As Built" plans have been submitted.

D. 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.

E. The CONTRACTOR shall submit one (1) copy of his construction record drawings to the ENGINEER upon completion of the work, and prior to final payment. These plans must be clearly marked "RECORD DRAWINGS" on every sheet with all structures, sewer service lateral locations, manhole rims, manhole inverts, utility crossing separations and line distances verified by a post-construction survey made at the CONTRACTOR's expense. Both plan and profile of any associated structures, sewer or water lines shall be verified and documented on the RECORD DRAWINGS. The ENGINEER shall review these plans within 5 business days of submittal and approve or reject the submittal. The CONTRACTOR shall provide revisions as needed.

F. After the ENGINEER has reviewed and approved the Record Drawings submitted above, the CONTRACTOR shall supply the OWNER with two (2) sets of the approved reproducible red line record drawings to document any and all deviations from the original BID plans, and one CD or other acceptable medium shall be supplied with all of the record drawings included in electronic, paperless format, with individual files related to each sheet. Items shall be presented only in pdf format.

G. RECORD DRAWINGS shall be prepared, signed and sealed by a licensed surveyor or registered professional ENGINEER.

H. The Directional drilling CONTRACTOR (if used) shall also be required to maintain a log of drilling operations which shall include horizontal location and vertical depths at station intervals of 25 feet. These logs shall be submitted with the RECORD DRAWINGS for the ENGINEER's approval.

-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 workers skilled and regularly employed in their respective trades.

D. The CONTRACTOR shall determine that the structures he proposes to furnish can be brought onto the site and the waterway and installed in the space available. Structures shall be installed as much as practicable so that all parts are readily accessible for inspection and maintenance.

E. The CONTRACTOR is responsible for the construction staking of the project and shall furnish all materials and labor relating to it. The ENGINEER will provide the location of control points at the outset of the project. The CONTRACTOR shall verify all dimensions and depths where old and new work are joined, and shall be responsible for same. Note: No materials shall be ordered until measurements are verified by the CONTRACTOR.

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 representatives from the companies that are manufacturing or supplying each type of structure as described in the specification sections and as needed.

B. The manufacturer or supplier shall provide sufficient engineering and technician man-hours to satisfactorily complete supervision of installation, and any required field acceptance tests.

1.05 TESTING SERVICES

A. Tests shall be conducted in accordance with manufacturer instructions.

1.06 CONTRACTOR'S RECORD DRAWINGS

A. The CONTRACTOR shall submit Construction Drawings in accordance with SECTION 01300 and Closeout Submittals in accordance with SECTION 01770.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not Used.

-END OF SECTION-

SECTION 01410
REGULATORY REQUIREMENTS & REFERENCES

PART 1 - GENERAL

1.01 - GENERAL REQUIREMENTS

CONTRACTOR shall comply with the requirements of any and all regulatory agencies having jurisdiction over the project.

The CONTRACTOR is responsible for obtaining any necessary permits that are not listed herein.

The CONTRACTOR shall be responsible for obtaining any Construction Stormwater General Permits (CSGP) if any proposed borrow pit disturbance, when added to the construction activity disturbance, will involve a total disturbance of 1 acre of land or greater.

All materials and labor to fulfill all permitting requirements shall be included in the project.

1.02 - GENERAL REFERENCES

The CONTRACTOR shall review and become familiar with the following references and shall use the information

A. None

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

-END OF SECTION-

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 TEMPORARY SANITARY FACILITIES

A. The CONTRACTOR shall construct and/or maintain, in a sanitary condition, temporary sanitary facilities for his employees and also employees of the subcontractors. The CONTRACTOR shall, at completion of the Work, properly dispose of these sanitary facilities.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with SECTION 01410 – REGULATORY REQUIREMENTS

B. Obtain and pay for all permits required by governing authorities that are not enclosed as part of these documents, but that are required for the operation of Temporary facilities.

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

D. Comply with applicable codes.

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

1.03 TEMPORARY LIGHTING

A. Furnish and install temporary lighting as needed and required for:

1. Construction Needs

2. Safe and adequate working conditions

3. Public Safety

4. Security lighting

5. Any required temporary office and storage area lighting.

B. Service periods:

1. Safety lighting

a. Within construction area: All times that authorized personnel are present.

2. CONTRACTOR shall pay for all installation, maintenance and removal costs of temporary lighting.

1.04 TEMPORARY UTILITIES

A. Comply with SECTION 02500 – UTILITY COORDINATION.

B. The CONTRACTOR shall be totally responsible for installation, maintenance and cost of all utility services, including temporary electric, water, natural gas and telephone service or other that are necessary for the operation of temporary facilities, to include but not be limited to sanitary disposal and temporary office space. Utility and heating costs shall become the owner's responsibility when the Certificate of Substantial Completion is issued.

1.06 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. Repair and restoration of any damages shall be as set forth in C-700 Standard 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.

1.07 PROTECTION OF CONSTRUCTION AREAS

A. Comply with the SECTION 01550 TRAFFIC CONTROL.

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.

1.08 TEMPORARY HEATING AND VENTILATING

Not Used

1.09 TEMPORARY TELEPHONE SERVICE

A. Furnish and install temporary telephone or cell phone service for construction needs throughout construction period as needed.

B. Pay costs for temporary telephone or cell phone service including installation, maintenance, and removal.

1.10 ACCESS ROADWAYS

A. The CONTRACTOR shall construct all access roadways as needed during construction, and the planned access roadways for the completed project. The CONTRACTOR shall maintain access roadways continuously during the construction period.

B. The CONTRACTOR shall maintain all existing roadways within the project site which are used for any purpose by his construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include daily dust control and grading as necessary on all roads and sweeping of paved roads every day. The CONTRACTOR shall be responsible for the repair of any damage to road surfaces caused by their activities. These repairs shall be conducted at no additional cost to the OWNER.

1.11 RESPONSIBILITY FOR TRENCH SETTLEMENT

A. The CONTRACTOR shall be responsible for any settlement caused by the construction that occurs within one (1) year after the final acceptance of this Contract by the OWNER. Repair of any damage caused by settlement shall meet the approval of the OWNER.

1.12 DAMAGE TO CROPS, LIVESTOCK AND VEGETATION

A. If applicable, the CONTRACTOR shall protect lawns, fencing, landscaping, crops, livestock and vegetation against damage or injury from construction operations at all times. Crops damaged or equipment access obtained outside of the easements provided shall be the responsibility of the CONTRACTOR. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock away from the construction area. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Damaged limbs shall be trimmed and damaged tree trunks shall be treated with wound dressing to the satisfaction of the OWNER and the respective Property owners.

1.13 WASTE DISPOSAL

A. The CONTRACTOR shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations. INDOT Specification 202 provides additional guidance.

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

1.14 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 as needed. Offsite 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) (if needed), storage and tool trailers and materials.

B. Limited on-site storage for materials on the property shall be coordinated between the CONTRACTOR and the OWNER.

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

D. The CONTRACTOR shall comply with SECTION 01410 - REGULATORY REQUIREMENTS & REFERENCE for Construction Stormwater General Permit (CSGP) in relation to staging areas.

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 these items shall be considered incidental to the project.

1.15 MAINTENANCE OF ROADWAY OPERATIONS

D. 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 OWNER'S roadways except in those instances which are approved by the OWNER.

The CONTRACTOR shall in no way:

1. Permit excavation adjacent to roadways that are to remain in place 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 County's ditches and streams which are not authorized in the applicable permits.

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

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

6. 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.

1.16 SCHEDULED ROAD CLOSURES

A. Due to the nature of the work to be completed, interruptions to public roads are expected; however, Road closures are to be avoided at all costs. If there is no alternative, the CONTRACTOR shall submit all intended road closures as part of their submitted Construction Schedule as noted in SECTION 01010 – SUMMARY OF WORK and 01330 - SUBMITTALS. All changes to this schedule and unanticipated closures shall follow the approval procedures as noted in applicable sections.

A. The CONTRACTOR shall complete all preparations for the scheduled work prior to any road or facility closures, including preparation of contingency plans, scheduling of additional workers to facilitate completion of the work, procurement of all equipment, tools, and supplies required to complete the work etc. If in the opinion of

the ENGINEER and the OWNER, the CONTRACTOR is insufficiently prepared for a roadway closure, the scheduled closure will be postponed and rescheduled at no extra cost to the OWNER.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used

-END OF SECTION-

SECTION 01550
TRAFFIC CONTROL

PART 1 - GENERAL

1.03 - GENERAL REQUIREMENTS

The CONTRACTOR shall provide traffic control throughout construction for both Projects.

The CONTRACTOR shall assign in writing and provide at the Pre-Construction Conference the name of one person who is assigned to the project as the certified worksite traffic supervisor (CWTS) certified by the American Traffic Safety Service Association (ATSSA) or approved equal certifying organization who shall direct all field layout placement, operation, maintenance, and removal of temporary traffic control devices. The CWTS shall follow the requirements of INDOT Specification 801.03 in the performance of their duties.

Traffic Control and the traffic control devices shall be in accordance with the most recent version of the Indiana Manual of Uniform Traffic Control Devices (MUTCD), and INDOT Specification 801.

The CONTRACTOR shall use the Traffic Control Device Report as follows and as referenced in INDOT Specification 801.03 for the placement and inspection of traffic control devices used on the project.

The report shall be made available on site and shall be available upon a request for review by the OWNER or the projects ENGINEER or INSPECTOR.

Copies of the Report shall be made available at project Progress Meetings and shall be included in the Project Closeout Submittals.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

09-01-13

801-T-150d TRAFFIC CONTROL DEVICE REPORT

(Adopted 09-01-05)

CONTRACT: _____ PROJECT: _____ DATES: _____ thru _____

LOCATION	DESCRIPTION	DATE PLACED	* Use "✓" if O.K.							DATE REMOVED	*REMARKS
			S	M	T	W	T	F	S		

* If device is not O.K., describe deficiency under Remarks.

Date Corrective Action Taken: _____ Report Prepared By: _____ , Title: _____

END OF SECTION-

SECTION 01610
PRODUCT REQUIREMENTS/HYDRODYNAMIC SEPARATOR ALT

PART 1 - GENERAL

1.01 GENERAL

A. This section relates to the furnishing, installing and testing of all products specified under all sections of the Contract Specifications.

B. It is the intent of this Specification to describe equipment, as supplied by specific manufacturers, which was selected for particular applications as shown on the Drawings and specified herein subject to the ENGINEER's review and approval. Equipment, as supplied by other approved manufacturers, may be used; however, the CONTRACTOR shall be totally responsible for any additional costs, including labor, equipment, and materials, cutting and patching, structural concrete or supports required for proper installation of equipment manufactured by alternate suppliers. No additional payment will be made for any labor, equipment, materials, or electrical work other than that shown on the Drawings or specified herein.

C. The CONTRACTOR shall submit detailed layout drawings to the ENGINEER for any alternate equipment approved after award, and shall not undertake any mechanical or structural work until ENGINEER's approval is obtained.

1.02 TIME OF DELIVERY

A. Delivery dates shall be as required by the CONTRACTOR to meet the finalized progress schedule.

1.03 SUBMITTALS

A. Submittals shall be in accordance with SECTION 01300.

1.04 OPERATION AND MAINTENANCE INSTRUCTIONS

A. The CONTRACTOR shall furnish and deliver to the ENGINEER four (4) complete sets of information required for the proper operation, maintenance, and repair of equipment supplied for this project. Manuals shall be delivered prior to Field Tests.

B. The manual for each piece of equipment shall be a separate document with the following specific requirements:

1. Loose leaf on punched paper

2. Holes reinforced with plastic, cloth or metal

3. Page size, 8-1/2 inch by 11 inch

4. Diagrams and illustrations, attached foldouts as required

5. Of original quality, reproducible by dry copy method

6. Covers: oil moisture, and wear resistant 9 x 12 size

C. Each manual shall contain:

1. Table of Contents.

2. Routine maintenance procedures over the life of the structure.

3. Manufacturer's printed operating and maintenance instructions, parts list, illustrations, and diagrams. These shall be specific to the material supplied under the contract, and not a manufacturer's general brochure.
4. One copy of each wiring diagram.

5. One final accepted copy of each shop drawing and each CONTRACTOR's coordination and layout drawing.

6. List of spare parts, manufacturer's price, and recommended quantity.

7. Name, address, and telephone number of manufacturer's local representative.

D. One CD or jump drive or other acceptable medium shall be supplied with all of the above Operation and Maintenance information from A through C included in an electronic, paperless format, with individual folders related to each system, binder and sub part. Items shall be presented only in a searchable pdf format.

1.05 FAILURE OF EQUIPMENT TO PERFORM

A. Any defects in the structure or failure to meet the guarantees or performance requirements of the specifications shall be promptly corrected by the CONTRACTOR by replacements or otherwise. If the CONTRACTOR fails to make these corrections, or if the improved installation again fails to meet the guarantees or specified requirements, the OWNER, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order the CONTRACTOR to remove it from the premises at the CONTRACTOR's expense.

1.06 GUARANTEE

A. All equipment shall be guaranteed in accordance with the General Conditions. Guarantee requirements may be added to, or modified in the detailed component specifications of other sections.

B. By supplying a product under the contract, the manufacturer and CONTRACTOR jointly agree that all manufacturers' warranties, expressed or implied, pass through the CONTRACTOR to the OWNER. This warranty obligation starts on the date of the substantial completion and survives any inspection by, delivery to, acceptance by or payment by the OWNER or the CONTRACTOR for the goods furnished by the manufacturer. Further, this warrants that the equipment designed, manufactured and/or used meets all applicable federal, state, and local laws, rules and regulations, including applicable OSHA standards.

PART 2 – PRODUCTS

Products provided shall be in accordance with the INDOT 2022 Standard Specifications and/or manufacturers requirements.

A. The CONTRACTOR shall provide detailed information per manufacture on Hydrodynamic Separator and calculations on TSS removal for Site 1. Hydrodynamic separator submitted shall show that 80% or greater TSS removal is met for annual rainfall event. Runoff curve number shall be 72 minimum or runoff Coefficient of 0.40, time of concentration shall be 21 minutes, and drainage area of 26 acres.

PART 3 – EXECUTION

Product Installation shall be in accordance with the INDOT 2022 Standard Specifications and/or manufacturers requirements.

-END OF SECTION-

SECTION 01740
SITE MAINTENANCE AND FINAL CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Related Requirements Specified Elsewhere:

1. Project Closeout: Section 01770.

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

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

C. 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.

1.2 SAFETY REQUIREMENTS

A. Hazards Control:

1. Store volatile wastes in covered containers of a material appropriate to contain the type of waste that the container holds, and remove from premises daily for disposal and handling in accordance with applicable laws.

2. Prevent accumulation of wastes which create hazardous conditions.

3. Provide adequate ventilation during use of volatile or noxious substances.

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

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

Do not dispose of volatile or other wastes including mineral spirits, oil, or paint thinner into storm or sanitary drains, streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 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.

E. Restrict traffic of any kind across structures involving any mortar and concrete work to ensure adequate curing of the work. The CONTRACTOR shall ensure that all concrete box structures which have had work done to the ceiling of the interior of the structure shall have no traffic placed on them for a minimum period of three (3) days.

3.2 DURING CONSTRUCTION

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

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

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

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

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

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

G. 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 water treatment plant.

H. The CONTRACTOR shall thoroughly clean all materials and equipment installed.

3.3 FINAL CLEANING

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

B. In preparation for substantial occupancy, conduct final inspection of sight-exposed interior and exterior surface, and of concealed spaces.

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

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

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

F. Remove snow and ice from access to buildings if applicable.

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

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

-END OF SECTION

SECTION 01770
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- **Liquidated Damages:** The work specified shall be arranged and prosecuted such that public roads shall remain open to Traffic.

  If the necessary work is not completed by the substantial and final completion dates and the Structures are not in place and normal traffic patterns returned within the contract dates specified, damages will be assessed in accordance with General Conditions per OWNER'S discretion.

Extension of contract time, if required, shall be in accordance with EJCDC C-700.

- Final Cleaning: Conduct in accordance with Section 01740.
- CONTRACTOR's Record Documents: SECTION 01300.

1.02 SUBSTANTIAL COMPLETION

Substantial Completion shall be as defined in SECTION 01010, Sub-section 1.02, DEFINITIONS.

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 five (5) business 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. The CONTRACTOR's list of items to be completed or corrected and to be 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. Responsibilities of OWNER and CONTRACTOR for:

        (1) Utilities

        (2) Operation of mechanical, electrical and other systems.

        (3) Maintenance and cleaning.

        (4) Security

    f. Signatures of:

        (1) ENGINEER.

        (2) CONTRACTOR.

        (3) OWNER.

3. OWNER occupancy of Project or Designated Portion of Project:

    a. CONTRACTOR shall:

        (1) Obtain certificate of occupancy if applicable.

        (2) Perform final cleaning in accordance with Section 01710.

    b. OWNER will occupy Project, under provisions stated in Certificate of Substantial Completion.

4. 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. Equipment and systems have been tested in presence of ENGINEER's Representative and are operational.

5. Project is completed and ready for final inspection.

B. ENGINEER will make final inspection within five (5) business 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 01710 for detailed requirements.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: To requirements of particular technical specifications and Section 01610.

B. Guarantees, Warranties and Bonds: To requirements of particular technical specifications and Section 01610.

C. Final Traffic Control Device Report

D. Final Contract Documentation.

1.06 INSTRUCTION

A. Instruct OWNER's personnel in operation of all systems, mechanical, electrical and other equipment as applicable.

1.07 FINAL APPLICATION FOR PAYMENT

A. CONTRACTOR shall submit final applications in accordance with requirements of EJCDC C-700.

1.08 FINAL CERTIFICATE FOR PAYMENT

A. ENGINEER will issue final certificate in accordance with provisions of EJCDC C-700.

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

-END OF SECTION-

DIVISION 2
SITE WORK

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 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..
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 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 (1) 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 may be "proofrolled" with a loaded truck or other heavy construction equipment by discretion of the ENGINEER.

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. Dewatering: Dewater trench and excavation as necessary to install structures. This section not used.

G. Material Storage:

1. The Contractor is responsible for obtaining their own stockpile area. 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.

H. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation. All loose material shall be removed from the excavation just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
3. Protruding rock formations, that would interfere with uniform footing bearing shall be removed such that the structure will bear upon uniform engineered fill at least 18 inches thick, unless rock is encountered for the entire footing.
4. No slab shall bear directly upon rock. All excavations shall extend to a depth that allows a minimum of a 6” crushed stone base under a slab.

I. 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 ROLLMAX BIONET blankets OR EQUAL.

C. Temporary silt fence fabric shall be in accordance with INDOT Specification 205.

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, REFER TO PLANS.

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 Rule 5 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.

B. Structure Backfill: Structure Backfill shall be in accordance to plans.

C. Riprap: Riprap shall meet INDOT specification 904.04 of the type listed in the plans.

PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Riprap shall be installed in accordance with INDOT specification 616. Riprap used for erosion control measures may be reused on the project as needed.

C. Structure backfill shall be installed in accordance with INDOT specification 211 and 715 as applicable.

D. Crushed stone, structure backfill and riprap shall be placed in those areas as shown on the Drawings.

E. Structure backfill used shall not be open graded nor allow stormwater to run through the material.

3.02 BROKEN CONCRETE RESTRICTION

A. Broken Concrete shall NOT be used as riprap.

-END OF SECTION –

SECTION 02500
UTILITY COORDINATION AND EXPLORATORY EXCAVATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide coordination with existing utility companies, 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 construction sites and coordinate with the OWNER 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.

PART 3 - EXECUTION

3.01 EXECUTION

A. UTILITIES

a. The Contractor shall coordinate with existing utilities 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 City of Bloomington Personnel for all work to be conducted. The Contractor shall ensure that all traffic restrictions and road closures are coordinated with the City of Bloomington Personnel 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 02923
LANDSCAPE GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

Final grading of topsoil for finish landscaping.

1.02 RELATED SECTIONS

Section 02160 - EARTHWORK

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 REFER TO PLANS FOR SEEDING AND PLANTING REQUIREMENTS

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

-END OF SECTION-

DIVISION 3
CONCRETE

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install all concrete reinforcement as shown on the Drawings and specified herein.

1.02 RELATED WORK

A. Section 03300 - Cast-in-Place Concrete

1.03 SUBMITTALS

A. Shop drawing submittals shall be in accordance with Section 01300.

B. The following shall be submitted for review prior to the fabrication of reinforcement.

1. Placing drawings for steel reinforcement, including provisions for all wall penetrations.

2. Bar bending details.

C. The following shall be submitted at the time of shipment of reinforcing steel.

1. Certified copy of mill test on each heat of reinforcing steel fabricated showing physical and chemical analysis.

1.04 REFERENCE STANDARDS

A. Steel reinforcement in concrete shall conform to INDOT specifications 703 and 910.01 unless otherwise specified herein.

1.05 PRODUCT DELIVERY AND HANDLING

A. Reinforcing shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.

B. Reinforcement shall be shipped and stored with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with

waterproof markings showing the same designations as shown on the submitted placing drawings.

C. Reinforcing steel shall be stored off the ground and shall be protected from moisture and kept free from dirt, oil, or other injurious contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall be new, of domestic manufacture, and shall conform to the following material specifications.

1. Concrete reinforcing bars: ASTM A 615, Grade 60 minimum deformed bars.

2. Welded steel wire fabric: ASTM A 185.

3. Concrete reinforcing bars used for shear or torsion stirrups or ties: ASTM A 615, Grade 60 deformed bars.

4. Plastic protected bar supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.

5. Stainless steel protected bar supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.

6. Precast concrete block bar supports: CRSI Bar Support specifications, Precast Blocks with Wires.

7. Tie wires for reinforcement: 16-gauge or heavier, black annealed wire.

2.02 FABRICATION OF REINFORCEMENT

A. Fabrication tolerances shall be in accordance with the CRSI, Code of Standard Practice-Fabrication.

B. Bars shall be cold bent.

C. Bars shall be bent around a revolving collar having a diameter of not less than that recommended by the CRSI, Code of Standard Practice-Detailing. Hooks shall conform to the same Code.

D. Bars that are to be butt spliced, placed through limited diameter holes in metal or have a threaded end shall have the applicable end(s) saw-cut.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Surface condition, bending, spacing, and tolerances of placement of reinforcement shall conform to the CRSI, Code of Standard Practice-Field Erection.

B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:

1. Concrete cast against and permanently exposed to earth; 3-in.

2. Concrete surfaces in contact with soil, water, sewage, sludge or exposed to the weather; 2-in.

3. Concrete surfaces not in contact with soil, water, sewage, sludge or exposed to the weather:

a. Beams, girders, columns: principal reinforcement, ties, stirrups or spirals; 1-1/2-inch;

b. walls and bottom steel of slabs; 1-in;

c. Shells and top steel of slabs; 3/4-in.

C. Reinforcement which is to be exposed for a considerable length of time after being placed shall be painted with a heavy coat of neat cement slurry.

D. No reinforcing bars shall be welded either during fabrication or erection unless specifically called for on the Drawings, specified herein, or with prior written approval of the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall conform to the AWS Structural Welding Code-Reinforcing Steel, AWS Dl.4.

3.02 REINFORCEMENT AROUND OPENING

Not used

3.03 SPLICING OF REINFORCEMENT

Except as otherwise indicated on the Drawings, compression embedment and lap splices shall be 40 diameters, but not less than 18 inches.

A. Except as otherwise indicated on the Drawings, tension lap splices shall be in accordance with the ACI 315 Detailing Manual. Class B splices shall be used in accordance with ACI 318.

B. Except as otherwise indicated on the drawings, splices in circumferential reinforcement in circular walls shall be Class B splices. Adjacent bars shall not be spliced within the required lap length.

C. Compression type mechanical connectors may be used only where expressly shown on the drawings or if approved in writing by the Engineer. The splice shall include concentric bearing from one bar to the other bar and shall be capable of developing 125 percent of specified yield strength. Splices in adjacent bars shall be offset at least 30 bar diameters unless otherwise shown on the Drawings.

D. Splices in welded wire fabric shall be lapped not less than 1-1/2 courses or 12-in. The spliced fabrics shall be tied together with wire ties at least 24-in. on center.

E. Horizontal wall reinforcing bar splices shall be staggered with no more than 50 percent of the bars spliced within the required lap length. Class B splices shall be used.

3.04 ACCESSORIES

A. The Contractor is solely responsible for determining, providing, and installing accessories such as chairs, chair bars, and the like in sufficient quantities and strength to adequately support the reinforcement to prevent its displacement during the erection of the steel and the placement of concrete and to provide spacings of bars with adequate cover as shown on the drawings or specified herein. Tie wire ends shall be directed away from the surface of the structure.

B. Precast concrete blocks with wires shall be used where the reinforcing steel is to be supported over soil.

C. Precast concrete blocks with wires or plastic protected bar supports shall be used to support reinforcing steel on formwork. If the bottom of the precast blocks will be exposed to view after the removal of forms, the color and appearance of the block shall match that of the adjacent concrete.

D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if accepted by the Engineer.

3.05 INSPECTION

A. In no case shall any reinforcing steel be covered with concrete until the amount and position of the reinforcement has been observed by the Engineer and his permission given to proceed with the concreting, unless otherwise agreed. The Engineer shall be given ample prior notice of the availability of set reinforcement for his review.

-END OF SECTION-

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

B. Section 03200 - Concrete Reinforcement

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 "C". Admixture shall be added for Anti Corrosion without lowering strength requirements. Strength of Concrete shall be 7000 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 or C” Concrete as specified in the Plans.

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° 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 7,000 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-