

INDIANA

DEPARTMENT OF NATURAL
RESOURCES

DIVISION OF RECLAMATION



ABANDONED MINE LANDS
PROGRAM

STANDARD SPECIFICATIONS

2010

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DIVISION 01 - GENERAL REQUIREMENTS

The Department of Administration, Public Works Division's *State of Indiana - General Conditions* form a part of the contract and all subcontracts and shall compliment these specifications for the work performed under the contract.

SECTION 101 - SUPPLEMENTARY CONDITIONS

101.01 Abbreviations and Like Terms

Wherever in the specifications or on the plans, the following abbreviations or terms in place of them are used, the intent and meaning shall be interpreted as follows:

10	AML AASHTO ANSI ASTM AWS BMP CFR DAPW Division	Abandoned Mine Lands American Association of State Highway and Transportation Officials American National Standards Institute American Society for Testing and Materials American Welding Society Best Management Practice Code of Federal Regulations Department of Administration, Public Works Division IDNR's Division of Reclamation
20	ECB General Conditions HDPE IAC IC IDEM IDNR INDOT ISWQM	Erosion Control Blanket <i>State of Indiana – General Conditions</i> High Density Polyethylene Indiana Administrative Code Indiana Code Indiana Department of Environmental Management Indiana Department of Natural Resources Indiana Department of Transportation <i>Indiana Storm Water Quality Manual</i>
30	MUTCD NOI NPDES OFCCP OSM PLS PVC SWWF	<i>Indiana Manual on Uniform Traffic Control Devices</i> Notice of Intent National Pollutant Discharge Elimination System United States Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance Program United States Department of the Interior, Office of Surface Mining Pure Live Seed Polyvinyl Chloride Significant Water Withdrawal Facility
40	TRM TSS	Turf Reinforcement Mat Total Suspended Solids

101.02

101.02 Laws to be Observed

The Contractor shall keep fully informed of Federal and State laws; local laws; ordinances; and rules, regulations, orders, and decrees of bodies or tribunals having any jurisdiction or authority which, in any manner, affect those engaged or employed on the work or which, in any way, affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, rules, regulations, orders, and decrees.

50

Certain counties in the State are considered by the United States Department of Agriculture to be generally infested with various harmful pests such as, but not limited to, various types of beetles. In an effort to prevent these pests from being spread by shipments of infested materials, quarantines have been imposed. Under the regulations, materials and equipment that may be infested must be treated before they are moved from an infested area. Such items as hay, straw, fodder, small grains, corn, sod, earth moving equipment, and other articles that might be infested are subject to these regulations. All State, Federal, and local regulations and quarantines pertaining thereto shall be observed. No additional allowance or compensation will be made for any delay or inconvenience incurred conforming to such requirements, but the cost thereof shall be included in the lump sum of the contract.

60

Water wells or test wells to be drilled shall be in strict accordance with the Indiana Code.

101.03 Standard Specifications

The Standard Specifications were developed to reduce project review time, provide consistency between projects, and reduce errors. A particular standard specification shall apply when relevant to the work and circumstances of the project as shown on the plans, listed on the Schedule of Supplemental Unit Prices, shown on the Project Information page, referenced by another specification, or required by change order.

70

These specifications use the word “shall” to describe the Contractor’s responsibilities. The word “will” is used to describe the Division’s responsibilities. The words “shall” and “will” are not required to be followed by the words “by the Contractor” or “by the Division” to retain these meanings.

As with all contract documents; prospective bidders shall read and be thoroughly familiar with the Standard Specifications.

101.04 Special Provisions

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The special provisions contained in the contract are additions and revisions to the Standard Specifications covering conditions peculiar to the project.

As with all contract documents; prospective bidders shall read and thoroughly familiarize themselves with the special provisions for each project.

101.05 Plans

The word “plans” is used throughout these specifications. Wherever in these specifications, or in other contract documents, the word “plans” is used, the intent and meaning shall be drawings.

90

The plans used for this contract shall have a revision date that corresponds to the revision date listed on the Project Information page and the saved date of the DWG format file. The revision and save dates shall be of a format that contains the month, day, year, and time to the second.

101.06 Verification of Levels and Measurements

Data on the plans regarding existing elevations is given solely to assist Contractors developing proposals for the project. The Owner and Engineer do not guarantee the data given. Contractors shall verify all levels and measurements by personal inspection at the site and govern themselves accordingly.

101.07 Contours and Profiles

Elevations and contours for the existing ground shown on the plans are believed to be reasonably correct, but are not guaranteed. The elevations and contours are presented only as an approximation.

The Contractor shall verify the plans before significant construction starts and submit to the Engineer a statement of verification. The statement of verification shall clearly indicate the Contractor agrees that the project can be completed as designed.

110

The Contractor shall not make claims for discrepancies or adjustments for additional payment due to plan errors. If discrepancies are found, the Contractor and the Engineer shall and will work to resolve the discrepancies in a timely manner. If discrepancies have a major impact on the cost of the project, the Owner reserves the right to terminate the project.

101.08 Engineer

For projects designed by the AML Program, the Designer of the project (the designer of record) is the IDNR's Division of Reclamation. For projects designed by AML Program consultants, the Designer of the project (the designer of record) is the person or firm hired as the consultant. In either case, the IDNR Division of Reclamation is the Engineer referred to in these specifications.

120

AML Project Managers will be the Engineer's authorized representative and shall have full authority to give orders and directions. The duties of technicians and inspectors when a consultant is hired for project oversight will be in accordance with 101.09(f). Technicians or inspectors shall not mean AML Project Managers.

101.09 Control of Work

130

(a) Authority of the Engineer

The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the rate of progress of the work; which may arise as to the interpretation of the plans and specifications and as to the acceptable fulfillment of the contract on the part of the Contractor.

101.09

The Engineer will have the authority to suspend the work wholly or in part for failure to carry out provisions of the contract; for failure to carry out orders; for such periods as may be deemed necessary due to unsuitable weather; for conditions considered unsuitable for prosecution of the work; or for any other condition or reason deemed to be in the public interest.

140 Work shall not be suspended without written authority from the Engineer.

In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be done, if, as, when, or where contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, rejected, or condemned, it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer".

150 **(b) Conformance with Plans and Specifications**

All work performed and all materials furnished shall be in reasonably close conformance with the lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown on the plans or indicated in the specifications. Any deviation from the plans or specifications that may be required by the exigencies of construction will be determined by the Engineer and authorized in writing.

160 Plan dimensions and contract specifications values are to be considered as the target value to be strived for and complied with as the design value from which any deviations are allowed. It is the intent of the specifications that the materials and workmanship shall be uniform in character and shall conform as nearly as realistically possible to the prescribed target value or to the middle portion of the tolerance range. The purpose of the tolerance range is to accommodate occasional minor variations from the median zone that are unavoidable for practical reasons.

When a maximum or minimum value is specified, the production and processing of the material and the performance of the work shall not be preponderately of borderline quality or dimension.

170 When construction equipment, office equipment, production equipment, or testing equipment are specified in metric sizes, any such equipment that has been built to nearly equivalent English system dimensions will be accepted. When such equipment is specified in English system sizes, any such equipment that has been built to nearly equivalent metric sizes will be accepted.

180 If the Engineer finds the materials or the finished product in which the materials are used are not within reasonably close conformance with the plans and specifications but that reasonably acceptable work has been produced, the Engineer will determine if the work will be accepted and remain in place. In this event, the basis of acceptance will be documented by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as deemed necessary to conform to the determination based on engineering judgment. If the Engineer finds the materials or the finished product in which the

materials are used or the work performed are not in reasonably close conformance with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected with no additional payment.

It is understood by all concerned that the apparent silence of the specifications as to a detail or the apparent omission of a detailed description concerning a point shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the first quality is to be used. All interpretations of these specifications shall be made on this
190 basis.

(c) Coordination of Plans, Standard Specifications, and Special Provisions

These specifications, the plans, special provisions, and all supplementary documents are essential parts of the contract. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; and the following list of contract documents shows the order in which documents hold over another. 1 holds over all and 6 holds over none:

- 200
1. Written Instructions and Addenda to Bidders
 2. Schedule of Supplemental Unit Items
 3. Special Provisions
 4. Plans
 5. Standard Specifications
 6. General Conditions

Notes on the plans which are not also included in either the special provisions or among the general notes portion of the plans, and refer to payment, non-payment, or cost to be included in that of the base bid or Supplemental Unit Items, will not govern over specifications.

210 Advantage shall not be taken of any apparent error or omission in the plans or specifications. In the event such an error or omission is discovered, the Engineer shall be notified immediately. Such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications will then be made.

(d) Cooperation by Contractor

The work shall be given the constant attention necessary to facilitate the progress thereof. The Contractor shall cooperate with the Engineer, technicians, inspectors, and other contractors in every way possible.

220 The Contractor shall have available at all times, and on the work site when work is in progress, as its agent, a competent superintendent capable of reading and understanding the plans and specifications and experienced in the type of work being performed. The superintendent shall receive instructions from the Engineer or its authorized representatives and shall have full authority to execute orders or directions without delay. They shall promptly supply such materials, equipment, tools, labor, and incidentals as may be required. Such superintendence shall be furnished irrespective of the amount of work sublet.

(e) Cooperation with Utilities

230 The Contractor shall not disturb any water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, or any other utility appurtenances within the working area. The Contractor shall be responsible for contacting, coordinating, and cooperating with all utility companies involved. All damage to these utilities caused by the Contractor's operations or equipment shall be repaired or replaced by the Contractor at no cost to the State.

(f) Duties of Technicians and Inspector

The technicians and inspectors employed by the Division are stationed on the work to:

- 240
1. keep the Engineer informed as to the progress of the work and the manner in which it is being done;
 2. report whenever it appears that the materials furnished and the work performed fail to fulfill the requirements of the specifications and contract; and
 3. call to the attention of the Contractor, as the work progresses, all known deviations from, or infringement upon, the plans and specifications with respect to materials and workmanship.

250 Technicians and inspectors will be authorized to inspect all work done and materials furnished and to exercise such additional authority as may be delegated to them in writing. Such inspection may extend to all of the work done and material furnished. They shall have authority to reject defective materials and to suspend any work that is being improperly done, subject to the final decision of the Engineer.

Such inspection will not relieve the Contractor from any obligation to furnish acceptable materials or to perform all work strictly in accordance with the requirements of the plans and specifications.

260 Technicians and inspectors will not be authorized to revoke, alter, enlarge, relax, or release any requirements of the specifications; not to approve or accept any portion of the work; not to issue instructions contrary to the plans and specifications.

Verbal agreements, understandings or conversations with any agent or employee of the Engineer, either before or after the execution of this contract, shall not effect or modify any of the terms or obligations of the contract.

270 Technicians and inspectors will, in no case, act as foremen or perform other duties for the Contractor, nor interfere with the management of the work. Any advice which technicians and inspectors may give the Contractor will not be construed as binding the Engineer or the Department in any way or as releasing the Contractor from the fulfillment of the terms of the contract.

101.10 Control of Material

(a) Materials Certification

The Engineer requires that any materials proposed for use in this project be accompanied by an attested Manufacturer's Certificate which states that the material proposed for use in this project complies with the pertinent specifications quoted within these documents, stating the
 280 specification reference and giving the approximate date of manufacture of the materials.

Furnishing of such certifications shall not be in lieu of other testing requirements set out herein, and the Engineer reserves the right to require further tests if he deems such tests are necessary.

Should the materials be found deficient, the Contractor shall bear all costs of the tests and corrections to the work.

(b) Storage of Materials

290 Storage of materials shall be such that will assure the preservation of their quality and fitness for the work. When considered necessary, materials shall be placed on raised, clean platforms, constructed of wood or other hard surfaced material and under cover. Stored materials shall be located to facilitate proper inspection. Materials to be used for all contracts shall be stored separately and intact and, after being tested for such work, shall not be used for other purposes except with permission unless otherwise approved.

The portion of the project limits used for storage purposes and for placing the Contractor's equipment shall not be kept in a manner that adversely affects public convenience and safety and must be approved by the Engineer. Approval will be based on the affects to public
 300 convenience and safety and the Contractor's proposed procedure for re-establishing vegetation in the affected area to its original condition or better. Private property outside of the project limits shall not be used for storage purposes without written permission of the owner or lessee. Copies of such written permission shall be furnished. All storage sites shall be restored to their original condition with no additional payment.

(c) Handling of Materials

All materials shall be handled in such manner as to preserve their quality and fitness for the work.

310 (d) Unacceptable Materials

All materials not in accordance with the specifications shall be considered as unacceptable and all such materials will be rejected and shall be removed immediately from the project site unless otherwise directed. No rejected material, the defects of which have been corrected, shall be used without approval by the Engineer.

(e) Division Furnished Materials

The Contractor shall furnish all materials required to complete the work except those specified to be furnished by the Division. Materials furnished by the Division will be delivered or made available at the locations specified. The cost of handling and placing materials after they

101.11

320 are delivered to the locations specified shall be included in the base bid or Supplemental Unit Item price in connection with which they are used. The Contractor will be held responsible for all materials delivered. Deductions will be made from any monies due to the Contractor to make good all shortages or deficiencies and for all damage which might occur after delivery or for demurrage charges.

(f) Proportioning Materials

330 All materials used shall be proportioned as specified for each type of work, kind of unit, or item of work required by the contract. No change in the source or kind of materials or blending of materials will be permitted during construction without written consent. Application for such permission shall be in writing. A material which is not in accordance with the quality requirements set out in these specifications shall not be blended with a better quality material to upgrade the end product.

Where not explicitly set out, the size and amount of aggregate shall be as ordered.

101.11 Calendar Day

A calendar day is every day shown on the calendar.

101.12 Failure to Complete on Time

340 For each calendar day that work remains incomplete after the contract time for the completion of the work as specified on the Project Information page, the liquidated damages specified on the Project Information page will be deducted from any money due the Contractor.

101.13 Base Bid

The base bid or contract sum shall include all the work shown on the plans, listed on the Schedule of Supplemental Unit Prices, and described in these specifications that is associated with the work shown on the plans and listed on the Schedule of Supplemental Unit Prices.

350 If work shown on the plans has a supplemental unit item in the specifications, but is not listed on the Schedule of Supplemental Unit Prices, the work shall be included in the base bid, and incorporated into the approved Schedule of Values. All such work will not be measured.

101.14 Supplemental Unit Prices

Unknown site conditions or design changes will have an impact on the amount of labor and materials required to complete the contract. The Contractor's base bid shall be prepared to include the items listed on the Schedule of Supplemental Unit Prices factored at their base bid quantities.

360 A completed Schedule of Supplemental Unit Prices shall be submitted with the Contractor's bid. The Engineer may authorize, in writing, an addition or deletion to any base bid quantity. If a base bid quantity increase or decrease is authorized by the Engineer, the contract sum shall and will be adjusted by change order at the unit price listed on the Schedule of Supplemental Unit Prices.

If a supplemental unit price is listed on the Schedule of Supplemental Unit Prices and the work is shown on the plans, the quantity of work shown on the plans will be included in the base bid quantity listed on the Schedule of Supplemental Unit Prices. If the base bid quantity listed on the Schedule of Supplemental Unit Prices is greater than the quantity of work shown on the plans, the difference shall be considered an undistributed quantity to be used at the discretion of the Engineer.

If a supplemental unit price is listed only on the Schedule of Supplemental Unit Prices and not shown on the plans, it shall be considered an undistributed quantity to be used at the discretion of the Engineer.

101.15 Remediation Allowance

The Contractor's base bid shall include an allowance in the amount stated on the Project Information page for Owner directed remediation of unforeseen constraints.

Such constraints include but are not limited to unforeseen subsurface conditions particular to this construction site; improperly recorded or unrecorded physical properties and conditions at the site; obstruction of or delays to reasonable work sequences by the Owner; uncommon adverse weather or site conditions; and conflict within or omissions from the contract documents.

All remediation work shall be proposed to and authorized by the Director of the Public Works Division prior to execution, jointly documented by the Contractor and Engineer, and recorded in the Contractor's as-built plans and the Engineer's project record documents.

101.16 Insurance

All insurance requirements contained in the General Conditions apply with the exception of Builder's Risk insurance. Builder's Risk insurance is not required.

101.17 Protection of Existing Utilities

The Contractor shall prevent all damage to any existing utilities during the construction operations. Any damage to these utilities caused by the Contractor's operations or equipment shall be repaired or replaced at the Contractor's expense.

101.18 Protection of Existing Drainage Structures

The Contractor shall prevent all damage to any existing drainage structures that are to remain in place during the construction operation. All damage to these structures caused by the Contractor's operations or equipment shall be repaired or replaced at the Contractor's expense.

101.19 Permits, Licenses, and Taxes

All permits and licenses which may be required due to construction methods such as, but not limited to, borrow or disposal pits, stream crossings, causeways, work bridges, cofferdams, etc., but which are not part of the contract documents shall be procured by the Contractor prior to beginning the work which requires the permit. All charges, fees, and taxes shall be paid. All notices necessary and incidental to the due and lawful prosecution of the work shall be given.

101.20

The Division is exempt from State, Federal, and local taxes and will not be responsible for any taxes levied on the Contractor as a result of the contract.

The Division may have acquired environmental permits, including, but not limited to, U.S. Army Corps of Engineers Permit, IDNR Certificate of Approval of Construction in a Floodway, or IDEM Section 401 Water Quality Certification. If the Division has acquired one or more of such permits, the restrictions or conditions which were issued with such permits will be made available to bidders prior to letting. The Contractor shall prosecute the work in accordance with all such restrictions or conditions.

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101.20 Patented Devices, Materials, and Processes

If a design, device, material, or process covered by letters of patent or copyright is employed by the Contractor, such use by suitable legal agreement with the patentee or owner shall be provided.

101.21 Federal Aid Provisions

When the United States Government pays or reimburses all or a portion of the cost of a project, the Federal laws and the rules and regulations made pursuant to such laws shall be observed. The work shall be subject to inspection by the appropriate Federal agency. Such inspection will in no sense make the Federal Government a party to the contract and will in no way interfere with the rights of any party.

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101.22 Federal Contract Provisions

This project uses federal aid in the form of a reimbursed grant through OSM. The following contract provisions apply to this project as set out in the OSM's *Federal Assistance Manual*. Additional information is available in OFCCP's *Technical Assistance Guide for Federal Construction Contractors* located at <http://www.dol.gov/ofccp/TAguides/consttag.pdf>

(a) General

These contract provisions shall apply to all work performed on the contract by the Contractor's own organization and with the assistance of workers under the Contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

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Except as otherwise provided for in each section, the Contractor shall insert in each subcontract all of the stipulations contained in 101.22, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. These contract provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these contract provisions.

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A breach of any of the stipulations contained in the contract provisions of 101.22 shall be sufficient grounds for termination of the contract and such termination shall be carried out in accordance with the General Conditions.

For contracts in excess of \$10,000, the Division shall have the right to terminate the contract for cause and for convenience. The Division may, by written order, terminate the

contract or a portion thereof only after a meeting with the Contractor and after determining that termination would be in the public interest. Reasons for termination will include, but will not be limited to, the following:

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(a) executive orders of the President relating to prosecution of war or national defense;

(b) national emergency which creates a serious shortage of materials;

(c) budgetary concerns of the Division;

(d) errors in the plans, specifications, or other contract documents which make the project unbuildable;

470

(e) orders from duly constituted authorities relating to energy conservation;

(f) restraining orders or injunctions obtained by third-party citizen action resulting from national or local environmental protection laws, or where the issuance of such order or injunction is primarily caused by acts or omissions of persons or agencies other than the Contractor;

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(g) when it is the finding of the Division that the Contractor is unable to complete the contract and the construction covered thereby within a reasonable length of time on account of inability to obtain materials or satisfactory substitutes therefore which do not change the general type of construction or labor.

In such cases, work performed, including partially completed items, will be paid for in full at the contract unit prices for the actual quantities of work done, which prices will not be subject to change if the quantity for a supplemental unit item or items is increased or decreased more than 20%. Should such relief from performance of a portion of the contract or such elimination of a portion of the contract directly cause the loss of work or material already furnished under the terms of the contract, the actual cost of such work or of salvaging such material will be reimbursed. All such material may, at the option of the Division, be purchased at its actual cost. Anticipated profit on work not performed will not be permitted. Final settlement will depend upon the merits of the individual case. All actual damages will be paid following a meeting with the Contractor to determine if payment of actual damages is appropriate and in accordance with applicable laws.

490

(b) Equal Employment Opportunity

For construction contracts in excess of \$10,000, the Contractor shall comply with Executive Order 11246, entitled "Equal Employment Opportunity," as amended by Executive Order 375, and as supplemented in Department of Labor regulations (41 CFR Part 60).

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(c) Copeland "Anti-Kickback" Act

The Contractor shall comply with the Copeland "Anti-Kickback" Act (18 USC 874) as supplemented in Department of Labor regulations (29 CFR Part 3). This Act provides that the

101.22

Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is entitled. The recipient must report all suspected or reported violations to OSM.

(d) Reporting

1. Notification of Award of Contracts

510 Contractors and subcontractors shall notify the regional OFCCP office within 10 days of award of any federally funded construction over \$10,000. The regional office for Indiana is:

Midwest Regional Office
Kluczynski Federal Building, Room 570
230 South Dearborn Street
Chicago, IL 60604
(312) 596-7010
(312) 596-7037 FAX

520 **2. EEO-1 Report**

Contractors and subcontractors with 50 or more employees and with a covered contract or subcontract of \$50,000 or more must submit an annual EEO-1 Report (41 CFR 60-1.7a). The EEO-1 Report shall be sent to:

EEO-1 Joint Reporting Committee
P.O. Box 19100
Washington, DC 20031-9100
1-866-286-6440
e1.techassistance@eeoc.gov

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(e) Access to Records

The Contractor shall provide for access by the Division, the Department of the Interior, the Comptroller General of the United States, or any of their authorized representatives, to any books, documents, papers and records of the contractor which are directly pertinent to that specific contract, for the purpose of making audit, examination, excerpts, and transcription. The Contractor shall maintain all pertinent records for three years after the Division makes final payments and all other pending matters are closed.

(f) Clean Air and Water Acts

540 For contracts in excess of \$100,000, the Contractor shall comply with all applicable standards, order, or requirements issued under section 306 of the Clean Air Act (42 USC 1857(h)), section 508 of the Clean Water Act (33 USC 1368), Executive Order 11738, and Environmental Protection Agency (EPA) regulations (40 CFR Part 15).

(g) Energy Policy and Conservation Act

Contractors and subcontractors shall recognize mandatory standards and policies relating to energy efficiency which are contained in the Indiana State Energy Conservation Plan issued in compliance with the Energy Policy and Conservation Act (P.L. 94-163, 89 Stat.871).

550 **101.23 Sanitary Conditions Requirements**

Accommodations for the use of the Contractor's employees shall be provided and maintained in a neat sanitary condition as may be necessary to comply with the requirements of the Federal, State, and local Boards of Health, or of other bodies or tribunals having jurisdiction.

101.24 Public Convenience and Safety

All safeguards, safety devices, and protective equipment shall be provided. Responsibility reasonably necessary to protect the lives of employees on the job, the safety of the public, and property in connection with the performance of the work, shall be taken.

560 **(a) Worker Safety**

All workers working near public roads who are exposed either to traffic or construction equipment within the work area shall wear high visibility safety apparel in accordance with 23 CFR 634.

If a trench, 5 ft or more in depth, is constructed on a project, the requirements for trench safety systems as specified in OSHA regulations 29 CFR 1926, Subpart P, shall be performed. Unless otherwise specified, trench safety systems work will not be paid for separately, but the cost thereof shall be incidental to the contract.

570 **(b) Dust and Air Pollution**

Provision shall be made for prompt removal from traveled roadways of all dirt and other materials that have been deposited thereon by operations concerned with the project whenever the accumulation is sufficient to cause the formation of dust or mud, interfere with drainage, damage pavements, or create a traffic hazard. Construction methods and means shall be employed to keep flying dust and air pollution to a minimum. Provision shall be made for the control of dust on the project and on roads, streets, and other areas affected by the project wherever traffic or buildings, or construction materials are affected by such dust. The materials and methods used for dust control shall be subject to approval. The cost of controlling dust and air pollution shall be incidental to the contract and no additional payment will be made.

580

(c) Protection to Traffic

The work shall be conducted in a manner that will ensure the least obstruction to public road traffic. Non-operating construction equipment, worker's vehicles, materials, field offices, field laboratories, and temporary offices may be stored on the project limits no less than 30 ft from the edge of public roads except, storage may be permitted closer to such roads if traffic is protected by guardrail in good condition or other suitable barrier. However, if the area has a posted speed limit of 40 mph or less prior to the start of construction, this distance may be reduced to 10 ft, if approved.

590 **(d) Notice to Local Public Officials**

On construction work, the chief administrative officer of the local governmental unit shall be given 24 hour notice, in writing, before it becomes necessary to blockade across a street or road.

101.25

If it is desired to use water from public hydrants, application shall be made to the proper authorities and in accordance with the city ordinances, rules, and regulations concerning their use. Fire hydrants shall be accessible at all times to the fire department. No material or other obstruction shall be placed closer to a fire hydrant than permitted by ordinances, rules, or regulations, or within 5 ft of a fire hydrant in the absence of such ordinances, rules, or regulations.

The local governmental agencies for each jurisdiction in the State have the legal authority to establish load limits on their roads. Prior to submitting a bid, each bidder shall contact the local governmental agency in which the use of roads is contemplated and confirm allowable routing of bidder's equipment.

101.25 Traffic Control Devices

All necessary barricades, suitable and sufficient lights, danger signals, signs, and other traffic control devices shall be provided, erected, and maintained. All necessary precautions shall be taken for the protection of the work and safety of the public. Public roads closed to traffic shall be protected by effective barricades. Obstructions shall be illuminated during hours of darkness. Suitable warning signs shall be provided to control and direct traffic

Warning signs shall be erected in advance of any location on the project where operations may interfere with the use of public roads by traffic. Such warning signs shall be constructed and erected in accordance with the plans.

Barricades, warning signs, lights, signals, markings, and other protective devices shall be in accordance with the plans and the MUTCD current on the date of advertisement for bids.

All signs, barricades, and other protective devices shall be maintained in good condition. Barricades and the backgrounds and messages of all signs shall be kept clean and bright. They shall be renewed or replaced as often as necessary to keep them effective.

Pavements and shoulders having an edge drop of more than 3 in. shall be delineated with drums. The use of cones will be permitted during daylight hours in lieu of drums.

At least seven days before a road is to be closed to traffic, notification shall be given of such intention to the Division.

Sufficient barricades, supplemented by watchers or flaggers when necessary, shall be provided continuously to protect any and all parts of the work and to promote safe and orderly movement of traffic. When a road is closed but is still usable by local traffic, barricades and road closure sign assemblies, in addition to the closure barricades, required at the beginning and end of the portion of such road, shall be erected at all high hazard locations. Such barricades shall be located within 150 ft of high hazard location. These barricades shall be of the type shown on the plans. Such barricades shall extend from shoulder to shoulder, or to the limit of area that is readily traversable by a motor vehicle, as directed. During non-working hours, no opening shall exist in the barricades. The road closure sign assembly shall be placed at or near the center of the roadway.

The use of hand signaling flags will not be permitted except for emergency situations. The “Stop”/“Slow” paddle shall be required as a primary hand signaling device to control traffic through work areas. The “Stop”/“Slow” paddle shall be in accordance with section 6E.03 of the MUTCD, except it shall be at least 24 in. wide.

If any of these requirements are violated, operations shall be suspended until adequate measures are taken for full compliance.

650 **101.26 Use of Explosives**

Blasting or the use of explosives will not be permitted without written authorization from the Engineer.

When the use of explosives is authorized, the utmost care shall be exercised not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.

660 All explosives shall be stored in a secure manner in accordance with all laws and ordinances. All such storage places shall be clearly marked in large black letters on a red background “Dangerous Explosives”. Where no local laws or ordinances apply, satisfactory storage shall be provided no closer than 1,000 ft from public roads or from a building or camping area or place of human occupancy. Detonators shall not be stored with explosives.

Each public utility company having structures in proximity to the site of the work shall be notified of intentions to use explosives. Such notice shall be given sufficiently in advance to enable the companies to take such steps necessary to protect their property from injury. The notification shall in no way relieve responsibility for damage to the structures.

101.27 Protection and Restoration of Property and Landscape

670 The Contractor shall be responsible for the preservation of all public and private property. All land monuments and property marks shall carefully be protected from disturbance or damage until the Engineer has witnessed or otherwise referenced their location and approved their removal. All areas within the project limits that are used for storage of any kind shall be restored to their original condition when no longer required for that purpose.

680 The Contractor shall be responsible for damage or injury to property resulting from defective work or materials and from any act, omission, or misconduct in its manner or method of executing the work. When direct or indirect damage or injury is done, such property shall be restored with no additional payment to a condition similar or equal to that existing before such damage or injury, or such damage or injury shall be made good in an acceptable manner.

Construction equipment shall not be stored in wetland replacement sites shown on the plans. Such sites shall not be used for purposes other than for the creation of wetlands.

101.28

101.28 Indiana Bat

All felling of trees equal to or greater than 3 in. in diameter at breast height shall be performed between October 1 and the following March 31, inclusive, unless otherwise approved by the Engineer, so as to minimize project-related impacts on the Indiana bat, *Myotis Sodalis*.

690 **101.29 NPDES and Notice of Intent**

Erosion and sediment control for storm water run-off associated with reclamation activities is required and all water discharged off-site must be authorized under Rule 7 of the NPDES General Permit Rule Program, 327 IAC 15-7.

If treating and discharging water off-site is not anticipated, a General NPDES Permit will be required. BMPs for erosion and sediment control for the storm water run-off associated with reclamation activities shall be in accordance with 105.

700 If treating and discharging water off-site is anticipated, a General NPDES Permit will be required that includes all outfalls and appropriate discharge parameters. Treatment and discharging of water shall be in accordance with 207.03 and BMPs for erosion and sediment control for the storm water run-off associated with reclamation activities shall be in accordance with 105.

710 If treating and discharging water off-site is not anticipated, but becomes necessary, all work associated with the treating and discharging of water off-site shall stop. The Contractor shall be responsible for modifying the existing General NPDES Permit to include all outfalls and appropriate discharge parameters. No water shall be discharged until the modification has been approved by IDEM and copies of all modification documents have been provided to the Engineer.

The Division will prepare the NOI for the anticipated situation. The Contractor shall sign and deliver the NOI letter and all fees to IDEM. By signing the NOI, the Contractor shall assume full responsibility for the proper treatment and discharge of water as specified in the NPDES permit.

720 No construction activity or discharge of water shall begin until 15 days after a complete NOI is filed by the Contractor. No construction activity shall begin until the Contractor has provided the Engineer with a signed copy of the NOI and proof of payment of fees to IDEM.

101.30 Materials Found in the Project Site

Except for hazardous wastes, hazardous substances, hazardous materials, asbestos, trash, debris, timber, and coal, all materials designated to be removed from the project and not used in the work shall become the property of the Contractor, unless otherwise set out in the following or in other specifications. The value of these materials shall be taken into account when the bid is being prepared.

730 Construction materials such as gravel, stone, or sand found in the excavation shall not be used for purposes other than indicated on the plans without written approval.

On all contracts involving construction within the corporate limits of cities and towns or along public road right-of-way in which items such as drainage structures, castings, guardrail, or other items having a salvage value, are to be removed, the removed items shall remain the property of the governmental bodies involved unless a written waiver from the governmental body is provided. If the items are to be retained by the governmental body, the Contractor shall deliver the items to the nearest highway or maintenance garage of the particular governmental body.

740 If any archaeological artifacts or human remains are uncovered during construction, federal law and regulations (16 USC 470, et seq.; 36 CFR 800.11, et al.) and State Law (IC 14-21-1) require that work must stop immediately and that the discovery must be reported to the Division of Historic Preservation and Archaeology in the Indiana Department of Natural Resources within 2 business days.

If archaeological artifacts are encountered during excavation operations, these operations shall be ceased in the immediate vicinity and the Engineer shall be notified. An archaeologist will be provided by the Division and a determination will be made as to the significance and the disposition of such findings. In no event shall an employee of the Contractor or the State of Indiana share in such ownership, or profit from salvaged archaeological findings.

750

101.31 Forest Protection

In carrying out work within or adjacent to State or National Forests and other wooded areas, the Contractor shall comply with all regulations of the State Fire Marshal, Natural Resources Commission, Forestry Department, or other authority having jurisdiction, governing the protection of forests and the carrying out of work within forests. The Contractor shall observe all sanitary laws and regulations with respect to the performance of work in forest areas. The Contractor shall keep the areas in an orderly condition, dispose of all refuse, and obtain permits for the construction and maintenance of all construction camps, stores, warehouses, residences, latrines, cesspools, septic tanks, and other structures in accordance with the requirements of the forest supervisor.

760

Reasonable precautions shall be taken to prevent and suppress forest fires. The Contractor's employees and subcontractors shall be required, both independently and at the request of forest officials, to do all reasonably within their power to prevent and suppress and to assist in preventing and suppressing forest fires and to make every possible effort to notify a forest official at the earliest possible moment of the location and extent of all fires seen by them.

101.32 Contractor's Responsibility for Utility Property and Services

770 At points where the Contractor's operations are adjacent to properties of railroad, telegraph, telephone, and power companies or are adjacent to other property, damage to which might result in considerable expenses, loss, or inconvenience, work shall not be commenced until all arrangements necessary for the protection thereof have been made.

The Contractor shall coordinate and cooperate with the owners of all underground or overhead utility lines in their removal and relocation operations in order that this work may

101.33

progress in a reasonable manner, that duplication of relocation work may be reduced to a minimum, and that services rendered by those parties are not unnecessarily interrupted.

780 If there is an interruption to water or utility services as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority, and shall cooperate with the said authority in the restoration of service. If water service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

The Contractor shall establish and maintain open communication with each utility affected by the construction and document and report all communication to the Engineer.

790 Regardless of any previous notification by the Division, the Contractor shall give notice to the owners of each utility located within the contract limits, or which might be affected by the work, in sufficient time before beginning work for the owners to relocate or protect their property. No work shall be done which injures or damages such property until satisfactory arrangements have been completed with the owner for its protection, relocation, or reconstruction.

Prior to any work which penetrates any existing soil, the Contractor shall notify the Indiana Underground Plant Protection Service, IUPPS, in accordance with the requirements of IC 8-1-26.

800 **101.33 Furnishing Right-of-Entry**

The Division will be responsible for securing necessary right-of-entry in advance of construction. Exceptions will be indicated at the pre-bid meeting.

101.34 Personal Liability of Public Officials

In carrying out any of the provisions of these specifications, or in exercising any power or authority granted to them by or within the scope of the contract, there shall be no liability upon the IDNR, the DAPW, their Directors, the Division, the Engineer, or their authorized representatives, either personally or as officials of the State, it being understood that in all such matters they act solely as agents and representatives of the State.

810

101.35 Site Access

The Contractor shall coordinate with, and meet the requirements of the Indiana Department of Transportation, cities, towns, and counties, whichever is applicable, for public road access to the site. The Contractor shall provide a copy of the written agreement with the county to the Engineer. The Contractor shall be responsible for bonding or any other county requirements for road damage. Road damage shall be repaired or replaced by the Contractor at no additional cost to the State.

SECTION 102 - PROJECT DESCRIPTION

102.01 Scope of Project

The location and scope of the project are shown on the Project Information page.

SECTION 103 - MOBILIZATION AND DEMOBILIZATION

103.01 Description

This work shall consist of all work necessary for the movement of personnel and equipment to and from the project site necessary to the performance of the work.

103.02 Limitations

10 Mobilization and demobilization will be limited to 8% of the original total contract price. The mobilization portion shall not exceed 65% of the amount shown on the approved Schedule of Values for mobilization and demobilization. The remaining portion, demobilization, shall be contained in the final pay request when all equipment has been removed from the site.

103.03 Basis of Payment

Mobilization and demobilization will be paid for in accordance with the approved Schedule of Values.

20 When specified on the Project Information page, mobilization and demobilization shall be included in the base bid. The cost of all materials, equipment, tools, labor, transportation, operations, and incidentals shall be included in the cost of mobilization and demobilization.

If not specified on the Project Information page, the cost of the mobilization and demobilization shall be incidental to the contract.

SECTION 104 - CONSTRUCTION ENGINEERING

104.01 Description

The work shall consist of performing all surveys, measurements, and computations required by this specification.

104.02 Equipment and Material

10 Equipment for construction engineering shall be of a quality and condition to provide the required accuracy. The equipment shall be maintained in good working order and in proper adjustment at all times. Records of repairs, calibration tests, accuracy checks, and adjustments shall be maintained and be available for inspection by the Engineer. Equipment shall be checked, tested, and adjusted as necessary in conformance with manufacturer's recommendations.

Material is field notebooks, stakes, templates, platforms, equipment, spikes, steel pins, tools, and all other items necessary to perform the work specified.

104.03 Quality of Work

20 All work shall follow recognized professional practice and the standards of the industry. The work shall be performed to the accuracy and detail appropriate for the type of job. Notes, sketches, and other data shall be complete, recorded neatly, legible, reproducible and organized to facilitate ease in review and allow reproduction of copies for job documentation. Survey equipment that requires little or no manual recording of field data shall have survey information documented.

All computations shall be mathematically correct and shall include information to identify the bid item, date, and who performed, checked, and approved the computations. Computations shall be legible, complete, and clearly document the source of all information used including assumptions and measurements collected.

30 If a computer program is used to perform the computations, the Contractor shall provide the Engineer with the software identification, vendor's name, version number, and other pertinent data before beginning survey activities. Computer generated computations shall show all input data including values assigned and assumptions made.

40 The elevations of permanent and temporary bench marks shall be determined and recorded to the nearest 0.01 foot. Differential leveling and transit traverses shall be of such precision that the error of vertical closure in feet shall not exceed plus or minus 0.1 times the square root of the traverse distance in miles. Linear measurements shall be accurate to within 1 foot in 5,000 feet. The angular error of closure for transit traverses shall not exceed 1 minute times the square root of the number of angles turned.

The minimum requirements for placing slope stakes shall be at 100-foot stations for tangents, as little as 25 feet for sharp curves, breaks in the original ground surface and at any other intermediate stations necessary to ensure accurate location for construction layout and measurement. Slope stakes and cross sections shall be perpendicular to the centerline. Significant breaks in grade shall be determined for cross sections. Distances shall be measured horizontally and recorded to the nearest 0.1 foot. Side shots for interim construction stakes may be taken with a hand level.

50 Measurements for stationing and establishing the location of structures shall be made to the nearest 0.1 foot.

Elevations for concrete work, pipes, and mechanical equipment shall be determined and recorded to the nearest 0.01 foot. Elevations for earth work shall be determined and recorded to the nearest 0.1 foot.

104.04 Primary Control

60 The Division will provide the Contractor with two northing and easting coordinates and one elevation. These benchmarks shall be used as the origin of all surveys, layouts, and measurements to establish construction lines and grades. The Contractor shall take all necessary precautions to prevent the loss or damage of primary control points. Any stakes or control points

lost or damaged by construction activity will be reestablished by the Contractor or at the Contractor's expense.

The Contractor shall verify the benchmarks before significant construction starts and submit to the Engineer a statement of verification. The statement of verification shall clearly indicate the Contractor agrees that the project can be completed as designed from these benchmarks.

- 70 The Contractor shall not make claims for discrepancies or adjustments for additional payment due to benchmark errors. If discrepancies are found, they shall be reported to the Engineer immediately. The Contractor and the Engineer shall and will work to resolve the discrepancies in a timely manner.

104.05 Construction Layout

Prior to the start of work that requires Contractor performed layout, the Contractor shall submit in writing for the Engineer's review: the name, qualifications, and experience of the individuals to be assigned to the layout and survey tasks.

- 80 The Contractor shall perform all the work necessary to establish lines and grades; set slope stakes; check staking; perform supplemental or interim staking; establish final grade stakes; provide grade sheets; and perform quantity surveys, measurements, and computations for progress payment.

104.06 Staking

The construction staking required for an item of work shall be completed before work on that item begins. Construction staking shall be completed as follows:

- 90
1. The boundary of the areas to be cleared and grubbed shall be staked or flagged at a maximum interval of 200 feet, closer if needed, to clearly mark the limits of work. All boundary stakes will be reviewed by the Engineer before start of this work item.
 2. Slope stakes shall be placed at the intersection of the specified slopes and ground line. Slope stakes and the reference stakes for slopes shall be marked with the stationing, required cut or fill, slope ratio, and horizontal distance from the centerline or other control line.
 3. Centerline and offset reference line stakes for location, alignment, and elevation shall be placed for all structures.
 4. The Contractor may use computer controlled equipment in lieu of staking when approved by the Engineer.
- 100

104.07 Records

All layout and survey data shall be recorded in fully identified standard hard-bound engineering survey field notebooks with consecutively numbered pages. All field notes and

104.08

printed data shall include the purpose or description of the work, the date the work was performed, weather data, sketches, and the personnel who performed and checked the work. 110 Electronically generated survey data and computations shall be bound, page numbered, and cross referenced in a bound field notebook containing the index for all survey activities. All work shall follow recognized professional practice.

The construction survey records shall be available at all times during the progress of the work for examination and use by the Engineer and when requested, copies shall be made available. The original field notebooks and other records shall be provided to and become the property of the owner before final payment and acceptance of all work.

120 Complete documentation of computations and supporting data for progress payments shall be submitted to the Engineer with each invoice for payment.

104.08 Basis of Payment

When specified on the Project Information page, construction engineering will be paid for in accordance with the approved Schedule of Values.

The cost of all materials, equipment, tools, labor, transportation, operations, and incidentals shall be included in the cost of construction engineering.

SECTION 105 - EROSION AND SEDIMENT CONTROL

105.01 Description

This work shall consist of employing BMPs for construction operations and BMPs for the furnishing, installing, maintaining, and removing of temporary erosion and sediment control measures.

MATERIALS

10 **105.02 Materials**

Materials shall be in accordance with the following.

Coarse Aggregate, Class F or Higher	601
Geotextile for Silt Fence	608.02
Geotextile Under Riprap	608.01
Revetment Riprap	601
Stakes	607.07(b)

20 Straw bales shall not weigh less than 35 lb. Bales shall be bound with wire or nylon twine.

105.03 NPDES

Compliance with Rule 7 of the NPDES General Permit Rule Program, 327 IAC 15-7, requires the use of the best management practices outlined in this section to protect public health, existing water uses, and aquatic biota.

30 The Contractor shall submit a monthly report for NPDES discharge to IDEM as a condition of the NPDES permit. The first report shall be submitted by the 28th day of the month following the month in which the permit becomes effective and monthly reporting shall continue for the life of the project. If no water is treated and/or discharged, the monthly report shall reflect a “NO DISCHARGE” condition. The Contractor shall provide the Engineer with a copy of the monthly report of NPDES discharge no later than the 28th day of the month following each monitoring period.

The Contractor shall comply with NOI and other requirements in accordance with 101.29.

CONSTRUCTION REQUIREMENTS

40 **105.04 Control Measures**

The installation of temporary erosion and sediment control measures shall include those necessary or required by permits at project locations where erosion or sediment control becomes an issue during the contract. The Contractor’s shall designate an individual that shall be responsible for the installation, inspection, and maintenance of these measures.

Adjustments of the erosion and sediment control measures shall be made where appropriate to meet field conditions. These measures shall be constructed as soon as practical and shall be maintained in accordance with these specifications.

50 The Contractor shall control the sediment leaving the site by employing the BMPs outlined in 105.04(a) through 105.04(h).

The Contractor shall schedule and conduct his operations to minimize erosion of soils and the movement of sediment into creeks, streams, rivers, lakes, reservoirs, impoundments, water pits, sewer systems, and drain systems. All contract work designed to control erosion and sedimentation shall be carried out before earth disturbing work begins for a particular area. The Contractor shall minimize the amount of exposed soil open at any one time.

(a) Silt Fence

60 The manufacturer’s recommendations shall be followed with regard to shipping, handling, storage, and protection from direct sunlight. The geotextile will be rejected if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation, storage, or installation. Each roll shall be labeled or tagged to provide product identification.

Silt fence shall be constructed as shown on the plans. The spacing of the posts shall be adjusted such that the posts are located at the low points along the fence line. Joints in fabric shall be avoided at low points along the fence line. At joints, the overlap shall be nailed or similarly fastened to the nearest post with a lath.

70

105.04

The original copies of all current manufacturers' manuals shall be provided prior to installation.

(b) Check Dams

Check dams shall be constructed with revetment riprap or straw bales as shown on the plans or in accordance with Chapter 7 of the ISWQM if not shown on the plans.

1. Revetment Riprap

Revetment riprap shall be in accordance with 503 unless otherwise specified.

80

2. Straw Bales

Straw bales shall be embedded and staked as shown on the plans or in accordance with Chapter 7 of the ISWQM if not shown on the plans. Adjacent bales shall be chinked to eliminate gaps between the bales. Bales shall be placed such that the bindings are parallel to and not in contact with the ground.

(c) Temporary Mulching

All disturbed areas not under active construction for a period of 14 days shall be mulched in accordance with 401.08 unless otherwise directed by the Engineer.

90

(d) Temporary Seeding

All disturbed areas not under active construction for a period of 14 days shall be seeded as follows unless otherwise directed by the Engineer:

	<u>Season</u>	<u>Seed</u>	<u>LBS/ACRE</u>
	Early Spring to	Perennial Ryegrass	10
	Mid Spring	Annual Ryegrass	5
	(2/15 - 6/15)	Weeping Lovegrass	2
100	Mid Spring to	Sudangrass	10
	Mid Summer	Weeping Lovegrass	2
	(6/15 - 8/15)	Pearl Millet	6
		Foxtail Mille	8
		Red Clover	4
	Mid Summer to	Rye	45
	Early Fall	Winter Wheat	45
	(8/15 - 11/15)	Annual Ryegrass	4
110		Perennial Ryegrass	5
		Crimson Clover	10

Temporary Seeding shall be in accordance with 401.07.

(e) Topsoil Salvage & Utilization

When directed by the Engineer, the Contractor shall salvage, store, and utilize topsoil in accordance with Chapter 7 of the ISWQM.

(f) Vegetative Filter Strip

120 When directed by the Engineer or shown on the plans, the Contractor shall not disturb existing vegetation to create vegetative filter strips in accordance with Chapter 7 of the ISWQM.

(g) Earthwork Shaping

Prior to suspension of construction operations for an appreciable amount of time, the Contractor shall shape all exposed earthwork in a manner that will minimize erosion and sedimentation in accordance with Chapter 7 of the ISWQM and as directed by the Engineer.

(h) Surface Roughening

130 When directed by the Engineer, the Contractor shall roughen bare surfaces with tracked machinery to reduce storm water runoff velocity in accordance with Chapter 7 of the ISWQM.

105.05 Maintenance and Removal

Temporary erosion and sediment control measures shall be inspected by the Contractor once every seven days and after rain activities. Inspections shall be documented and records shall be maintained by the Contractor, to be made available for review upon request. Records shall include, at a minimum, the date, the inspector's name, the maintenance and corrections needed based on this inspection, and the status of previously identified deficiencies. The temporary protection measures shall be returned to good working conditions within 48 hours after inspection or as directed.

140 Temporary erosion and sediment control measures shall remain in place until directed to be removed. The Contractor shall remove and dispose of all excess silt accumulations, dress the area, and vegetate all bare areas. Use or disposal of riprap and straw bales shall be as directed.

105.06 Method of Measurement

Silt fence will be measured by the linear foot. Straw bale check dams will be measured per each bale installed. Revetment riprap check dams will be measured by the ton.

Weight receipts for supplemental unit items measured by the ton shall be retained by the Contractor and presented to the Engineer upon request.

150

105.07 Basis of Payment

Topsoil salvage & utilization, vegetative filter strips, earthwork shaping, surface roughening, temporary mulching, and temporary seeding shall be incidental to the contract.

Silt fence and check dams will be paid for in accordance with the Schedule of Supplemental Unit Prices.

105.07

	Supplemental Unit Items	Unit Symbol
160	Temporary Check Dam, No. 5 Stone.....	TON
	Temporary Check Dam, Revetment Riprap.....	TON
	Temporary Silt Fence.....	LFT
	Temporary Check Dam, Straw Bales.....	EACH
	Geotextile.....	SYS

The cost of geotextile fabric, trenching, backfilling, posts, fencing, and all necessary incidentals shall be included in the cost of silt fence.

170 The cost for stakes, trenching, backfilling, posts, and all necessary incidentals shall be included in the cost of temporary check dams, straw bales.

The cost of maintenance and removal of temporary erosion and sediment control items shall be included in the base bid.

DIVISION 02 - EARTHWORK AND AREA OPERATION

SECTION 201 - CLEARING AND GRUBBING

201.01 Description

This work shall consist of clearing, grubbing, removing, and disposing of all vegetation, trash, and debris, except such objects as are designated to remain or are to be removed in accordance with other sections of these specifications, within the project limits as shown on the plans. This work shall include the preservation from injury or defacement of all vegetation and objects designated to remain.

10

CONSTRUCTION REQUIREMENTS

201.02 General

Trees, shrubs, plants, seeded or sodded areas, slopes or other things to remain will be designated. All such designated items and vegetation shall be preserved. All areas outside the project limits shall remain in their original condition. All damage to natural terrain, vegetation, objects designated to remain, or areas outside the construction limits which have subsequently eroded or been damaged, shall be repaired or replaced. Tree wound dressing required for cut or scarred surfaces of trees or shrubs selected for retention shall be in accordance with 607.07(c).

20

201.03 Indiana Bat

All felling of trees equal to or greater than 3 in. in diameter at breast height shall be performed between October 1 and the following March 31, inclusive, unless otherwise approved by the Engineer, so as to minimize project-related impacts on the Indiana bat, *Myotis Sodalis*.

201.04 Clearing and Grubbing

30

Surface objects, trees, stumps, roots, and other protruding obstructions not designated to remain shall be cleared and grubbed, including mowing as required. Undisturbed sound stumps, roots, and non-perishable solid objects, which are a minimum of 3 ft below the final grade or slope of embankments, may be left, provided they are as nearly flush as possible. However, they shall not extend more than 4 in. above the ground line or low water level. Sound stumps may be cut off at ground level outside the grading limits of cut and embankment areas if approved.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted.

When performing clearing and grubbing operations in State or National Forests that conduct timber sales, all merchantable timber identified by the State Forester, the forest supervisor, a forest property manager, or the Engineer shall be neatly set aside in a pile as directed by the Engineer

40

Perishable materials and debris shall be disposed of in one of the following methods. Burning of perishable material is not permitted. The method for a particular area will be shown on the plans.

201.05

(a) Brush Piles

Perishable material shall be disposed of on site in brush piles at locations determined by the Engineer during construction.

(b) Chip

50 Perishable material shall be chipped and disposed of at a location shown on the plans or determined at the pre-bid meeting. The location may be off site and may require hauling of chipped material to other AML sites. Chips shall be produced using a disc chipper or a drum grinder equipped with a chipping drum. Samples are available at the Division’s Jasonville field office.

201.05 Tree Removal on an Individual Basis

60 Tress shall be removed and, when specified, stumps shall be ground to at least 4 in. below the existing ground surface. Tree removal on and individual basis shall only apply when specific individual trees are shown to be removed on the plans or when there is an item to remove specific individual trees in the Schedule of Supplemental Unit Prices. Tree removal on an individual basis does not apply for areas inside or along grading limits shown on the plans.

201.06 Method of Measurement

Trees to be removed on an individual unit basis will be measured by the diameter at breast height. The units will be designated and measured in accordance with the schedule of sizes as follows:

	Measured Diameter at Breast Height	Pay Diameter
70	0 to 4 in.	2 in.
	Over 4 to 8 in.	6 in.
	Over 8 to 12 in.	10 in.
	Over 12 to 24 in.	18 in.
	Over 24 to 36 in.	30 in.
	Over 36 to 60 in.	48 in.
	Over 60 in.	60 in.

201.07 Basis of Payment

80 Clearing and grubbing will be paid for in accordance with the approved Schedule of Values.

Tree removal and tree and stump removal will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items

Unit Symbol

Tree, <u> (size) </u> , Remove.....	EACH
Tree, <u> (size) </u> , and Stump, Remove.....	EACH

90

The cost of all labor, materials, equipment, and tools necessary to clear and grub the areas designated on the plans shall be included in the base bid.

The cost of all labor, materials, equipment, and tools necessary to remove trees and tree stumps on an individual basis shall be included in tree removal and tree and stump removal.

The cost of repair or replacement of terrain, vegetation, objects designated to remain, or areas outside the construction limits which have been damaged by the Contractor or have subsequently eroded, shall be incidental to the contract.

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SECTION 202 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202.01 Description

This work shall consist of the removal, wholly or in part, and satisfactory disposal of all obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the contract. It shall include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits.

CONSTRUCTION REQUIREMENTS

10

202.02 General

All obstructions within the project limits designated to be removed shall be razed, removed, and disposed of except those features for which other provisions have been made for removal. Designated salvageable material shall be removed without unnecessary damage in sections or pieces which may be transported readily and shall be stored at locations within the project limits or as otherwise designated.

202.03 Removal of Trash and Debris

20 Trash and debris shall be removed and disposed of in accordance with applicable federal, state, and local laws in approved landfills or disposal sites.

202.04 Removal of Culverts, and Other Drainage Structures

Culverts and other drainage structures in use by traffic shall not be removed in whole or in part until satisfactory arrangements have been made to accommodate traffic. Any excavation adjacent to the structure or to its approaches shall be shored adequately to avoid damage to them or to traffic.

202.05 Removal of Pipe and Tile Drains

30 Pipes to be re-laid shall be removed and stored so that there is no loss or damage to the pipe. Replacement will be required of sections lost from storage or from damage through negligence or from improper methods in handling.

202.06 Reserved (Removal of Houses and Buildings)

202.07 Reserved (Removal of Asbestos)

202.08

202.08 Method of Measurement

40 The length of pipe removed will be measured by the linear foot, computed by multiplying the number of commercial lengths removed by the nominal laying length, or by measuring in place prior to removal, if practicable.

Pavement and concrete slab removal will be measured by the square yard of the area removed.

All other specific work designated for removal will be measured per unit, by the linear foot, or by the square yard.

202.09 Basis of Payment

50 Values Trash and debris removal will be paid for in accordance with the approved Schedule of

All other specific work removal will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Item

Unit Symbol

_____ (specific work) _____, Remove.....	EACH
	LFT
	SYS

60 The cost of all labor; equipment; materials; and documentation required for complying with the applicable laws, regulations and procedures, including but not limited to, licenses, permits, other legal fees, or disposal charges shall be included in the cost of the base bid or supplemental unit items. No payment will be made for work which is not performed in accordance with the specifications or that which is not required by the contract.

70 The cost of removal of specific work shall include the removal and disposal of such obstructions, all necessary excavation, salvage of materials removed, their custody, preservation, storage, and disposal. All damage to existing facilities caused by the Contractor's operations or equipment shall be satisfactorily replaced or repaired with no additional payment.

SECTION 203 - EARTHWORK

203.01 Description

This work shall consist of all earthwork, borrow excavation, hauling of borrow, spreading of borrow, grading, compaction, and density testing required to achieve the lines and grades within the grading limits as shown on the plans.

CONSTRUCTION REQUIREMENTS

10 **203.02 Grading**

The Contractor shall achieve those grades shown on the plans using materials approved by the Engineer prior to their use.

Slopes shall not be steeper than 4:1 unless otherwise indicated on the plans. Grading shall be such that all areas blend smoothly into surrounding topography. Grade stakes shall be in accordance with 104. All exposed stones and rubble larger than 6 in. in diameter within disturbed areas shall not be left on the graded surface.

20 Positive drainage shall be maintained on all areas unless indicated otherwise on the plans. The Contractor shall protect all newly graded areas from the elements as much as possible before seeding. All settlement or erosion that occurs prior to the acceptance of the work shall be repaired and re-graded at the Contractor's expense.

203.03 Compaction

30 Unless otherwise specified, all earthwork shall be compacted to at least 95% of the maximum dry density. Earthwork shall be placed in lifts. The loose depth of each lift shall be such that the required compaction can be obtained, but in no case shall it exceed 8 in. The first two layers shall be compacted with 3 passes using a vibratory roller or until no appreciable movement is detected. The top 6 in. of soil shall be fine graded and prepared in accordance with 401.05.

203.04 Density Testing

The percent of compaction shall be based on maximum dry densities unless otherwise specified or directed. The Contractor shall provide for in-situ density tests in the quantity listed on the Schedule of Supplemental Unit Prices. The in-situ density tests shall be in accordance with ASTM D 1556, D 2167, D 2922, or D 2937, and shall be performed where directed by the Engineer for the purpose of insuring uniform compaction of at least 95%.

203.05 Borrow

40 Borrow shall consist of approved material required for the construction of embankments or for other portions of the work. Borrow shall be obtained from the on-site locations and sources shown on the plans. Borrow material shall be free of substances that will form deleterious deposits, or produce toxic concentrations or combinations that may be harmful to human, animal, plant or aquatic life, or otherwise impair the designated uses of the stream or area.

50 The excavation of borrow material shall be planned to minimize finish grading. The Contractor shall leave a transition slope no steeper than 4:1 from the bottom of the excavation to the surrounding areas not to be disturbed by the contract. The slopes within the bottom of the borrow area shall be between 2% and 20%. The Contractor shall finish grade the borrow area to a smooth contour approved by the Engineer. Lime, fertilizer, seed, and mulch shall then be applied in accordance with 401.

203.06

Borrow areas shall be cut to provide the borrow necessary to achieve the final grades shown on the Plans. The exact amount of borrow material required will be dependent upon borrow needs and borrow quality. When primary and secondary borrow areas are shown on the plans, the secondary borrow areas shall not be used until the primary is exhausted.

203.06 Method of Measurement

60 All density and moisture tests performed in the field or in a laboratory to determine the percent compaction at one specific location will be measured as 1 density test.

203.07 Basis of Payment

Earthwork to achieve the grades inside the grading limits shown on the plans will be paid for in accordance with the approved Schedule of Values.

Density tests will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Item	Unit Symbol
Density Test	EACH

The cost of all earthwork including but not limited to borrow excavation, grading, finish grading, hauling, and compacting to achieve the grades inside the grading limits shown on the plans shall be included in the base bid.

The cost of all labor, materials, equipment, tools, and incidentals necessary to complete the required density tests shall be included in the cost of the density test. No payment will be made for tests that fail to meet the compaction requirements.

SECTION 204 - RESERVED (EXCAVATION AND EARTHFILL)

SECTION 205 - FLOWABLE BACKFILL

205.01 Description

This work shall consist of placing flowable backfill as shown on the plans or as directed by the Engineer.

MATERIALS

205.02 Materials

10 Materials shall be in accordance with the following:

Fine Aggregate.....	.601.04
Water.....	.606.03

Portland Cement shall conform to the requirements of AASHTO M 85

Fly ash shall be in accordance with AASHTO M 295.

205.03 Flowable Backfill Mix

20 The flowable backfill mix shall be as follows:

<u>Material</u>	<u>lbs./yd³</u>
Portland Cement	250
Fine Aggregate	2400
Fly Ash	550
Water	250 (approx. 30 gal)

The flowable backfill shall have a slump of 5 in.

30 **CONSTRUCTION REQUIREMENTS**

205.04 Placement

Flowable backfill shall be placed as shown on the plans or as directed by the Engineer. Flowable backfill shall not be placed on frozen ground. Flowable backfill shall be protected from freezing for 72 hr. Flowable backfill shall not be placed into or through standing water unless approved by the Engineer in writing.

Flowable backfill shall be brought up uniformly to the fill line as shown on the plans or as directed.

40

205.05 Method of Measurement

Flowable backfill will be measured by the cubic yard. Receipts for flowable backfill shall be retained by the Contractor and presented to the Engineer upon request.

205.06 Basis of Payment

The accepted quantities of flowable backfill will be paid for at the contract unit price per cubic yard, furnished and placed.

Supplemental Unit Items

Unit Symbol

50

Flowable Backfill.....CYS

The cost of all labor, materials, equipment, and tools shall be included in the cost of flowable backfill.

SECTION 206 - COAL REFUSE DEPOSIT TREATMENT

206.01 Description

This work shall consist of treating, removing, or burying coal refuse deposits.

MATERIALS

206.02 Materials

Materials shall be in accordance with the following.

10

Agricultural Lime.....607.03

CONSTRUCTION REQUIREMENTS

206.03 General

Coal refuse deposits shall be treated by one or a combination of following methods as shown on the plans.

(a) Agricultural Lime

20

The coal refuse shall be covered with 100 t/acre of agricultural lime, unless otherwise directed, incorporated to a minimum of 6 in. and compacted with 3 passes using a vibratory roller or until no appreciable movement is detected.

(b) Removal

The objectionable material shall be removed and hauled to a location as shown on the plans.

(c) Burial

30

The objectionable material shall be buried in earthwork as shown on the plans.

206.04 Method of Measurement

Agricultural lime will be measured by the ton. Weight receipts for agricultural lime shall be retained by the Contractor and presented to the Engineer upon request.

206.05 Basis of Payment

Coal refuse deposit treatment, with the exception of agricultural lime, will be paid for in accordance with the approved Schedule of Values.

40

Agricultural lime will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items

Unit Symbol

Agricultural Lime..... TON

The cost of all materials, labor, equipment, and tools necessary for placing, incorporating, and compacting agricultural lime shall be included in agricultural lime.

50

The cost of all materials, labor, equipment, and tools necessary to treat coal refuse deposits, with the exception of agricultural lime, shall be included in the cost of the base bid.

SECTION 207 - DEWATERING

207.01 Description

This work shall consist of the removal of water as necessary to perform the construction required by the contract in accordance with the specifications. It shall include:

1. constructing, installing, building, and maintaining all necessary temporary water containment facilities, channels, and diversions;
- 10 2. furnishing, installing, and operating all necessary pumps, piping, and other facilities and equipment;
3. testing and treating water when required by NPDES permit, and
4. removing all such temporary works and equipment after their intended function is no longer required.

When shown on the plans, all dewatering work shall be included in the base bid. All labor, materials, and equipment for water treatment shall be included in the cost of the sodium hydroxide item shown in the Schedule of Supplemental Unit Prices.

MATERIALS

207.02 Materials

Sodium Hydroxide (NaOH) Solution207.05

207.03 NPDES

30 The Contractor shall submit a monthly report for NPDES discharge containing test results of water samples collected during the previous month. to IDEM as a condition of the NPDES permit The first report shall be submitted by the 28th day of the month following the month in which the permit becomes effective and monthly reporting shall continue for the life of the project, or until directed otherwise by the Engineer. During months in which no water is discharged, the monthly report shall reflect a "NO DISCHARGE" condition. The Contractor shall provide a copy of the monthly report of NPDES discharge to the Engineer no later than the 28th day of the month following each monitoring period.

40 The Contractor shall comply with NOI and other requirements in accordance with 101.29.

207.04 Application

An in-line aeration system, as referred to in the U.S. Bureau of Mines *Report of Investigations 8868* and *Information Circular 9027* shall be utilized in the treatment of water. A venturi type jet pump shall be utilized for mixing acidic water, Sodium Hydroxide (NaOH), and air. The mixture shall then pass thru a static mixer.

207.05

50 The Contractor shall submit a written request and detailed information regarding the use of an alternative treatment process to the Engineer. The submittal shall include the proposed treatment method, treatment sequence, and equipment to be used. An alternative treatment process must have the prior approval of the Engineer before any construction activities are initiated. The Contractor shall take full responsibility for the water treatment operation to produce the desired water quality stipulated.

207.05 Sodium Hydroxide (NaOH) Solution

60 The Contractor shall use the sodium hydroxide solution listed on the Schedule of Supplemental Unit Prices to treat acidic water as well as any additional acidic water accumulated in sediment or water treatment basins used during construction. A 50% sodium hydroxide solution freezes at approximately 56°F. The Contractor shall use 20% sodium hydroxide solution at temperatures below 56°F.

207.06 Testing

70 The Contractor shall be responsible for testing and monitoring all effluent discharges from areas being dewatered and any sediment/water treatment basins. Once the pH has been adjusted to a level greater than 6.0 but less than 9.0, and water has a minimum retention time of 24 hours, it may be discharged into the receiving stream if, through proper testing, it has proven to meet the following criteria:

	Daily Average Report	Daily Maximum Report
Flow		
Total Iron	3.0 mg/l	6.0 mg/l
Total Manganese	2.0 mg/l	4.0 mg/l
TSS	35 mg/l	70 mg/l

Effluent shall be visually clear.

If the water in the impoundment does not meet the criteria, the treatment process shall be repeated until these quality standards are met.

80 When water is being treated or discharged the Contractor shall continually monitor the operation in order that an "Upset Condition", as referred to in the NPDES permit, can immediately be detected. If an upset condition is detected, all discharging shall cease until such time as the situation is remedied.

The Contractor shall sample water in the affected areas and effluent prior to and at the start of discharging to verify that all testing criteria have been met. Sampling shall be done a minimum of every four hours thereafter. This sampling shall utilize a field test kit from the HACH Company or an equivalent approved by the Engineer.

90 Another sample shall be taken at the start of discharging each day and split with the Division. The Contractor shall send their sample to a laboratory approved by the Engineer for testing and the results shall be recorded in the monthly report for NPDES discharges.

On-site refrigeration for all Contractor and Division samples shall be provided by the Contractor and approved by the Engineer.

Should water quality exceed the acceptable standards, the Contractor shall stop all pumping until acceptable water quality levels are achieved.

100 The Contractor shall maintain a log of water treatments and discharging activities including but not limited to:

1. Application rate of treatment
2. Discharge rates, dates, and times
3. Water quality test results, sample dates and times for:

110 Flow
TSS
pH
Total Iron
Total Manganese
Total Aluminum
Total Copper
Total Nickel
Total Zinc

120 This log is to be available to the Engineer upon request and shall become property of the Division at the completion of the project.

207.07 SWWF Registration

In accordance with IC 14-25-7-15, if the Contractor has the capability of withdrawing, in the aggregate from all sources and by all methods, more than 100,000 gallons of ground water, surface water, or ground and surface water combined in one day, the Contractor shall submit a temporary construction dewatering report, <http://www.in.gov/icpr/webfile/formsdiv/50355.pdf>, to the Engineer prior to submitting a final pay request.

207.08 Method of Measurement

130 Sodium hydroxide solutions will be measured by the gallon.

207.09 Basis of Payment

Dewatering will be paid for in accordance with the approved Schedule of Values.

Sodium hydroxide solutions will be paid for in accordance with the Schedule of Supplemental Unit Prices.

	Supplemental Unit Item	Unit Symbol
140	Sodium Hydroxide Solution, <u> (percent) </u>	GAL

The cost of all labor, materials, equipment, pumps, tools, temporary earthwork, and incidentals, except sodium hydroxide solution for water treatment, necessary for dewatering shall be included in the base bid.

The cost of all labor, materials, equipment, tools, and incidentals required for water treatment shall be included in the cost of sodium hydroxide solution.

DIVISION 03 - DRAINAGE CONTROL

SECTION 301 - DITCHES AND TERRACES

301.01 Description

This work shall consist of constructing ditches and terraces in accordance with the plans.

MATERIALS

301.02 Materials

Materials shall be in accordance with the following.

10	Coarse Aggregate, Class F or Higher	601
	Erosion Control Blanket	608.03
	Geotextile	608
	Riprap	601
	Turf Reinforcement Mat	608.04

CONSTRUCTION REQUIREMENTS

301.03 General

20 All ditches and terraces shall be constructed to the elevations, dimensions, and locations shown on the plans. Staking of centerline elevations shall be in accordance with 104. Details for ditch and terrace types will be shown on the plans.

During excavation approved boulders shall be segregated and used as drop structures in ditch and pool areas.

301.04 Method of Measurement

Ditches and terraces will be measured by the linear foot along the centerline.

30 Coarse aggregate and riprap will be measured by the ton.

Geotextile, erosion control blanket, and turf reinforcement mat will be measured by the square yard.

Weight receipts for supplemental unit items measured by the ton shall be retained by the Contractor and presented to the Engineer upon request.

301.05 Basis of Payment

40 Ditches, terraces, coarse aggregate, riprap, geotextile, erosion control blanket, and turf reinforcement mat will be paid for in accordance with the Schedule of Supplemental Unit Prices

302.01

Supplemental Unit Item	Unit Symbol
Coarse Aggregate, No. <u> (number) </u>	TON
Ditch, <u> (type) </u>	LFT
Erosion Control Blanket	SYS
Geotextiles	SYS
Riprap, Class <u> (class) </u>	TON
Riprap, Revetment	TON
50 Riprap, Uniform	TON
Terrace, <u> (type) </u> , <u> (width) </u> , <u> (height) </u>	LFT
Turf Reinforcement Mat	SYS

The cost of all labor, tools, and equipment necessary to construct ditches and terraces as shown on the plans, including excavation, placing earthfill, and grading, shall be included in ditches and terraces.

60 The cost of all labor, tools, and equipment necessary to place or install coarse aggregates, riprap, geotextile, erosion control blankets, and turf reinforcement mats shall be included in the cost of the respective item.

SECTION 302 - STOPLOG STRUCTURES

302.01 Description

This work consists of constructing stoplog structures in accordance with the plans.

MATERIALS

302.02 Materials

10 Materials shall be in accordance with the following.

Concrete	606.01
Reinforcing Bars	604.01
Stop Logs	605.02
Water	606.03

CONSTRUCTION REQUIREMENTS

302.03 Stoplog Structures

20 All stoplog structures shall be constructed to the elevations, dimensions, and locations shown on the plans.

302.04 Method of Measurement

Stoplog structures will be measured per unit.

302.05 Basis of Payment

Stoplog structures will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items	Unit Symbol
30 Stoplog, <u> (height) </u> , <u> (opening width) x (opening height) </u>	EACH

The cost of all labor, materials, equipment, and incidentals necessary to construct stoplog structures shall be included in the stoplog item.

SECTION 303 - PIPES AND CULVERTS

303.01 Description

This work shall consist of installing pipes and culverts in accordance with the plans. All pipes and culverts shall be constructed to the elevations, dimensions, and locations shown on the plans.

MATERIALS

10 **303.02 Materials**

Materials shall be in accordance with the following.

Anti-Seep Collars.....	602.17
Coarse Aggregate, Class D or Higher.....	601
Concrete	606.01
Drainage Components.....	602
Geotextile.....	608
Metal Pipe.....	603
Reinforcing Bars	604.01

20 The maximum particle size of backfill material for corrugated pipe shall be less than one-half the corrugation depth.

CONSTRUCTION REQUIREMENTS

303.03 Excavation

Unless otherwise directed, the trench cross sectional dimensions shall be as shown on the plans. The trench bottom shall give full support to the pipe as shown on the plans. Recesses shall be cut to receive any projecting hubs or bells.

30 Where pipe is to be placed in fill sections, a portion of the fill shall be constructed prior to installation of the pipe as shown on the plans.

303.04

Where rock or boulder formation is encountered at or above the proposed trench bottom elevation, the trench shall be excavated at least 8 in. below the proposed grade, backfilled, and compacted.

40 In case a firm foundation is not encountered at the required grade, the unstable material shall be removed to such depth that when replaced with suitable material and properly shaped, it will produce a uniform and stable foundation along the entire length of the pipe. A timber mat shall be placed to hold the pipe to line and grade if it is necessary.

All trenches shall be kept free from water until any joint filling material has hardened sufficiently not to be harmed.

303.04 Laying Pipe

50 Each section of pipe shall have a full firm bearing throughout its length, true to the line and grade given. All pipes which settle or which are not in alignment shall be taken up and re-laid. Pipe shall not be laid on a frozen trench bottom.

Concrete and clay pipe shall be laid with hub up grade, with the spigot end fully extended into the adjacent hub, and with all ends fitted together tightly.

Concrete pipe shall not be laid in muck or sulphate soils.

60 Except for circular concrete pipe, pipe joints designed to accommodate seals or pipe joints requiring seals shall be sealed with approved rubber type gaskets, caulking, bituminous mastic pipe joint sealer, elastomeric material, or sealing compound. Circular concrete pipe joints shall utilize rubber type gaskets.

If the infiltration of water is a factor, each joint, regardless of the type used, shall be sealed with an approved compression type joint sealer.

Joints and stub-tee connections for plastic pipe shall be in accordance with the requirements of the respective material specifications for each type of pipe.

Connections of plastic pipe to manholes, catch basins, and inlets shall be in accordance with the manufacturer's recommendations.

70 Prior to being lowered into the trench, corrugated metal pipe sections shall be examined closely and so fitted that they will form a true line of pipe when in place. Sections which do not fit together properly shall not be used.

At the time of acceptance, all pipe shall have been cleaned and be free from silt and other foreign matter.

Prior to constructing a pipe extension, the existing structure shall be cleaned of all foreign materials. Existing anchors, end sections, or headwalls shall be removed as shown on the plans or as directed. All existing pipes which are damaged by the removal operation shall be replaced.

80

303.05 Joining Pipe

Band couplers for type I and type II corrugated steel pipe and pipe-arches shall have corrugations that mesh with the corrugations of the pipe sections being joined or the annular rerolled ends of those pipe sections. Band couplers with projections (dimples) may be used with pipe having either annular or helical corrugations only when corrugated band couplers will not provide a matching connection to both pipes. Band couplers for type IA and IIA corrugated steel pipe and pipe-arches shall have corrugations that mesh with the corrugations of the pipe or shall be gasketed flat bands.

90 At the connection of a pipe extension to an existing structure where the extension is a different pipe material from that in place, or a satisfactory joint cannot be obtained, a concrete collar shall be constructed. Portions of the existing structure shall be removed as shown on the plans, or as necessary, to ensure proper fit of the extension to the existing pipe. If not shown on the plans, the collar shall have a width of at least 18 in. and a thickness of at least 6 in. around the entire joint.

If rigid pipe connections are of lesser strength than that of the main barrel of a pipe structure, these connections shall be encased with concrete at least 6 in. thick.

100 Any pipe which is damaged during installation shall be repaired or replaced as directed.

303.06 Tee and Stub-Tee Connections

At locations shown on the plans, or where directed, a stub-tee connection of the size specified shall be furnished and placed as a tee connection to corrugated metal pipe, corrugated metal pipe-arch, concrete pipe, reinforced concrete pipe, or reinforced concrete horizontal elliptical pipe.

110 The stub-tee connection to a corrugated metal pipe or pipe-arch shall be constructed of corrugated metal and the length of the stub shall be no less than that which readily accommodates the connecting band. It shall be made by shop welding a stub of corrugated metal pipe to the corrugated metal pipe or pipe-arch at the time of fabrication. Where field conditions warrant, stub-tee or other connections may be field connected by using shop fabricated saddle connectors, welds, flame cut edges, and damaged spelter coating shall be regalvanized or painted with zinc dust-zinc oxide paint in accordance with Federal Specification TT-P641, type II or MIL-P-21035. Damaged bituminous coating shall be repaired with asphalt mastic. The pipe connection to the stub shall be made by means of connecting bands of required size or by means of concrete collars as directed.

120 The stub-tee connection to concrete pipe, reinforced concrete pipe, or reinforced concrete horizontal elliptical pipe may be field constructed or factory constructed. The concrete used in the stub shall be of the same proportions as that used in the construction of such pipe. The length of the concrete stub shall be no less than 6 in. or more than 12 in. The pipe connection to the concrete stub shall be made by means of a cement mortar bead or concrete collar or as directed.

303.07

303.07 Backfilling

All pipes shall be backfilled as shown on the plans or as directed.

130 Prior to placing flowable backfill, all standing water shall be removed from the trench. If the water cannot be removed from the trench, structure backfill shall be used in lieu of flowable backfill to an elevation 2 ft above the groundwater. The remainder of the trench shall be backfilled as shown on the plans.

All pipes, except underdrains, will be visually inspected for acceptance a minimum of 30 days after the completion of backfill operations. Pipes that cannot be visually inspected shall be video inspected for acceptance. The Engineer will determine the sections of pipe to be video inspected.

140 Backfill material shall be of such nature that compacts readily. That portion around and for 6 in. above the top of the pipe shall be free from large stones. This material shall be placed in layers not to exceed 6 in, loose measurement, and each layer compacted thoroughly by means of mechanical tamps. Where coarse aggregate No. 8, No. 9, or No. 11 is used for structure backfill, geotextile shall be installed.

An adequate earth cover, as shown on the plans, shall be placed over the structure before heavy equipment is operated over it.

303.08 Pipe End Sections, Anchors, and Safety Metal End Sections

150 Pipe end sections, anchors, and safety metal end sections shall be constructed as shown on the plans or as directed.

Straps or hook bolts required for anchors shall be as shown on the plans or as directed. Anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 42 in. or greater. Hook bolts and anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 84 in. or greater.

160 A dimpled connection band shall be used for connecting pipe end sections and safety metal end sections to ends of corrugated metal pipe whose end corrugations are not perpendicular to the centerline of the pipe.

303.09 Re-Laid Pipe

Where shown on the plans or as directed, existing pipe shall be taken up, re-laid, and if necessary, extended.

303.10 Anti-Seep Collars

170 Anti-seep collars shall be of the size and for the pipe diameter as shown on the plans or the Schedule of Supplemental Unit Prices. Anti-seep collars shall be installed as shown on the plans or as directed by the Engineer. Anti-seep collars shall be in accordance with 602.17.

303.11 Method of Measurement

Pipe, culverts, extensions, and the relaying of pipes and culverts will be measured by the linear foot along the centerline of the pipe.

Anchors, end sections, and anti-seep collars will be measure by the unit.

303.12 Basis of Payment

Pipe, culverts, extensions, relaying of pipe, culverts, anchors, end sections, and anti-seep collars will be paid for in accordance with the Schedule of Supplemental Unit Prices

180

Supplemental Unit Item	Unit Symbol
<u> (material) </u> Pipe, <u> (shape) </u> , <u> (size) </u>	LFT
<u> (material) </u> Pipe Extension, <u> (shape) </u> , <u> (size) </u>	LFT
<u> (material) </u> , Pipe, Relaid, <u> (shape) </u> , <u> (size) </u>	LFT
Anti-Seep Collar, <u> (pipe diameter) </u> Pipe, <u> (width) </u> x <u> (height) </u>	EACH
Concrete Anchor, <u> (size) </u>	EACH
Pipe End Section, <u> (size) </u>	EACH
Safety Metal End Section, <u> (size) </u>	EACH

190

The cost of all labor, materials, and equipment necessary to install, construct, or re-lay pipes, culverts, end sections, anchors, and anti-seep collars including, but not limited to, excavation, placing of earthfill, grading, concrete, rebar, geotextile, and plastic pipe shall be included in the pipe and culvert items.

SECTION 304 - RESERVED (CONCRETE BOX STRUCTURES)

DIVISION 04 - REVEGETATION

SECTION 401 - SEEDING, MULCHING, AND FERTILIZER

401.01 Description

This work shall consist of revegetating all disturbed and barren areas within the project limits with lime, fertilizer, seed, and mulch.

MATERIALS

401.02 Materials

10 Materials shall be in accordance with the following.

Agricultural Lime.....	607.03
Fertilizer.....	607.02
Grass Seed.....	607.04
Grass Seed, Temporary.....	607.01
Leguminous Inoculants.....	607.06
Mulch.....	607.05

CONSTRUCTION REQUIREMENTS

20

401.03 General

Work under this specification shall proceed only in calm weather and on ground free of frost, snow or ice.

401.04 Soil Test

Upon completion of rough grading of cover material, the Contractor shall take representative soil samples of the disturbed areas. Each composite sample shall consist of 5 sub samples. The samples shall be tested at locations as designated by the Engineer.

30

The soil samples shall be tested for pH, SMP buffer pH, weak Bray P1 phosphorus, ammonium acetate extractable potassium, CEC, Lime Index and texture. Prior to the application of any lime or fertilizer, the Contractor shall submit to the Engineer one copy of the lab's test results and recommendations.

401.05 Preparation of Seedbed

Seedbed preparation consists of tilling the top 6 in. of soil material along the contour and removing all stones and foreign matter over 6 in. in diameter. All disturbed and barren areas within the project limits require seedbed preparation, unless otherwise directed by the Engineer. The seedbed shall be tilled until a uniform consistency is obtained as approved by the Engineer.

40

401.06 Lime and Fertilizer

Agricultural lime and fertilizer shall be spread evenly over all disturbed and barren areas within the project limits and incorporated to a minimum depth of 6 in. and a maximum depth of 9 in. The application rate for final grade of soil cover shall be as directed by the Engineer. Incorporation of the amendments shall occur within 2 days of spreading. For agricultural lime

applications rates greater than 60 tons/acre, more than one incorporation pass shall be required when determined by the Engineer. The seedbed shall be tilled until a uniform consistency is obtained.

50 Fertilizer shall be applied in composition, dry, and free flowing.

401.07 Seeding

Seed mixes shall be as shown on the plans. Seed may be applied by drill, hydro-seeder or broadcast method. The drill depth shall range from 0.25 in. to 0.50 in. If seed is applied with the broadcast method, seed to ground contact shall be ensured by use of culti-packer or other means as approved by the Engineer.

60 Legume seed shall be inoculated with the proper bacterial cultures prior to mixing into the seed mix. If the Contractor uses a hydroseeder, the inoculant rate shall be doubled and the pH of the slurry shall be kept above 5.0 by adding hydrated lime.

All seeding rates shall be based on PLS. The germination and purity test results, as determined by the State Seed Commission, shall be used to determine the PLS. PLS equals germination rate multiplied by purity.

No seed shall be used after one year from the test date shown on the bag tag.

70 On areas where mechanical application or incorporation is unfeasible as determined by the Engineer, the Contractor shall apply lime, fertilizer, seed, and mulch, by hand or other approved means as determined by the Engineer at the time of application.

401.08 Mulching

Mulch shall be applied with or immediately after seeding. Mulch shall be applied until the ground is completely covered at an average rate of 3 tons per acre.

80 Mulch material shall be punched into the soil along the contour with a mulch stabilizer such as a Finn Krimper. In areas inaccessible to mulch stabilizing equipment, mulch shall be stabilized by hand using netting or other approved means. Slopes greater than 3:1 shall be netted with an extruded plastic mesh with approximately 2 in. square openings. This netting shall be biodegradable.

401.09 Warm-season Grass Planting

The Contractor shall plant warm-season grass mixes to ensure the seed to soil contact that is essential for seed germination. The seedbed shall be firm and free of large clumps. Under no circumstances shall the seed be placed deeper than 1/4 in. Seeds shall be pressed firmly into the soil either by packing wheels on a drill or by using a culti-packer. Seeding shall be completed between April 1 and June 30, unless otherwise authorized by the Engineer.

90 The Contractor shall seed using a warm-season grass drill specifically designed for warm-season grass seeding applications, such as a Truax or Great Plains equipped with a chaffy seed box. The Contractor may use a broadcast method when approved by the Engineer. Grain

401.10

drills or cool-season grass drills modified to plant warm-season grasses will not be acceptable. Seed shall be thoroughly mixed to ensure adequate distribution. All warm-season grass and forb seed shall be certified PLS.

401.10 Vegetation Map

100 The Contractor shall prepare an as built vegetation map on the plans, or other approved record by the Engineer, that depicts the vegetation process. This map shall show areas revegetated and include: soil sample locations and analysis, lime and fertilizer rates and dates of application, seeding rates and dates of application, seeding method and mulch rates and dates of application. This vegetation map shall be presented to the Engineer upon completion of the project.

401.11 Warranty

110 Soil erosion is critical on this project. The Contractor shall take all necessary measures to prevent and repair any erosion areas for a period of one year after the date of final completion. In the event erosion or seed failure is observed, the Contractor shall be notified in writing and will have a period of 30 days to take measures to stabilize the affected area to the satisfaction of the Engineer. The actual area of erosion and extent of the repair or prevention shall be at the discretion of the Engineer.

401.12 Method of Measurement

Agricultural lime will be measured by the ton. Fertilizer, nitrogen, phosphate, and pot ash will be measured by the pound. Soil Tests will be measured per unit.

Weight receipts for supplemental unit items measured by the ton or pound shall be retained by the Contractor and presented to the Engineer upon request.

401.13 Basis of Payment

120 Seeding and mulching will be paid for in accordance with the approved Schedule of Values.

Agricultural lime, fertilizer, nitrogen, phosphate, potash, and soil tests will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items

Unit Symbol

130	Agricultural Lime.....	TON
	Fertilizer <u> </u> (% N) - <u> </u> (% P ₂ O ₅) - <u> </u> (% K ₂ O)	LBS
	Nitrogen	LBS
	Phosphate	LBS
	Pot Ash.....	LBS
	Soil Test	EACH

The cost of all labor, materials, equipment, tools, and incidentals for seed and mulch shall be included in the base bid.

140 The cost of all labor, materials, equipment, tools, and incidentals for agricultural lime, fertilizer, nitrogen, phosphate, potash, and soil tests shall be included in the cost of the respective item.

SECTION 402 - RESERVED (TREE PLANTING)

DIVISION 05 - MISCELLANEOUS CONSTRUCTION

SECTION 501 - PROJECT SIGNS

501.01 Description

This work shall consist of furnishing, installing, and maintaining a project sign or signs as shown on the plans.

MATERIALS

501.02 Materials

10 Materials shall be in accordance with the following.

Project Signs605.01

CONSTRUCTION REQUIREMENTS

501.03 Installation

20 Project sign installations shall be as shown on the plans. Project sign installations shall be plumb and the backfill of postholes shall be well tamped to properly support the sign in position throughout the life of the contract.

501.04 Painting

The sign and posts shall be given one base coat and two finish coats before lettering. Lettering and trim shall be applied to one side only and of the color, style, and size shown on the plans.

501.05 Maintenance and Removal

30 The project sign shall be maintained in good condition and be repaired if necessary. If the Engineer does not direct the removal of the project sign by the end of the contract, the sign shall remain the property of the Division and shall remain on the site. If the Engineer directs the project sign to be removed, the project sign shall become property of the Contractor and shall be removed from the site.

501.06 Basis of Payment

Project signs will be paid for in accordance with the approved Schedule of Values.

The cost of all labor, materials, equipment, tools, and incidentals necessary for the installation, maintenance, and removal of project signs shall be included in the base bid.

SECTION 502 - ACCESS ROUTES AND STAGING AREAS

502.01 Description

This work shall consist of clearing vegetation, grading, placing compacted aggregate, and restoring vegetation of grassed areas of the routes and areas shown on the plans to provide access to and staging areas on the site for equipment, materials, and labor.

MATERIALS

10 **502.02 Materials**
 Materials shall be in accordance with the following.

Compacted Aggregate, Class D or higher.....601

CONSTRUCTION REQUIREMENTS

502.03 General

20 Access routes shall be maintained and repaired as necessary. The staging areas shall be kept in a clean and orderly condition free of trash and debris as directed by the Engineer. Access routes and staging areas that cross lawn or similar type maintained areas shall be repaired and revegetated as directed by the Engineer.

502.04 Method of Measurement

Compacted aggregate will be measured by the ton. Weight receipts for compacted aggregate shall be retained by the Contractor and presented to the Engineer upon request.

502.05 Basis of Payment

30 Access route and staging area construction will be paid for in accordance with the approved Schedule of Values.

Compacted aggregate will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Item	Unit Symbol
-------------------------------	--------------------

Compacted Aggregate, No. <u> (number) </u>	TON
--	-----

40 The cost of all labor, materials, equipment, tools, and incidentals necessary for access routes and staging areas, except compacted aggregate, shall be included in the base bid.

The cost of all labor, materials, equipment, tools, and incidentals necessary for placing and compacting aggregate on access roads and on staging areas shall be included in compacted aggregate.

SECTION 503 - RIPRAP

503.01 Description

This work shall consist of placing riprap as shown on the plans and as directed by the Engineer.

MATERIALS

503.02 Materials

10 Materials shall be in accordance with the following.

Geotextile.....	608
Riprap.....	601.03

CONSTRUCTION REQUIREMENTS

503.03 Placing Revetment, Class 1, and Class 2 Riprap

20 Revetment, class 1 and class 2 riprap may be placed by dumping and shall be placed to the required thickness. The finished surface shall be free from clusters of small stones or of large ones. The finished surface shall vary from a true plane no more than 9 in. for revetment riprap or 18 in. for class 1 or class 2 riprap but shall not be less than the minimum depth specified.

503.04 Placing Uniform Riprap

Uniform riprap shall be placed to produce a surface of approximate regularity with edges having projections no more than 3 in. above the required cross section. The material shall be hand laid or placed by other approved means.

503.05 Installation of Geotextile Under Riprap

30 Storage and handling of geotextiles shall be in accordance with the manufacturer's recommendations, except that the geotextile shall not be exposed to direct sunlight, ultraviolet rays, water, temperature greater than 140°F, mud, dirt, dust, and debris, to the extent that its strength, toughness, or permeability requirements are diminished. Each geotextile roll shall be labeled or tagged to provide product identification sufficient for inventory and quality control purposes. Exposure of geotextiles to the elements between lay down and cover shall be a maximum of 14 days. At the time of installation, the geotextile shall be rejected and replaced with no additional payment if defects, rips, flaws, deterioration or damage incurred during manufacture, transportation, storage, or construction is evident.

40 The surface to receive the geotextile shall be prepared to a relatively smooth condition free of obstructions, depressions, and debris within the limits indicated on the plans.

Geotextiles used along channels shall be placed with the machine direction of the geotextile parallel to the channel. Successive geotextile sheets shall be overlapped in such a manner that the upstream sheet is placed over the downstream sheet and the upslope sheet over the downslope sheet.

50 Geotextiles used for 2:1 slopes or greater shall be placed with the machine direction of the geotextile sheets perpendicular to the toe of slope. The geotextile sheets shall be overlapped in the direction of the anticipated movement of water.

Adjacent pieces of geotextile may be joined by sewing if approved, or by overlapping and pinning. The minimum overlap shall be 18 in. except when placed under water. When placed

under water, the overlap shall be a minimum of 3 ft. Securing pins shall be steel, 3/16 in. in diameter, 18 in. long, pointed at one end and fabricated with a head to retain a steel washer having an outside diameter of no less than 1.5 in. Securing pins with washers shall be inserted through both strips of overlapped geotextile at spacing intervals in Table 1 along a line through the midpoint of the overlap. The geotextile strip shall be placed so that the lower strip will be overlapped by the next higher strip. Pins shall be driven until the washer bears against the geotextile and secures it firmly to the ground.

60

Whether the fabric is joined by sewing or pinning, additional pins shall be installed as necessary to prevent any slippage of the fabric regardless of location.

TABLE 1

Slope	Pin Spacing
Steeper than 3:1	2 ft
3:1 to 4:1	3 ft
4:1 or flatter	5 ft

The geotextile shall be placed in such a manner that placement of the overlying materials will not excessively stretch or tear the geotextile and will not pull the required overlap or seam apart. Construction equipment will not be allowed on the exposed geotextile. Placement of riprap or stone shall start from the base of the slope, moving upslope and from the center outward. Riprap shall not be allowed to roll downslope and the height of drop for riprap shall be kept to less than 2 ft.

70

503.06 Method of Measurement

Geotextiles will be measured by the square yard. Revetment, class 1, class 2, and uniform riprap will be measured by the ton. Weight receipts for supplemental unit items measured by the ton shall be retained by the Contractor and presented to the Engineer upon request.

503.07 Basis of Payment

Geotextiles, revetment riprap, class 1 riprap, class 2 riprap, and uniform riprap will be paid for in accordance with the Schedule of Supplemental Unit Prices

80

Supplemental Unit Items	Unit Symbol
Geotextiles	SYS
Riprap, Class <u> (class) </u>	TON
Riprap, Revetment	TON
Riprap, Uniform.....	TON

The cost of all labor, materials, equipment, and incidentals necessary to place geotextiles, revetment riprap, class 1 riprap, class 2 riprap, and uniform riprap shall be included in the cost of respective item.

90

SECTION 504 - COARSE AGGREGATE

504.01 Description

This work consists of placing coarse aggregate and compacting the aggregate when specified as shown on the plans and as directed by the Engineer.

MATERIALS

504.02 Materials

10 Materials shall be in accordance with the following.

Coarse Aggregate, Class F or Higher	601
Geotextile.....	608

CONSTRUCTION REQUIREMENTS

504.03 Compacted Aggregate

Coarse aggregate shall be compacted with 3 passes of a vibratory roller when specified.

20 **504.04 Installation of Geotextile Under Coarse Aggregate**

The placing of geotextile under coarse aggregate shall be in accordance with 503.05.

504.05 Method of Measurement

Coarse and compacted aggregate will be measured by the ton. Geotextile will be measured by the square yard.

Weight receipts for supplemental unit items measured by the ton shall be retained by the Contractor and presented to the Engineer upon request.

30 **504.06 Basis of Payment**

Compacted aggregate, coarse aggregate, and geotextiles will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items	Unit Symbol
Coarse Aggregate, No. <u> (number) </u>	TON
Compacted Aggregate, No. <u> (number) </u>	TON
Geotextiles	SYS

40 The cost of all labor, materials, tools, equipment, and incidentals necessary to place coarse aggregate, compacted aggregate, and geotextiles shall be included in the cost of the respective item.

SECTION 505 - BENTONITE CLAY

505.01 Description

This work shall consist of placing and grading bentonite clay or mixing bentonite clay with soil then placing and grading the mixture.

MATERIALS

505.02 Materials

10 Bentonite clay shall consist of commercially processed granular fragments of pure bentonite, without additives.

CONSTRUCTION REQUIREMENTS

505.03 General Requirements

20 Bentonite clay shall be mixed with soil when shown on the plans. The bentonite clay or bentonite clay-soil mixture shall be placed and graded as shown on the plans or as directed by the Engineer. Bentonite clay shall be mixed with soil at a ratio of 1:10, respectively, unless otherwise noted on the plans or directed by the Engineer.

505.04 Method of Measurement

Bentonite clay will be measured by the pound or the ton in accordance with the Schedule of Supplemental Unit Prices. Receipts for bentonite clay shall be retained by the Contractor and provided to the Engineer upon request.

505.05 Basis of Payment

The accepted quantities of bentonite clay will be paid for in accordance with the Schedule of Supplemental Unit Prices.

30 Supplemental Unit Items	Unit Symbol
Bentonite Clay	LBS TON

The cost of all labor, materials, equipment, and tools necessary to place and grade bentonite clay or a bentonite clay-soil mixture shall be included in the cost of bentonite clay.

SECTION 506 - FENCES AND ACCESS GATES

506.01 Description

This work shall consist of the construction of fence and access gates as shown on the plans.

MATERIALS

506.02 Materials

10 Materials shall be in accordance with the following.

Barbed Wire	604.03(b)4
Chain Link Fabric	604.03(b)
Concrete, Packaged Dry.....	606.02
Field/Woven Wire.....	604.03(a)
Fence Posts.....	604.02
Tension Wire.....	604.03(b)1
Water.....	606.03

20

CONSTRUCTION REQUIREMENTS

506.03 General Requirements

The area necessary for the construction of fence and access gates shall be cleared and grubbed in accordance with 201.

At locations where breaks in a run of fencing are required, or at intersections with existing fences, appropriate adjustment in post spacing shall be made in accordance with the requirements for the type of closure indicated.

30 When the plans require that posts, braces, or anchors be imbedded in concrete, temporary guys or braces shall be installed, if required to hold the posts in proper position. Unless otherwise permitted, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until 96 hours have elapsed from the time of placing of the concrete.

The tops of all posts shall be set to the required grade and alignment. Cutting of the posts will only be allowed with the approval of the Engineer. Post caps shall be installed at the time the fence fabric is placed on the posts.

40 Wire or fencing of the size and type required shall be firmly attached to the posts and braces in the manner indicated. All wires shall be stretched taut and installed to the required elevations.

At each location where an electric transmission, distribution, or secondary line crosses any of the types of fences covered by these specifications, a ground, conforming to applicable requirements of the National Electric Safety Code, shall be furnished and installed.

506.04 Setting Fence Posts

50 If an object, such as a tree, is located in way of the fence and is to remain in place, the fence may be adjusted to miss the obstruction. There shall be a gradual offset for at least three posts in each direction of the obstruction.

Line posts for field type fence shall be set on 16 ft centers, and for chain link fence on 10 ft centers. In either case, a tolerance of ± 2 ft in spacing will be allowed at special locations as approved. Spacing of these posts shall be as uniform as practicable under the existing conditions. However, additional posts shall be set to maintain the bottom clearance dimensions as required.

Pull posts shall be set at 500 ft maximum intervals in straight runs and at each vertical angle point of 10 degrees or more.

60 Corner posts shall be set at each horizontal angle point of 10 degrees or more.

End, corner, and pull posts for both types of fence, line posts for chain link fence and diagonal braces for field type fence shall be set in concrete made from packaged, dry combined materials for concrete and water as shown on the plans.

Except where rock is encountered, intermediate or line posts shall be driven and furnished with an approved anchor plate or other satisfactory device to hold the post in proper alignment and plumb. The plate or anchor shall be welded or riveted to the post with no less than two rivets.

70 Access gate posts shall be set in concrete as shown on the plans.

Extra length posts shall be required at stream crossings as shown on the plans or as directed and also at ground depressions where it is not practicable for the fencing to follow closely the contour of the ground. These posts shall be set in concrete as shown on the plans.

80 At small stream crossings and ground depressions, the space below the fence fabric shall be closed with barbed or ground tension wire, either on horizontal lines or fanned, as shown on the plans or as directed. The wires shall be stretched taut between and fastened to the posts to prevent vertical movement of the wires. Barbed or tension wire shall not be placed where its installation would cause collecting drifts in the channel.

506.05 Placing Barbed and Tension Wire and Fabric

The bottom of the fabric shall be placed above the ground line as shown on the plans. Over irregular ground, a minimum of 1 in. and a maximum of 4 in. clearance will be permitted.

90 The tension required to stretch the fabric and wire shall be applied by mechanical fence stretchers and with single wire stretchers designed and manufactured for the purpose, and in accordance with the fence manufacturer's recommendations.

All splices in the fabric and wire shall be securely made in accordance with the best practice and the manufacturer's recommendations, and by the use of tools designed for that purpose.

Field fence shall be placed by fastening one end and then applying sufficient tension to remove all slack before making permanent attachments elsewhere. The line wires shall be fastened to end, corner, and pull posts by wrapping the wires around the posts and tying the wire

506.06

back on itself with no less than 1 1/2 tightly wrapped twists. Tying shall be with tools designed for the purpose in accordance with the fence manufacturer's recommendations. This same method shall be used in placing barbed or tension wire. Fence fabric shall be fastened to intermediate or line posts with at least five wire ties. Barbed or tension wire shall be fastened in the same manner with one fastening device for each post.

The top and bottom tension wires of chain link fence shall be placed, stretched taut, and secured at the ends and to all posts before the fabric is placed. The ends of the fabric shall be secured by the use of stretcher-bars threaded through the loops of the fabric and secured to the posts by means of clamps with bolts and nuts. The number of clamps shall be as indicated on the plans. The fabric shall be placed by securing one end and then applying tension to remove all slack before making attachments elsewhere. The fabric shall be fastened to the line posts and to the top and bottom tension wires with tie wires spaced as shown on the plans.

506.06 Resetting Fence

Resetting fence shall consist of the removal of existing fence within the specified limits and, if necessary, storing and then resetting it in accordance with the plans, or as directed. Resetting fence shall be in accordance with 506.03, 506.04, and 506.05. Damaged or missing parts, including posts shall be replaced.

506.07 Access Gates

Access gate installations shall be in accordance with the plans. ANSI Schedule steel pipe shall be used as shown and be welded together. Access gates shall be given two coats of paint. A lockbox approved by the Engineer shall be welded to the gate. The lockbox shall provide for double locking. The access gate shall be maintained throughout the contract in good condition and be repaired as necessary.

506.08 Method of Measurement

Fence and resetting fence will be measured by the linear foot for the type specified. Measurement will be made along the top of the fence from outside to outside of end posts for each continuous run of fence.

Access gates will be measured as complete units of the size and type specified.

506.09 Basis of Payment

The accepted quantities of fence, resetting fence, and access gates will be paid for in accordance with the Schedule of Supplemental Unit Prices.

Supplemental Unit Items

Unit Symbol

	Access Gate, <u> (width) </u> ft	EACH
	Fence, <u> (type) </u> , <u> (height) </u> in.....	LFT
140	Fence, <u> (type) </u> , Reset.....	LFT
	Fence, Field, Barbed Wire, <u> (height) </u> in.	LFT
	Fence, Field, Tension Wire, <u> (height) </u> in.	LFT

The cost of adding grounding in accordance with the National Electric Safety Code including all materials, and labor shall be included in the cost of the fence.

The cost of fence, and corner, end, line, and pull posts shall be included in the cost of the fence.

150 The cost of fence, post and miscellaneous hardware shall be included in the cost of fence gate and access gate.

The cost of all miscellaneous hardware related to the type of fence including brace connections, caps, clips, clamps, hinges, rivets, ties, truss rods, diagonal braces and stretcher bars shall be included in the cost of the fence.

The cost of clearing and grubbing for the construction or resetting of fence shall be included in the cost of the fence.

160 The cost of all labor, materials, including the prefabricated lockbox, equipment, tools, and incidentals necessary for the installation and maintenance of access gates shall be included in the cost of the access gate.

SECTION 507 - RESERVED (GUARDRAIL)

SECTION 508 - RESERVED (BIOREACTORS)

SECTION 509 - RESERVED (MINE SHAFT CAPS)

SECTION 510 - RESERVED (MONUMENTS AND MARKERS)

DIVISION 06 - MATERIALS

SECTION 601 - AGGREGATES

601.01 Aggregates

Aggregates shall consist of natural or manufactured materials produced from but not limited to limestone, dolomite, gravels, sandstones, steel furnace slag, air-cooled blast furnace slag, granulated blast furnace, wet bottom boiler slag, or other geologic rock types approved by the Engineer. All aggregates shall come from a certified aggregate producer on INDOT's most current approved materials list unless approved otherwise by the Engineer.

- 10 At time of use, aggregates shall be free from lumps or crusts of hardened or frozen materials.

601.02 Coarse Aggregate

Coarse aggregates are defined as having a minimum of 20% retained on the No. 4 sieve. Coarse aggregates shall not contain adherent fines that are detrimental to the end product.

- 20 The coarse aggregate shall comply with the quality requirements and the additional requirements in accordance with 601.02(a). However, coarse aggregate may be rejected based on previous performance service records. Class AP is defined as the highest classification and Class F the lowest. Blending of material for compliance with gradation or crushed particle requirements may be permitted when requested in writing. Blending of aggregate products to improve the quality classification of the finished product will not be permitted.

(a) Classification of Aggregates

Characteristic Classes	AP	AS	A	B	C	D	E	F
Quality Requirements								
Freeze and Thaw Beam Expansion, % Max. (Note 1).....	.060							
Los Angeles Abrasion, % Max. (Note 2)	40.0	30.0	40.0	40.0	45.0	45.0	50	
Freeze and Thaw, AASHTO T 103, Procedure A, % Max. (Note 3)	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Sodium Sulfate Soundness, % Max. (Note 3).....	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Brine Freeze and Thaw Soundness, % Max. (Note 3).....	30	30	30	30	40	40	50	60
Absorption, % Max. (Note 4).....	5.0	5.0	5.0	5.0	5.0			
Additional Requirements								
Deleterious, % Max.								
Clay Lumps and Friable Particles	1.0	1.0	1.0	1.0	2.0	4.0		
Non-Durable (Note 5).....	4.0	4.0	4.0	4.0	6.0	8.0		
Coke.....					(See Note 6)			
Iron.....					(See Note 6)			
Chert	3.0	3.0	3.0	5.0	8.0	10.0		
Weight per Cubic Foot for Slag, lbs, Min. ..	75.0		75.0	75.0	70.0	70.0	70.0	
Crushed Particles, % Min								
Asphalt Seal Coats.....			70.0	70.0				
Compacted Aggregate			20.0	20.0	20.0	20.0		
Notes:	<ol style="list-style-type: none"> Freeze and thaw beam expansion for concrete slabs. Los Angeles abrasion requirements shall not apply to blast furnace slag. Aggregates may, at the option of the Engineer, be accepted by the Sodium Sulfate Soundness or Brine Freeze and Thaw Soundness requirements. Absorption requirements apply only to aggregates used in concrete and asphalt mixtures except they shall not apply to blast furnace slag. Non-durable particles include soft particles and other particles which are structurally weak, such as soft sandstone, shale, limonite concretions, coal, weathered schist, cemented gravel, ocher, shells, wood, or other objectionable material. Air cooled blast furnace slag and steel furnace slag coarse aggregate shall be free of objectionable amounts of coke, iron, and lime agglomerates. The bulk specific gravity of chert shall be based on the saturated surface dry condition. The amount of chert less than 2.45 bulk specific gravity shall be determined on the total weight of material retained on the 3/8 in. sieve for sizes 2 through 8, 43, 53, and 73 and on the total weight of material retained on the No. 4 sieve for sizes 9, 11, 12, and 91. Crushed particle requirements shall apply to gravel coarse aggregates used in compacted aggregates, and seal coats except seal coats used on shoulders. Determination of crushed particles shall be made from the weight of material retained on the No. 4 sieve in accordance with ASTM D 5821. 							

(b) Sizes of Coarse Aggregates

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.										
3 1/2 in.										
2 1/2 in.	100									
2 in.	80-100									
1 1/2 in.		100					100		100	
1 in.	0-25	85-98	100				70-90	100	80-100	100
3/4 in.	0-10	60-85	75-95	100			50-70		70-90	90-100
1/2 in.	0-7	30-60	40-70	60-85	100	100	35-50		55-80	60-90
3/8 in.		15-45	20-50	30-60	75-95	95-100				
No. 4		0-15	0-15	0-15	10-30	50-80	20-40		35-60	35-60
No. 8		0-10	0-10	0-10	0-10	0-35	15-35		25-50	
No. 30						0-4	5-20		12-30	12-30
No. 200 ⁽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 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, the total amount passing the No. 200 sieve shall be 10.0 to 12.0.

30

601.03 Riprap

Riprap shall consist of sound stone, stone masonry, or other approved material, free from structural defects and of approved quality. Stone containing shale, unsound sandstone, or other material that will disintegrate readily, shall not be used.

(a) Revetment, Class 1, and Class 2 Riprap

The material shall be coarse aggregate, Class F or higher in accordance with 601.02(a). Gradation shall be in accordance with 601.03(c).

(b) Uniform Riprap

40 The material shall be coarse aggregate, Class F or higher in accordance with 601.02(a). Gradation shall be in accordance with 601.03(c). Either type A or type B may be utilized.

(c) Sizes of Riprap

GRADATION REQUIREMENTS					
Percent Smaller					
Size, in.	Revetment	Class 1	Class 2	Uniform A	Uniform B
30			100		
24		100	85-100		
18	100	85-100	60-80		
12	90-100	35-50	20-40		
8				100	
6	20-40	10-30	0-20	35-80	95-100
3	0-10	0-10	0-10		35-80
1				0-20	0-20
Depth of Riprap, Minimum	18 in.	24 in.	30 in.		

601.04 Fine Aggregates

Fine aggregates are defined as 100% passing the 3/8 in. sieve and a minimum of 80% passing the No. 4 sieve.

50

(a) Sizes of Fine Aggregates

SIZES (PERCENT PASSING)					
Sieve Sizes	23	24	15	16	PP
3/8 in.	100	100			
No. 4	95-100	95-100			100
No. 6			100		
No. 8	80-100	70-100	90-100		85-95
No. 16	50-85	40-80			
No. 30	25-60	20-60	50-75	100	50-65
No. 50	5-30	7-40	15-40		15-25
No. 80				95-100	
No. 100	0-10	1-20	0-10		0-10
No. 200	0-3	0-6	0-3	65-100	

(b) Mortar Sand

Fine aggregate for mortar shall consist of uniformly graded natural sand in accordance with gradation requirements of 601.04(a) for size No. 15.

SECTION 602 - CONCRETE, CLAY, AND PLASTIC DRAINAGE COMPONENTS**602.01 Non-Reinforced Concrete Pipe**

This pipe shall be in accordance with AASHTO M 86 for the specified diameter and strength classes. When used for underdrain, each section of pipe shall not exceed 3 ft in length.

602.02

602.02 Reinforced Concrete Pipe

10 This pipe shall be in accordance with AASHTO M 170 for the specified diameters and strength classes. Precast concrete units shall be from a source listed on INDOT's List of Certified Precast Concrete Producers. Unless otherwise specified, pipe wall design and use of elliptical reinforcement in circular pipe are optional.

The pipe provided shall be in accordance with the class and D-load rating shown in the plans.

Precast reinforced concrete end sections shall be in accordance with the cited specifications to the extent to which they apply.

20 The manufacturer of the steel reinforcement shall furnish to the pipe manufacturer a mill test report. The pipe manufacturer shall certify, on furnished forms that:

- (a) The placement of the steel reinforcement is in accordance with the Standard Specifications.
- (b) The area of steel reinforcement per linear foot of pipe is in accordance with or exceeds the specification requirements.
- (c) Based on the steel reinforcement manufacturer's mill test report, the steel used in the pipe is in accordance with the specification requirements.
- 30 (d) Copies of the steel reinforcement manufacturer's mill test reports shall be on file and available to review for five years.

602.03 Reinforced Concrete Horizontal Elliptical Pipe

This pipe shall be in accordance with AASHTO M 207. Material certification shall be in accordance with 602.02.

602.04 Precast Concrete Manholes, Inlets, and Catch Basins

40 These units shall be in accordance with AASHTO M 199. References to diameter are applicable to corresponding dimensions in other than circular sections. Absorption tests will not be required for flat top or base slabs. Certification shall be in accordance with 602.02.

No more than three holes shall be cast or drilled in each section for the purpose of handling.

In addition to the requirements of AASHTO M 199, the manhole steps shall be permanently marked with the specific step designation, and the manufacturer's identification. This marking shall remain exposed after installation.

602.05 Plastic Pipe Manufacturer Requirements

50 A list of approved Plastic Pipe, Fittings, Solvent Cement, and Elastomeric Seals is maintained by INDOT. The list specifies the manufacturer, plastic pipe, solvent cement, or

elastomeric seals designation. All of these materials shall comply with the applicable AASHTO or ASTM requirements and will only be accepted from qualified manufacturers. The manufacturer is defined as the plant which produces the plastic pipe, fittings, solvent cements, or elastomeric seals.

602.06 Corrugated Polyethylene Drainage Tubing

60 Tubing and fittings shall be in accordance with AASHTO M 252. Perforations shall be required for tubing used as a longitudinal underdrain. Qualification requirements for the manufacturers shall be in accordance with 602.05.

602.07 Corrugated HDPE Pipe

Pipe and fittings shall be in accordance with AASHTO M 294. The compound used in manufacturing this pipe shall have a minimum cell class in accordance with 335420C as shown in ASTM D 3350. Qualification requirements for the manufacturers shall be in accordance with 602.05. If corrugated or smooth wall is not specified on the plans or the Schedule of Supplemental Unit Prices, HDPE pipe shall be corrugated.

70 602.08 Smooth Wall HDPE Pipe

Pipe shall be in accordance with ASTM F 714 for nominal diameters of 39 in. or less. Fittings shall be in accordance with ASTM F 1055. The pipe sizes shall be in accordance with ISO sizing system. The pipe dimension ratio shall be 26 or less. The compound used in manufacturing this type of pipe shall have a minimum cell class in accordance with 335434C as shown in ASTM D 3350. Qualification requirements for the manufacturers shall be in accordance with 602.05. If corrugated or smooth wall is not specified on the plans or the Schedule of Supplemental Unit Prices, HDPE pipe shall be corrugated.

80 602.09 Profile Wall PVC Pipe

Pipe and fittings shall be in accordance with AASHTO M 304 for nominal diameters of 36 in. or less. Perforations shall be required when used as a longitudinal underdrain. Qualification requirements for the manufacturers shall be in accordance with 602.05.

602.10 Smooth Wall PVC Pipe

Pipe and fittings shall be in accordance with AASHTO M 278 for pipe sizes 4 in. through 15 in., and ASTM F 679 for pipe sizes 18 in. through 27 in. The compound used in manufacturing pipe shall have a minimum cell class in accordance with 12454C as shown in ASTM D 1784. Qualification requirements for the manufacturers shall be in accordance with 602.05.

90 602.11 Smooth Wall Pipe for Outlets

Pipe and pipe fittings shall be smooth wall, non-perforated plastic pipe. Qualification requirements for the manufacturers shall be in accordance with 602.05.

(a) Type PSM PVC Pipe and Fittings

Pipe and fittings shall be in accordance with ASTM D 3034, SDR 23.5.

602.12

(b) Schedule 40 PVC Pipe

100 Pipe shall be in accordance with ASTM D 1785 and shall have a minimum pipe stiffness of 150 psi at 5% deflection when determined in accordance with ASTM D 2412.

602.12 Solvent Cements for PVC and Pipe Fittings

Solvent cement for polyvinyl chloride pipe and fittings shall be in accordance with ASTM D 2564. Qualification requirements for the manufacturers of this material shall be in accordance with 602.05.

602.13 Reserved (Thermoplastic Pipe Liners)

602.14 Rubber Type Gaskets

110 Ring gaskets for pipe shall be in accordance with AASHTO M 315, Standard Gasket. Material furnished under this specification shall have a certification that shall be prepared by the manufacturer. It shall show the limits of test values for the specified tests and shall certify that the materials furnished comply with the specifications. The applicable specification shall be referred to in the certification. The tests may be conducted in the laboratory of the manufacturer or in another qualified laboratory.

602.15 Bituminous Mastic Pipe Joint Sealer

120 This is a cold applied, mineral filled, joint sealing compound for joints of bell and spigot or tongue and groove concrete or clay pipe. Joint sealing compound shall be in accordance with AASHTO M 198.

(a) General Requirements

130 This sealer shall be a smooth uniform mixture, not thickened or livered, and shall show no separation which cannot be overcome easily by stirring. The material shall be of such consistency and proportions that it can be applied readily with a trowel, putty knife, or caulking gun without pulling or drawing. It shall exhibit good adhesive and cohesive properties when applied to metal, concrete, or vitrified clay surfaces. It shall not be damaged by exposure to below freezing temperatures and shall be applicable when the temperature of the air is between 20°F and 100°F.

(b) Certification

Material furnished under this specification shall have a certification that shall be prepared by the manufacturer and shall certify that the materials furnished are in accordance with the specifications. The applicable specification shall be referred to in the certification.

602.16 Elastomeric Seals

140 Elastomeric seals for joining plastic pipe shall be in accordance with ASTM F 477. Qualification requirements for the manufacturers of this material shall be in accordance with 602.05.

602.17 Anti-Seep Collars

Anti-seep collars shall be constructed of a wood frame with neoprene or of HDPE sheets.

(a) Neoprene Anti-seep Collar

Neoprene anti-seep collars shall be used for pipes with smooth walled exteriors. Neoprene anti-seep collars shall be constructed of a wood frame with a neoprene insert. The frame shall be constructed of one 1 in. nominal dimension sheet of lumber with two 1 in. by 4 in. nominal dimension lumber members attached on the top and bottom to hold the neoprene. The neoprene shall face upstream. The hole in the sheet of lumber shall be cut to the outside diameter of the pipe. The hole in the neoprene shall be cut at 25% the diameter of the pipe.

(b) HDPE Anti-seep Collar

HDPE anti-seep collars shall be used for pipes with corrugated exteriors. HDPE anti-seep collars shall be constructed of 1/4 in. HDPE sheets. The hole for the pipe shall be cut into two HDPE sheets to create an overlap of 2 in. The diameter of the hole shall be the inner corrugated dimension. Plastic bolts shall be used to join the sheets and be placed 4 in. on center. A mastic sealant shall be used on seam between the two sheets, bolt holes, and joint between the pipe and the anti-seep collar to prevent leaks.

SECTION 603 - METAL PIPE**603.01 Corrugated Steel Pipe and Pipe-Arches**

Corrugated steel pipe and pipe-arches shall be type I, IA, II, or IIA in accordance with AASHTO M 36.

Corrugated steel pipe, pipe-arches, and coupling bands shall be zinc coated steel or aluminum coated steel in accordance with AASHTO M 36, except as noted herein. They may be fabricated with circumferential corrugations and riveted lap joint construction or with helical corrugations with continuous lock or welded seam extending from end to end of each length of pipe. Reforming the ends of helical corrugated pipe to form circumferential corrugations will be permitted to allow use of circumferential corrugated coupling bands. The reforming shall be limited to the length required to accommodate the coupling bands and in such a manner that there is no appreciable slippage of the seam nor a plane of weakness created.

Polymer precoated galvanized corrugated steel pipe type IA and pipe-arch type IIA have an outer shell of corrugated sheet with helical corrugations and an inner liner of smooth sheet attached to the shell with a helical lock seam.

Fittings, including stub-tee connections and saddle connectors shall be shop fabricated. Damage to the coating on fittings shall be repaired in accordance with AASHTO M 36.

Sheet metal used to fabricate pipe shall be the same brand from the same manufacturer in any one length of finished pipe.

The manufacturer shall furnish to the fabricator a certified mill report for materials shipped to the fabricator. This certified mill report shall list the kind of base metal, actual test results of the chemical analysis and mechanical tests of each heat, the thickness, the weight of coating, and shall certify that the material complies with specified requirements for the type of metal furnished.

603.02

The fabricator shall certify, on furnished forms that:

- (a) the fabricated structure has been manufactured in accordance with these Standard Specifications;
- (b) based on the sheet manufacturer's certified mill report, the materials used in fabricating the structure were tested and the test results are in accordance with the specified requirements; and
- (c) copies of the sheet manufacturer's certified mill report shall be on file and available to review for five years.

40

603.02 Corrugated Aluminum Alloy Pipe and Pipe-Arches

Pipes, pipe-arches, and coupling bands shall be in accordance with AASHTO M 196. The pipe shall be type I, IA, II, or IIA.

The sheet manufacturer's certified mill report and the fabricator's certification shall be in accordance with 603.01, except the documents shall be in accordance with the applicable requirements of AASHTO M 196.

50

Where aluminum alloy pipe culvert is furnished, aluminum alloy end sections shall also be furnished. All component parts shall be aluminum alloy.

603.03 Metal End Sections

The end section's metal shall be in accordance with AASHTO M 36 or M 196, whichever is applicable. The sheet metal manufacturer's certified mill report and the fabricator's certification shall be in accordance with 603.01 or 603.02, whichever is applicable.

60

End sections consisting of multiple panels shall have lap seams which shall be tightly jointed with 3/8 in. galvanized rivets or bolts.

All steel pipe end sections shall have a toe plate anchor constructed of 0.138 in. thick galvanized steel. The toe plate anchor shall be match punched to fit holes in the skirt lip, and shall be supplied loose, and complete with 3/8 in. diameter galvanized bolts.

Straps for pipe end sections shall be either galvanized No. 6 reinforcing bars or zinc coated 3/8 in. diameter aircraft cable.

70

603.04 Polymer Precoated Galvanized Corrugated Steel Culvert Pipe and Pipe-Arches

The pipe or pipe-arch and coupling bands shall be in accordance with AASHTO M 245 with additions in accordance with 603.01. The polymer precoated galvanized steel sheets shall be in accordance with AASHTO M 246, Grade 10/10.

603.05 Structural Plate Pipe, Pipe-Arches, and Arches

(a) Steel

80 Steel structural plate pipe, pipe-arches, and arches shall be constructed from individually galvanized corrugated steel plates as described herein. For pipes and pipe-arches having a thickness less than 0.280 in., the bottom plates shall be of the next greater thickness than that specified for the top and side plates, not including corner plates for pipe-arches. The individual plates shall be in accordance with AASHTO M 167 and Section 26 of the AASHTO Standard Specifications for Highway Bridges, Division II.

The materials and fabrication shall be as follows:

- 90 1. The minimum corner plate radius of the arc joining the top and bottom plates of pipe-arches shall be 18 in. for openings up to and including 131 sq ft and 31 in. for openings over 131 sq ft. The minimum radius of the arc shall be 31 in. for openings from 98 sq ft up to and including 214 sq ft.
2. Assembly bolts shall be in accordance with AASHTO M 164, ASTM A 325, or ASTM A 449. Nuts shall be in accordance with ASTM A 563, grade C; AASTHO M 164; or ASTM A 325. Assembly bolts, nuts, and washers shall be galvanized in accordance with ASTM A 153, or be mechanically galvanized and conform to the coating thickness, adherence, and quality requirements of ASTM A 153, class C.
- 100 3. The sheet manufacturer's certified mill report and the fabricator's certification shall be furnished in accordance with 603.01, except the documents shall be in accordance with the applicable requirements of AASHTO M 167.

(b) Aluminum Alloy

Aluminum alloy structural plate pipe, pipe-arches, and arches shall be in accordance with AASHTO M 219. The sheet manufacturer's certified mill report and the fabricator's certification shall be furnished in accordance with 603.01.

603.06 Cast Iron Soil Pipe

110 This pipe shall be in accordance with ASTM A 74. Markings shall be in accordance with ASTM A 74 or ANSI A 40.1.

603.07 Steel Pipe

This item shall be electric-fusion, arc-welded steel pipe in accordance with ASTM A 139, grade B, or electric-resistance welded pipe in accordance with ASTM A 53, Type E, Grade B, as applicable. Material furnished under this specification shall have a certification that shall be prepared by the manufacturer and shall certify that the materials furnished are in accordance with the specifications. The applicable specification shall be referred to in the certification.

603.08

120 **603.08 Straps, Hook Bolts and Nuts Used in Anchors**

Straps shall be of the type and size shown on the plans. Reinforcing bars used for straps shall meet the applicable requirements of 604.01 and shall be galvanized in accordance with ASTM A 767, class I. Aircraft cable used for straps shall be made of zinc coated steel wire, 3/8 in. nominal diameter, consisting of seven 19 wire flexible steel strands, with a minimum breaking strength of 14,000 lb. The cable shall be in accordance with Military Specification MIL-W-83420D.

130 Hook bolts and nuts shall be of the size shown on the plans, shall be in accordance with ASTM A 307, and shall be galvanized in accordance with ASTM A 153. Threads shall be American Standard Coarse Thread Series Class 2 fit. Threads shall be cleaned after galvanizing to provide a free running fit. Maximum oversizing of the nut threads shall be 1/64 in.

SECTION 604 - METAL MATERIALS

604.01 Reinforcing Bars

(a) General

Unless otherwise specified, bars for concrete reinforcement shall be deformed billet steel, grade 60. Tie bar assemblies used in lieu of bent tie bars shall be in accordance with the minimum total ultimate strength and minimum total yield strength requirements specified for bent tie bars; bend test and elongation will not be required.

10

Reinforcement used in precast concrete structural members, including deck panels, shall be in accordance with ASTM A 615 grade 60 or ASTM A 706 grade 60.

Reinforcing bars shall be furnished by selecting bars made by a manufacturer on INDOT's list of Certified Uncoated Reinforcing Bar Manufacturers. Material furnished under this specification shall have a certification that shall be prepared by the manufacturer and shall certify that the materials furnished are in accordance with the specifications. The applicable specification shall be referred to in the certification.

20

(b) Specific Requirements

1. Billet Steel Bars

Billet steel bars shall be in accordance with ASTM A 615.

2. Threaded Tie Bar Assembly

The threaded tie bar assembly shall be deformed billet steel, grade 60 or higher, in accordance with 604.01(b)1 and a coupling device. The tie assembly shall achieve a minimum load of 76.144 kip/in.2.

30

3. Splicing Systems

Reinforcing bar splicing systems shall be selected from INDOT's list of approved Reinforcing Bar Splicing Systems.

(c) Inspection, Sampling, and Testing

All reinforcing bars may be inspected, sampled, and tested after delivery to the project.

604.02 Steel Fence Posts

Tubular steel fence posts and line posts shall meet the following specifications and the requirements as shown on the plans.

40

(a) Line Posts

Line posts shall be in accordance with AASHTO M 281 and galvanized in accordance with AASHTO M 111, Coating grade 65. Line posts for field fence shall be furnished with anchor plates. End, corner, pull, and gate posts for field type fence shall be furnished with braces and all fittings and details required to make a complete installation as shown on the plans.

(b) Tubular Steel Fence Posts

Tubular section posts shall have heavy malleable iron caps or pressed galvanized steel caps. Such caps shall be made to provide a drive fit over the outside of the section to exclude moisture. The weight per foot for tubular posts and braces shall be no less than 90% of the weight specified.

50

Tubular steel fence posts shall be hot-dipped zinc-coated and shall be in accordance with ASTM F 1083. The weight per foot will be acceptable provided it is at least 90% of the specified weight.

End, corner, and pull posts shall be 2 in. nominal diameter and shall weigh 3.65 lbs/ft. The diagonal brace shall be 1 1/4 in. nominal diameter and shall weigh 2.27 lbs/ft. Line posts shall weigh 1.33 lbs/ft.

60

(c) Fence Fastenings

When fastenings are necessary for attaching the field fence to the posts, they shall be either galvanized or aluminum coated No. 9 wire, or galvanized or aluminum coated clamps of the manufacturer's standard design. The coating weights shall be a minimum of 0.60 oz/sq ft and 0.30 oz/sq ft for galvanized and aluminum coated, respectively. A sufficient quantity of individual tie wires or clamps shall be furnished to provide for five attachments of the fencing to each line post and one tie wire for each strand of barbed or tension wire.

70

Line posts for chain link type fence shall be furnished with the necessary tie wires or fabric bands for fastening the fabric to the posts. These fastenings shall be made of aluminum strip or wire of approved gage and design or of galvanized steel wire and may be in accordance with the manufacturer's standard design. If galvanized steel wire ties are furnished, the wire shall be no smaller than No. 9 gage. A sufficient quantity of individual ties or bands shall be furnished to provide for attaching the fabric to each line post each 1 ft or as called for on the plans.

604.03 Fence, Fittings, and Gates

(a) Field or Woven Wire Fence

80 This fence shall be in accordance with ASTM A 116. The wire shall be No. 9 gage. The design shall be 1047-6-9. The coating shall be class 3. The method of securing the vertical stays to the horizontal wires may be either of those shown on the plans. Diagonal braces shall be in accordance with 910.18(b)3.

(b) Steel Fabric Chain Link Fence

90 This fence shall be in accordance with ASTM A 392 for galvanized steel fabric or ASTM A 491 for aluminum coated steel fabric. The height of the fabric shall be 48 in. unless otherwise specified. It shall be of No. 9 gage wire woven in 2 in. mesh. The fabric shall be knuckled at the top and bottom selvages when the height is less than 72 in. Fabric of 72 in. in height or higher shall be knuckled at the top and shall have the twisted and barbed finish at the bottom. For galvanized fabric, coating shall be done after weaving and shall be class II, average of 2 or more specimens no less than 2.0 oz/sq ft and no less than 1.8 oz/sq ft for any individual specimen. For aluminum coated fabric, coating shall be class II, 0.40 oz/sq ft minimum.

100 The fabric shall be furnished with ties required for fastening it to the top and bottom tension wires. These fastenings may be of aluminum wire or strip of approved gage and design, or of galvanized steel wire in accordance with the manufacturer's standard design. If galvanized steel wire ties are furnished, the wire shall be no smaller than No. 12 gage. Sufficient ties shall be furnished to provide for attaching to the top and bottom tension wires each 24 in. Fittings necessary to make complete installation shall be pressed or rolled steel, forged steel, cast steel, or malleable iron.

Steel fabric chain link fence shall be as shown on the plans and as set out above.

1. Tension Wire

110 Tension wire intended for use on the top or bottom of steel chain link fence or on the bottom of field fence when specified shall be spring coil or crimped steel wire with an initial diameter of 0.177 ± 0.005 of an in., a minimum breaking load of 1,950 lb, and a coating of either zinc or aluminum. The minimum weight of coating shall be 0.80 oz/sq ft for galvanized wire and 0.40 oz/sq ft for aluminum coated steel wire. The weight of aluminum coating shall be determined in accordance with ASTM A 428.

2. Stretcher Bars, Truss Rods, and Turnbuckles

Stretcher bars shall be 3/16 by 3/4 in. flat bars. These bars, truss rods, turnbuckles, and necessary fittings shall be of good commercial quality steel, malleable iron, or wrought iron. They shall be galvanized in accordance with ASTM A 153 after fabrication. The turnbuckles shall be made from drop forged malleable iron. They shall have a minimum take up of 4 in. The fittings may be pressed or rolled steel, forged steel, cast steel, or malleable iron.

3. Braces

120 Braces shall be made of steel pipe with bolted steel couplings or connections. Steel pipe shall be in accordance with ASTM F 1083. They shall be galvanized as set out therein.

Fabrication or manipulation that causes minor damage to the galvanized coating shall be corrected by approved application of a high zinc dust-zinc oxide paint conforming to the requirements of Federal Specification TT-P-641 type II or Military Specifications DOD-P-21035. When spray paints are used, two coats shall be applied. Damaged braces will be rejected.

4. Barbed Wire

130 Barbed wire used at the top and bottom of field fence, or as otherwise specified, and in accordance with 505 shall be in accordance with applicable provisions of ASTM A 121. It shall be composed of No. 12 1/2 gage galvanized or aluminum coated steel wire with four round 14 gage barbs at approximately 5 in. spacing. The galvanized coating shall be in accordance with class 3 in Table 2. The minimum aluminum coating shall be in accordance with class 60 for the line wire and class 20 for the barb wire. The weight of coating shall be determined in accordance with ASTM A 428. The use of aluminum barbs, in accordance with ASTM B 211, alloy 5052-H38, nominal diameter No. 14 gage, will be permitted.

140 The use of barbed wire with No. 15 1/2 gage, high tensile strength line wires, and No. 16 1/2 gage barbs will be permitted. The barbs shall be round with four points and spaced at approximately 5 in. intervals. The barbed wire shall be in accordance with ASTM A 121. The galvanized coating shall be in accordance with class 3 in Table 2.

(c) Aluminum Fabric Chain Link Fence

This fence shall be in accordance with the applicable requirements of 604.03(b) except for composition of materials. Requirements for the various component parts of aluminum fence shall be as shown in Table 1.

TABLE 1

ITEM	ASTM REFERENCE	ALLOY	ADDITIONAL INFORMATION
Fabric	B 211	Alclad 5056 or 6061-T94	
Barbed Wire-Line	B 211	5062-0, H38, or 6061-T89	2-strand dia. 0.110 in. 4-pt barb. dia. 0.080 in. 5 in. space
Barbs	B 211	5052-H38	
Tension Wire	B 211	Alclad 5056 or 6061-T94	Dia. 0.192 in.; Note 1
Hog Ring Fasteners	B 211	6061-T94	Dia. 0.110 in.
Wire Ties	B 211	1100-H18	Dia. 0.148 in.
Flat band ties	B 211	3003-H14	1.2 in. wide; 0.06 in. thick
Stretcher Bars	B 211	6063-T6	3/4 in. by 1/4 in.; square edges
Truss and Brace Rods	B 211 or B 221	6061-T6	Dia. 3/8 in.
Turn Buckles	B 26 (cast parts), B 211 (wrought)	356.0-T6 6061-T6	
Bands	B 221	6063-T6	1/8 in. by 1 in. beveled edge
Bolts	B 211 or B 221	2024-T4	ASA B 18.2 hexagon threads class 2, 2A, or 2B
Nuts	B 211 or B 221	6061-T6	
Expansion Sleeves	B 210	3003-H18	1.695 in. ID by 0.078 in.; wall drawn type. 6 in. long; self centering
Post Tops, Rail And Brace Ends	B 26 or B 108	356.0T6	Fabricated in permanent molds or sand castings
Top and Brace Rails	B 241 and B429	6063-T6	1 1/4 in. pipe; Note 2
Barbed Wire Extension Arms	B 26 or B 108	356.0T6	1 1/4 in. pipe; Note 2
Line Posts	B 241 and B429	6063-T6	2 in. pipe; Note 2
Corner Posts	B 241 and B429	6063-T6	2 1/2 in. pipe; Note 2
Note 1:	Aluminum coated steel wire in accordance with 604.03(b) may be used.		
Note 2:	ANSI schedule 40 pipe, plain ends.		

SECTION 605 - WOOD MATERIALS

605.01 Project Signs

Project signs shall be constructed of good sound materials suitable for the purpose. Lumber shall be of softwood, No. 2 or Standard grade.

All project sign hardware shall be of commercial quality and of the sizes shown in the detail on the plans.

- 10 The base coat shall be primer paint. The finish coats shall be exterior oil paint. Letters and trim shall be enamel paint.

605.02 Stop Logs

Stop logs shall be constructed of 2 in. by 6 in. treated lumber. Stop logs shall be tongued on the bottom and grooved on the top.

SECTION 606 - CONCRETE MATERIALS

606.01 Concrete

Concrete shall have a 28 day compressive strength of 3,000 psi. The cement content in pounds per cubic yard of concrete shall be 564. The maximum water/cement ratio in pounds of water per pound of cement shall be 0.490. Slump shall be no less than 1 in. or more than 4 in.

- 10 Slump tests shall be in accordance with ASTM C 143. Compression test specimens shall be in accordance with ASTM C 31 or ASTM C 42. Compressive strength tests shall be in accordance with ASTM C 39.

606.02 Packaged, Dry, Combined Materials for Mortar and Concrete

These materials shall be in accordance with ASTM C 387. All packages shall be identified as conforming to ASTM C 387. The markings shall also show the kind and type of material, the net weight in each bag, the yield in cubic feet or yield in square feet per inch of thickness, and the amount of water recommended for mixing to produce a 2 in. to 3 in. slump.

606.03 Water

- 20 Water used in mixing or curing of concrete shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water will be tested in accordance with AASHTO T 26. Water shall be in accordance with the requirements as follows.

- (a) pH 6 to 8
- (b) Chloride Ionsless than 300 ppm
- (c) Sulphate (SO₄)less than 500 ppm
- (d) Total Solidsless than 1500 ppm

- 30 In addition, water containing algae will be unacceptable for use in concrete. Water known to be of potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.

SECTION 607 - REVEGETATION MATERIALS

607.01 Temporary Seed

Temporary seed will be approved for use by visual inspection of the Engineer. Temporary seed may be purchased from any commercial source provided the seed's package is clearly marked and labeled by the manufacturer as to its content and weight.

607.02 Fertilizer

10 Fertilizer shall be commercial fertilizer with an analysis of percent nitrogen-phosphate-potash. Fertilizer may be purchased from any commercial source provided the fertilizer's package is clearly marked and labeled by the manufacturer as to its content and weight.

Tests will not be required, but fertilizer standards shall be governed by the rulings of the Indiana State Seed Commissioner.

607.03 Agricultural Lime

Agricultural lime shall be raw, ground agricultural limestone meeting the following requirement:

- 20
1. Fineness, percent passing the No.8 sieve, shall be no less than 80.
 2. The total neutralizing value, calcium carbonate equivalent shall be no less than 90.
 3. The product of the two factors, fineness multiplied by the calcium carbonate equivalent, shall be no less than 8500.

607.04 Grass and Legume Seed

30 Grass and legume seed in the quantities and varieties required shall be furnished full-tagged and delivered in properly designated packages or bags as directed. Seeds shall be in accordance with the following requirements.

Seed of warm season grasses, forbs, or aquatic species shall be delivered to the project site individually packaged by species. Warm season grass and forb seed shall be purchased from lots for which test results are provided. Testing will not be required for aquatic species. When normal germination testing is not practical for forb species, a tetrazolium test shall be conducted to determine seed viability.

40 Seeds shall contain none of the noxious weeds listed herein nor any that are listed in the Acts of the General Assembly of the State. Noxious weeds are Canada Thistle, Field Bindweed, Johnson Grass, Perennial Peppergrass, Perennial Sowthistle, Quack Grass, Russian Knapweed, and Wild Garlic.

Clover shall be free from dodder with no tolerance allowed. Lespedza will be allowed no more than 90 dodder/lb and 45 giant foxtail per lb.

Requirements noted above are minimums and trade allowances will not be permitted.

50 Seed shall be of known origin and quality. Seed shall be purchased from sources of supply that have been sampled, tested, and reported by the State Seed Commissioner, Purdue University, West Lafayette, Indiana, and found to be satisfactory. Seed of warm season grasses shall be tested by the State Seed Commissioner or an independent laboratory. Seed of forbs shall be tested by an independent laboratory. Test results by independent laboratories shall be signed by a Registered Seed Technologist. Test results shall be submitted to the State Seed Commissioner, and a copy to the Division. This report is required before seed is sown. Such test report shall be no more than nine months old at the time seed is used and the use of the seed shall be subject to approval.

60 Each bag of seed shall bear a tag showing the purity and germination test results, the testing date, and that the seed meets the requirements of the Commission. Receipts or tags indicating the seed mix is in compliance with the specifications shall be retained by the Contractor and presented to the Engineer upon request.

Seed which has been tested by the State Seed Commissioner may be used without further testing provided each bag of seed bears a tag showing the seed meets the requirements of the Standard Specifications.

607.05 Mulch

70 (a) Mulch for Seeding

Mulch for seeding shall consist of straw or straw mats. All mulch shall be reasonably free from mold and primary noxious weeds in accordance with 607.04.

Straw mulch shall contain no more than 50 percent moisture at time of delivery. Straw mulch containing more than 50 percent moisture shall be rejected.

80 Straw mats shall consist of a machine produced mat consisting of at least 90% of the total dry mass being clean straw from agricultural crops, with the exception that up to 30% of the total dry mass may be coconut fibers in lieu of an equal percentage of straw. Paper or paper related products shall not be permitted as component in the straw mat. The straw shall be evenly distributed throughout the mat to form a thickness of 1/2 in. \pm 1/8 in. The top side of the mat shall be covered with a photodegradable/biodegradable plastic mesh which shall be substantially adhered to the straw by a knitting process using photodegradable/biodegradable thread. The rolls shall be packaged with suitable protection for outdoor storage at a construction site in a manner which protects them from biodegradation prior to use. The average dry mass of the straw shall not be less than 0.7 lb/sq yd. The minimum roll width shall be 6 ft.

(b) Mulch for Plants

90 Mulch for plants shall consist of broken corncobs, wood chips, chopped bark, size No. 5 gravel, or crushed stone in accordance with 601.04(b), except 0% to 5% may pass the No. 200 sieve, or other approved materials. The particles of wood chips, chopped bark, and corncobs shall contain no more than 10% passing the 1/2 in. screen and 100% shall pass the 3 in. screen.

607.06

Wood chips shall be from green, hardened, deciduous trees. Broken corncobs shall be no longer than 4 in.

607.06 Leguminous Inoculants

100 The inoculants for treating leguminous seeds shall be standard pure culture of nitrogen fixing bacteria. They shall be no more than one year old at the time of use and shall be subject to approval. Directions of the manufacturer on containers of inoculants shall be followed when inoculating seed.

607.07 Miscellaneous Materials

(a) Water

Water used in the planting or care of vegetation shall be free from oil, acids, alkalis, salts, or any substance injurious to plant life. Water from streams, lakes, ponds, or similar sources shall not be used unless approved.

(b) Stakes for Bracing and Anchoring

110 Wood stakes for anchoring straw bales shall be of rough cypress, cedar, locust, oak, or other approved wood free from knots, rot, cross grain, or other defects that would impair the strength of the stake. Wood stakes for anchoring straw bales shall be a minimum of 2 in. by 2 in. square in cross section and of a length that is the height of the straw bale plus 1 ft.

(c) Tree Wound Dressing

Dressing for treating tree wounds or cuts shall be either:

1. an approved black asphaltum base antiseptic paint;
- 120 2. an approved black paint consisting of Bordeaux Mixture, raw linseed oil, and lampblack; or
3. an approved black paint consisting of zinc oxide, raw linseed oil, and lampblack.

SECTION 608 - SOIL FABRICS

608.01 Geotextile for Use Under Riprap

The geotextiles to be used shall be selected from INDOT's list of approved Geotextiles for Use Under Riprap.

608.02 Geotextile for Silt Fence

The geotextiles to be used shall be selected from the following list of Geotextiles for Silt Fence unless otherwise approved by the Engineer:

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MANUFACTURER	PRODUCT NAME
Mirafi	FF101 (also in orange)
North Georgia Converting, Inc	MSF70
Propex	2134 (2135 orange)
Synthetic Industries	111F
Willacoochee Industrial Fabrics	2014 (2015 orange)

608.03 Erosion Control Blankets

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(a) Installation

The ERB shall be installed in accordance with the manufacturers recommended procedures and as shown on the plans using U-shaped staples of recommended wire gauges with legs at least 6 in. in length.

Prior to placing the blankets, the area to be covered shall be relatively free of all rocks or clods over 1.5 in. in diameter, and all sticks or other foreign material, which prevent the close contact of the blanket with the seed bed. If as a result of a rain, prepared seed bed becomes crusted or eroded, or if eroded places, ruts, or depressions exist, the soil shall be reworked until it is smooth. Such areas which are reworked shall be re-seeded.

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(b) Pre-Approved Erosion Control Blankets

MANUFACTURER	PRODUCT NAME
American Excelsior Company	Curlex I (Standard)
Bon Terra America	S1
North American Green	S-75
PPS Packaging Co.	Xcel Regular

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608.04 Turf Reinforcement Mat

(a) Installation

The TRM shall be installed in accordance with the manufacturers recommended procedures and as shown on the Plans using U-shaped staples of recommended wire gauges with legs at least 6 in. in length. Staples shall be placed using the white DOT staple pattern and along all breaks.

Prior to the installation of the TRM the areas shall be prepared, limed, fertilized, and seeded in accordance with 401 and approved by the Engineer.

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608.04

(b) Pre-Approved Turf Reinforcement Mats

MANUFACTURER	PRODUCT NAME
North American Green	SC250
SI Geosolutions	Landlok TRM 1051
Tenax	Multimat 100

DIVISION 07 – RESERVED (STANDARD DRAWINGS)