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PROJECT MANUAL

LAKE MANITOU

ROBBINS-TAYLOR SITE

Property of
Lake and River Enhancement Section
Division of Fish and Wildlife/IDNR
402 W. Washington Street, W-273
Indianapolis, IN 46204

7/24/90

PROJECT MANUAL
FOR
ROBBINS-TAYLOR SITE

Financial assistance provided by the Indiana Department of Natural Resources, Division of Soil Conservation, Lake Enhancement Program.

set no.

Constructed and Improved Wetlands for the Protection of the Water Quality of

LAKE MANITOU

Fulton County, Indiana

Lake Manitou Association
P.O. Box 376
Rochester, IN 46975

WILLIAM B. EVISTON
7-1-82
No. 49
STATE OF
INDIANA
LANDSCAPE ARCHITECT

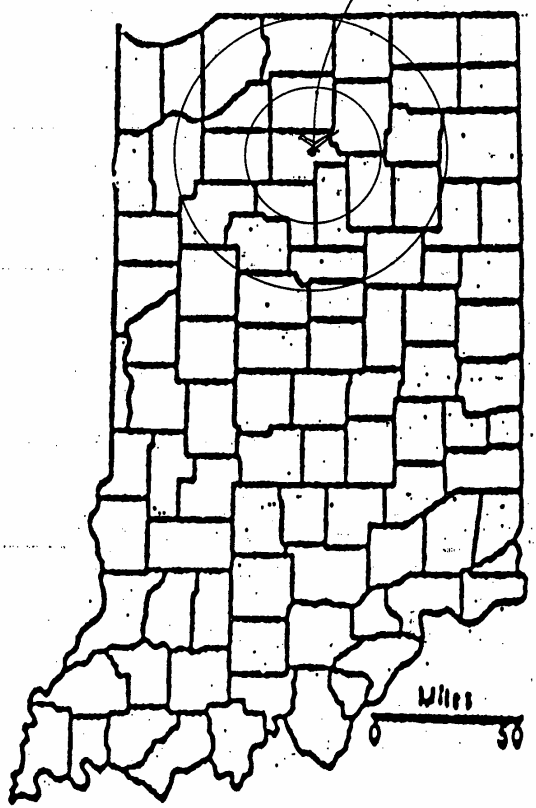
Michael Gensic

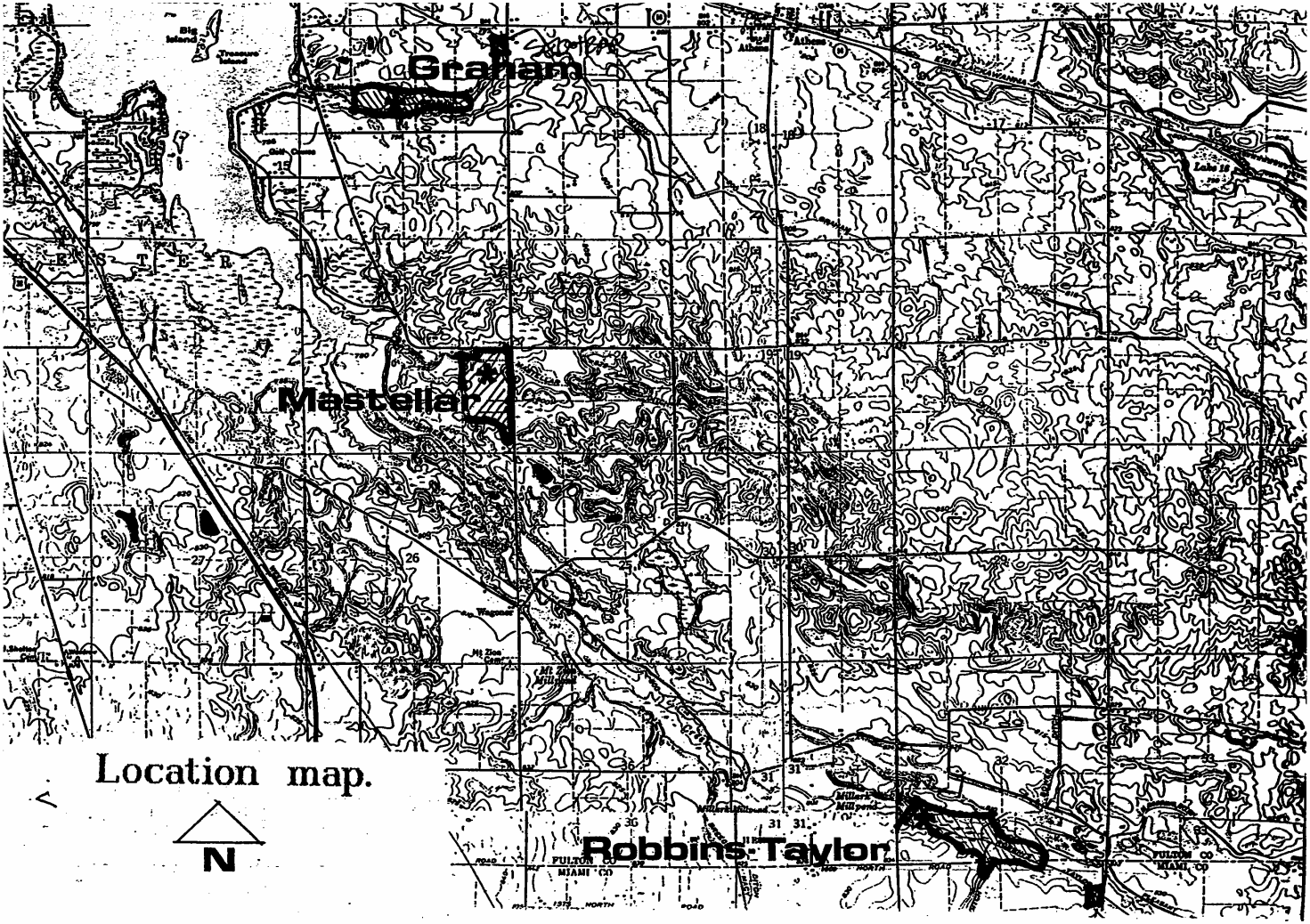
William B. Eviston

Earth·Source Inc

349 Airport North Office Park, Fort Wayne, IN 46825 (219) 489-8511

Location map.





Location map.

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INVITATION FOR BIDS

The_____ will receive bids for the
_____
_____
_____
until _____A.M._____time on the _____
P.M.
day of_____19___ at the _____
_____
at which time and place all Bids will be opened privately.

Sealed Bids are invited upon the several items as follows:
_____
_____
_____
_____
_____
_____

Contract Documents, including Drawings and Specifications, are on file at the office of the Landscape Architect,_____
_____ and at the_____
_____

Copies of the Contract Documents may be obtained at the office of _____on payment of $_____ for each set of Documents so obtained. Said sum is refundable upon return of all Documents in good condition within _____ days following opening of Bids. Plans may be examined without cost.

A certified check or bank draft, payable to the _____ _____ or a satisfactory Bid Bond executed by the Bidder and an acceptable surety, in an amount equal to _____ (_____%) percent of the total Base Bid shall be submitted with each bid as a guarantee that if the Proposal is accepted the Bidder will execute the Contract and file acceptable Performance and Labor and Material Bonds within ten (10) days after award of the Contract.

The _____ hereinafter called the Owner, reserves the right to reject any and all Proposals and waive any formality or technicality in any Proposal in the interest of the Owner.

Bids may be held by the Owner for a period not to exceed_____ days from the date of Bids for the purpose of reviewing the Bids and investigating the qualifications of the Bidders, prior to awarding the Contract.

BIDDING REQUIREMENTS, FORMS, & INFORMATION

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS. (Owner refers to the LAKE MANITOU ASSOCIATION; P.O. Box 376, Rochester, IN 46975. **"Architect",Landscape Architect (L.A.), Project Designer,** or **"Engineer"** refers to **Earth Source, Inc.**, 349 Airport North Office Park, Fort Wayne, IN 46825 219-489-8511. Other terms, such as **'Contracting Officer'** and **'Project Representative'** refer to the **Lake Manitou Association,** who is the responsible contracting agency who will refer items to the proper individual, consultant, or agency for action. **Project Inspector** refers to the individual, consultant, or Engineer who is responsible for monitoring, inspection, and administration of the project during the construction phase. **Lake Enhancement Staff** refers to a representative of the Indiana Department of Natural Resources, Division of Soil Conservation.The term **"Bidder"** means one who submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder. The term **"Successful Bidder"** means the lowest, qualified, responsible and responsive Bidder to whom the Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids.)
2. COPIES OF BIDDING DOCUMENTS.
   2.1 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation to Bid may be obtained from the Owner. The refundable portion of the bid deposit will be returned to bid document holders of record who return the Bidding Documents in good condition. Refund will be made on or about the 30th day after the Bid Opening Date.
   2.2 Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Landscape Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
   2.3 Owner and Landscape Architect in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS.
   Each Bid shall include **Form 96, Contractors Bid for Public Works, provided and executed by the Bidders,** as required by State Statute. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

4.1 It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance of furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

4.2 Information and data reflected in the Contract Documents with respect to Underground Facilities at or Contiguous to the site is based upon information and data furnished to Owner and L.A. by owners of such Underground Facilities or others, and Owner does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.3 Before submitting a Bid, each Bidder will be responsible to make or obtain such explorations, tests and data concerning physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site, or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.4 On request in advance, Owner will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

4.5 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easement for permanent structures or permanent changes in existing structures are to be obtained and paid for by the Owner unless otherwise provided in the Contract Documents.

4.6 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that

without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

5. INTERPRETATIONS AND ADDENDA.

5.1 All questions about the meaning or intent of the Contract Documents are to be directed to L.A. Interpretations or clarifications considered necessary by L.A. in response to such questions will be issued by Addenda mailed or delivered to all parties recorded as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5.2 Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner or L.A.

6. BID SECURITY

6.1 Each Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of the Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached, if a form is prescribed) issued by a surety meeting the requirements of the General Conditions.

6.2 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required contract security, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within ten days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the Effective Date of the Agreement or the forty-sixth day after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

7. CONTRACT TIME.

The numbers of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the Contract Time) are set forth in the Bid Form, the Agreement, and in the latter sections of these Instructions to Bidders.

8. LIQUIDATED DAMAGES.

Provisions for liquidated damages, if any, are set forth in the Agreement and in the latter sections of these Instructions to Bidders.

9. SUBSTITUTE OR "OR-EQUAL" ITEMS.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to L.A., application for such acceptance will not be considered by L.A. until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by L.A. is set forth in the General Conditions.

10. SUBCONTRACTORS, SUPPLIERS AND OTHERS.

10.1 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement, the apparent successful Bidder, and any other Bidder so requested, shall within seven days after the Bid opening submit to Owner a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person or organization if requested by Owner. If Owner or L.A. after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, either may before the Notice of Award is given, request the apparent Successful Bidder to submit an acceptable

substitute without an increase in Bid price.

If apparent Successful Bidder declines to make any such substitution, Owner may award the contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and L.A., subject to revocation of such acceptance after the Effective Date of the Agreement as provided in the General conditions.

10.2 In contracts where the Contract Price is on the basis of Cost-of-the-Work Plus a Fee, the apparent Successful Bidder, prior to the Notice of Award, shall identify in writing to Owner those portions of the Work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the Work with Owner's written consent.

10.3 No Contractor shall be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

11. BID FORM.

11.1 The Bid Form is included with the Bidding Documents; additional copies may be obtained from L.A. (or the issuing office).

11.2 All blanks on the Bid Form must be completed in ink or by typewriter.

11.3 Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

11.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5 All names must be typed or printed below the signature.

11.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

11.7 The address and telephone number for communications regarding the Bid must be shown.

12. SUBMISSION OF BIDS.

12.1 Bids shall be submitted at the time and place indicated in the Advertisement of Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted) and name and address of the Bidder and accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

12.2 It is the intent of the Owner to open Bids immediately after the designated time in the Advertisement for Bids. However, the Owner reserves the right to delay the Bid opening process in the event of unforeseen circumstances as determined by the Owner that may be a factor in delaying a Bidder from delivering a Bid on time. **No Bids will be received or opened after the Bid opening process has begun.**

13. MODIFICATION AND WITHDRAWAL OF BIDS.

13.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

13.2 If, within twenty-four hours after Bids are opened, any Bidder files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

14. OPENING OF BIDS.

Bids will be opened and (unless obviously non-responsive) read aloud **privately.** A copy of the certified Bid tabulation sheet(s) will be furnished to each Bidder sometime after the tentative awards have been made.

15. AWARD OF CONTRACT.

15.1 Owner reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, nonresponsive, unbalanced or conditional Bids.
Also, Owner reserves the right to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

15.2 In evaluating Bids, Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

15.3 Owner may consider the qualifications and experience of Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

15.4 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

15.5 If the contract is to be awarded, it will be awarded to the lowest Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project.

16. CONTRACT SECURITY.

The General Conditions set forth Owner's requirements as to performance and payment Bonds. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by the required performance and payment Bonds.

17. SIGNING OF AGREEMENT.

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen days thereafter Contractor shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Contractor.

18. LETTER FROM SURETY.

In addition to the Bid bond, the Bidder shall submit a letter or statement from the Bidder's surety company that it will execute and deliver a one hundred percent surety bond.

19. SECURITY FOR FAITHFUL PERFORMANCE.

Simultaneously with the delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the Project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.

20. POWER OF ATTORNEY.

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

21. LAWS AND REGULATIONS.

The Bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the contract throughout, and they will be deemed to be included in the Contract the same as though

herein written out in full.

22. SAFETY STANDARDS AND ACCIDENT PREVENTION.

With respect to all work performed under this Contract, the Contractor shall:

a. Comply with the safety standards provisions of applicable laws, building and construction codes, and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "Federal Register", Volume 36, No. 75, Saturday, April 17, 1971.

b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.

c. Maintain at his office or other well-known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

23. TAX EXEMPTIONS.

The Indiana Dept. of Revenue requires that the Contractor or Subcontractors engaged in a contract with a governmental agency must submit an exemption certificate for construction contractors (Form SP 134) to each supplier for each exempt Project. The Owner will cooperate with the Contractor in filing the necessary forms with the Indiana Dept. of Revenue, but the Contractor shall be responsible for the initiation of these proceedings. The contract price will be based upon a complete exemption from this tax, and if later determined that a tax must be paid by the Owner, the contract price will be adjusted to reflect this liability to the Owner.

24. ESCROW ACCOUNT(S)

The establishment of an escrow account between the Owner and the successful Bidder(s) for the retainage will be left to the sole discretion of the successful Bidder(s).

25. BIDS TO REMAIN OPEN.

All Bids shall remain open for **forty-five(45)** days after the day of the Bid opening. The Owner may release any Bid and return the Bid security prior to that date.

26. COMPLETION TIME AND LIQUIDATED DAMAGES.

The Bidder must agree to commence work on or before the date to be specified in the written Notice to Proceed. Bidder must agree that the work be substantially complete and totally completed within the following consecutive calendar days after the date when Contract Time commences to run:

(SEE PAGE CS-1)

27. FAMILIARITY WITH PROJECT SITE.

Bidders are required to walk the project on the day of the Pre-Bid Conference or any time prior to the preparation of their Bids.

28. ~~WAGE~~ RATES.

Davis-Bacon ~~does not~~ apply to ~~this project~~. Contractors will be required, ~~however,~~ to pay wage rates according to the Indi~~ana wage~~ rate deci~~sion~~ enclosed in this Pro~~ject~~ Manual.

29. ALTERNATE BIDS. (if any)

Bidders must bid on all alternate bids.

30. SUMMARY OF ITEMS TO BE SUBMITTED WITH BID.

1. Bid Form - Completely executed and signed (including Alternate Bid)

2. Bid Security - Acceptable bid bond or cashier's check in an amount not less than five of the total bid price.

3. Letter from Surety

4. Form 96 - Contractors Bid for Public Works, executed, signed. Complete informational section **Part II, and Non-Collusion Affidavit only.**

SPECIAL REQUIREMENTS TO NOTICE TO BIDDERS.

1. The Contractor must report any archaeological or cultural material that may be encountered during construction immediately to the Project Inspector or Owner.

2. The Contractor must supply name of all subcontractors prior to contract approval.

3. All contractors and subcontractors will be required to provide in writing sources of materials and supplies prior to ordering, delivery, or use on the site. Failure to do so may result in rejection and/or nonpayment of the finished work.

4. Include all mobilization in bid items.

5. The parties included in the Preconstruction Conference, any Change Orders, Substantial Completion determination, and completion acceptance are the Owner, Engineer, Project Inspector, and DNR Lake Enhancement Staff (required if DSC funded).

6. Payment will be made as per Bid Form. If quantities are substantially less or more than the contracted amount, the Contractor or Project Representative must initiate a change order to the contract. Measured or agreed quantities for these items will then become the basis for payment. It is the intent of the Project Designer that no measurement for quantities will be necessary.

BID

TO: LAKE MANITOU ASSOCIATION
P.O. Box 376
Rochester, IN 46975

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for **forty-five** (45) **days** after the day of Bid opening. BIDDER will sign the Agreement and submit the Contract Security and other Documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.

3. In submitting his Bid, BIDDER represents, as more fully set forth in the Agreement, that:

   a. BIDDER has examined copies of all the Contract Documents, Advertisement or Invitation to Bid and the Instructions to Bidders, and BIDDER has examined copies of (receipt of all of which are hereby acknowledged) Addenda Nos._____.

   b. BIDDER has familiarized self with the nature and extent of the Contract Documents, Work, site, locality and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

   c. BIDDER has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions, and accepts the determination set forth of the extent of the technical data contained in such reports and drawings upon which BIDDER is entitled to rely.

   d. BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in C above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance

Robbins - Taylor Site

for: Lake Manitou Association

BID SCHEDULE

Item		Spec. No.	Quantity	Unit Price	Extension
1.	Construction Layout	01050	L.S.	_____	_____
2.	Clear & Grub	2	.5 acres	_____	_____
3.	Structure Removal	3	L.S.	_____	_____
4.	Clearing-Class C	1	7.7 acres	_____	_____
5.	Topsoil Stripping & Replacement	26	400 C.Y.	_____	_____
6.	Excavation (sediment traps)	21	2400 C.Y.	_____	_____
7.	Excavation (island & baffles)	21	4,400 C.Y.	_____	_____
8.	Earthfill	23	2,600 C.Y.	_____	_____
9.	Gabions	64&S.R.3	268 S.Y.	_____	_____
10.	Pollution Control	5	L.S.	_____	_____
11.	Rip Rap	61&S.R.5	185 C.Y.	_____	_____
12.	Filter Fabric	S.R.4	820 S.Y.	_____	_____
13.	Piling	13	260 S.F.	_____	_____
14.	Stop logs & mounting	81	1 L.S.	_____	_____
15.	Concrete pad, reinforced	32	L.S.	_____	_____
16.	Channel piping	51	550 L.F.	_____	_____
17.	Pipe gate	81	5	_____	_____
18.	Erosion control materials	02491/S.R.9	7,800S.Y.	_____	_____
19.	Landscaping/restoration (as per Plant List, sheet RT4)	02491/02495	L.S.	_____	_____

Notes:

S.R. = Special Requirements

L.S. = Lump sum

L.F. = Linear feet

S.Y. = Square yards

C.Y. = Cubic Yards

Total Bid _____

In submitting this Bid, Bidder accepts Plan Quantities as itemized above as basis for lump sum contract. Unit price column provided for Bidder's convenience only, and need not be filled out at time of bidding.

_____

signature of Bidder date

_____

business name of Bidder

In submitting this Bid, Bidder is provided an estimate of Plan Quantities as itemized on sheet 1 of the drawings.

BID: _____dollars, $___,_____._

or furnishing of the Work as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigation, exploration, test, reports or similar information or data are or will be required by BIDDER for such purpose.

e. BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are, or will be, required by Bidder in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, as per the provisions of the General Conditions.

f. BIDDER has correlated the results of all such observations, examinations, investigations, exploration, tests, reports and studies with the terms and conditions of the Contract Documents.

g. BIDDER has given Owner written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by Owner is acceptable to BIDDER.

h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. BIDDER will complete the Work for the following prices: (Where lump sum figures are used, the Contractor shall furnish to the Landscape Architect upon request a detailed breakdown of said lump sum cost. Where unit and unit price figures are used as part of the Bid, they will be used in computing the Contractor's payments. Quantities are not guaranteed.)

5. BIDDER agrees that the work will be substantially complete and totally complete within the following consecutive calendar days after the date when the contract time commences to run: see CS-1

6. The following documents are attached to and made condition of this Bid:

(see page ITB-10)

7. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

8. Submitted on_____.19__

By: Contractor_____
(Corporation__) (Partnership__) (Individual__)

(SEAL)

By_____

_____
(Name & Title of Person
Authorized to Sign)

Business Address: _____

_____

Phone _____ _____

Form No. 96 (Revised 1987)

BID OF

_____
(Contractor)

_____
(Address)

_____

FOR
PUBLIC WORKS PROJECTS
OF

_____

_____

_____

Filed _____, 19____

Action taken _____

_____

CONTRACTORS BID FOR PUBLIC WORKS

PART I

(To be completed for all bids)
(Please type or print)

_____

Date: _____

1. Governmental Unit: _____
2. County: _____
3. Bidder (Firm): _____
   Address: _____
   City/State: _____
4. Telephone Number: _____
5. Agent of Bidder (If applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____ (Governmental Unit) in accordance with plans and specifications of said unit for the sum of _____ $_____. The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, submit a proposal for each in accordance with the notice.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract. If the bid is to be awarded on a unit basis, the itemization of units shall be shown on a separate attachment. The Contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS
(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States. I.C. 5-16-8-2. I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

NON-COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

OATH AND AFFIRMATION

I affirm under the penalties of perjury that the foregoing facts and information are true and correct to the best of my knowledge and belief.

Dated at _____ this _____ day of _____, 19___.

_____
(Name of Organization)

By _____

_____
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
) SS:
COUNTY OF _____)

_____ being duly sworn, deposes and says that he is
_____ of the above _____ and that the
(Title) (Name of Organization)
statements contained in the foregoing bid, certification and affidavit are true and correct.

Subscribed and sworn to before me this _____ day of _____, 19___.

_____
Notary Public

My Commission Expires: _____

County of Residence: _____

ACCEPTANCE

The above bid is accepted this _____ day of _____, 19____, subject to the following conditions: _____

_____

Contracting Authority Members:

_____ _____

_____ _____

_____ _____

PART II

(Complete sections I, II, III and IV for all state and local public works projects as required by statutes.)

Governmental Unit: _____

Bidder (Firm): _____

Date: _____

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed?

Contract Amount	Class of Work	When Completed	Name and Address of Owner

2. What public works projects has your organization now in process of construction?

Contract Amount	Class of Work	When to be Completed	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

_____

_____

_____

4. List references from private firms for which you have performed work.

_____

_____

_____

_____

_____

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work.

2. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you expect to require a bond.

3. What equipment do you intend to use for the proposed project?

4. Have you made contracts or received offers for all materials within prices used in preparing your proposal?

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV OATH AND AFFIRMATION

I hereby affirm under the penalties of perjury that the facts and information contained in the foregoing bid for public works are true and correct to the best of my knowledge and belief.

Dated at _____ this _____ day of _____, 19___.

_____
(Name of Organization)

By _____

_____
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
) SS:
COUNTY OF _____)

_____ being duly sworn, deposes and says that he is

_____ of the above _____ and that the
(Title) (Name of Organization)
answers to the questions in the foregoing questionnaires and all statements therein contained are true and correct.

Subscribed and sworn to before me this _____ day of _____, 19___.

_____
Notary Public

My Commission Expires: _____

County of Residence: _____

ROBBINS - TAYLOR SITE

PROJECT CONSTRUCTION SCHEDULE	days
Layout	0-45
Clearing	0-30
Sediment Traps & Pollution Control	15-45
Piping	15-45
Earthwork, Excavation, Embankment	30-90
Channel, Erosion Control	30-90
Landscape Construction (season permitting)	90-150

Anticipated start date _____

Anticipated substantial completion date _____

Completion date _____

Note: Construction schedule may need to be adjusted depending on start and completion dates. See also Invitation to Bid for additional Construction Schedule information.

FORM OF CONTRACT

to be provided at time of bidding by Owner.

NOTICE OF AWARD

DATE: _____, 19___

TO CONTRACTOR:

_____

_____

_____

_____

PROJECT: (Insert name of Contract as it appears in the Bid Documents)

_____

_____

You are hereby notified that your Bid dated _____, 19_____, for the above Contract has been evaluated and you are the apparent successful bidder. You have been awarded a contract for (insert description of work including which, if any, alternate bids)

_____

_____

_____

The Contract Price of your contract is $_____.

Three copies of the proposed Agreement (Contract) accompany this Notice of Award. Three sets of the plans and project manual will be delivered separately or otherwise be made available to you.

You must comply with the following conditions within fifteen days of the date of this Notice of Award, that is by _____, 19_____.

1. You must deliver to the Owner three fully executed counterparts of the Agreement (Contract). Each of the Agreements must bear your signature.

2. You must deliver the Contract Securities (Performance & Payment Bonds) as specified in the Instructions to Bidders, & General Conditions.

3. You must deliver the certificates of insurance as specified in the General Conditions.

4. (List other conditions, if applicable):

_____

_____

Failure to comply with these conditions within the time specified will entitle OWNER to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within ten days after you comply with these conditions, OWNER will return to you one fully signed counterpart of the Agreement for your records.

OWNER:

(Name & Title)

(City, Town or County)

NOTICE TO PROCEED

DATE:_____, 19____

TO CONTRACTOR:

_____

_____

_____

_____

PROJECT: (Insert name of Contract as it appears in the Bid Documents)

_____

_____

You are hereby notified to proceed with the above referenced project and that Contract Time for the above contract will commence to run on _____, 19_____. No later than that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement (contract), the dates of Substantial Completion and Final Completion are _____, 19_____, and _____, 19_____, respectively.

Before you may start any Work at the site, the General Conditions provides that you deliver to us certificates of insurance (with a copy sent to the Engineer) per the Contract Documents.

OWNER:

_____
(Name and Title)

_____
(City, Town, or County)

APPLICATION AND CERTIFICATE FOR PAYMENT *AIA DOCUMENT G702*

(Instructions on reverse side) PAGE ONE OF PAGES

TO (OWNER):

PROJECT:

APPLICATION NO:

Distribution to:
☐ OWNER
☐ ARCHITECT
☐ CONTRACTOR
☐
☐

PERIOD TO:

FROM (CONTRACTOR):

VIA (ARCHITECT):

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY			
Change Orders approved in previous months by Owner		ADDITIONS	DEDUCTIONS
TOTAL			
Approved this Month			
Number	Date Approved		
TOTALS			
Net change by Change Orders			

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

Application is made for Payment, as shown below, in connection with the Contract. **Continuation Sheet, AIA Document G703,** is attached.

1. **ORIGINAL CONTRACT SUM** ..... $ _____
2. **Net change by Change Orders** ..... $ _____
3. **CONTRACT SUM TO DATE** (Line 1 ± 2) ..... $ _____
4. **TOTAL COMPLETED & STORED TO DATE** ..... $ _____
   (Column G on G703)
5. **RETAINAGE:**
   a. ____ % of Completed Work $ _____
   (Column D + E on G703)
   b. ____ % of Stored Material $ _____
   (Column F on G703)
   Total Retainage (Line 5a + 5b or
   Total in Column I of G703) ..... $ _____
6. **TOTAL EARNED LESS RETAINAGE** ..... $ _____
   (Line 4 less Line 5 Total)
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT** (Line 6 from prior Certificate) ..... $ _____
8. **CURRENT PAYMENT DUE** ..... $ _____
9. **BALANCE TO FINISH, PLUS RETAINAGE** ..... $ _____
   (Line 3 less Line 6)

State of: County of:
Subscribed and sworn to before me this day of ,19
Notary Public:
My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ _____

(Attach explanation if amount certified differs from the amount applied for.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without

CONTINUATION SHEET

AIA DOCUMENT G703 (Instructions on reverse side) PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT, containing Contractor's signed Certification is attached.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NUMBER:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C − G)	RETAINAGE
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					

deficient for the inspection or payment, then the Project Inspector may invoice time and expense incurred as an Additional Service to the Owner who may recover from the Contractor by a reduction of payment amount.

12. Completion:

    a. Before Owner issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

    b. Conduct final inspection in the company of Owner and contractor and prepare a final list of items to be completed or corrected.

    c. Observe that all items on final list have been completed or corrected and make recommendations to concerning acceptance.

C. Limitations of Authority

The Project Inspector or Project Representative:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by Owner.
2. Shall not undertake any of the responsibilities of Contractor, subcontractors, or Contractor's superintendent.
3. Shall not advise on, issue directions relative to, or assume control over any aspect or the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.
4. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the work.
5. Shall not accept Shop Drawing or sample submittals from anyone other than Contractor.
6. Shall not authorize Owner to occupy the Project in whole or in part.
7. Shall not participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by Owner.
8. Shall not be responsible, or be a liaison, to Property Owners of or near the Project Site.
9. Shall not be responsible, or be a liaison, to local, State, or Federal Public Agencies or their representatives unless the Owner is required specifically by the funding or granting party.

END

9. Records:

a. Maintain orderly files for correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents, including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent of the execution of the Contract, clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.

b. Keep a diary or log book, data relative to questions of Work Directive Changes, Change Orders or changed conditions, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures and send copies to Owner.

c. Record names, addresses and telephone numbers of all contractors, subcontractors and major suppliers of materials and equipment.

d. Prepare as-built plans (if required by the Owner).

10. Reports:

a. Furnish Owner periodic reports as required of progress of the work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.

b. Consult with Owner in advance of scheduled major tests, inspections or start of important phases of work.

c. Draft proposed Change Orders and Work Directive Changes, obtaining backup material from Contractor and recommend to Owner Change Orders, Work Directive Changes, and Field Orders, and other items that may affect change of contract price.

d. Report immediately to Owner upon the occurrence of any accident.

11. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission, noting particularly the relationship of the payment requested to the schedule of values, work completed and materials and equipment delivered at the site but not incorporated in the work. In the event that the Contractor requests inspections of work or materials and/or Payments, and the Contractor is

4. Liaison:

   a. Serve as Owner's liaison with Contractor, working principally through Contractor's superintendent and assist in understanding the intent of the Contract Document's; serve as Owner's liaison with Contractor when Contractor's operations affect Owner's on-site operations.

   b. Assist in obtaining from Owner additional details or information, when required for proper execution of the work.

5. Shop Drawings and Samples:

   a. Record date of receipt of Shop Drawings and samples.
   b. Receive samples which are furnished at the site by Contractor, and notify Owner of availability of samples for examination.
   c. Advise Owner and Contractor of the commencement of any work requiring Shop Drawing or sample if the submittal has not been approved.

6. Review of Work, Rejection of Defective Work, Inspections and Tests:

   a. Conduct intermittent on-site observations of the work in progress to assist Owner in determining if the work is proceeding in accordance with the Contract Documents.

   b. Report to Owner whenever **PI** believes that any work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Owner of work the **PI** believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

7. Interpretation of Contract Documents: Report to Owner when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by the Owner.

8. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report recommendations to Owner. Transmit to contractor decisions.

DUTIES, RESPONSIBILITIES AND LIMITATIONS OF AUTHORITY OF THE PROJECT INSPECTOR (PI) (Construction Monitor)

The Project Inspector (Construction Monitor) shall assist in observing of the work of the Contractor. The PI may furnish a Project Representative to assist in observing the work. Through more extensive on-site observations of the work in progress and field checks of materials and equipment, the PI shall endeavor to provide further protection for Owner against defects and deficiencies in the work; but the furnishing of such services will not make the PI responsible for or give the PI control over construction means, methods, techniques, sequences or procedures or for safety precautions or programs, or responsibility for Contractor's failure to perform the work in accordance with the Contract Documents.

A. General

The PI is Owner's agent at the site, will act as directed by the Owner, and will confer with Owner and the Designer of Record to ascertain the design intent. The PI's dealings in matters pertaining to the on-site work shall in general be with the Contractor, keeping Owner advised as necessary. The PI's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor. In the event that the PI is not the Designer of Record, the Owner will be responsible for obtaining information from the Designer of Record, including Cost of Services of the Designer of Record to obtain such information.

B. Duties and Responsibilities of the PI

1. Schedules: Review the construction schedule, schedule of Shop Drawing submittals and schedule of values prepared by Contractor and consult with Owner concerning acceptability.

2. Provide temporary Bench Marks (one time) for the use by the Contractor and PI. (For these duties, the PI will provide skilled, equipped surveying personnel.) Provide construction layout of location, center line and base of structures and earthwork, and elevations for same. Provide measurements of units for Payments as per specifications and Bid Schedule.

3. Conferences and Meetings: Attend periodic meetings with contractor, such as pre-construction conferences, progress meetings, job conferences and other project related meetings, and prepare and circulate copies of minutes thereof.

SPECIAL REQUIREMENTS

1. Any item specified may be substituted with an equal approved by the Owner.

2. Gabions baskets shall be Maccaferri zinc coated Type I, and shall be paid for on a square yard basis.

3. Gabions shall be installed and filled with rip rap, (utilize 9" maximum size in gabions) and placed as per instructions in Appendix.

4. Filter fabric shall be Polyfelt Geotextiles grade TS 700, placed as per manufacturers instructions, as available from NuTec Supply, Indianapolis, IN, (317) 546-6340.

5. Rip rap shall be limestone revetment rip rap IDOH sections 616.02 (b); 903.02(a) minimum Class D.

6. Control points will be set by Engineer for use by Contractor for Field Engineering.

7. Field density tests will not be required.

8. Erosion Control materials shall be as shown in the Appendix.

9. Restoration consists of shaping, grading, seeding, and mulching designated areas that have been disturbed by Construction activities.

10. In the event that existing field tile drainage is encountered or discovered during the work, **Construction Specification 46 (SCS-NEH 20), Tile Drains for Land Drainage,** will be engaged. No Bid Item is scheduled for this specification. Work will consist of reporting to the Owner, repair, and rerouting to drain at the direction of the Owner and/or Engineer. Compensation will be negotiated per instance and made by the Owner as a change in the Contract Price.

ARTICLE 21
OTHER CONDITIONS OR PROVISIONS

21-1 Report of Differing Conditions: IF CONTRACTOR believes that:

a. any technical data on which CONTRACTOR is entitlied to rely is innaccurate, or

b. any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents.

CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency) notify OWNER and Project Inspector (PI) in writing about the inaccuracy or difference.

2. PI will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of PI's findings and conclusions.
3. Possible Document Change: If PI concludes that there is a material error in the Contract Documents or that because of newly discovered conditions a change in the Contract Documents is required, a Work Directive Change or a Change Order will be issued to reflect and document the consequences of the inaccuracy or difference.
4. Possible Price and Time Adjustments: In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to any such inaccuracy or difference.

This Agreement entered into as of the day and year first written above.

OWNER	CONTRACTOR
(Signature)	*(Signature)*
(Printed name and title)	*(Printed name and title)*

AIA DOCUMENT A107 • ABBREVIATED OWNER-CONTRACTOR AGREEMENT • NINTH EDITION • AIA® • ©1987
THE AMERICAN INSTITUTE OF ARCHITECTS, 1735 NEW YORK AVENUE, N.W., WASHINGTON, D.C. 20006

pletion of the Contract or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article 18 apply to Work done by Subcontractors as well as to Work done by direct employees of the Contractor.

18.2 Nothing contained in this Article 18 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Paragraph 18.1 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

ARTICLE 19

MISCELLANEOUS PROVISIONS

19.1 The Contract shall be governed by the law of the place where the Project is located.

19.2 As between the Owner and the Contractor, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued:

- **.1** not later than the date of Substantial Completion for acts or failures to act occurring prior to the relevant date of Substantial Completion;
- **.2** not later than the date of issuance of the final Certificate for Payment for acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment; and
- **.3** not later than the date of the relevant act or failure to act by the Contractor for acts or failures to act occurring after the date of the final Certificate for Payment.

ARTICLE 20

TERMINATION OF THE CONTRACT

20.1 If the Architect fails to recommend payment for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment thereon for a period of 30 days, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for all Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages applicable to the Project.

20.2 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days' written notice to the Contractor and without prejudice to any other remedy the Owner may have, may make good such deficiencies and may deduct the cost thereof, including compensation for the Architect's services and expenses made necessary thereby, from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, such excess shall be paid to the Contractor, but if such costs exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

15.5 The making of final payment shall constitute a waiver of claims by the Owner except those arising from:

- **.1** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 16
PROTECTION OF PERSONS AND PROPERTY

16.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein; and
- **.3** other property at the site or adjacent thereto.

The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss. The Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Subparagraphs 16.1.2 and 16.1.3, except for damage or loss attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 9.12.

16.2 The Contractor shall not be required to perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB).

ARTICLE 17
INSURANCE

17.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located insurance for protection from claims under workers' or workmen's compensation acts and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and from claims for damages, other than to the Work itself, to property which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them. This insurance shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater, and shall include contractual liability insurance applicable to the Contractor's obligations under Paragraph 9.12. Certificates of such insurance shall be filed with the Owner prior to the commencement of the Work.

17.2 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance. Optionally, the Owner may purchase and maintain other insurance for self-protection against claims which may arise from operations under the Contract. The Contractor shall not be responsible for purchasing and maintaining this optional Owner's liability insurance unless specifically required by the Contract Documents.

17.3 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall be on an all-risk policy form and shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage and physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief.

17.4 A loss insured under Owner's property insurance shall be adjusted with the Owner and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgagee clause.

17.5 The Owner shall file a copy of each policy with the Contractor before an exposure to loss may occur. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Contractor.

17.6 The Owner and Contractor waive all rights against each other and the Architect, Architect's consultants, separate contractors described in Article 12, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Article 17 or any other property insurance applicable to the Work, except such rights as they may have to the proceeds of such insurance held by the Owner as fiduciary. The Contractor shall require similar waivers in favor of the Owner and the Contractor by Subcontractors and Sub-subcontractors. The Owner shall require similar waivers in favor of the Owner and Contractor by the Architect, Architect's consultants, separate contractors described in Article 12, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them.

ARTICLE 18
CORRECTION OF WORK

18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of one year from the date of Substantial Com-

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the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. Except by written consent of the person or entity sought to be joined, no arbitration arising out of or relating to the Contract Documents shall include, by consolidation, joinder or in any other manner, any person or entity not a party to the Agreement under which such arbitration arises, unless it is shown at the time the demand for arbitration is filed that (1) such person or entity is substantially involved in a common question of fact or law, (2) the presence of such person or entity is required if complete relief is to be accorded in the arbitration, (3) the interest or responsibility of such person or entity in the matter is not insubstantial, and (4) such person or entity is not the Architect or any of the Architect's employees or consultants. The agreement herein among the parties to the Agreement and any other written agreement to arbitrate referred to herein shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

ARTICLE 11
SUBCONTRACTS

11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

11.2 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of the Subcontractors for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow to the Subcontractor the benefit of all rights, remedies and redress afforded to the Contractor by these Contract Documents.

ARTICLE 12
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

12.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under conditions of the contract identical or substantially similar to these, including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such claim as provided elsewhere in the Contract Documents.

12.2 The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

12.3 Costs caused by delays, improperly timed activities or defective construction shall be borne by the party responsible therefor.

ARTICLE 13
CHANGES IN THE WORK

13.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of additions, deletions or modifications, the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor and Architect, or by written Construction Change Directive signed by the Owner and Architect.

13.2 The Contract Sum and Contract Time shall be changed only by Change Order.

13.3 The cost or credit to the Owner from a change in the Work shall be determined by mutual agreement.

ARTICLE 14
TIME

14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

14.2 The date of Substantial Completion is the date certified by the Architect in accordance with Paragraph 15.3.

14.3 If the Contractor is delayed at any time in progress of the Work by changes ordered in the Work, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties or any causes beyond the Contractor's control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

ARTICLE 15
PAYMENTS AND COMPLETION

15.1 Payments shall be made as provided in Articles 4 and 5 of this Agreement.

15.2 Payments may be withheld on account of (1) defective Work not remedied, (2) claims filed by third parties, (3) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment, (4) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum, (5) damage to the Owner or another contractor, (6) reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay, or (7) persistent failure to carry out the Work in accordance with the Contract Documents.

15.3 When the Architect agrees that the Work is substantially complete, the Architect will issue a Certificate of Substantial Completion.

15.4 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such

8 The Contractor shall review, approve and submit to the chitect Shop Drawings, Product Data, Samples and similar bmittals required by the Contract Documents with reason-le promptness. The Work shall be in accordance with proved submittals. When professional certification of per-rmance criteria of materials, systems or equipment is required the Contract Documents, the Architect shall be entitled to ly upon the accuracy and completeness of such certifications.

9 The Contractor shall keep the premises and surrounding a free from accumulation of waste materials or rubbish sed by operations under the Contract. At completion of the ork the Contractor shall remove from and about the Project ste materials, rubbish, the Contractor's tools, construction uipment, machinery and surplus materials.

10 The Contractor shall provide the Owner and Architect cess to the Work in preparation and progress wherever cated.

11 The Contractor shall pay all royalties and license fees; all defend suits or claims for infringement of patent rights and all hold the Owner harmless from loss on account thereof, it shall not be responsible for such defense or loss when a rticular design, process or product of a particular manufac-rer or manufacturers is required by the Contract Documents less the Contractor has reason to believe that there is an fringement of patent.

12 To the fullest extent permitted by law, the Contractor all indemnify and hold harmless the Owner, Architect, Archi-ct's consultants, and agents and employees of any of them m and against claims, damages, losses and expenses, includ-g but not limited to attorneys' fees, arising out of or resulting m performance of the Work, provided that such claim, dam-e, loss or expense is attributable to bodily injury, sickness, sease or death, or to injury to or destruction of tangible prop-ty (other than the Work itself) including loss of use resulting erefrom, but only to the extent caused in whole or in part by gligent acts or omissions of the Contractor, a Subcontractor, yone directly or indirectly employed by them or anyone for hose acts they may be liable, regardless of whether or not ch claim, damage, loss or expense is caused in part by a party demnified hereunder. Such obligation shall not be construed negate, abridge, or reduce other rights or obligations of emnity which would otherwise exist as to a party or person scribed in this Paragraph 9.12.

12.1 In claims against any person or entity indemnified der this Paragraph 9.12 by an employee of the Contractor, a bcontractor, anyone directly or indirectly employed by them anyone for whose acts they may be liable, the indemnifica-n obligation under this Paragraph 9.12 shall not be limited by imitation on amount or type of damages, compensation or nefits payable by or for the Contractor or a Subcontractor der workers' or workmen's compensation acts, disability nefit acts or other employee benefit acts.

12.2 The obligations of the Contractor under this Paragraph 12 shall not extend to the liability of the Architect, the Archi-ct's consultants, and agents and employees of any of them sing out of (1) the preparation or approval of maps, drawings, inions, reports, surveys, Change Orders, Construction hange Directives, designs or specifications, or (2) the giving of the failure to give directions or instructions by the Architect, e Architect's consultants, and agents and employees of any of em provided such giving or failure to give is the primary use of the injury or damage.

ARTICLE 10

ADMINISTRATION OF THE CONTRACT

10.1 The Architect will provide administration of the Contract and will be the Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the correction period described in Paragraph 18.1

10.2 The Architect will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work. On the basis of on-site observations as an architect, the Architect will keep the Owner informed of progress of the Work and will endeavor to guard the Owner against defects and deficiencies in the Work.

10.3 The Architect will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in Paragraphs 9.1 and 16.1. The Architect will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

10.4 Based on the Architect's observations and evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

10.5 The Architect will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes or other matters in question between the Owner and Contractor, but will not be liable for results of any interpretations or decisions rendered in good faith. The Architect's decisions in matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents. All other decisions of the Architect, except those which have been waived by making or acceptance of final payment, shall be subject to arbitration upon the written demand of either party.

10.6 The Architect will have authority to reject Work which does not conform to the Contract Documents.

10.7 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

10.8 All claims or disputes between the Contractor and the Owner arising out or relating to the Contract, or the breach thereof, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect unless the parties mutually agree otherwise and subject to an initial presentation of the claim or dispute to the Architect as required under Paragraph 10.5. Notice of the demand for arbitration shall be filed in writing with the other party to this Agreement and with the American Arbitration Association and shall be made within a reasonable time after the dispute has arisen. The award rendered by

ARTICLE 7
CONTRACT DOCUMENTS

7.1 The Contract Documents consist of this Agreement with Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, addenda issued prior to the execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

7.2 The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Architect and Contractor, (2) between the Owner and a Subcontractor or Sub-subcontractor or (3) between any persons or entities other than the Owner and Contractor.

7.3 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site and become familiar with the local conditions under which the Work is to be performed.

7.4 The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

ARTICLE 8
OWNER

8.1 The Owner shall furnish surveys and a legal description of the site.

8.2 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or permanent changes in existing facilities.

8.3 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

ARTICLE 9
CONTRACTOR

9.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.

9.2 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

9.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

9.4 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

9.5 Unless otherwise provided in the Contract Documents, the Contractor shall pay sales, consumer, use, and other similar taxes which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect, and shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work.

9.6 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Architect and Owner if the Drawings and Specifications are observed by the Contractor to be at variance therewith.

9.7 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under a contract with the Contractor.

6.1.4 The Drawings are as follows, and are dated unless a different date is shown below:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

6.1.5 The Addenda, if any, are as follows:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 6.

6.1.6 Other documents, if any, forming part of the Contract Documents are as follows:

(List any additional documents which are intended to form part of the Contract Documents.)

ARTICLE 5

FINAL PAYMENT

5.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when the Work has been completed, the Contract fully performed, and a final Certificate for Payment has been issued by the Architect.

ARTICLE 6

ENUMERATION OF CONTRACT DOCUMENTS

6.1 The Contract Documents are listed in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated as follows:

6.1.1 The Agreement is this executed Abbreviated Form of Agreement Between Owner and Contractor, AIA Document A107, 1987 Edition.

6.1.2 The Supplementary and other Conditions of the Contract are those contained in the Project Manual dated , and are as follows:

Document	Title	Pages

6.1.3. The Specifications are those contained in the Project Manual dated as in Subparagraph 6.1.2, and are as follows:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Pages

3.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If decisions on other alternates are to be made by the Owner subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date until which that amount is valid.)

3.3 Unit prices, if any, are as follows:

ARTICLE 4
PROGRESS PAYMENTS

4.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents. The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

4.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

(Usury laws and requirements under the Federal Truth in Lending Act, similar state and local consumer credit laws and other regulations at the Owner's and Contractor's principal places of business, the location of the Project and elsewhere may affect the validity of this provision. Legal advice should be obtained with respect to deletions or modifications, and also regarding requirements such as written disclosures or waivers.)

ARTICLE 1
THE WORK OF THIS CONTRACT

1.1 The Contractor shall execute the entire Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others, or as follows:

ARTICLE 2
DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

2.1 The date of commencement is the date from which the Contract Time of Paragraph 2.2 is measured, and shall be the date of this Agreement, as first written above, unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement, if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

2.2 The Contractor shall achieve Substantial Completion of the entire Work not later than

(Insert the calendar date or number of calendar days after the date of commencement. Also insert any requirements for earlier Substantial Completion of certain portions of the Work, if not stated elsewhere in the Contract Documents.)

, subject to adjustments of this Contract Time as provided in the Contract Documents.

(Insert provisions, if any, for liquidated damages relating to failure to complete on time.)

ARTICLE 3
CONTRACT SUM

3.1 The Owner shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of Dollars ($), subject to additions and deductions as provided in the Contract Documents.

AIA Document A107

Abbreviated Form of Agreement Between Owner and Contractor

For CONSTRUCTION PROJECTS OF LIMITED SCOPE where the Basis of Payment is a STIPULATED SUM

1987 EDITION

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS COMPLETION OR MODIFICATION.

This document includes abbreviated General Conditions and should not be used with other general conditions. It has been approved and endorsed by The Associated General Contractors of America.

AGREEMENT

made as of the day of in the year of Nineteen Hundred and

BETWEEN the Owner:
(Name and address)

and the Contractor:
(Name and address)

The Project is:
(Name and location)

The Architect is:
(Name and address)

The Owner and Contractor agree as set forth below.

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CONDITIONS & REQUIREMENTS

COMPLETION AFFIDAVIT

IN THE MATTER relating to the Improvement Project and Contract for _____ and the plans and specifications relating thereto comes now _____, who being duly sworn upon oath and says he is _____ of
(title)
_____, the corporation to whom was awarded
(corporation name)
the contract, and who performed the work required under _____ _____ Improvement Project.

The undersigned is familiar with and personally knows the requirements of the plans and specifications of the improvement project and contract, and further knows that _____ has complied with the terms
(corporation name)
and conditions of the contract in every particular, and that the material used was of the character, kind, quantity and quality required therein, and that any and all subcontractors, material suppliers, and workmen have received their just compensation, all this according to and under the direction of the _____.
(Owner)

_____
(Corporation Name)

By_____
(Principal)

STATE OF INDIANA:
SS:
COUNTY OF

SUBSCRIBED and sworn to before me, this _____ day of _____, 19___.

_____
Notary Public

My Commission Expires:

_____

_____
(Printed/typed name of Notary)
Resident of _____County, Indiana

LAKE ENHANCEMENT STAFF accepts on .....19.....

By.....

If the construction takes place without Division of Soil Conservation grant money, participation by the Lake Enhancement Staff is not required. The Lake Enhancement Staff will be pleased to attend the substantial completion conference if requested and schedules permit.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, insurance and warranties shall be as follows:

RESPONSIBILITIES:

OWNER: _____

_____

_____

CONTRACTOR: _____

_____

_____

==========

The following documents are attached to and made a part of this Certificate:

==========

The certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

==========

Executed by Project Inspector.....19.....

.....

Project Inspector

By.....

CONTRACTOR accepts this Certificate of Substantial

Completion on....., 19.....

.....

CONTRACTOR

By.....

OWNER accepts this Certificate of Substantial Completion

on....., 19.....

.....

OWNER

By.....

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No..... Project No.....

Project.....

CONTRACTOR .....

Contract For ..... Contract Date.....

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To.....
OWNER

And To.....
CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, and CONTRACTOR, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

.....
DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____days of the above date of Substantial Completion.

SPECIFICATIONS

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide such field engineering services beyond those controls established by the Engineer as are required for proper completion of the Work including, but not necessarily limited to:
1. Establishing and maintaining lines and levels;
2. Structural design of shores, forms, and similar items provided by the Contractor as part of his means and methods of construction.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions,

2. Additional requirements for field engineering also may be described in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Upon request of the Engineer, submit:
1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
2. Documentation verifying accuracy of field engineering work.
3. Certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance or nonconformance with requirements of the Contract Documents.

1.4 PROCEDURES

A. In addition to procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
1. Locate and protect control points before starting work on the site.
2. Preserve permanent reference points during

progress of the Work.

3. Do not change or relocate reference points or items of the Work without specific approval from the Engineer.
4. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.

1.5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. No measurement will be made for work required in this section.

B. Include in the contract sum an amount sufficient to cover all costs for field engineering. This is Bid item 1.

SECTION 01201

PRE-CONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To help clarify construction contract administration procedures, the Engineer will conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions.

..2 QUALITY ASSURANCE

A. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.

.3 SUBMITTALS

A. To the maximum extent practicable, advise the Engineer at least 24 hours in advance of the Conference as to items to be added to the agenda.

B. The Engineer will compile minutes of the Conference, and will furnish three copies of the minutes to the Contractor and required copies to the Owner. The Contractor may make and distribute such other copies as he wishes.

.4 PRECONSTRUCTION CONFERENCE

A. The Conference will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed, but prior to actual start of the Work.

B. Attendance:
1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
2. The Engineer will advise other interested parties, including the Owner and Lake Enhancement Staff, and request their attendance.

C. Minimum agenda: Data will be distributed and discussed on:
1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors,

materials suppliers, and the Engineer;

2. Channels and procedures for communication;
3. Construction schedule, including sequence of critical work;
4. Contract Documents, including distribution of required copies of Drawings and revisions;
5. Processing of Shop Drawings and other data submitted to the Engineer for review;
6. Processing of field decisions and Change Orders;
7. Rules and regulations governing performance of the Work; and
8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.

If the construction takes place without Division of Soil Conservation grant money, participation by the Lake Enhancement Staff is not required. The Lake Enhancement Staff will be pleased to attend the pre-construction conference if requested and its schedules permit.

CONSTRUCTION SPECIFICATION

1. CLEARING

1. SCOPE

The work shall consist of the clearing and disposal of trees, snags, logs, brush, shrubs, stumps, and rubbish from the designated areas.

2. CLASSIFICATION

Unless otherwise specified in Section 7, clearing will be classified according to the following definitions:

Class A clearing requires that trees and other woody vegetation be cut off so that the remaining stumps extend no higher than 4 inches above the ground surface.

Class B clearing requires that trees and other woody vegetation be cut off so that the remaining stumps extend no higher than 12 inches above the ground surface.

Class C clearing requires that trees and other woody vegetation be cut off as near the ground surface as conventional tools or field conditions will permit, or as specified in Section 7 of this specification.

3. MARKING

The limits of the areas to be cleared will be marked by means of stakes, flags, tree markings or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about 6 feet above the ground surface.

4. CLEARING

All trees not marked for preservation and all snags, logs, brush, and rubbish shall be cleared from within the limits of the marked areas.

5. DISPOSAL

All materials cleared from the designated areas shall be disposed of in the locations and in the manner shown on the drawings, or as specified in Section 7 of this specification.

6. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the cleared area will be measured to the nearest 0.1 acre. Payment for clearing will be made for the total area within the designated limits at the contract unit price for the specified class of clearing. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the length of the cleared area will be measured to the nearest full station (100 feet) along the line designated on the drawings or in the specifications. Payment for clearing will be made for the total length within the designated limits at the contract unit price for the specified class of clearing. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, the cleared areas will be measured within the specified limits to the nearest 0.1 acre.

The cleared areas will be determined by measuring the width cleared, within the specified limits, at representative sections and multiplying the average width between sections by the linear distance between sections. Payment for clearing will be made at the contract unit price for the item and shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 4 For items of work for which specific lump sum prices are established in the contract, payment for clearing will be made at the contract lump sum prices. Such payment shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to completion of the work.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 4, Clearing

(1) This item consists of clearing as to the areas shown on the plans or described by the Engineer.

(2) Disposal made to the areas shown on the plans.

(3) Construction work shall continue expeditiously after clearing.

(4) Clearing & Grubbing, Specification 2 is related to this item.

(5) Payment includes compensation for mobilization and disposal.

CONSTRUCTION SPECIFICATION

2. CLEARING AND GRUBBING

1. SCOPE

The work shall consist of the clearing and grubbing of designated areas by removal and disposal of trees, snags, logs, stumps, shrubs and rubbish.

2. MARKING

The limits of the areas to be cleared and grubbed will be marked by means of stakes, flags, tree markings or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about six feet above the ground surface.

3. REMOVAL

All trees not marked for preservation and all snags, logs, brush, stumps, shrubs and rubbish shall be removed from within the limits of the marked areas. Unless otherwise specified, all stumps, roots and root clusters having a diameter of one inch or larger shall be grubbed out to a depth of at least two feet below subgrade elevation for concrete structures and one foot below the ground surface at embankment sites and other designated areas.

4. DISPOSAL

All materials removed from the cleared and grubbed areas shall be burned or buried at location shown on the drawings or as specified in Section 6 of this specification.

5. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the cleared and grubbed area will be measured to the nearest 0.1 acre. Payment for clearing and grubbing will be made for the total area within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the length of the cleared and grubbed area will be measured to the nearest full station (100 feet) along the line designated on the drawings or in the specifications. Payment for clearing and grubbing will be made for the total length

within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, each tree, stump and snag having a diameter of 4 inches or greater and each log having a diameter of 4 inches or greater and a length of 10 feet will be measured prior to removal. The size of each tree and snag will be determined by measuring its trunk at breast height above the natural ground surface. The size of each log will be determined by measuring the butt and by measuring its length from butt to tip. The size of each stump will be measured at the top. Diameter shall be determined by dividing the measured circumference by 3.14.

Payment for clearing and disposal of each tree, stump and snag having a diameter of 4 inches or greater and each log having a diameter of 4 inches or greater and a length of 10 feet or greater will be made at the contract unit price for its size designation as determined by the following schedule:

Measured Diameter	Size Designation
4 inches to 8 inches	6-inch size
Over 8 inches to 12 inches	10-inch size
Over 12 inches to 24 inches	18-inch size
Over 24 inches to 36 inches	30-inch size
Over 36 inches to 60 inches	48-inch size
Over 60 inches	60-inch size

The sum of such payments shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to the work of completely clearing and grubbing the designated areas, including clearing, grubbing and disposal of smaller trees, stumps, snags and logs and brush, shrubs, roots and rubbish.

Method 4 For items of work for which specific lump sum prices are established in the contract, payment for clearing and grubbing will be made at the contract lump sum price. Such payment shall constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to completion of the work.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 2, Clearing and Grubbing

(1) This item shall consist of clearing and grubbing of the area designated on the drawings.

(2) Grubbing shall not be done in advance of immediate need as approved by the Engineer. Once an area has been grubbed, construction work shall proceed expeditiously to completion in that area.

(3) Material from cleared and grubbed areas shall be disposed of as shown on the drawings.

(4) Areas cleared and grubbed shall be measured by mapping of the drip line, or canopied area, of the trees to be cleared.

CONSTRUCTION SPECIFICATION

3. STRUCTURE REMOVAL

1. SCOPE

The work shall consist of the removal, salvage and disposal of structures (including fences) from the designated areas.

2. MARKING

Method 1 Each structure unit to be removed will be marked by means of stakes, flags, painted markers or other suitable methods.

Method 2 The limits of the areas from which structures must be removed will be marked by means of stakes, flags or other suitable methods. Structures to be preserved in place or salvaged will be designated by special markings.

3. REMOVAL

Method 1 All structures designated in the contract for removal shall be removed to the specified extent and depth.

Method 2 Within the areas so marked all visible structures and attachments and all buried structures located and identified by survey stakes shall be removed to the specified extent and depth.

4. SALVAGE

Structures that are designated to be salvaged shall be carefully removed and neatly placed in the specified storage areas. Salvaged structures that are capable of being disassembled shall be dismantled into individual members or sections. Such structures shall be neatly match marked with paint prior to disassembly. All pins, nuts, bolts, washers, plates and other loose parts shall be marked or tagged to indicate their proper locations in the structure and shall be fastened to the appropriate structural member or packed in suitable containers. Materials from fences designated to be salvaged shall be placed outside the work area on the property from which they were removed. Wire shall be rolled into uniform rolls of convenient size. Posts and rails shall be neatly piled.

5. DISPOSAL OF REFUSE MATERIALS

Refuse materials resulting from structure removal shall be burned or buried at locations shown on the drawings or as specified in Section 7 of the specification.

6. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, payment for the removal of each structure unit, except fences, will be made at the contract unit price. Fences removed or removed and salvaged will be measured to the nearest linear foot. Payment for fence removal or removal and salvage will be made at the contract unit prices appropriate to each type and size of fence.

Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific lump sum prices are established in the contract, payment for structure removal will be made at the contract lump sum price.

Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are:

a. Bid item 3, structure Removal

(1) This item includes removal of wire fence, posts, as indicated on the plans, and as marked by Method 1, Section 2, to 18" below existing grade.

(2) Dispose of removed materials by hauling from site to landfill.

(3) In Section 3, Removal, Method 1, shall apply.

(4) Payment includes compensation for mobilization and disposal.

CONSTRUCTION SPECIFICATION

5. POLLUTION CONTROL

1. SCOPE

The work shall consist of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air during construction operations in accordance with these specifications.

2. MATERIALS

All materials furnished shall meet the requirements of the Material Specifications listed in Section 8 of this specification.

3. EROSION AND SEDIMENT CONTROL MEASURES AND WORKS

The work and measures shall include but not be limited to the following, as shown on the drawings or as specified in Section 8 of this specification.

Staging of Earthwork Activities - The excavation and moving of soil materials shall be scheduled so that the smallest possible areas will be unprotected from erosion for the shortest time feasible.

Seeding - Seedings to protect disturbed areas shall be done as specified on the drawings or in Section 8 of this specification.

Mulching - Mulching shall be used to provide temporary protection to soil surfaces from erosion.

Diversions - Diversions shall be used to divert water away from work areas and/or to collect runoff from work areas for treatment and safe disposition.

Stream Crossings - Culverts or bridges shall be used where equipment must cross streams.

Sediment Basins - Sediment basins shall be used to settle and filter out sediment from eroding areas to protect properties and streams below the construction site.

Straw Bale Filters - Straw bale filters shall be used to trap sediment from areas of limited runoff. Bales are temporary and shall be removed when permanent measures are installed.

Waterways - Waterways shall be used for the safe disposal of runoff from fields, diversions and other structures or measures.

4. CHEMICAL POLLUTION

The Contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to be used to dispose of chemical pollutants (such as drained lubricating or transmission oils, greases, soaps, asphalt, etc.) produced as a by-product of the project's work. At the completion of the construction work, sumps shall be voided without causing pollution as specified in Section 8 of this specification.

Sanitary facilities such as pit toilets, chemical toilets, or septic tanks shall not be placed adjacent to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water sources. At the completion of construction work, facilities shall be disposed of without causing pollution as specified in Section 8 of this specification

5. AIR POLLUTION

Local and state regulations concerning the burning of brush or slash or disposal of other materials shall be adhered to.

Fire prevention measures shall be taken to prevent the start or the spreading of fires which result from project work. Fire breaks or guards shall be constructed at locations shown on the drawings.

All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust.

6. MAINTENANCE, REMOVAL, AND RESTORATION

All pollution control measures and works shall be adequately maintained in a functional condition as long as needed during the construction operation. All temporary measures shall be removed and the site restored to as nearly original conditions as practicable.

7. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract each item will be measured to the nearest unit applicable. Payment for each item will be made at the contract unit price for that item. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific lump sum prices are established in the contract, payment for pollution control will be made at the contract lump sum price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items, and the items to which they are made subsidiary, are identified in Section 8 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction detail therefore are:

a. **Bid item 10, Pollution Control.**

(1) This item shall consist of application of erosion and sediment control measures where indicated on the plans and as per Section 3:
   a. Seeding
   b. Mulching
   c. Sediment basins
   d. Straw bale filters

(2) Sediment shall be removed from traps as needed, or at the request of the Project Inspector or Owner. Material removed from the traps shall be disposed of by uniformly spreading in adjacent areas.

(3) Payment for this item shall include compensation for the mobilization, materials, and soil spreading, and including a final clean-out of construction sediment trap at completion acceptance.

CONSTRUCTION SPECIFICATION

10. WATER FOR CONSTRUCTION

1. SCOPE

The work shall consist of furnishing, transporting, and using water for construction purposes in accord with the applicable specifications.

2. FACILITIES AND EQUIPMENT

The Contractor shall build and maintain such access and haul roads as are needed, and shall furnish, operate, and maintain all pumps, piping, tanks, and other facilities needed to load, transport, and use the water as specified.

These facilities shall be equipped with meters, tanks, or other devices by which the volume of water supplied can be measured.

3. DUST ABATEMENT AND HAUL ROAD MAINTENANCE

Water for dust abatement and haul road maintenance shall be applied to haul roads and other dust-producing areas as needed to prevent excessive dust and to maintain the roads in good condition for efficient operation while they are in use.

4. EARTHFILL, DRAINFILL, ROCKFILL

Water for earthfill, drainfill, or rockfill shall be used in the fill materials as specified in the applicable construction specifications.

5. CONCRETE, MORTAR, GROUT

Water used in mixing or curing concrete, pneumatically applied mortar, or other portland cement mortar or grout shall meet the requirements of the applicable construction specifications and shall be used in conformance with those specifications. Payment for water used in these items is covered by the applicable concrete, mortar, or grout specification.

6. MEASUREMENT AND PAYMENT

For water items for which specific unit prices are established in the contract, the volume of water furnished and used in accordance with the specifications will be measured to the nearest 1000 gallons.

Except as otherwise specified, the measurement for payment will include all water needed at the construction site, except as noted in Section 5, to perform the work required under the contract in accordance with the specifications but will not include water wasted or used in excess of the amount needed. It will not include water used in concrete which is mixed elsewhere and transported to the site.

Payment for water will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to furnishing, transporting, and using the water.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefor are:

a. Subsidiary Item, Water For Construction

(1) This item consists of furnishing all water called for in these specifications.

(2) No separate payment shall be made for "Water For Construction." Compensation for the Water shall be included in the payment for that item in which it is used.

CONSTRUCTION SPECIFICATION

11. REMOVAL OF WATER

1. SCOPE

The work shall consist of the removal of surface water and ground water as needed to perform the required construction in accordance with the specifications. It shall include (1) building and maintaining all necessary temporary impounding works, channels, and diversions, (2) furnishing, installing and operating all necessary pumps, piping and other facilities and equipment, and (3) removing all such temporary works and equipment after they have served their purposes.

2. DIVERTING SURFACE WATER

The Contractor shall build, maintain and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protective works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, a diversion must discharge into the same natural drainageway in which its headworks are located.

Unless otherwise specified, the Contractor shall furnish to the Engineer in writing, his plan for diverting surface water before beginning the construction work for which the diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

3. DEWATERING THE CONSTRUCTION SITE

Foundations, cutoff trenches and other parts of the construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction work. The Contractor shall furnish, install, operate and maintain all drains, sumps, pumps, casings, wellpoints, and other equipment needed to perform the dewatering as specified. Dewatering methods that cause a loss of fines from foundation areas will not be permitted.

Unless otherwise specified, the Contractor shall furnish to the Engineer, in writing, his plan for dewatering before beginning the construction work for which the dewatering is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

4. DEWATERING BORROW AREAS

Unless otherwise specified in Section 8, the Contractor shall maintain the borrow areas in drainable condition or otherwise provide for timely and effective removal of surface and ground waters that accumulate within the borrow areas from any source. Borrow material shall be processed as necessary to achieve proper and uniform moisture content for placement.

If pumping to dewater borrow areas is included as an item of work in the bid schedule, each pump used for this purpose shall be equipped with a water meter in the discharge line. Accuracy of the meters shall be such that the measured quantity of water is within 3 percent, plus or minus, of the true quantity. Means shall be provided by the Contractor to check the accuracy of the water meters when requested by the Contracting Officer.

5. EROSION AND POLLUTION CONTROL

Removal of water from the construction site, including the borrow areas shall be accomplished in such a manner that erosion and the transmission of sediment and other pollutants are minimized.

6. REMOVAL OF TEMPORARY WORKS

After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

Except as otherwise specified, pipes and casings shall be removed from temporary wells and the wells shall be filled to ground level with gravel or other suitable material approved by the Contracting Officer.

7. MEASUREMENT AND PAYMENT

Method 1 Items of work listed in the bid schedule for removal of water, diverting surface water, dewatering construction sites, and dewatering borrow areas will be paid for at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2 Items of work listed in the bid schedule for removal of water, diverting surface water, dewatering construction sites, and dewatering borrow areas will be paid for at the contract lump sum prices. Such payment will constitute full compensation for furnishing, installing, operating, and maintaining the necessary trenches, drains, sumps, pumps, and piping, and for all labor,

equipment, tools, and all other items necessary and incidental to the completion of the work, except that additional payment for pumping to dewater borrow areas will be made as described in the following paragraph.

If pumping to dewater borrow areas is listed as an item of work in the bid schedule, payment will be made at the contract unit price which shall be the price per 1,000 gallons shown in the bid schedule. Such payment will constitute full compensation for pumping only. Compensation for equipment and preparation and for other costs associated with pumping will be included in the lump sum payment for removal of water or the lump sum payment for dewatering borrow areas. Payment will be made only for pumping that is necessary to dewater borrow areas that cannot be effectively drained by gravity or that must have the water table lowered to be usable. Pumping for other purposes will not be included for payment in this item.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 8 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefor are:

a. Subsidiary Item, Removal of Water

(1) This item shall consist of all work necessary to divert the streamflow and other surface water and dewatering of the worksite.

(2) No separate payment shall be made for diverting the streamflow and dewatering the worksite.

CONSTRUCTION SPECIFICATION

13. PILING

1. SCOPE

The work shall consist of furnishing and driving the specified kinds and types of piles at the locations shown on the drawings.

2. MATERIALS

Piles shall conform to the requirements of Material Specifications 512, 513, or 514 as appropriate to the kinds of piles specified.

3. SITE PREPARATION

All excavation within the area to be occupied by bearing piles shall be completed before the piles are driven.

4. PROTECTION OF PILE HEADS

The heads of all piles shall be protected during driving by suitable caps, rings, heads, blocks, mandrels and other devices.

The heads of timber piles shall be fitted into a steel head block or fitted with heavy steel or wrought iron rings or wire wrapping.

The heads of steel piles shall be cut square and fitted with a steel driving cap.

The heads of precast concrete piles and casings shall be fitted into cushion type drive caps having a rope or other suitable cushion next to the pile head and fitting into a casting which in turn supports a timber shock block.

Driving heads, mandrels and other devices shall be provided by the Contractor as needed for special types of piles and shall conform to the recommendations of the pile manufacturer.

5. DRIVING BEARING PILES

Piles shall be driven only in the presence of the Engineer.

The piles shall be driven to the position, line and batter specified on the drawings. Each pile shall be driven continuously and without interruption to the specified depth or until the specified bearing capacity is obtained. Deviation from this procedure will be permitted only when interruption of driving is caused by conditions that could not reasonably be anticipated.

Unless otherwise approved, piles shall be driven with steam, air or diesel powered hammers or a combination of hammers and water jets. Water jets may be used only when specifically authorized by the Contracting Officer. Where jetting is authorized, the jets shall be withdrawn before the specified depth or bearing capacity is reached and the piles shall be driven with the hammer to the final penetration.

When drop hammers are permitted, the height of drop shall be not more than 8 feet for concrete piles or 12 feet for steel or timber piles.

The driving of piling with followers shall be allowed only when expressly approved by the Contracting Officer.

Diesel hammers shall be operated with throttles fully open when blows are counted for determination of bearing capacity except that throttle adjustments shall be made as necessary to prevent the nonstriking parts of the hammer from rising from the pile on the ram upstroke.

Piles shall not be driven within 20 feet of concrete less than 7 days old, including concrete placed in cast-in-place piles with or without predriven shells or casings.

The Contractor shall not attempt to drive piles beyond the point of refusal, as indicated by excessive bouncing of the hammer or kicking of the pile.

6. DRIVING SHEET PILING

The piling shall be driven in such a manner as to insure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose.

At any time that the forward edge of the sheet pile wall is found to be out of correct alignment: (a) the piling already assembled and partly driven shall be driven to the required depth, and (b) taper piles shall then be driven to bring the forward edge into correct alignment before additional regular piling is assembled and driven. The maximum permissible taper in a single pile shall be one-fourth inch per foot of length.

7. ESTIMATING BEARING CAPACITY

When load tests are not required, the bearing capacity of each pile shall be estimated by use of one of the following formulas, as appropriate:

a. For gravity hammers, $R = \frac{2WH}{S+1}$

b. For single-acting steam or air hammers and for diesel hammers having unrestricted rebound of the ram, $R = \frac{2WH}{S+0.1}$

c. For double-acting steam or air hammers and diesel hammers having enclosed rams, $R = \frac{2H(W+AP)}{S+0.1}$; or, $R = \frac{2E}{S+0.1}$

where:

R = safe bearing capacity in pounds,
W = weight, in pounds, of striking parts of hammer,
H = height of fall in feet,
A = area of piston in square inches,
P = pressure, in pounds per square inch, of steam, air or other gas exerted on the hammer piston or ram,
E = the manufacturers rating for foot-pounds of energy developed by double-acting steam or air hammers, or 90 percent of the average equivalent energy, in foot-pounds, developed by diesel hammers having enclosed rams as evaluated by gauge and chart readings.
S = average penetration, inches per blow, for the last 5 to 10 blows of a gravity hammer or the last 10 to 20 blows for steam, air or diesel powered hammers.

The above formulas are applicable only when:

a. The hammer has a free fall

b. The head of the pile is not crushed

c. The penetration is reasonably quick and uniform

d. There is no sensible bounce after the blow

e. A follower is not used.

Twice the height of the bounce shall be deducted from "H" to determine its value in the formula.

In case water jets are used in connection with the driving, the bearing power shall be determined by the above formulas from the results of driving after the jets have been removed.

8. LOAD TESTS

When load tests are specified, the test loads shall be applied gradually, without impact, and in such a way that no lateral forces are applied to the pile. Load testing shall not be started until 24 hours after driving of the test pile is completed, or such longer time as is specified. Except as otherwise specified, load tests shall be made according to the following procedure:

The total test load shall be twice the specified working load and shall be applied to the pile in increments equal to 25 percent of the working load. Settlement of the top of the pile shall be measured to an accuracy of 0.01 inch before and after the application of each load increment and at 2, 4, 8, 15, 30, and 60 minutes after, and then every 2 hours until the next load increment is applied. Additional load shall not be applied until the rate of settlement is less than 0.01 inch in one hour.

The total test load shall remain on the pile for a period of at least 24 hours. Settlement shall be measured at 6-hour intervals during this period and at the end of the period, at least twice during removal of the load, and immediately after all of the test load is removed. The net settlement shall be measured approximately 24 hours after all of the load has been removed.

If settlement continues in excess of 0.01 inch per hour under less than the total test load, no additional load shall be applied, but the load that has been applied shall remain on the pile for a period of at least 24 hours, and settlement measurements while the load is on the pile, and during and after removal of the load shall be made as if it were the total test lead.

9. CUTTING OFF PILES

The Contractor shall cut the piles off at the specified elevations. The length of pile cut off shall be sufficient to permit the removal of all damaged material. Steel shells or concrete casings for cast-in-place concrete piles shall be cut off at the specified elevation before being filled with concrete.

Steel bearing piles shall be cut off in clean, straight lines as shown on the drawings. Any irregularities shall be leveled off with deposits of weld metal or by grinding before placement of bearing caps.

Precast concrete piles and concrete casings shall be cut off in a manner such as to prevent damage to the remaining portion of the pile or casing or to the projecting reinforcement required for connecting the piles to the structure.

Timber piles that are to be capped shall be accurately cut off so that true bearing is obtained on every pile without the use of shims.

10. DEFECTIVE PILES

Any pile damaged in driving, driven out of its proper location, driven below the specified cut off elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Contracting Officer.

a. The defective pile shall be pulled and replaced or redriven;

b. A new pile shall be driven adjacent to the defective pile; or,

c. The defective pile shall be spliced or built up or a sufficient portion of the footing shall be extended to properly embed the pile.

Pile shells abandoned in place after driving shall be filled with concrete or sand-cement grout as appropriate to the situation.

All piles pushed up by the driving of adjacent piles or by any other cause shall be driven down again.

Any sheet pile ruptured in the interlock or otherwise damaged during driving shall be pulled and replaced.

11. CORRECTING SURFACE HEAVE

Any excess material resulting from displacement of earth by pile driving shall be removed. Materials disturbed by pile driving shall be conditioned and compacted to a density equal to that of the adjacent undisturbed material.

12. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the number of each type, kind, and length of pile driven in place will be counted. Payment for furnishing and driving each type, kind, and length of pile will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the number of each type, kind, and length of pile furnished, accepted, and stockpiled in good condition at the site of the work will be counted. Payment for furnishing each type, kind, and length of pile will be made at the contract unit price. Payment for driving each type and kind of pile will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, the length of each type and kind of pile driven will be computed to the nearest foot as the difference between the measured length of pile before driving and measured length of pile cut off after driving. Payment for furnishing and driving each type and kind of pile will be made at the contract unit price. Such payment will constitute full payment for all labor, materials, equipment, and all other items necessary and incidental to the completion of the work.

Method 4 For items of work for which specific unit prices are established in the contract, the area of sheet pile walls, acceptably placed, will be computed to the nearest square foot within the neat lines shown on the drawings. Payment will be made at the contract unit price for each type, kind, and weight of piling. Such payment will constitute full payment for all labor, materials, equipment, and all other items necessary and incidental to the completion of the work.

All Methods The following provisions apply to all methods of measurement and payment.

The measurement of the number of linear feet of piles (or number of piles) furnished and the number of piles driven shall include test and tension piles specified in the contract but not those furnished and driven by the Contractor at his own option. No payment will be made for furnishing or driving piles, including test piles, to replace piles lost or damaged prior to the completion of the contract while in stockpile or during handling and driving.

When load tests are specified, payment for each test will be made at the contract price per test. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to making the test except furnishing and driving piling.

When splices are specified, payment for each splice will be made at the contract unit price. Such payment shall constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 13 of this specification.

13. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 13, Piling

(1) This item consists of driving sheet piling, and cutting.

(2) Site clearing and preparation is included in Specification 1, Clearing.

(3) Materials specification shall conform to that indicated on plans.

(4) Compensation will include all mobilization, installation, and coordination with subsidiary items.

CONSTRUCTION SPECIFICATION

21. EXCAVATION

1. SCOPE

The work shall consist of the excavation required by the drawings and specifications and disposal of the excavated materials.

2. CLASSIFICATION

Excavation will be classified as common excavation or rock excavation in accordance with the following definitions or will be designated as unclassified.

Common excavation shall be defined as the excavation of all materials that can be excavated, transported, and unloaded by the use of heavy ripping equipment and wheel tractor-scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of one cubic yard and equipped with attachments (such as shovel, bucket, backhoe, dragline or clam shell) appropriate to the character of the materials and the site conditions.

Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials the accomplishment of which requires blasting or the use of excavators larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than one cubic yard in volume encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation.

Excavation will be classified according to the above definitions by the Engineer, based on his judgment of the character of the materials and the site conditions.

The presence of isolated boulders or rock fragments larger than one cubic yard in size will not in itself be sufficient cause to change the classification of the surrounding material.

For the purpose of this classification, the following definitions shall apply:

Heavy ripping equipment shall be defined as a rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a tractor having a power rating of 200-300 net horsepower (at the flywheel).

Wheel tractor-scraper shall be defined as a self-loading (not elevating) and unloading scraper having a struck bowl capacity of 12-20 yards.

Pusher tractor shall be defined as a track type tractor having a power rating of 200-300 net horsepower (at the flywheel) equipped with appropriate attachments.

3. UNCLASSIFIED EXCAVATION

Items designated as "Unclassified Excavation" shall include all materials encountered regardless of their nature or the manner in which they are removed. When excavation is unclassified, none of the definitions or classifications stated in Section 2 of this specification shall apply.

4. BLASTING

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operations.

Blasting shall be done in such a way as to prevent damage to the work or unnecessary fracturing of the foundation and shall conform to any special requirements in Section 12 of this specification.

5. USE OF EXCAVATED MATERIALS

Method 1 To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent earthfill or rockfill. The suitability of materials for specific purposes will be determined by the Engineer. The Contractor shall not waste or otherwise dispose of suitable excavated materials.

Method 2 Suitable materials from the specified excavations may be used in the construction of required earthfill or rockfill. The suitability of materials for specific purposes will be determined by the Engineer.

6. DISPOSAL OF WASTE MATERIALS

Method 1 All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of at the locations shown on the drawings.

Method 2 All surplus or unsuitable excavated materials will be designated as waste and shall be disposed of by the Contractor at sites of his own choosing away from the site of the work.

7. BRACING AND SHORING

Excavated surfaces too steep to be safe and stable if unsupported shall be supported as necessary to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring, and other supporting installations. The Contractor shall furnish, place and subsequently remove such supporting installations.

8. STRUCTURE AND TRENCH EXCAVATION

Structure or trench excavation shall be completed to the specified elevations and to sufficient length and width to include allowance for forms, bracing and supports, as necessary, before any concrete or earthfill is placed or any piles are driven within the limits of the excavation.

9. BORROW EXCAVATION

When the quantities of suitable materials obtained from specified excavations are insufficient to construct the specified fills, additional materials shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as directed by the Engineer.

Borrow pits shall be excavated and finally dressed in a manner to eliminate steep or unstable side slopes or other hazardous or unsightly conditions.

10. OVEREXCAVATION

Excavation in rock beyond the specified lines and grades shall be corrected by filling the resulting voids with portland cement concrete made of materials and mix proportions approved by the Engineer. Concrete that will be exposed to the atmosphere when construction is completed shall contain not less than 6 sacks of cement per cubic yard of concrete. Concrete that will be permanently covered shall contain not less than 4-1/2 sacks of cement per cubic yard. The concrete shall be placed and cured as specified by the Engineer.

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved compacted earthfill, except that, if the earth is to become the subgrade for riprap, rockfill, sand or gravel bedding, or drainfill, the voids may be filled with material conforming to the specifications for the riprap, rockfill, bedding or drainfill.

11. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of each type and class of excavation within the specified pay limits will be measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Regardless of quantities excavated, the measurement for payment will be made to the specified pay limits, except that excavation outside the specified lines and grades directed by the Engineer to remove unsuitable material will be included. Excavation required because unsuitable conditions result from the Contractor's improper construction operations, as determined by the Contracting Officer will not be included for measurement and payment.

Method 1 The pay limits shall be as designated on the drawings.

Method 2 The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated for previous excavation or fill the upper limit shall be the modified ground surface resulting from the specified previous excavation or fill.

b. The lower and lateral limits shall be the neat lines and grades shown on the drawings.

Method 3 The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated for previous excavation or fill the upper limit shall be the modified ground surface resulting from the specified previous excavation or fill.

b. The lower and lateral limits shall be the true surface of the completed excavation as directed by the Engineer.

Method 4 The pay limits shall be defined as follows:

a. The upper limit shall be the original ground surface as it existed prior to the start of construction operations except that where excavation is performed within areas designated for previous excavation or fill the upper limit shall be the modified ground surface resulting from the specified previous excavation or fill.

b. The lower limit shall be at the bottom surface of the proposed structure.

c. The lateral limits shall be 18 inches outside of the outside surfaces of the proposed structure or shall be vertical planes 18 inches outside of and parallel to the footings, whichever gives the larger pay quantity, except as provided in d, below.

d. For trapezoidal channel linings or similar structures that are to be supported upon the sides of the excavation without intervening forms, the lateral limits shall be at the under side of the proposed lining or structure.

e. For the purposes of the definitions in b, c, and d, above, any specified bedding or drainfill directly beneath or beside the structure will be considered to be a part of the structure.

All Methods The following provisions apply to all methods of measurement and payment.

Payment for each type and class of excavation will be made at the contract unit price for that type and class of excavation. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work, except that extra payment for backfilling overexcavation will be made in accordance with the following provisions:

Payment for backfilling overexcavation, as specified in Section 10 of this specification, will be made only if the excavation outside specified lines and grades is directed by the Engineer to remove unsuitable material and if the unsuitable condition is not a result of the Contractor's improper construction operations as determined by the Contracting Officer.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 12 of this specification.

12. ITEMS OF WORK AND CONSTRUCTED DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. In Section 5, Use of Excavated Materials, Method 1, shall apply.

b. In Section 6, Disposal of Waste Materials, Method 1, shall apply at the discretion of the Engineer.

c. Bid Item 6, Excavation (sediment traps.)
   (1) This item consists of excavation, and grading of excavated materials from sediment traps to elevations shown on the drawings.
   (2) Clearing and landscaping items including work area and access are compensated under Bid Items 4, and 19.

d. Bid Item 7, Excavation - (islands and Baffles.)
   (1) This item consists of excavation and grading of excavated materials into islands and baffles to elevations shown on drawings.
   (2) Channel piping is related to this work and is compensated under Bid Item 16 and Specification 81.

e. Bid Item 8, Earthfill (embankment) is related to this item.
   (1) This item consists of borrow excavation and grading of excavated materials into the embankment, outlet structure, and outlet channel as per plans, sections, and details to elevations shown, and is detailed in Specification 23.
   (2) The outlet structure is related to this work and is compensated under Bid Item 13.
   (3) Earthshaping for outlet structure, gabions, and riprap is compensated under this item.

f. Compensation under these items includes all mobilization, labor, materials, methods, and operations necessary to complete this item of work.

CONSTRUCTION SPECIFICATION

23. EARTHFILL

SCOPE

The work shall consist of the construction of earth embankments and other earthfills required by the drawings and specifications.

MATERIALS

All fill materials shall be obtained from required excavations and designated borrow areas. The selection, blending, routing and disposition of materials in the various fills shall be subject to approval by the Engineer.

Fill materials shall contain no sod, brush, roots or other perishable materials. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compaction of the fill.

The types of materials used in the various fills shall be as listed and described in the specifications and drawings.

FOUNDATION PREPARATION

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable materials or shall be excavated as specified.

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earthfill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earthfill as specified for subsequent layers of earthfill.

Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two inches in depth normal to the slope and shall be at such a moisture content that the earthfill can be compacted against them to effect a good bond between the fill and the abutments.

Rock foundation and abutment surfaces shall be cleared of all loose materials by hand or other effective means and shall be free of standing water when fill is placed upon them. Occasional rock

outcrops in earth foundations for earthfill, except in dams and other structures designed to restrain the movement of water, shall not require special treatment if they do not interfere with compaction of the foundation and initial layers of the fill or the bond between the foundation and the fill.

Foundation and abutment surfaces shall be not steeper than 1 horizontal to 1 vertical unless otherwise specified. Test pits or other cavities shall be filled with compacted earthfill conforming to the specifications for the earthfill to be placed upon the foundation.

4. PLACEMENT

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the Engineer. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified. Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted. Hand compacted fill, including fill compacted by manually directed power tampers, shall be placed in layers whose thickness before compaction does not exceed the maximum thickness specified for layers of fill compacted by manually directed power tampers.

Adjacent to structures, fill shall be placed in a manner which will prevent damage to the structures and will allow the structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure.

Earthfill in dams, levees and other structures designed to restrain the movement of water shall be placed so as to meet the following additional requirements:

a. The distribution of materials throughout each zone shall be essentially uniform, and the fill shall be free from lenses, pockets, streaks or layers of material differing substantially in texture, moisture content, or gradation from the surrounding material.

b. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

c. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of approximately 2 percent shall be maintained to insure effective drainage, and except as otherwise specified for drainfill or sectional zones.

d. Dam embankments shall be constructed in continuous layers from abutment to abutment except where openings to facilitate construction or to allow the passage of stream flow during construction are specifically authorized in the contract.

e. Embankments built at different levels as described under (c) or (d) above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all material not meeting the requirements of this specification, and shall be scarified, moistened and recompacted when the new fill is placed against it as needed to insure a good bond with the new fill and to obtain the specified moisture content and density at the contact of the in place and new fills.

5. CONTROL OF MOISTURE CONTENT

During placement and compaction of fill, the moisture content of the materials being placed shall be maintained within the specified range.

The application of water to the fill materials shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the materials after placement on the fill, if necessary. Uniform moisture distribution shall be obtained by disking.

Material that is too wet when deposited on the fill shall either be removed or be dried to the specified moisture content prior to compaction.

If the top surface of the preceding layer of compacted fill or a foundation or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond it shall either be removed or scarified and moistened by sprinkling to an acceptable moisture content prior to placement of the next layer of fill.

6. COMPACTION

Earthfill shall be compacted according to the following requirements for the class of compaction specified:

Class A compaction. Each layer of fill shall be compacted as necessary to make the density of the fill matrix not less than the minimum density specified. The fill matrix is defined as the portion of the fill material finer than the maximum particle size used in the compaction test method specified.

Class B compaction. Each layer of fill shall be compacted to a mass density not less than the minimum density specified.

Class C compaction. Each layer of fill shall be compacted by the specified number of passes of the type and weight of roller or other equipment specified, or by an approved equivalent method. Each pass shall consist of at least one passage of the roller wheel or drum over the entire surface of the layer.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators. Unless otherwise specified, heavy equipment including backhoe mounted powertampers, or vibrating compactors and manually directed vibrating rollers, shall not be operated within 2 feet of any structure. Towed or self-propelled vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist will not be permitted.

The passage of heavy equipment will not be allowed: (1) over cast-in-place conduits prior to 14 days after placement of the concrete; (2) over cradled or bedded precast conduits prior to 7 days after placement of the concrete cradle or bedding; or (3) over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 2 feet, whichever is greater.

Compacting of fill adjacent to structures shall not be started until the concrete has attained the strength specified in Section 10 for this purpose. The strength will be determined by compression testing of test cylinders cast by the Engineer for this purpose and cured at the work site in the manner specified in ASTM Method C 31 for determining when a structure may be put into service.

When the required strength of the concrete is not specified as described above, compaction of fill adjacent to structures shall not be started until the following time intervals have elapsed after placement of the concrete.

Structure	Time Interval
Retaining walls and counterforts (impact basins)	14 days
Walls backfilled on both sides simultaneously	7 days
Conduits and spillway risers, cast-in-place (with inside forms in place)	7 days
Conduits and spillway risers, cast-in-place (inside forms removed)	14 days
Conduits, precast, cradled	2 days
Conduits, precast, bedded	1 day
Cantilever outlet bents (backfilled) both sides simultaneously)	3 days

7. REWORKING OR REMOVAL AND REPLACEMENT OF DEFECTIVE FILL

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced by acceptable fill. The replacement fill and the foundation, abutment and fill surfaces upon which it is placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture control and compaction.

8. TESTING

During the course of the work, the Engineer will perform such tests as are required to identify materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These tests performed by the Engineer will be used to verify that the fills conform to the requirements of the specifications. Such tests are not intended to provide the Contractor with the information required by him for the proper execution of the work and their performance shall not relieve the Contractor of the necessity to perform tests for that purpose.

Densities of fill requiring Class A compaction will be determined by the Engineer in accordance with ASTM Method D 1556, D 2167, D 2922 or D 2937 except that the volume and moist weight of included rock particles larger than those used in the compaction test method specified for the type of fill will be determined and deducted from the volume and moist weight of the total sample prior to computation of density or if using the nuclear gauge, added to the specified density to bring it to the measure of equivalent composition for comparison. The density so computed will be used to determine the percent compaction of the fill matrix. Unless otherwise specified, moisture content will be determined by one of the following methods: ASTM Method D 2216 or D 3017.

9. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the volume of each type and compaction class of earthfill within the specified zone boundaries and pay limits will be measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Unless otherwise specified, no deduction in volume will be made for embedded conduits and appurtenances.

The pay limits shall be as defined below, with the further provision that earthfill required to fill voids resulting from overexcavation of the foundation, outside the specified lines and grades, will be included in the measurement for payment only where such overexcavation is directed by the Engineer to remove unsuitable material and where the unsuitable condition is not a result of the Contractor's improper construction operations as determined by the Contracting Officer.

Method 1 The pay limits shall be as designated on the drawings.

Method 2 The pay limits shall be the measured surface of the foundation when approved for placement of the fill and the specified neat lines of the fill surface.

Method 3 The pay limits shall be the measured surface of the foundation when approved for placement of the fill and the measured surface of the completed fill.

Method 4 The pay limits shall be the specified pay limits for excavation and the specified neat lines of the fill surface.

Method 5 The pay limits shall be the specified pay limits for excavation and the measured surface of the completed fill.

Method 6 Payment for each type and compaction class of earthfill will be made at the contract unit price for that type and compaction class of fill. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work.

Method 7 Payment for each type and compaction class of earthfill will be made at the contract unit price for that type and compaction class of fill. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work, except furnishing, transporting, and applying water to the foundation and fill materials. Water applied to the foundation and fill materials will be measured and payment will be made as specified in Construction Specification 10.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 10 of this specification.

10. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 8, Earthfill, Class B, (Embankment)

(1) This item shall consist of stripping and salvaging topsoil and the placement of the fill in the embankment including the foundation.

(2) Fill shall be placed according to plans, sections, and details. Bid quantity is by calculated volume of plan.

(3) Material for the embankment earthfill shall come from borrow excavation shown on the plans at the outlet structure site, and from adjacent excavation.

(4) Earthfill shall be:

(a) Compaction Class B. The fill matrix shall be compacted to a density indicated on the drawings.

(b) The maximum thickness of each layer placed before compaction shall be nine (9) inches.

(5) Compensation for this item includes all work necessary for the construction of the embankment and shaping of the foundation of the overflow spillway including dewatering if necessary.

CONSTRUCTION SPECIFICATION

26. SALVAGING AND SPREADING TOPSOIL

1. SCOPE

The work shall consist of salvaging topsoil from borrow pits or required excavations and spreading it on the areas shown on the drawings to the specified depths.

2. QUALITY OF TOPSOIL

Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, stones or other foreign materials.

3. EXCAVATION

After the site has been cleared and grubbed the topsoil shall be removed from the designated areas and shall be stockpiled at locations shown on the drawings or approved by the Engineer. Objectionable materials encountered during excavation shall be removed and buried at locations shown on the drawings or approved by the Engineer or otherwise removed from the construction site.

4. SPREADING

Method 1 Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation.

After placement is completed the surface of the topsoil shall be finished to a reasonably smooth surface.

Method 2 Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation. Where compacted fills are designated to be covered by topsoil, the topsoil shall be placed concurrently with the fill and shall be bonded to the compacted fill with the compacting equipment.

After placement is completed the surface of the topsoil shall be finished to a reasonably smooth surface.

5. MEASUREMENT AND PAYMENT

Method 1 The total areas of the surfaces covered by topsoil will be computed to the nearest square yard. Payment for salvaging and placing topsoil will be made at the contract unit price. Such

payment will constitute full compensation for all materials, labor and equipment and all other items necessary and incidental to the completion of the work, including excavating, stockpiling, hauling, and spreading.

Method 2 The total area of the surfaces covered by topsoil will be computed to the nearest square yard except that the areas of the surfaces of embankments, levees, dikes and other earthfills will not be included for payment. Payment for salvaging and placing topsoil will be made at the contract unit price. Such payment will constitute full payment for all materials, labor and equipment and all other items necessary and incidental to the completion of the work, including excavating, stockpiling, hauling, and spreading.

Payment for topsoil spread on the surfaces of embankments, levees, dikes and other earthfills will be considered as included in the payment for the item of earthfill under which the embankment, levee, dike, or other earthfill is constructed.

Method 3 For items of work for which specific unit prices are established in the contract, the volume of topsoil salvaged and spread will be measured by cross section surveys of the stockpile from which it is taken if it is stockpiled, otherwise, of the area from which it is borrowed; and will be computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for salvaging and spreading topsoil will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work including excavation, stockpiling, hauling, and spreading.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction detail there are:

a. Bid Item 5, Topsoil Stripping and Replacement.

   (1) This item of work consists of topsoil stripping to 6" depth from the area indicated on the plans (at outlet structure location), stockpiling, and spreading on area adjacent to outlet structure.

b. Placement of topsoil on baffles, islands, and sediment trap spoil is subsidiary to and compensated under Bid Items 6 and 7.

c. In Section 4, Spreading, Method 1, shall apply.

CONSTRUCTION SPECIFICATION

32. CONCRETE FOR MINOR STRUCTURES

1. SCOPE

The work shall consist of furnishing, forming, placing, finishing and curing portland cement concrete as required to build the structures named in Section 24 of this specification.

2. MATERIALS

Portland cement shall conform to the requirements of Material Specification 531 for the specified type.

Aggregates shall conform to the requirements of Material Specification 522 unless otherwise specified. The grading of coarse aggregates shall be as specified in Section 24.

Water shall be clean and free from injurious amounts of oil, salt, acid, alkali, organic matter or other deleterious substances.

Preformed expansion joint filler shall conform to the requirements of Material Specification 535.

Waterstops shall conform to the requirements of Material Specifications 537 and 538 for the specified kinds.

3. CLASS OF CONCRETE

Concrete for minor structures shall be classified as follows:

Class of Concrete	Maximum Net Water Content (gallons/bag)	Minimum Cement Content (bags/cu. yd.)
3000M	7	6
4000M	6	6

4. AIR CONTENT AND CONSISTENCY

Unless otherwise specified, the slump shall be 2 to 4 inches. If air entrainment is specified, the air content by volume shall be 5 to 8 percent of the volume of the concrete. When specified, directed or approved by the Engineer, a water-reducing, set-retarding or other admixture shall be used.

5. DESIGN OF THE CONCRETE MIX

The proportions of the aggregates shall be such as to produce a concrete mixture that will work readily into the corners and angles

of the forms and around reinforcement when consolidated, but will not segregate or exude free water during consolidation.

Prior to placement of concrete, the Contractor shall furnish the Engineer for approval, a statement of the materials and mix proportions (including admixtures, if any) he intends to use. The statement shall include evidence satisfactory to the Engineer that the materials and proportions will produce concrete conforming to this specification. The materials and proportions so stated shall constitute the "job mix." After a job mix has been approved, neither the source, character or grading of the aggregates nor the type or brand of cement or admixture shall be changed without prior notice to the Engineer. If such changes are necessary, no concrete containing such new or altered materials shall be placed until the Engineer has approved a revised job mix.

6. INSPECTION AND TESTING

The Engineer shall have free entry to the plant and equipment furnishing concrete under the contract. Proper facilities shall be provided for the Engineer to inspect materials, equipment and processes and to obtain samples of the concrete. All tests and inspections will be conducted so as not to interfere unnecessarily with manufacture and delivery of the concrete.

7. HANDLING AND MEASUREMENT OF MATERIALS

Materials shall be stockpiled and batched by methods that will prevent segregation or contamination of aggregates and insure accurate proportioning of the ingredients of the mix.

Except as otherwise provided in Section 8, cement and aggregates shall be measured as follows:

Cement shall be measured by weight or in bags of 94 pounds each. When cement is measured in bags, no fraction of a bag shall be used unless weighed.

Aggregates shall be measured by weight. Mix proportions shall be based on saturated, surface-dry weights. The batch weight of each aggregate shall be the required saturated, surface-dry weight plus the weight of surface moisture it contains.

Water shall be measured, by volume or by weight, to an accuracy within one percent of the total quantity of water required for the batch.

Admixtures shall be measured within a limit of accuracy of three percent.

8. MIXERS AND MIXING

Concrete shall be uniform and thoroughly mixed when delivered to the work. Variations in slump of more than 1 inch within a batch will be considered evidence of inadequate mixing and shall be corrected by increasing mixing time or other means.

For stationary mixers, the mixing time after all cement and aggregates are in the mixer drum shall be not less than 1-1/2 minutes. When concrete is mixed in a truck mixer, the number of revolutions of the drum or blades at mixing speed shall be not less than 70 nor more than 100.

Unless otherwise specified, volumetric batching and continuous mixing at the construction site will be permitted. The batching and mixing equipment shall conform to the requirements of ASTM Specification C 685 and shall be demonstrated prior to placement of concrete, by tests with the job mix, to produce concrete meeting the specified proportioning and uniformity requirements. Concrete made by this method shall be produced, inspected, and certified in conformance with Sections 6, 7, 8, 13, and 14 of ASTM Specification C 685.

No mixing water in excess of the amount called for by the job mix shall be added to the concrete during mixing or hauling or after arrival at the delivery point.

9. FORMS

Forms shall be of wood, plywood, steel or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags or other irregularities. Forms shall be coated with a nonstaining form release agent before being set into place.

Metal ties or anchorages within the forms shall be equipped with cones, she-bolts or other devices that permit their removal to a depth of at least one inch without injury to the concrete. Ties designed to break off below the surface of the concrete shall not be used without cones.

All edges that will be exposed to view when the structure is completed shall be chamfered, unless finished with molding tools as specified in Section 18.

10. PREPARATION OF FORMS AND SUBGRADE

Prior to placement of concrete the forms and subgrade shall be free of chips, sawdust, debris, water, ice, snow, extraneous oil, mortar,

or other harmful substances or coatings and the temperature of all surfaces to be in contact with the new concrete shall be no colder than 40°F. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. Rock surfaces shall be cleaned by air-water cutting, wet sandblasting or wire brush scrubbing, as necessary, and shall be wetted immediately prior to placement of concrete. Earth surfaces shall be firm and damp. Placement of concrete on mud, dried earth or uncompacted fill or frozen subgrade will not be permitted.

Items to be embedded in the concrete shall be positioned accurately and anchored firmly.

Weepholes in walls or slabs shall be formed with nonferrous materials.

11. CONVEYING

Concrete shall be delivered to the site and discharged into the forms within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes.

The Engineer may allow a longer time, provided the setting time of the concrete is increased a corresponding amount by the addition of an approved set-retarding admixture. In any case, concrete shall be conveyed from the mixer to the forms as rapidly as practicable by methods that will prevent segregation of the aggregates or loss of mortar.

12. PLACING

Concrete shall not be placed until the subgrade, forms and steel reinforcement have been inspected and approved. No concrete shall be placed except in the presence of the Engineer. The Contractor shall give reasonable notice to the Engineer each time he intends to place concrete. Such notice shall be far enough in advance to give the Engineer adequate time to inspect the subgrade, forms, steel reinforcement and other preparations for compliance with the specifications. "Other preparations" includes but is not limited to the concrete mixing plant, delivery equipment system, placing and finishing equipment and system, schedule of work, workforce, heating or cooling facilities if applicable. Deficiencies are to be corrected before concrete is delivered for placing.

The concrete shall be deposited as closely as possible to its final position in the forms and shall be worked into the corners and angles of the forms and around all reinforcement and embedded items

in a manner to prevent segregation of aggregates or excessive laitance. Formed concrete shall be placed in horizontal layers not more than 20 inches thick. Concrete shall not be dropped more than five feet vertically unless suitable equipment is used to prevent segregation. Hoppers and chutes, pipes or "elephant trunks" shall be used as necessary to prevent segregation and the splashing of mortar on the forms and reinforcing steel above the layer of being placed.

Immediately after the concrete is placed in the forms, it shall be consolidated by spading, hand tamping or vibration as necessary to insure smooth surfaces and dense concrete. Each layer shall be consolidated to insure monolithic bond with the preceding layer. If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when spaded or vibrated, the Contractor shall discontinue placing concrete and shall make a construction joint according to the procedure specified in Section 13.

If placing is discontinued when an incomplete horizontal layer is in place, the unfinished end of the layer shall be formed by a vertical bulkhead.

13. CONSTRUCTION JOINTS

Construction joints shall be made at the locations shown on the drawings. If construction joints are needed which are not shown on the drawings, they shall be placed in locations approved by the Engineer.

Where a feather edge would be produced at a construction joint, as in the top surface of a sloping wall, an insert form shall be used so that the resulting edge thickness on either side of the joint is not less than 6 inches.

In walls and columns, as each lift is completed, the top surfaces shall be immediately and carefully protected from any condition that might adversely affect the hardening of the concrete.

Steel tying and form construction adjacent to concrete in place shall not be started until the concrete has cured at least 12 hours. Before new concrete is deposited on or against concrete that has hardened, the forms shall be retightened. New concrete shall not be placed until the hardened concrete has cured at least 12 hours.

Surfaces of construction joints shall be cleaned of all unsatisfactory concrete, laitance, coatings or debris by washing and scrubbing with a wire brush or wire broom or by other means approved by the Engineer. The surfaces shall be kept moist for at least one hour prior to placement of the new concrete.

14. EXPANSION AND CONTRACTION JOINTS

Expansion and contraction joints shall be made only at locations shown on the drawings.

Exposed concrete edges at expansion and contraction joints shall be carefully tooled or chamfered, and the joints shall be free of mortar and concrete. Joint filler shall be left exposed for its full length with clean and true edges.

Preformed expansion joint filler shall be held firmly in the correct position as the concrete is placed.

When open joints are specified, they shall be constructed by the insertion and subsequent removal of a wooden strip, metal plate or other suitable template in such a manner that the corners of the concrete will not be chipped or broken. The edges of open joints shall be finished with an edging tool prior to removal of the joint strips.

15. WATERSTOPS

Waterstops shall be held firmly in the correct position as the concrete is placed. Joints in metal waterstops shall be soldered, brazed or welded. Joints in rubber or plastic waterstops shall be cemented, welded or vulcanized as recommended by the manufacturer.

16. REMOVAL OF FORMS

Forms shall not be removed without the approval of the Engineer. Forms shall be removed in such a way as to prevent damage to the concrete. Supports shall be removed in a manner that will permit the concrete to take the stresses due to its own weight uniformly and gradually.

17. FINISHING FORMED SURFACES

Immediately after the removal of the forms:

a. All fins and irregular projections shall be removed from exposed surfaces.

b. The holes produced on all surfaces by the removal of form ties, cone-bolts, and she-bolts shall be cleaned, wetted and filled with a dry-pack mortar consisting of one part portland cement, three parts sand that will pass a No. 16 sieve, and just sufficient water to produce a consistency such that the filling is at the point of becoming rubbery when the material is solidly packed.

18. FINISHING UNFORMED SURFACES

All exposed surfaces of the concrete shall be accurately screeded to grade and then float finished, unless specified otherwise.

Excessive floating or troweling of surfaces while the concrete is soft will not be permitted.

The addition of dry cement or water to the surface of the screeded concrete to expedite finishing will not be allowed.

Joints and edges on unformed surfaces that will be exposed to view shall be chamfered or finished with molding tools.

19. CURING

Concrete shall be prevented from drying for a curing period of at least 7 days after it is placed. Exposed surfaces shall be kept continuously moist for the entire period, or until curing compound is applied as specified below. Moisture shall be maintained by sprinkling, flooding or fog spraying or by covering with continuously moistened canvas, cloth mats, straw, sand or other approved material. Wood forms left in place during the curing period shall be kept continuously wet. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

Concrete, except at construction joints, may be coated with the approved curing compound in lieu of continued application of moisture, except as otherwise specified in Section 24. The compound shall be sprayed on the moist concrete surfaces as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. The compound shall be applied at a uniform rate of not less than one gallon per 150 square feet of surface and shall form a continuous adherent membrane over the entire surface. Curing compound shall be thoroughly mixed before applying and continuously agitated during application. Curing compound shall not be applied to surfaces requiring bond to subsequently placed concrete, such as construction joints, shear plates, reinforcing steel and other embedded items. If the membrane is damaged during the curing period, the damaged area shall be resprayed at the rate of application specified above. Surfaces covered by the membrane shall not be trafficked unless protected from wear.

20. REMOVAL AND REPLACEMENT OR REPAIR

When concrete is honeycombed, damaged or otherwise defective, the Contractor shall remove and replace the structure or structural

member containing the defective concrete or, where feasible, correct or repair the defective parts. The Engineer will determine the required exten of removal, replacement or repair. Prior to starting repair work the Contr tor shall obtain the Engineer's approval of his plan for effecting the repa The Contractor shallperform all repair work in the presence of the Engineer

21. CONCRETING IN COLD WEATHER

Concrete shall not be mixed nor placed when the daily minimum atmospheric temperature is less than 40°F unless facilities are provided to prevent the concrete from freezing. The use of accelerators or antifreeze compounds will not be allowed.

22. CONCRETING IN HOT WEATHER

The Contractor shall apply effective means to maintain the temperature of the concrete below 90°F during mixing, conveying and placing.

23. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, concrete will be measured to the neat lines shown on the drawings and the volume of concrete will be computed to the nearest 0.1 cubic yard. Measurement of concrete placed against the sides of an excavation without the use of intervening forms will be made only to the neat lines or pay limits shown on the drawings. No deduction in volume will be made for chamfers, rounded or beveled edges or for any void or embedded item that is less than 3 cubic feet in volume.

Payment for each item of concrete for minor structures will be made at the contract unit price or the contract lump sum, whichever is applicable, for that item. Such payment will constitute full compensation for all labor, materials, equipment, transportation, tools, forms, falsework, bracing and all other items necessary and incidental to the completion of the work, except items listed for payment elsewhere in the contract.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 24 of this specification.

24. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 15, Concrete Pad Reinforced.

   (1) This item consists of the concrete base for the outlet structure as shown on the plans, excavation, subbase (if required), dewatering, reinforcement, forms, installation, joints, and coordination with construction of earthwork and the outlet structure.

   (2) Concrete shall be 4000 M.

b. Specification 34, Steel Reinforcement is a subsidiary item to this specification.

CONSTRUCTION SPECIFICATION

34. STEEL REINFORCEMENT

1. SCOPE

The work shall consist of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

2. MATERIALS

Steel reinforcement shall conform to the requirements of Material Specification 539. Before reinforcement is placed, the surfaces of the bars and fabric and any metal supports shall be cleaned to remove any loose, flaky rust, mill scale, oil, grease or other coatings or foreign substances. After placement, the reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

3. BAR SCHEDULE, LISTS AND DIAGRAMS

Any supplemental bar schedules, bar lists or bar-bending diagrams required to accomplish the fabrication and placement of reinforcement shall be provided by the Contractor. Prior to placement of reinforcement, the Contractor shall furnish four prints or copies of any such lists or diagrams to the Contracting Officer. Acceptance of the reinforcement will not be based on approval of these lists or diagrams but will be based on inspection of the reinforcement after it has been placed.

4. BENDING

Reinforcement shall be cut and bent in compliance with the requirements of the American Concrete Institute Standard 315. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks, cracks or improper bends will be rejected.

5. SPLICING BAR REINFORCEMENT

Method 1 Splices of reinforcement shall be made only at locations shown on the drawings and provided by the steel schedule. Placement of bars at the lap splice locations shown, when not in contact, shall not be farther apart than one-fifth the shown lap length and in any case no greater than 6 inches.

Method 2 Splices of reinforcement shall be limited to those locations shown on the drawings. Splice lengths shall be determined prior to fabrication and meet the requirements of ACI Standard 318

"Building Code Requirements for Reinforced Concrete" based upon design information contained in Section 10 of this specification. Bar placement drawings and schedules shall be provided for approval prior to fabrication. The drawings shall show all splice locations, layouts, and lap distances.

6. SPLICING WELDED WIRE FABRIC

Unless otherwise specified, welded wire fabric shall be spliced in the following manner:

a. Adjacent sections shall be spliced end to end (longitudinal lap) by overlapping a minimum of one full mesh plus 2 inches plus the length of the two end overhangs. The splice length is measured from the end of the longitudinal wires in one piece of fabric to the end of the longitudinal wires in the lapped piece of fabric.

b. Adjacent sections shall be spliced side to side (transverse lap) a minimum of one full mesh plus 2 inches. The splice length shall be measured from the centerline of the first longitudinal wire in one piece of fabric to the centerline of the first longitudinal wire in the lapped piece of fabric.

7. PLACING

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. Tack welding of bars will not be permitted. Metal chairs, metal hangers, metal spacers and concrete chairs may be used to support the reinforcement. Metal hangers, spacers and ties shall be placed in such a manner that they will not be exposed in the finished concrete surface. The legs of metal chairs or side form spacers that may be exposed on any face of slabs, walls, beams or other concrete surfaces shall have a protective coating or finish by means of hot dip galvanizing, epoxy coating, plastic coating, or be stainless steel. Metal chairs and spacers not fully covered by a protective coating or finish shall have a minimum cover of 3/4 inch of concrete over the unprotected metal portion except for those with plastic coatings may have a minimum cover of 1/2 inch of concrete over the unprotected metal portion. Precast concrete chairs shall be manufactured of the same class of concrete as that specified for the structure and shall have tie wires securely anchored in the chair or a V-shaped groove at least 3/4 inch in depth molded into the upper surface to receive the steel bar at the point of support. Precast concrete chairs shall be moist at the time concrete is placed.

High density or structural plastic rebar accessories, designed to insure maximum concrete bond, may be substituted for metal or concrete accessories in spacer applications as approved by the

Contracting Officer. Exposure of plastic rebair accessories at the finished concrete surface shall be kept to a minimum. Plastic rebar accessories, if used, shall be staggered along adjacent parallel bars and shall be placed at intervals no closer than 12 inches. Plastic rebar accessories shall not be used in concrete sections 6 inches or less in thickness.

Reinforcement shall not be placed until the prepared site has been inspected and approved by the Engineer. After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by the Engineer.

8. STORAGE

Steel reinforcement stored at the work site shall be placed above the ground surface on platforms, skids or other supports and protected from mechanical damage or corrosion.

9. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the weight of reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of reinforcement will be based on the unit weights established in Tables 34-1 and 34-2. Computation of weights for welded wire fabric not shown in Table 34-2 shall be based on ACI Standard 315. The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for laps. The weight of steel reinforcing in extra splices or extra length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

Payment for furnishing and placing reinforcing steel will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, storing, cutting, bending, cleaning and securing all reinforcements.

Method 2 For items of work for which specific unit prices are established in the contract, the weight of bar reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest pound by computation from the placing drawings.

Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of bar reinforcement will be based on the unit weights established in Table 34-1. The weight of steel reinforcing in extra splices or extra length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for laps.

Payment for furnishing and placing bar reinforcing steel will be made at the contract unit price for bar reinforcement. Payment for furnishing and placing welded wire fabric reinforcing steel will be made at the contract unit price for welded wire fabric reinforcement. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including preparing and

furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, cutting, bending, cleaning, and securing all reinforcement.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items to which they are made subsidiary are identified in Section 10 of this specification.

TABLE 34-1. STANDARD REINFORCING BARS

Bar Size No.	Wt. (lb./ft.)
3	0.376
4	0.668
5	1.043
6	1.502
7	2.044
8	2.670
9	3.400
10	4.303
11	5.313
14	7.65
18	13.60

TABLE 34-2. RECTANGULAR WELDED WIRE FABRIC [1]

Style Designation By Steel Wire Gauge	Style Designation By W-Number	Weight, lb. Per 100 Sq. Ft.
6 x 6 - 10 x 10	6 x 6 - W1.4 x W1.4	21
6 x 6 - 8 x 8	6 x 6 - W2.1 x W2.1	30
6 x 6 - 6 x 6	6 x 6 - W2.9 x W2.9	42
6 x 6 - 4 x 4	6 x 6 - W4.0 x W4.0	58
4 x 4 - 10 x 10	4 x 4 - W1.4 x W1.4	31
4 x 4 - 8 x 8	4 x 4 - W2.1 x W2.1	44
4 x 4 - 6 x 6	4 x 4 - W2.9 x W2.9	62
4 x 4 - 4 x 4	4 x 4 - W4.0 x W4.0	85
4 x 12 - 8 x 12	4 x 12 - W2.1 x W0.9 [2]	25
4 x 12 - 7 x 11	4 x 12 - W2.5 x W1.1 [2]	31

1/ Style designation is defined in ACI Standard 315 of the American Concrete Institute.

2/ Welded smooth wire fabric with wires smaller than Size W1.4 is manufactured from galvanized wire.

10. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. This item is subsidiary to and included in Bid Item 15 and consists of reinforcement of concrete pad at outlet structure, as per reinforcement materials shown on plans.

b. Under Section 5, Splicing Bar Reinforcement, Method 1, shall apply.

c. No additional compensation will be made under this specification.

CONSTRUCTION SPECIFICATION

51. CORRUGATED METAL PIPE CONDUITS

1. SCOPE

The work shall consist of furnishing and placing circular, arched or elliptical corrugated metal pipe and the necessary fittings.

2. MATERIALS

Pipe and fittings shall conform to the requirements of Material Specification 551 or Material Specification 552, whichever is specified.

3. LAYING AND BEDDING THE PIPE

Unless otherwise specified, the pipe shall be installed in accordance with the manufacturer's recommendations. The pipe shall be laid with the outside laps of circumferential joints pointing upstream and with longitudinal laps at the sides at about the vertical midheight of the pipe. Field welding of corrugated galvanized iron or steel pipe will not be permitted. Unless otherwise specified, the pipe sections shall be joined with standard coupling bands. The pipe shall be firmly and uniformly bedded throughout its entire length to the depth and in the manner specified on the drawings.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical center line. Perforations shall be clear of any obstructions at the time the pipe is laid.

The pipe shall be loaded sufficiently during backfilling around the sides to prevent its being lifted from the bedding.

4. STRUTTING

When required, struts or horizontal ties shall be installed in the manner specified on the drawings. Struts and ties shall remain in place until the backfill has been placed to a height of 5 feet above the top of the pipe, or has been completed if the finished height is less than 5 feet above the top of the pipe, at which time they shall be removed by the Contractor.

5. HANDLING THE PIPE

The Contractor shall furnish such equipment as is necessary to place the pipe without damaging the pipe or coatings. The pipe shall be transported and handled in such a manner as to prevent bruising, scaling, or breaking of the spelter coating or bituminous coating.

6. REPAIR OF DAMAGED COATINGS

Any damage to the zinc coating shall be repaired by thoroughly wire brushing the damaged area, removing all loose and cracked coating, removing all dirt and greasy material with solvent, and painting with two (2) coats of one of the following paint options.

Painting shall be by use of one of the following options based upon installed exposure of the pipe as determined by the Contracting Officer:

Normal exterior or interior atmospheric exposure:

(a) Zinc dust - zinc oxide primer, Federal Specification TT-P-641, Type I or Type II,

(b) Single package, moisture cured urethane primer in silver metallic color, or

(c) Zinc-rich cold galvanizing compound, brush, or aerosol application.

Submergence in water exposure:

(a) Zinc dust-zinc oxide primer, Federal Specification TT-P-641, Type III.

(b) Zinc dust paint, Military Specification MIL-P-21035,

(c) Zinc Dust Chlorinated Rubber, Federal Specification TT-P-1046a, or

(d) Epoxy-Polyamid, Department of Defense Specification DOD-P-15145 B.

If the coating is damaged in any individual area larger than 12 square inches, or if more than 0.2 percent of a total surface area of a length of pipe is damaged, the length will be rejected.

Breaks or scuffs in bituminous coatings that are less than 36 square inches in area shall be repaired by the application of two coats of hot asphaltic paint or a coating of cold-applied bituminous mastic. The repair coating shall be at least 0.05 inches thick after hardening and shall bond securely and permanently to the pipe. The material shall meet the physical requirements for bituminous coatings contained in the references cited in Material Specifications 551 and 552. Whenever individual breaks exceed 36 square inches in area or when the total area of breaks exceeds 0.5 percent of the total surface area of the pipe, the pipe will be rejected.

Bituminous coating damaged by welding of coated pipe or pipe fittings shall be repaired as specified in this Section for breaks and scuffs in bituminous coatings.

7. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract the quantity of each type, class, size and gauge of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the centerline of the pipe. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined as the sum of the nominal laying lengths of the pipe sections and fittings used. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the centerline of the pipe. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work except items designated as "special fittings." Payment for special fittings will be made at the contract lump sum price for special fittings (CMP).

Method 4 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined as the sum of the nominal laying lengths of the pipe sections and fittings used. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work except items designated as "special fittings." Payment for special fittings will be made at the contract lump sum price for special fittings (CMP).

Method 5 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of pipe along the centerline of the pipe. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe, including the necessary fittings and all other items necessary and incidental to the completion of the work except the special fittings and appurtenances listed separately in the bid schedule. Payment for each special fitting and appurtenance will be made at the contract unit price for that type and size of fitting or appurtenance.

Method 6 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined as the sum of the nominal laying lengths of the pipe sections used. Payment for each type, class, size and gauge of pipe will be made at the contract price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe, including the necessary fittings and all other items necessary and incidental to the completion of the work except the special fittings and appurtenances listed separately in the bid schedule. Payment for each special fitting and appurtenance will be made at the contract unit price for that type and size of fitting or appurtenance.

Method 7 For items of work for which specific lump sum prices are established in the contract, payment for corrugated metal pipe structures will be made at the contract lump sum prices. Such payment will constitute full compensation for furnishing, fabricating, transporting, and installing the pipe, fittings, and appurtenances, and all other items necessary and incidental to completion of the work, including, except as otherwise specified, required excavation, dewatering, and backfilling.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 8 of this specification.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. **Bid Item 16, Channel Piping**

(1) Work under this item consists of fabrication, excavation, (if necessary) and installation of channel piping to grades shown on the plans.

(2) Materials Specification 551, shall apply.

(3) **Bid Item 17, Pipe Gates, and Specification 81** is related to this item and is compensated under that item.

CONSTRUCTION SPECIFICATION

61. LOOSE ROCK RIPRAP

1. SCOPE

The work shall consist of the construction of loose rock riprap revetments and blankets, including filter layers or bedding where specified.

2. MATERIALS

Rock for loose rock riprap shall conform to the requirements of Material Specification 523 or, if so specified shall be obtained from designated sources. It shall be free from dirt, clay, sand, rock fines and other materials not meeting the required gradation limits.

At least 30 days prior to delivery of rock from other than designated sources, the Contractor shall designate in writing the source from which he intends to obtain the rock and information satisfactory to the Contracting Officer that the material meets the requirements of the contract. The Contractor shall provide the Engineer free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in Section 9 of this specification.

Rock from designated sources shall be excavated, selected and processed as necessary to meet the quality and grading requirements in Section 9 of this specification. The rock shall conform to the specified grading limits when installed in the riprap.

Filter or bedding materials when required, shall, unless otherwise specified, conform to the requirements of Material Specification 521.

3. SUBGRADE PREPARATION

The subgrade surfaces on which the riprap or bedding course is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved materials and shall conform to the requirements of the specified class of fill.

Riprap shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by the Engineer.

4. EQUIPMENT-PLACED ROCK RIPRAP

The rock shall be placed by equipment on the surfaces and to the depths specified. The riprap shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock shall be delivered and placed in a manner that will insure that the riprap in place shall be reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks.

Riprap shall be placed in a manner to prevent damage to structures. Hand placing will be required to the extent necessary to prevent damage to the permanent works.

5. HAND-PLACED RIPRAP

The rock shall be placed by hand on the surfaces and to the depths specified. It shall be securely bedded with the larger rocks firmly in contact one to another. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge.

6. FILTER LAYERS OR BEDDING

When the drawings specify filter layers or bedding beneath riprap, the filter or bedding material shall be spread uniformly on the prepared subgrade surfaces to the depth specified. Compaction of filter layers or bedding will not be required, but the surface of such layers shall be finished reasonably free of mounds, dips or windrows.

7. TESTING

The Engineer will perform such tests as are required to verify that the riprap, filter, and bedding materials and the completed work meet the requirements of the specifications. These tests are not intended to provide the Contractor with the information he needs to assure that the materials and workmanship meet the requirements of the specifications, and their performance will not relieve the Contractor of the responsibility of performing his own tests for that purpose.

8. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the volume of each type of riprap, including filter layers and bedding, will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for each type of riprap, including filter layers and bedding, will be made at the

contract unit price for that type of riprap. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

Method 2 For items of work for which specific unit prices are established in the contract, the volume of each type of riprap and the volume of each type of filter layer or bedding will be measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

Method 3 For items of work for which specific unit prices are established in the contract, the quantity of each type of riprap placed within the specified limits will be measured to the nearest ton by actual weight, and the volume of each type of filter layer or bedding will be measured within the specified limits and computed to the nearest cubic year by the method of average cross-sectional end areas. For each load of rock placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton, of rock in the load.

Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the riprap, filter layers and bedding.

Method 4 For items of work for which specific unit prices are established in the contract, the quantity of each type of riprap placed within the specified limits will be measured to the nearest ton by actual weight, and the volume of each type of filter material or bedding delivered and placed within the specified limits will be measured to the nearest cubic yard by measurement of the hauling equipment. For each load of material placed as specified, the Contractor shall furnish to the Engineer a statement-of-delivery ticket showing the weight, to the nearest 0.1 ton, of rock in the load; or the volume, to the nearest 0.1 cubic yard, of filter material or bedding in the load.

Payment for each type of riprap will be made at the contract unit price for that type of riprap. Payment for each type of filter or bedding will be made at the contract unit price for that type of filter or bedding. Such payment will be considered full

compensation for all labor, materials, equipment and all other items necessary and incidental to completion of the riprap, filter layers and bedding.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

9. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Materials shall conform to IDOH specification indicated in the Special Requirements #5 and drawings. Maximum dimension of 9" for gabion installation.

b. Bid Item 11, Riprap.

   (1) This item of work consists of furnishing and installation of the rock comprising riprap shown on the drawings, including final earth shaping to grades and/or channels shown.

   (2) Underlayment of Filter Fabric is included under Bid Item 12 and is compensated for under that item. (see Special Requirements #4 and Appendix.

   (3) Riprap shall be equipment placed.

c. Furnishing and placement of riprap in gabions is included in Bid Item 9 and described in Specification 64, the Special Requirements, and Appendix.

CONSTRUCTION SPECIFICATION

64. WIRE MESH GABIONS

1. SCOPE

The work shall consist of furnishing, assembling, and installing rock filled, wire mesh gabions and geotextile material or bedding as shown on the drawings.

2. MATERIALS

Gabion baskets, unless otherwise specified by Section 7, shall be a minimum of 11 gage (0.118 in - 3.00 mm) galvanized steel wire, fabricated into hexagonal triple-twist mesh openings no larger than 3¼" x 4½". Selvedge wire running through all edges shall be a minimum of 9 gage (0.148 in - 3.76 mm) galvanized steel wire.

Lacing, tie and connecting wire shall be a minimum of 13½ gage (0.087 in - 2.21 mm) galvanized steel wire.

All wire shall conform to ASTM specification A 510, grade number 1006 through 1020. Wire shall have a minimum tensile strength of 60,000 lb/in^2 (413MPa) and a class 3 coating conforming to ASTM A 641. The galvanized coating will be applied by the hot dip process in accordance with ASTM A 385 and ASTM A 386.

Tolerance limits for height, length, and width shall be subject to plus or minus 5 percent of the manufacturer's stated sizes. Wire diameters shall be within a tolerance of 0.004 inches per ASTM A 641.

Rock, except for the shape and as otherwise specified in Section 7, shall conform to the quality requirements in Material Specification 523. Rock size and gradation shall be limited to those shown in the table below for gabion baskets 12 inches or greater in depth. Rock size and gradation limits for gabion baskets less than 12 inches in depth shall be as specified in Section 7.

Gabion Size (in.)	Predominant Rock Size (in.)	Minimum Rock Dimension (in.)	Maximum Rock Dimension (in.)
12 Deep Basket	4 to 8	3	10
18 and 36 Deep Baskets	4 to 8	3	12

After the contractor has determined the rock meets the specification and at least 30 days prior to delivery to the site, the contractor shall inform the contracting officer in writing of the source from which the rock will be obtained, and include the test data and other information by which he determined the material to be satisfactory. The contractor shall provide the engineer free access to the source for the purpose of obtaining samples for testing and source approval.

Bedding of aggregate, geotextiles or other materials shall conform to the requirements specified in Section 7.

3. FOUNDATION PREPARATION

The foundation on which the gabions, are to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill is required, it shall consist of approved materials and shall conform to the specified requirements. Vegetation, surface irregularities, and loose material shall be removed from foundations. Gabions, geotextile material and bedding shall not be placed until the foundation preparation is completed, and the subgrade surfaces have been inspected and approved by the engineer.

4. GABIONS

Assembly of gabions shall consist of shaping and tying each individual basket. Where the length of the gabion exceeds its horizontal width, the gabion shall be equally divided by diaphragms into cells whose length does not exceed the basket horizontal width. Diaphragms shall be fabricated of the same mesh and gauge as the body of the gabions. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base in such a manner that no additional tying at this juncture will be necessary. Each gabion basket shall be assembled by tying all untied edges, including diaphragms, with lacing wire in accordance with one of the following two methods:

Lacing shall be used for both the assembly of baskets and connecting baskets together unless otherwise specified in Section 7. The lacing procedure consists of cutting a length of lacing wire approximately 1 1/2 times the distance to be laced (not to exceed 5 feet), securing one end of the wire at the corner by looping and twisting, alternately lacing with single and double loops at approximately four (4) inch intervals, and securing the other end of the wire to selvedges by looping and twisting.

Looping, when specified in Section 7, will be permitted as an alternative to lacing only for the assembly of each individual basket unit. The loop procedure consists of cutting an adequate length of lacing wire for a triple loop and securely twisting the ends of wire a minimum of five (5) twists after looping. The maximum spacing between loop ties shall be ten (10) inches with a minimum of three (3) ties per edge.

Placing of gabions shall consist of installing baskets to the lines and grades shown on the drawings. Gabions shall be securely tied to each adjoining gabion with lacing wire along the vertical reinforced edges and the top selvedges. Empty gabion sections stacked on a filled line of gabions shall be tightly laced to the latter along the front

and back. When the upper section only partially overlaps the lower section, the lacing shall be done along the line where the front edge of the upper section meets the lower section, and where the back edge of the lower section meets the base of the upper section. For the end sections only, the layer of empty gabions placed on top of filled gabions must be wired to the latter at the front, back and external lateral edge.

Prior to placement of rock, the baskets used in retaining walls shall be stretched. If necessary, the gabions shall be temporarily staked to maintain proper alignment. Staking through geotextile material will not be allowed. Connecting wires shall be attached during the filling operation to preserve the strength and shape of the structure.

5. FILLING OPERATION

The gabions shall be carefully filled with rock, by either hand or machine placement, unless otherwise specified in Section 7, to ensure alignment, avoid bulges, and provide a compact mass with a minimum of voids. Machine placement may have to be supplemented with hand work to ensure a neat, compact, square appearance.

Cells in rows shall be filled in stages such that the depth of rock placed in any cell does not exceed the depth in an adjoining cell by more than one foot. Rock smaller than 4 inches showing on visible faces shall be rodded into or removed from the gabion prior to any earth backfilling.

The placement of rock in gabions, including the installation of connecting wires, shall be performed in the following sequence for the depth of gabions indicated.

a. 36-inch Deep Gabions.

(1) Fill gabions to a depth of 12 inches.

(2) Tightly tie one connecting wire in each direction to opposite faces of each gabion cell at a 12-inch height above the base except for exposed cell faces. Two connecting wires evenly spaced shall be used in lieu of one between an exposed front face and the opposite back face.

(3) Fill gabions another 12 inches and tightly tie connecting wires to opposite faces of each gabion at this level as described in step 2 above.

(4) Complete filling of gabions to the top.

b. 18-inch and 12-inch Deep Gabions

(1) Connecting wires are not necessary in the 12-inch size.

(2) Connecting wires are necessary in the 18-inch size gabion only when it is used to construct vertical structures.

(3) When connecting wires are required, tightly tie connecting wires to the opposite face, at 9 inches above the base as described for the 36-inch deep gabions, after filling with rock to this level.

All connecting wires shall be looped around two mesh openings and the ends of the wires shall be securely twisted with a minimum of five (5) twists after looping.

When the gabion has been filled, the lid shall be bent and stretched until it meets the perimeter edges of the front and end panels. To assist in closing and lacing, a pinch bar or special closing tool may be used. The lid shall then be tightly laced with lacing wire to the edges of the front and end panels. The lids shall also be securely tied to each adjoining gabion with lacing wire along all contact edges. Lacing adjacent lids to the vertical panels in one operation is acceptable. Lacing the back edge of the lid to adjoining gabions shall be done prior to filling the gabion. The lid shall be tied to each diaphragm by lacing wire. Lacing shall be performed in the same manner as described in Section 4.

6. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the volume of rock will be measured within the neat lines of the gabion structure and computed to the nearest cubic yard. The measurement for gabions will be the number of each size satisfactorily placed. Payment will be made at the contract unit price for each item. Such payment will be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the installation of the rock filled gabions. No deduction in volume shall be made for any void or embedded item that is less than five (5) cubic feet in volume.

Method 2 For items of work for which specific unit prices are established in the contract, the volume of rock will be measured within the neat lines of the gabion structure and computed to the nearest cubic yard. Payment for the rock will be made at the contract unit price, and include the wire mesh gabions, and bedding, specified. Such payment will be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the work. No deduction in volume shall be made for any void or embedded item that is less than five (5) cubic feet in volume.

All Methods The following provisions apply to both methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Each item and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 9, Gabions

(1) This item of work consists of furnishing, installing and filling gabions; and furnishing and installing riprap rock into gabions where shown on the drawings.

(2) Materials shall conform to that specified in the Special Requirements #2 and #3, and the Appendix.

(3) Installation instructions are further described in the Appendix.

(4) Fabric bedding is required and is specified in the Special Requirement #4 and compensated under Bid Item 12.

CONSTRUCTION SPECIFICATION

81. METAL FABRICATION AND INSTALLATION

1. SCOPE

The work shall consist of furnishing, fabricating and erecting metalwork, including the metal parts of composite structures.

2. MATERIALS

Unless otherwise specified, materials shall conform to the requirements of Material Specification 581. Steel shall be structural quality unless otherwise specified. Castings shall be thoroughly cleaned and subjected to careful inspection before installation. Finished surfaces shall be smooth and true to assure proper fit. Galvanizing shall conform to the requirements of Material Specification 582.

3. FABRICATION

Fabrication of structural steel shall conform to the requirements of Section 1.23 of the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (Riveted, Bolted and Arc-Welded Construction)," American Institute of Steel Construction.

Fabrication of structural aluminum shall conform to the requirements in the Aluminum Construction Manual, "Specifications for Aluminum Structures," Section 6 and Section 7, The Aluminum Association, November 1976.

4. ERECTION

The frame of metal structures shall be carried up true and plumb. Temporary bracing shall be placed wherever necessary to resist all loads to which the structure may be subjected, including those applied by the installation and operation of equipment. Such bracing shall be left in place as long as may be necessary for safety.

As erection progresses the work shall be securely bolted up, or welded, to resist all dead load, wind and erection stresses. The Contractor shall furnish such fitting up bolts, nuts and washers as may be required.

No riveting or welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned.

Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

All field welding shall be done in conformance to the requirements for shop fabrication, except those that expressly apply to shop conditions only.

Galvanized items shall not be cut, welded or drilled after the zinc coating is applied.

5. PROTECTIVE COATINGS

Items specified to be galvanized shall be completely fabricated for field assembly before the application of the zinc coatings.

Items specified to be painted shall be painted in conformance to the requirements of Construction Specification 82 for the specified paint systems.

6. MEASUREMENT AND PAYMENT

Method 1 The work will not be measured. Payment for metal fabrication and installation will be made at the contract lump sum price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work, including connectors and appurtenances such as rivets, bolts, nuts, pins, studs, washers, hangers and weld metal.

Method 2 The weight of metal installed complete in place shall be determined to the nearest pound. Unless otherwise provided, the weight of metal shall be computed by the method specified in Section 3 of the "Code of Standard Practice for Steel Buildings and Bridges," American Institute of Steel Construction, except that the following unit weights shall also be used, as appropriate, as the basis of computation:

Material	Unit Weight Pounds per Cubic Foot
Aluminum alloy	173.0
Bronze or copper alloy	536.0
Iron, malleable	470.0
Iron, wrought	487.0

Payment for furnishing, fabricating and installing metalwork will be made at the contract unit price for the specified types of labor, materials, equipment and all other items necessary and incidental to the completion of the work.

Method 3 The work will not be measured. Payment for furnishing, fabricating and installing each item of metalwork will be made at the contract price for that item. Such payment will constitute full compensation for all labor, materials, equipment and all other items

necessary and incidental to the completion of the work, including connectors and appurtenances such as rivets, bolts, nuts, pins, studs, washers, hangers and weld metal.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. **Bid Item 17, Pipe Gates.**

(1) This work consists of fabrication, painting, and installation of Pipe Gates indicated on the drawings to control water flow in the channel piping.

b. **Bid Item 14, Stop Logs and Mounting.**

(1) The work under this item consists of furnishing, fabricating, and installing the stop logs and channels in the Outlet Structure.

(2) **Specification 83, Timber,** is subsidiary to this item.

CONSTRUCTION SPECIFICATION

83. TIMBER FABRICATION AND INSTALLATION

1. SCOPE

The work shall consist of the construction of timber structures and timber portions of composite structures.

2. MATERIALS

Structural timber and lumber shall conform to the requirements of Material Specification 584. Treated timber and lumber shall be impregnated with the specified type and quantity of preservative and in the manner specified in Material Specification 585.

Hardware, except cast iron, shall be galvanized as specified for iron and steel hardware in Material Specification 582. Unless otherwise specified, structural steel shapes, plates and rods shall not be galvanized. Nuts, driftbolts, dowels and screws shall be either wrought iron or medium steel.

Steel bolts shall conform to the requirements of ASTM Specification A 307. When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of Material Specification 582.

Washers shall be ogee gray iron castings or malleable iron castings unless washers cut from medium steel or wrought iron plate are specified on the drawings. Cast washers shall have a thickness equal to the diameter of the bolt and a diameter equal to four times the thickness. For plate washers the thickness shall be equal to one-half the diameter of the bolt, and the sides of the square shall be equal to four times the diameter of the bolt. Holes in washers shall be not more than one-eighth inch greater in diameter than the bolt. Split ring connectors, tooth ring connectors and pressed steel shear plate connectors shall be manufactured from hot-rolled, low carbon steel conforming to the requirements of ASTM Designation A-711, Grade 1015. Malleable iron shear plate connectors and spike grid connectors shall be manufactured in conformance with the requirements of ASTM Designation A 47, Grade No. 35018. All connectors shall be of approved design and the type and size specified.

Structural shapes, rods and plates shall be structural steel conforming to the requirements of Material Specification 581. No welds will be permitted in truss rods or other main members of trusses or girders.

3. WORKMANSHIP

All framing shall be true and exact. Timber and lumber shall be accurately cut and assembled to a close fit and shall have even bearing over the entire contact surfaces. No open or shimmed joints will be accepted. Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood. Deep hammer marks in wood surfaces shall be considered evidence of poor workmanship and sufficient cause for rejection of the work.

Holes for round driftpins and dowels shall be bored with a bit one-sixteenth inch smaller in diameter than that of the driftpin or dowel to be used. The diameter of holes for square driftpins or dowels shall be equal to one side of the driftpin or dowel. Holes for machine bolts and rods shall be bored with a bit not larger than the body of the screw at the base of the thread.

Washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with wood. Cast iron washers shall be used when the bolt will be in contact with earth. All nuts shall be checked or burred effectively with a pointed tool after finally tightened.

Unless otherwise specified, surfacing, cutting and boring of timber and lumber shall be done before treatment. If cutting of treated timber and lumber is authorized, all cuts and abrasions shall be carefully trimmed and coated with not less than three brush coats of a wood preservative containing, by weight, not less than 5 percent pentachlorophenol.

All recesses and holes cut or bored in treated timber and lumber shall be swabbed with not less than three coats of a wood preservative containing, by weight, not less than 5 percent pentachlorophenol. After field treatment any unfilled holes shall be plugged with tightly fitting wooden plugs as treated above for cuts, abraisons and holes.

4. HANDLING AND STORING MATERIALS

All timber and lumber stored at the site of the work shall be neatly stacked on supports at least twelve inches above the ground surface and protected from the weather by suitable covering. Untreated material shall be so stacked and stripped as to permit free circulation of air between the tiers and courses. Treated timber shall be close-stacked. The ground underneath and in the vicinity of all stacks shall be cleared of weeds and rubbish. The use of cant hooks, peavies, or other pointed tools, except end hooks will not be permitted in the handling of structural timber or lumber. Treated timber shall be handled with rope slings or other methods that will prevent the breaking or bruising of outer fibers, or penetration of the surface in any manner.

5. PAINTING

Except as otherwise specified, surfaces designated for painting shall be painted in accordance with Construction Specification 84.

6. MEASUREMENT AND PAYMENT

Method 1 The unit of measurement of lumber and timber will be the number of thousand feet board measure (MBM) of each type, size, species and grade of lumber and timber in place in the completed structure. The quantity of each type, size, species and grade will be computed from the nominal dimensions and actual lengths of the pieces in the completed structure and will not include waste timber used for erection purposes (such as falsework or temporary sheeting and bracing) or any portion of any pile or other round timber. The total quantity of lumber and timber in each type, size, species and grade will be computed to the nearest 0.01 MBM.

The unit of measurement of plywood will be the number of square feet of each type, species, grade and thickness in place in the completed structure.

Payment for each type, size, species and grade of lumber and timber will be made at the contract unit price for that type, size, species and grade. Payment for each type, species, grade and thickness of plywood will be made at the contract unit price for that type, species, grade and thickness. Such payment will be considered full compensation for all labor, equipment, transportation and materials and all other items necessary and incidental to the completion of the structure in place including hardware and accessories, paint and wood preservatives.

Method 2 No measurement of material quantities will be made. Payment for each structure, complete in place, will be made at the contract lump sum price for that structure. Such payment will be considered full compensation for all labor, transportation, equipment and materials and all other items necessary and incidental to the completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, measurement and payment for each structure unit, except those for which a linear foot payment is established, will be counted and payment made at the contract unit price. Items for which a linear foot payment is established will be measured to the nearest linear foot and payment will be made at the contract unit prices appropriate. Such payment will be considered full compensation for all labor, equipment, transportation, materials and all other items necessary and incidental to the completion of the structure in place, including hardware and accessories, paint and woods preservatives.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 7 of this specification.

7. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. This item is subsidiary to Specification 81 and compensated under **Bid Item 14, Stop Logs and Mounting.**

(1) This work consists of furnishing, fabricating, and installing the stop log lumber as described in the drawings to the proposed elevations shown.

LANDSCAPE CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide trees, plants, erosion control and ground cover as indicated on the Drawings, specified herein, and needed for a complete and proper installation.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General conditions, Supplementary Conditions, and Sections of the Specification.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirement and the methods needed for proper performance of the work of this Section.

B. Standards:

   1. Plants and planting material: Meet or exceed the specifications of Federal, State, and County Laws requiring inspection for plant disease and insect control.

   2. Quality and size: Comply with current edition of "Horticultural Standards" for nursery stock as adopted by American Association of Nurserymen.

   3. All plants:
      a. True to name, with one of each bundle or lot tagged with the name and size of the plants in accordance with standards of practice of American Association of Nurserymen.

      b. In all cases, botanical names take precedence over common names.

      c. Be northern grown at the same zone or latitude of the project site.

      d. From a source acceptable to the Landscape Architect and the Owner.

      e. At the Owners option, plants may be tagged by the Landscape Architect, with the Contractor present.

1.3 SUBMITTALS

A. Comply with pertinent provisions of other Sections.

B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Complete materials list of items proposed to be provided under this Section.
   2. Complete data on source, size, and quality.
   3. Sufficient data to demonstrate compliance with the specified requirements.

C. Certificates
   1. Require certificates required by law to accompany shipments.
   2. Upon completion of the installation, deliver certificates to the Landscape Architect or Owner's Representative.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions.

B. Immediately remove from the site plants which are not true to name, and materials which do not comply with the specified requirements, and promptly replace with plants and materials meeting the specified requirements.

PART 2 - PRODUCTS

2.1 FERTILIZER

A. Provide commercial balanced 16-8-8 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis. Bulk application will be acceptable for large areas. (Provide certification of guaranteed analysis.)

2.2 SOIL AMENDMENT

A. Provide commercial bagged Michigan peat.

2.3 MULCH

A. Provide shredded hardwood mulch of medium-heavy texture, free of large chunks, leaves and twigs.

2.4 TREE STAKES

A. Unless otherwise indicated on the Drawings, provide hardwood stakes, Construction grade, rough sawn, 2 x 2" x 8 ft. long.

2.5 EROSION CONTROL MATERIAL

A. TYPE 1: Erosion Control blankets by North American Green type SC150 (see appendix.) Installation shall be as per factory instructions.

2.6 PLANT MATERIALS

A. Provide the plant materials shown on the schedule in the Drawings.

2.7 TOPSOIL

A. Provide sandy loam topsoil 2 inches in depth typical of the area, free of stones, debris and compaction with minimum of 2% organic matter; available on site.

2.8 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PLANTING TREES AND SHRUBS

A. General:
   1. Plant nursery stock immediately upon delivery to the site and approval by the Landscape Architect except that, if this is not feasible, heel-in all bare root and balled materials with damp soil and protect from sun and wind.

   2. Regularly water nursery stock in containers, and place them in a cool area protected from sun and drying winds.

B. Excavating:
   1. For shrubs in one gal containers, dig a hole 12" in diameter and 12" deep.
   2. For shrubs and trees in five gal containers, dig a hole 20" in diameter and 18" deep.

3. For trees in 15 gal containers, dig a hole 30" in diameter and 30" deep.
4. For large tree balls, dig a hole 24 inches in diameter larger than ball.

C. Planting:
1. Fill holes with backfill mixture consisting of three parts topsoil and one part specified soil amendment, by volume. Remove soil and/or debris excavated from hole from the site.
2. Fill to proper height to receive the plant, and thoroughly tamp the mixture before setting the plant.
3. Set plant in upright position in the center of the hole, and compact the backfill mixture around the ball or roots.
4. Thoroughly water each plant when the hole is 2/3 full.
5. After watering, tamp the soil in place until the surface of the backfill is level with the surrounding area and the crown of the plant is at the finished grade of the surrounding area.
6. Build up a temporary watering basin around the base of each tree and shrub, unless otherwise directed by the Engineer.

3.3 PLANTING HYDRIC PLANT MATERIALS

A. Plant as per suppliers instructions.

3.4 STAKING

A. Stakes trees, using one stake per tree with two tree ties per stake and driving stakes into the ground at least two feet.

3.5 INSPECTION

A. In addition to normal progress observations, schedule and conduct the following formal inspections, giving the Engineer at least 24 hours advance notice of readiness for inspection:

1. Inspection of plants in containers prior to planting.
2. Inspection of plant locations, to verify compliance with the Drawings.

3. Final inspection after completion of planting:
   a. Schedule this inspection sufficiently in advance, and in cooperation with the Engineer, so final inspection may be conducted within 24 hours after completion of planting.
4. Final inspection at the end of the maintenance period, provided that previous deficiencies have been corrected.

3.6 MAINTENANCE

A. Maintain planting, starting with the planting operations and continuing for 30 calendar days after planting is complete and approved by the Engineer.

B. Work included:
   1. Watering, weeding, cultivating, spraying, and pruning necessary to keep the plant materials in a healthy growing condition and to keep the planted areas neat and attractive throughout the maintenance period.
   2. Provide equipment and means for proper applications of water.
   3. Protect planted areas against damage, including erosion and trespassing, by providing and maintaining proper safeguards.

C. Replacements:
   1. At the end of the maintenance period, all plant material shall be in healthy growing condition.
   2. During the maintenance period, should the appearance of any plant indicate weakness and probability of dying, immediately replace that plant with a new and healthy plant of the same type and size without additional cost to the Owner.
   3. Replacement required because of causes beyond control of the Contractor are not part of the Contract.

D. Extension of maintenance period:
   1. Continue the maintenance period at no additional cost to the Owner until previously noted deficiencies have been corrected, at which time an inspection for provisional acceptance will be made.

E. Guarantee:
   1. All plant material to be in healthy, vigorous condition for one year from date of provisional acceptance. Items rejected will be replaced at no additional cost to the Owner.
   2. Only one replacement will be required per location.

3. During the guarantee period, the Contractor will inspect the plantings periodically to determine any conditions or maintenance requirements affecting the acceptance of the plantings at the end of the guarantee period, and advise the Owner in writing of these observations. Therefore, no remedy will be due the Contractor for replacements due to maintenance reasons.

3.7 METHOD OF MEASUREMENT

A. The erosion control fabric will be measured on a per square yard basis. Shredded wood mulch will not be measured. Topsoil will not be measured.

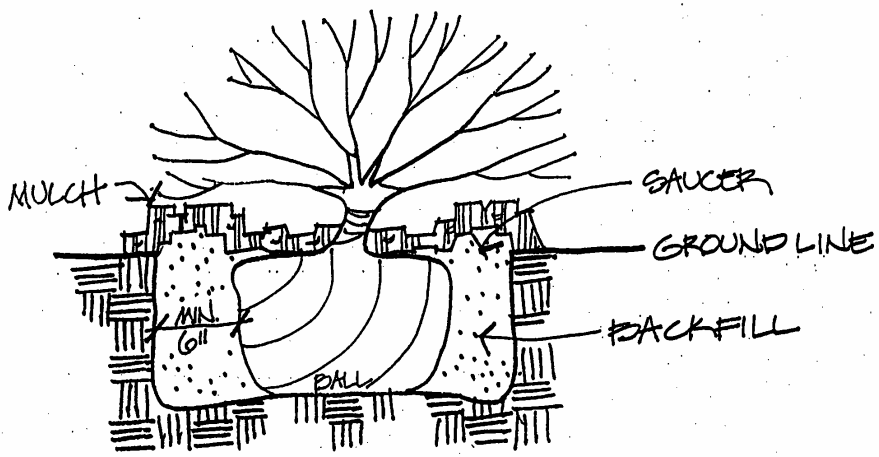
3.8 BASIS OF PAYMENT

A. The erosion control fabric will be paid for on a per square yard unit price basis as per quantity indicated on the bid schedule.

B. Compensation for the items of work necessary for installation of the erosion control blanket is included under **Bid Item 18.**

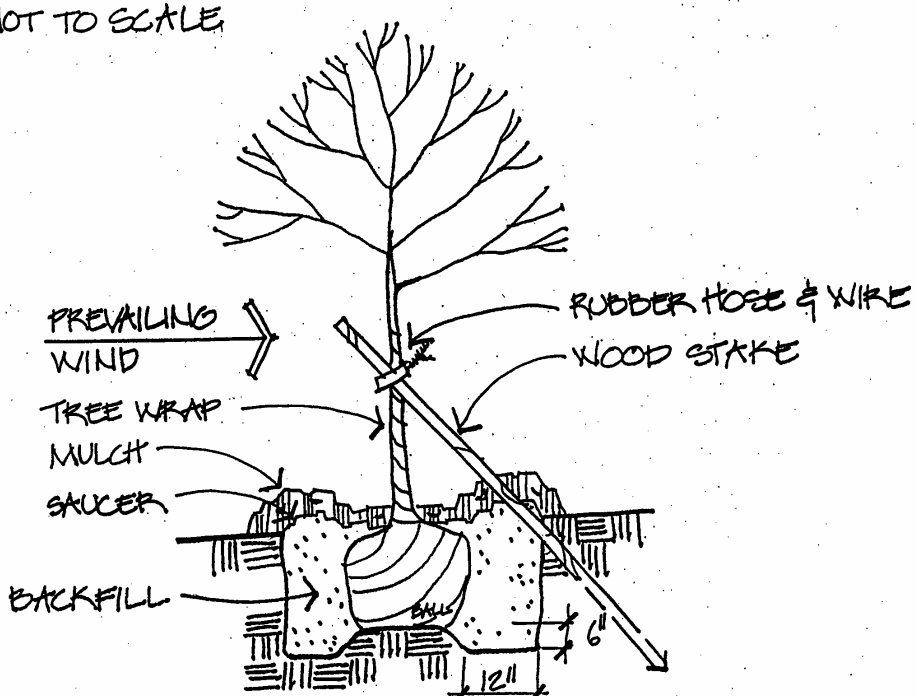
C. Compensation for all other work described in this section is included under **Bid Item 19.**

D. **Seeding** of disturbed area, **Specification 02495** is subsidiary to **Bid Item 19.**



SHRUB PLANTING DETAIL

NOT TO SCALE



TREE PLANTING DETAIL

NOT TO SCALE

SECTION 02495
SEEDING AND SODDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide either or both plain and mulch seeding, broadcast seeding. It includes furnishing and placing seed, fertilizer, topsoil and mulch in a prepared seedbed at locations shown on the plans.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.

B. It is the intent of this Seeding and Sodding Specification to require the Contractor to water the seeded areas as many times as necessary to insure a good, growing finished product at the completion of the project.

C. The watering of the seed and sod shall continue until germination has been achieved and a satisfactory growth of new grass is achieved as determined by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall conform to the following requirements as specified in the following subsections of the Indiana Dept. of Highways Standard Specifications:

Fertilizers	.....913.03
Water	.....913.09 (a)
Mulch	.....913.05 (a)
Sod	.....913.07

SEED MIXTURE See page 02495-4

PART 3- EXECUTION

3.1 PREPARATION OF GROUND BEFORE SEEDING

A. The area to be seeded shall be made smooth and uniform and shall conform with the finished grade and cross section shown on the plans. It shall have been given final trimming. No soil to be seeded shall be tilled when in a wet or muddy conditions.

B. The seedbed, if not loose, shall be loosened to a minimum depth of three (3) inches before fertilizer and seed is applied. Where soil is highly subject to erosion and to receive erosion control blanket, one (1) inch depth of tillage is required.

3.2 FERTILIZING, SEEDING AND MULCHING

A. Fertilizer shall be applied and spread uniformly over the area to be seeded at a rate of 400 pounds per acre.

B. Seed may be broadcast, drilled, or mixed with water and the mixture sprayed over the area to be seeded. An approved mechanical method to place the seed in direct contact with the soil may be used.

C. Those seeded areas so designated shall be thoroughly mulched by a method approved by the Engineer. Mulching material, when specified, shall be applied uniformly in a continuous blanket at a rate of two tons per acre, except wood cellulose fiber mulch shall be applied at a rate of 1,500 pounds per acre.

D. Mulching material shall be punched into the soil so that it is partially covered. The punching operation shall be performed longitudinally with a mulch tiller, or crimper.

E. After procedures for holding the mulch in place have been completed, mulch (other than when applied by hydroseeder) shall be watered thoroughly. The seed or soil beneath it shall not be displaced. The mulching material shall be maintained in place satisfactorily until final completion and acceptance of the project.

F. When seeding is performed between June 1 and August 15, a second thorough watering shall be applied approximately 20 days after the seeding. Watering shall be done in such a manner as to not displace the seed, or soil underneath it.

3.3 SEASONAL LIMITATIONS

A. Seeding will be permitted only from February 1 to November 15. Seeding without mulch shall not be done between May 1 and August 15. During other periods, the time of sowing shall be determined by the Engineer, whose decisions will be based upon soil moisture and weather conditons.

3.4 LIMITS OF SEEDING

A. The limits of seeding shall be all those areas shown on the drawings and also as indicated as Landscape Restoration.

3.5 BASIS OF PAYMENT

A. Subsidiary to **Bid Item 19, Landscape Restoration**

(1) This item of work includes seeding of all disturbed areas as per this specification.

(2) Compensation is included under **Bid Item 19.**

B. It is the intent of this specification to require the Contractor to provide to the Owner good, live, growing grass areas at the completion of the project. Contractor shall reseed all areas necessary at no additional expense to the Owner. Contractor shall provide all necessary watering to meet this intent.

SPECIAL REQUIREMENTS TO LANDSCAPE CONSTRUCTION

Seed Mixture No. 1. (for turf grass areas)

Baron Kentucky Bluegrass	30% by weight	85% germination
Kenblu Kentucky Bluegrass	30%	85%
Pennfine Perennial Ryegrass	20%	85%
Pennlawn Red Fescue	20%	85%

Application rate: 5 pounds per 1,000 square feet in straw mulch.

Seed Mixture No. 2. (field - turf grass areas)

Orchardgrass	20% by weight
Timothy	15%
Red clover	5%
Proso Millet	20%
Pennfine Perennial Ryegrass	20%
Annual ryegrass	20%

Application rate: 120 pounds per acre

- no mulch

Seed Mixture No. 3. (embankment/erosion control)

Perennial Ryegrass	20% by weight
Kentucky 31 Fescue	30%
Korean Lespedeza	15%
Annual ryegrass	20%
Orchardgrass	15%

Application rate: 150 pounds per acre, erosion control material applied over seeding.

MATERIAL SPECIFICATION

522. AGGREGATE FOR PORTLAND CEMENT CONCRETE

1. SCOPE

This specification covers the quality of fine aggregate and coarse aggregate for use in the manufacture of portland cement concrete.

2. QUALITY

Aggregate shall conform to the requirements of ASTM Specification C-33 for the specified sizes. Aggregates that fail to meet any requirement may be accepted only when: (1) the specified alternate conditions of acceptance can be proved prior to the use of the aggregates on the job and within a period of time such that no work under the contract will be delayed by the requirements of such proof; or, (2) the specification for concrete expressly contains a provision of special mix requirements to compensate for the effects of the deficiencies.

3. REACTIVITY WITH ALKALIES

The potential reactivity of aggregates with the alkalies in cement shall be evaluated by petrographic examination and, where applicable, the chemical method of test, ASTM Designation C 289, or by the results of previous tests or service records of concrete made from similar aggregates from the same source. The standards for evaluating potential reactivity shall be as described in ASTM Specification C 33, Appendix A1.

Aggregates indicated by any of the above to be potentially reactive shall not be used, except under one of the following conditions:

a. Applicable test results of mortar bar tests, made according to ASTM Method C 227, are available which indicate an expansion of less than 0.10 percent at six months in mortar bars made with cement containing not less than 0.8 percent alkalies expressed as sodium oxide; or

b. Concrete made from similar aggregates from the same source has been demonstrated to be sound after 3 years or more of service under conditions of exposure to moisture and weather similar to those anticipated for the concrete under these specifications.

Aggregates indicated to be potentially reactive, but within acceptable limits as determined by mortar bar test results or service records, shall be used only with "low alkali" cement, containing less than 0.60 percent alkalies expressed as sodium oxide.

4. STORING AND HANDLING

Aggregate of each class and size shall be stored and handled by methods that prevent segregation of particles sizes or contamination by intermixing with other materials.

MATERIAL SPECIFICATION

531. PORTLAND CEMENT

1. SCOPE

This specification covers the quality of portland cements.

2. QUALITY

Portland cement shall conform to the requirements of ASTM Specification C 150 for the specified types of cement, except that, when Type I portland cement is specified, Type IS portland blast-furnace slag cement or Type IP portland-pozzolan cement conforming to the requirements of ASTM Specification C 595 may be used unless prohibited in the specifications.

If air-entraining cement is to be used, the Contractor shall furnish the manufacturer's written statement giving the source, amount and brand name of the air-entraining addition.

3. STORAGE AT THE CONSTRUCTION SITE

Cement shall be stored in such a manner as to be protected from weather, dampness or other destructive agencies. Cement that is partially hydrated or otherwise damaged will be rejected.

MATERIAL SPECIFICATION

539. STEEL REINFORCEMENT (FOR CONCRETE)

1. SCOPE

This specification covers the quality of steel reinforcement for reinforced concrete.

2. QUALITY

All reinforcement shall be free from rust, oil grease, paint or other deleterious matter.

Steel bars for concrete reinforcement requiring bends shall be deformed billet-steel bars conforming to ASTM Specification A 615, Grade 40 or Grade 60.

Straight steel bars shall be deformed bars conforming to one of the following specifications:

Deformed Billet-Steel Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM Designation A 615.

Rail-Steel Deformed Bars for Concrete Reinforcement (Grade 50 or Grade 60) - ASTM Designation A 616.

Axle-Steel Deformed Bars for Concrete Reinforcement (Grade 40 or Grade 60) - ASTM Designation A 617.

Fabricated steel bar mats shall conform to the requirements of ASTM Specification A 184.

Welded steel wire fabric reinforcement shall conform to the requirements of ASTM Specification A 185.

Welded deformed steel wire fabric for concrete reinforcement shall conform to the requirements of ASTM Specification A 497.

Cold-drawn steel wire reinforcement shall conform to the requirements of ASTM Specification A 82.

Deformed steel wire for concrete reinforcement shall conform to the requirements of ASTM Specification A 496.

3. DIMENSIONS OF WELDED WIRE FABRIC

Gauges, spacing and arrangement of wires in welded steel wire fabric shall be as defined in ACI Standard 315 of the American Concrete Institute for the specified style designations.

4. STORAGE

Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

MATERIAL SPECIFICATION

551. ZINC-COATED IRON OR STEEL CORRUGATED PIPE

1. SCOPE

This specification covers the quality of zinc-coated iron or steel corrugated pipe and fittings.

2. PIPE

Zinc-coated iron or steel corrugated pipe and fittings shall conform to the requirements of Federal Specification WW-P-405 for the specified classes and shapes of pipe, and to the following additional requirements:

a. Unless otherwise specified, circumferential shop riveted seams shall have a maximum rivet spacing of 6 inches, except that 6 rivets will be sufficient for 12-inch diameter pipe;

b. When close riveted pipe is specified: (1) the pipe shall be fabricated so that the rivet spacing in the circumferential seams shall not exceed 3 inches, except that 12 rivets will be sufficient to secure the circumferential seams in 12-inch pipe, and (2) in those portions of the longitudinal seams that will be covered by the coupling bands the rivets shall have finished flat heads or the rivets and holes shall be omitted and the seams shall be connected by welding to provide a minimum of obstruction to the seating of the coupling bands.

c. Double riveting or double spot welding for pipe less than 42 inches in diameter may be required. When double riveting or double spot welding is specified, the riveting or welding shall be done in the manner specified for pipe 42 inches or greater in diameter.

3. COATINGS

Coatings shall conform to the requirements of Federal Specification WW-P-405 for the specified types of coatings.

MATERIAL SPECIFICATION

552. ALUMINUM CORRUGATED PIPE

1. SCOPE

This specification covers the quality of aluminum corrugated pipe and fittings.

2. PIPE

Aluminum corrugated pipe and fittings shall conform to the requirements of Federal Specification WW-P-402 for the specified classes and shapes of pipe, and to the following additional requirements:

a. When close riveted pipe is specified: (1) the pipe shall be fabricated so that the rivet spacing in the circumferential seams shall not exceed 3 inches, except that 12 rivets will be sufficient to secure the circumferential seams in 12-inch pipe; and (2) in those portions of the longitudinal seams that will be covered by the coupling bands the rivets shall have finished flat heads or the rivets and holes shall be omitted and the seams shall be connected by welding to provide a minimum of obstruction to the seating of the coupling bands.

b. Double riveting of pipe less than 42 inches in diameter or double spot welding of pipe less than 30 inches in diameter may be required.

When double riveting or double spot welding is specified, the riveting or welding shall be done in the manner specified for pipe of greater diameter.

3. COATINGS

Coatings shall conform to the requirements of Federal Specification WW-P-402 for the specified types of coatings.

MATERIAL SPECIFICATION

581. METAL

1. SCOPE

This specification covers the quality of steel and aluminum alloys.

2. STRUCTURAL STEEL

Structural steel shall conform to the requirements of ASTM Specification A 36.

High-strength low-alloy structural steel shall conform to ASTM Specification A 242 or A 588.

Carbon steel plates of structural quality to be bent or formed cold shall conform to ASTM Specification A 283, Grade C.

Carbon steel sheets of structural quality shall conform to ASTM Specification A 570, Grade D or A 611, Grade D.

Carbon steel strip of structural quality shall conform to ASTM Specification A 570, Grade C.

3. COMMERCIAL OR MERCHANT QUALITY STEEL

Commercial or merchant quality steel shall conform to the requirements of the applicable ASTM specifications listed below:

Product	ASTM Specification
Carbon steel bars	A 575, Grade M 1015 to Grade M 1031
Carbon steel sheets	A 569
Carbon steel strip	A 569
Zinc-coated carbon steel sheets	A 526

4. ALUMINUM ALLOY

Aluminum alloy products shall conform to the requirements of the applicable ASTM specifications listed below. Unless otherwise specified, alloy 6061-T6 shall be used.

Product	ASTM Specification
Standard structural shape	B 308
Extruded structural pipe and tube	B 429

Extruded bars, rods, shapes and tube	B 221
Drawn seamless tubes	B 210
Rolled or cold-finished bars, rods and wire	B 211
Sheet and plate	B 209

5. Bolts

Steel bolts shall conform to the requirements of ASTM Specification A 307. If high-strength bolts are specified they shall conform to the requirements of ASTM Specification A 325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Specification A 153; except that bolts 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification B 633, Service Condition SC 3 or ASTM Specification A 165, Type TS, unless otherwise specified.

6. RIVETS

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM Specification A 502, Grade 1. Unless otherwise specified, aluminum alloy rivets shall be Alloy 606-T6 conforming to the requirements of ASTM Specification B 316.

7. WELDING ELECTRODES

Steel welding electrodes shall conform to the requirements of American Welding Society specification AWS A5.1. "Specification for Mild Steel Covered Arc-Welding Electrodes," except that they shall be uniformly and heavily coated (not washed) and shall be of such a nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

Aluminum welding electrodes shall conform to the requirements of American Welding Society specification AWS A5.10, "Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes."

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MATERIAL SPECIFICATION

582. GALVANIZING

1. SCOPE

This specification covers the quality of zinc coatings applied to iron and steel products.

2. QUALITY

Zinc coatings shall conform to the requirements of ASTM Specification A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products or as otherwise specified in the items of work and construction details of the Construction Specification.

ASTM A 123 covers both fabricated and unfabricated products e.g., assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from uncoated steel wire. It also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to removed excess galvanizing bath metal). Items to be centrifuged or otherwise handled to remove excess zinc shall meet the requirements of ASTM A 153, except: Bolts, screws and other fasteners 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification A 165, Type TS, or ASTM Specification B 633, Service Condition SC-3 unless otherwise specified.

MATERIAL SPECIFICATION

584. STRUCTURAL TIMBER AND LUMBER

1. SCOPE

This specification covers the quality of structural timber, lumber and plywood.

2. GRADING

Structural timber and lumber shall be graded in accordance with the grading rules, applicable to the specified species, adopted by a lumber grading or inspection bureau or agency recognized as being competent and that conform to the basic principles of ASTM Methods D 245. The material supplied according to the commercial grading rules shall be of equal or greater stress value than the specified stress-grade.

Plywood shall conform to the requirements of Product Standard PS 1-74 for the grade, species or group, and type specified.

3. QUALITY

All materials shall be sound wood free from decay. No boxed heart pieces of Douglas fir or redwood shall be used in stringers, floor beams, caps, posts, sills or other principal structural members. Boxed heart pieces are defined as timber so sawed that at any section in the length of a sawed piece the pith lies entirely inside the four faces.

4. HEARTWOOD REQUIREMENTS

All timber and lumber specified for use without preservative treatment shall contain not less than 75 percent heartwood on any diameter or on any side or edge, measured at the point where the greatest amount of sapwood occurs. This requirement shall not apply to timber and lumber for which pressure treatment with wood preservative is specified.

5. SIZES

The sizes specified are nominal sizes. Unless otherwise specified the material shall be furnished in American Standard dressed sizes.

6. MARKING

Each piece of timber and lumber shall be legibly stamped or branded with an official grade mark. Plywood shall be legibly stamped with an official mark designating the grade, type and surface finish as described in the cited Product Standard.

MATERIAL SPECIFICATION

585. WOOD PRESERVATIVES AND TREATMENT

1. SCOPE

This specification covers the quality of wood preservatives and methods of treatment of wood products.

2. TREATING PRACTICES

Treating practices and sampling, inspection and test procedures shall conform to the requirements of Federal Specification TT-W-571, "Wood Preservation: Treating Practices."

3. PRESERVATIVES

The wood shall be treated with the specified type of preservative. Wood preservatives shall conform to the requirements of the applicable specifications listed in Federal Specification TT-W-571.

4. QUALITY OF TREATED MATERIALS

Treated lumber, timber, piles, poles, or posts shall be free from heat checks, water bursts, excessive checking, results of chafing or from any other damage or defects that would impair their usefulness or durability for the purpose intended. The use of "s" irons will not be permitted. Holes bored for tests shall be filled with tight fitting treated plugs.

5. MARKING

Each treated wood item delivered to the job site shall be marked as specified in Federal Specification TT-W-571 unless otherwise specified.

APPENDIX

* Construction Standards

SITE NUMBER 1

Soil Boring Number	Depth	USDA Classification	UNIFIED Classification	Water Table Depth
1	0-[illegible]2 in	Sapric Muck	PT	18 in
	52-[illegible] in	Sand and Gravel	SP, SP-SM	
2	0-45 [illegible]	Sandy loam	SM, SM-SC	----
	45-70 in	Clay loam	Cl, CL-ML	
	70-80 in	Sand and gravel	SP, SP-SM	
	80-84 in	Sand	SP, SP-SM	
3	0-56 in	S[illegible]ric muck	PT	18 in
	56-100 in	Sand [illegible]nd gravel	SP, SP-SM	

SITE NUMB[illegible] 2

1-2	0-12 in	Silt loam	ML, CL-ML	18 in
	12-120 in	Sapric muck	PT	
3	0-24 in	Loam and clay loam	CL, CL-ML	----
	24-60 in	Loam till	[illegible]L, CL-ML	
4	0-18 in	Silt Loam	ML, [illegible]CL-ML	22 in
	18-120 in	Sapric muck	[illegible]	
5	0-20 in	Loam and clay loam	CL, CL-[illegible]	----
	20-60 in	Loam till	CL, CL-M[illegible]	

SITE NUMBER 3

1	0-10 in	Silt loam	ML, CL-ML	6 in
	10-80 in	Sapric muck	PT	
	80-84 in	Sand and gravel	SP, SP-SM	
2	0-12 in	Fine sandy loam	SM, SM-SC	----
	12-48 in	Clay loam	CL, CL-ML	
	48-60 in	Loam till	CL, CL-ML	
3	0-10 in	Silt loam	ML, CL-ML	2 in
	10-80 in	Sapric muck	PT	
	80-96 in	Sand and gravel	SP, SP-SM	
	96-120 in	Loam till	CL, CL-ML	

Product Specifications

SPECIFIED

TYPICAL ROLL PROPERTIES

PROPERTY	TEST PROCEDURE	UNIT	TS 600	TS 650	TS 700	TS 750	TS 800	TS 900	TS 1000
						POLYFELT			
MECHANICAL									
Grab Tensile	ASTM D4632	lbs.	165	[illegible]	225	[illegible]	325	380/320	420/340
Grab Elongation	ASTM D4632	%	>50	[illegible]	>50	[illegible]	>60	85/90	90/95
Puncture	ASTM D4833	lbs.	90	[illegible]	120	[illegible]	150	155	160
Trapezoidal Tear	ASTM D4533	lbs.	75	[illegible]	100	[illegible]	135	150/140	160/150
Mullen Burst	ASTM D3786	psi	255	[illegible]	345	[illegible]	450	460	475
HYDRAULIC									
Water Flow Rate	ASTM D4491	gpm/ft²	170	[illegible]	130	[illegible]	90	80	65
Permittivity	ASTM D4491	sec⁻¹	2.0	[illegible]	1.6	[illegible]	1.2	0.9	0.8
Permeability, k	ASTM D4491	cm/sec	0.4	[illegible]	0.4	[illegible]	0.4	0.35	0.35
A.O.S.	ASTM D4751	sieve size	100-60	[illegible]	120-80	[illegible]	140-100	>140	>140
		mm	0.15-0.25	[illegible]	0.12-0.18	[illegible]	0.10-0.15	<0.10	<0.10
PHYSICAL									
Fabric Weight	ASTM D3776	oz/yd.²	6.0	[illegible]	8.3	[illegible]	12.0	14.0	16.2
Thickness	ASTM D1777	mils	80	[illegible]	105	[illegible]	130	150	170
U.V. Resistance (500 hours)	ASTM D4355	% strength retained	>80	[illegible]	>80	[illegible]	>90	>90	>90
pH Resistance			2-13	[illegible]	2-13	[illegible]	2-13	2-13	2-13

MINIMUM AVERAGE ROLL PROPERTIES

PROPERTY									
Grab Tensile	ASTM D4632	lbs.	145	[illegible]	205	[illegible]	300	310	320
Puncture	ASTM D4833	lbs.	75	[illegible]	100	[illegible]	130	135	140
Trapezoidal Tear	ASTM D4533	lbs.	70	[illegible]	95	[illegible]	120	130	140
Mullen Burst	ASTM D3786	psi	220	[illegible]	300	[illegible]	400	420	450

PACKAGING

ROLL								
Width, ft.	15	[illegible]	15	[illegible]	13	10	10
Length, ft.	360	[illegible]	360	[illegible]	300	300	300
Area, yd.²	600	[illegible]	600	[illegible]	433	333	333
Weight	235	[illegible]	320	[illegible]	335	300	345

Nonstandard roll dimensions are available on request and subject to a minimum quantity.

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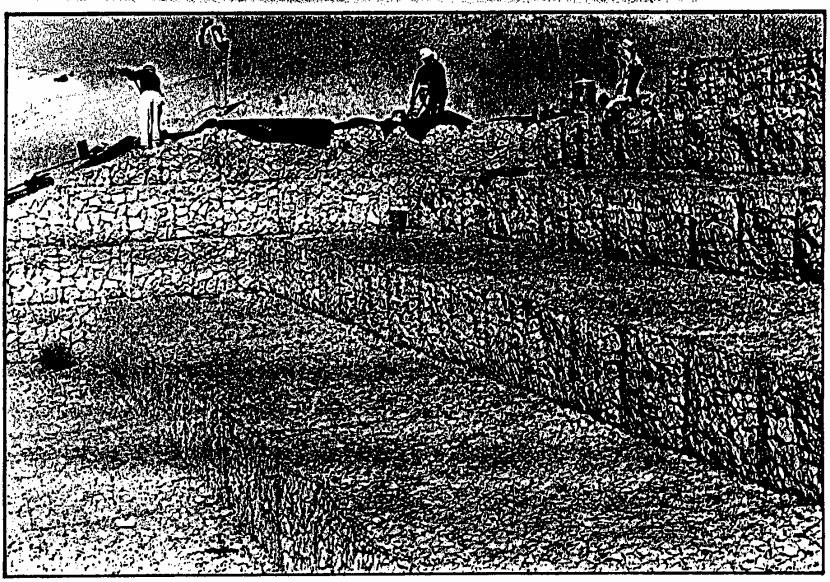
MACCAFERRI GABIONS

We are number one

Instructions for Assembly and Erection



This publication presents the procedure for proper gabion installation. The method is quite simple; unskilled labor can be readily trained to perform the various tasks. If the proper procedures are followed, an economical, attractive, and structurally sound gabion installation will be assured. Technical literature describing the use of gabions for various applications is available on request. Maccaferri's technical staff is available to lend any assistance that may be required.

Supply and Delivery:

Gabions are supplied folded flat, tied in pairs and packed in bundles. For ease in handling, the number of gabions per bundle varies according to the size of the gabion. The gabions are identified by color stripes and by labels indicating their code size and dimensions. The lacing wire is supplied in coils.

If contract specification requires additional wiring extra coils may be ordered at reasonable cost.

Assembly:

Remove a single gabion from the bundle and proceed to unfold it on a hard flat surface. Stretch the gabion and stamp out all kinks (See Fig. No. 1). Fold the front and back panels to a right angle by stepping on the base along the crease. Fold up the end panels and diaphrams and fasten them to the front and back panels using the heavy gage wire projecting from the upper corners of each panel. This procedure will assure properly squared baskets with the tops of all panels even. Securely lace all vertical edges of ends and diaphrams. Use only Maccaferri connecting wire supplied for this purpose. No substitution of common wire is allowed, as this may not meet the specification requirements.

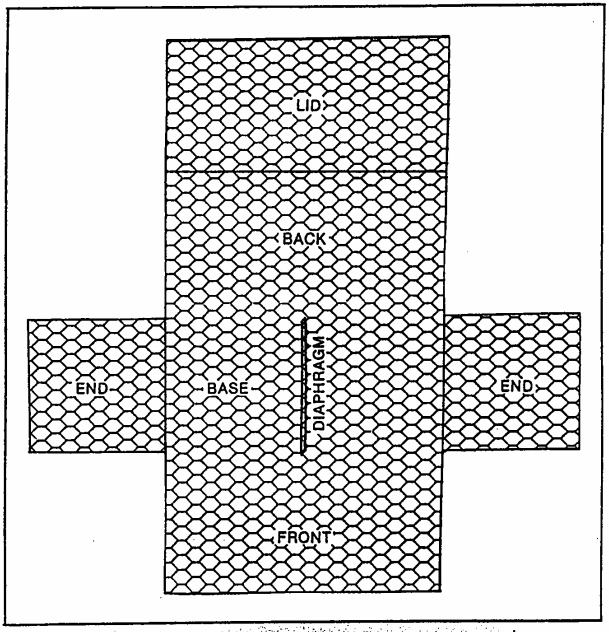


Fig. No. 1

The lacing procedure is as follows: cut a length of lacing wire approximately 1½ times the distance to be laced but not exceeding 5 feet. Secure the wire terminal at the corner by looping and twisting, then proceed lacing with single and double loops at approximately five (5) inch intervals (See Fig. No. 2). Securely fasten the other lacing wire terminal.

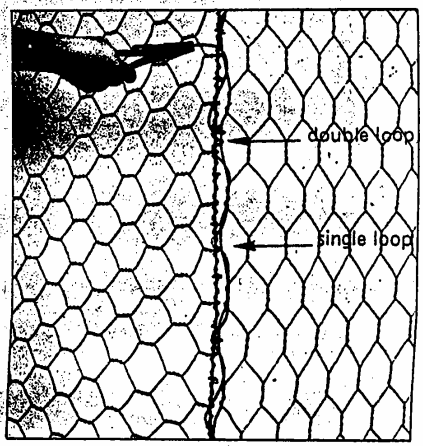


Fig. No. 2

Installation:

Before placing the gabions, it is necessary to make the ground surface relatively smooth and even.

The assembled gabions are carried to the job site and placed in their proper location. It is convenient to place the gabions front to front and back to back, as illustrated in Fig. No. 3, in order to expedite the stone filling and lid lacing operations.

For structural integrity, adjacent gabions must be laced along the perimeter of ALL contact surfaces.

To facilitate this operation it may be easier to construct sub-assemblies in the yard consisting of as many gabions as can be handled by the crew at one time. The sub-assembly is then placed at the job site and laced along the perimeter of ALL contact surfaces.

The base of the empty gabions placed on top of a completed row must also be tightly wired to the latter. (See blown up section).

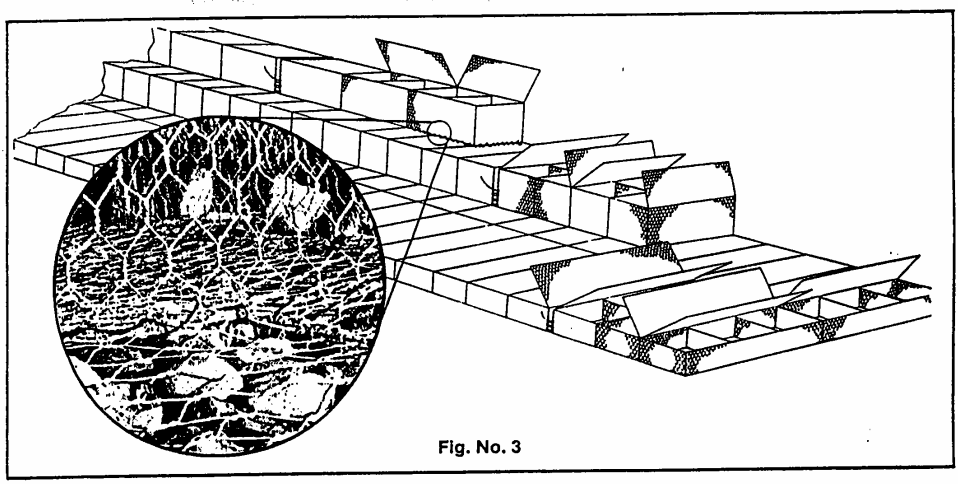


Fig. No. 3

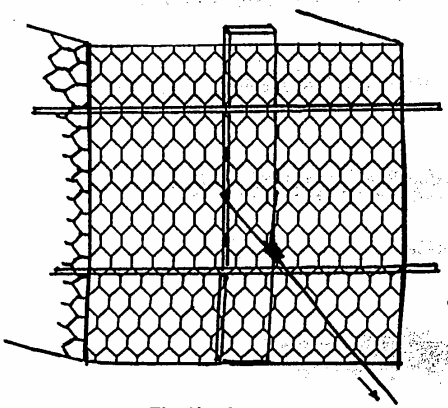


Fig. No. 4

The following method applies to three foot high gabions. Gabions should be placed empty and laced for a stretch approximately 100 linear feet. The first gabion shall be firmly anchored and tension shall be applied to the other end with a come-a-long or other means, in order to achieve the proper alignment. (See Fig. No. 4.) Anchoring can be accomplished by partially filling the first gabion with stone.

While gabions are being stretched, inspect all corners for open "V's" which will result if corners were not properly secured. Such "V's" must be closed by relacing.

Keep gabions in tension while being filled; leave the last gabion empty to allow for easily lacing the subsequent sub-assembly.

Filling:

The fill material shall consist of hard, durable stone, graded between 4 to 8 inches or as approved by the Engineer. All stone must be of size sufficient to be retained within the mesh.

Gabions shall be filled in lifts of one foot at a time. Two connecting wires shall be placed between each lift in each cell of all exposed faces and firmly wired as indicated in Figures 5 and 6. This operation is repeated until the gabions are completely filled.

It is important that the mesh forming the lid be stretched tight when the gabion is wired closed in order that there can be no movement of the fill.

For coastal structures additional requirements apply to choice of fill and to workmanship. Information on these requirements will gladly be supplied on application to any Maccaferri Area Office.

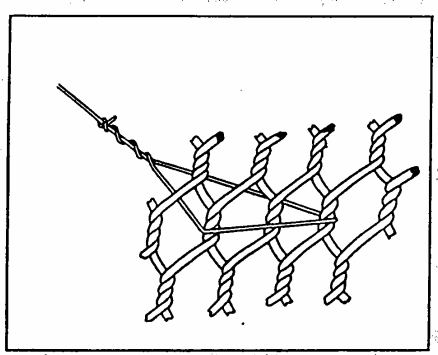


Fig. No. 5

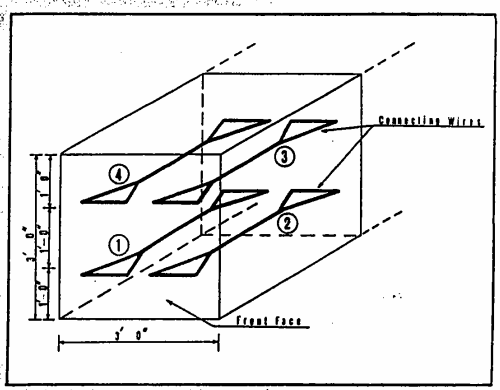


Fig. No. 6

Mechanical Filling

As most filling operations are carried out by machine it is helpful to protect the top edges of the diaphragms and end panels from being bent or folded by the stone during placement. There are several methods by which this can be achieved.

Rebars may be temporarily placed across the top edges of each mesh panel and laced to them to prevent movement.

Alternatively lengths of pliable metal may be bent into a V shape and placed over the vertical panels to deflect the stone.

During filling the stone should be dumped from the bucket when it is in the lowest practicable position.

Gabions may be filled by almost any type of earth-handling equipment: payloader, gradall, crane, conveyor or modified concrete bucket. Some manual stone adjustment, during the filling operation is required to prevent undue voids. (See Figs. No. 7 & 8).

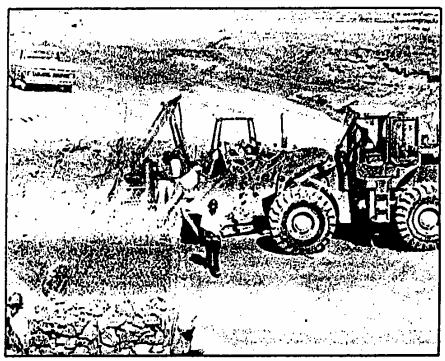


Fig. No. 8

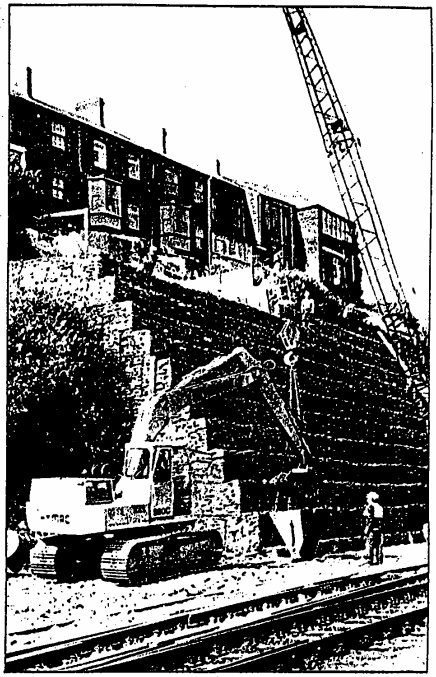


Fig. No. 7

The exposed face(s) should be hand-placed using selected stone. This hand-placing will add to the appearance of the structure by preventing the gabions from bulging. (See Figs. No. 9 & 10).

The last lift of stone should be level with the top of the gabion to properly close the lid and provide an even surface for the next course. The mesh must be stretched tight at all times.

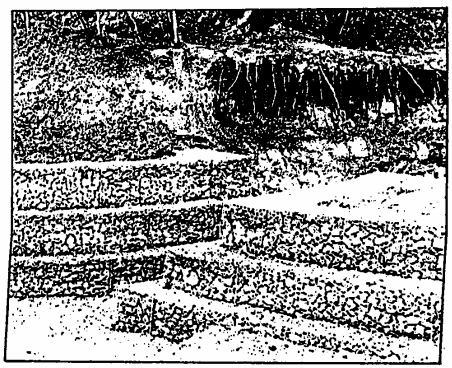


Fig. No. 9

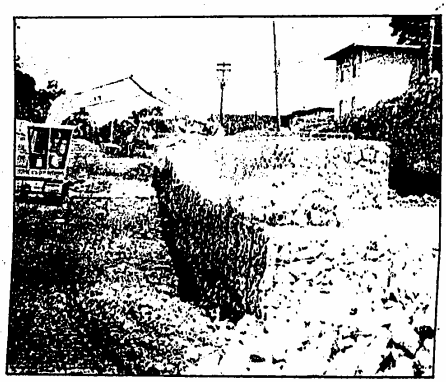
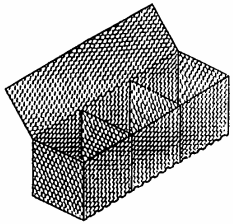


Fig. No. 10

Letter Code	Length	Width	Height	Number of Diaphragms	Capacity Cubic Yards	Color Code
A	6'	3'	3'	1	2.0	BLUE
B	9'	3'	3'	2	3.0	WHITE
C	12'	3'	3'	3	4.0	BLACK
D	6'	3'	1'6"	1	1.0	RED
E	9'	3'	1'6"	2	1.5	GREEN
F	12'	3'	1'6"	3	2.0	YELLOW
G	6'	3'	1'	1	0.66	BLUE-RED
H	9'	3'	1'	2	1.0	BLUE-YELLOW
I	12'	3'	1'	3	1.33	BLUE-GREEN

Gabions

Also available in P.V.C. coated wire



SPECIFIED

SPECIFICATIONS

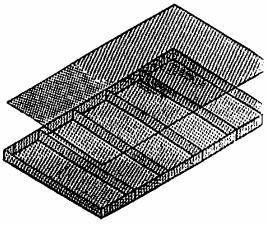
	ZINC COATED	PVC COATED
Mesh opening	Hex. nom. $3^{1/4}$" x $4^{1/2}$"	Hex. nom. $3^{1/4}$" x $4^{1/2}$"
Wire for netting	0.1181" nom. diam.	0.1062" nom. diam. plus nom. 0.02165" PVC
Wire for selvedges	0.1535" nom. diam.	0.1338" nom. diam. plus nom. 0.02165" PVC
Wire for binding	0.0866" nom. diam.	0.0866" nom. diam. plus nom. 0.02165" PVC
Zinc coating	0.80 ozs. per sq. ft.	0.80 ozs. per sq. ft. plus nom. 0.02165" PVC

Minimum thickness of PVC coating shall be not less than 0.015".

Letter Code	Length	Width	No. of Thickness	No. of Cells	Area Square Yards	Capacity Cubic Yards	Color Code
Q	9'	6'	6"	3	6	1	WHITE-YELLOW
R	12'	6'	6"	4	8	1.33	WHITE-GREEN
T	9'	6'	9"	3	6	1.5	RED-YELLOW
U	12'	6'	9"	4	8	2	RED-GREEN

Reno mattress

Also available in P.V.C. coated wire



SPECIFICATIONS

	ZINC COATED	PVC COATED
Mesh opening	Hex. nom. $2^{1/2}$" x $3^{1/4}$"	Hex. nom. $2^{1/2}$" x $3^{1/4}$"
Wire for netting	0.0866" nom. diam.	0.0866" nom. diam. plus nom. 0.02165" PVC
Wire for selvedges	0.1062" nom. diam.	0.1062" nom. diam. plus nom. 0.02165" PVC
Wire for binding	0.0866" nom. diam.	0.0866" nom. diam. plus nom. 0.02165" PVC
Zinc coating	0.70 ozs. per sq. ft.	0.70 ozs. per sq. ft. plus nom. 0.02165" PVC

Minimum thickness of PVC coating shall be not less than 0.015".

olerances are in conformity with U.S. Federal Specification Q-W-461H and A.S.T.M. A641.

Lid Closing:

Fold the lid down along the hinge line so that the lid and gabion edges meet closely without gaps. To assist in closing and lacing the lids, a pinch bar or Maccaferri lid closer may be used. (See Figs. 11 & 12). Secure the lid at the corners with the wire projecting from the lid. Lace the lid shut, starting with the front face and then the ends and diaphrams. A tight joint must be achieved during the lacing operation by pulling the edges together. To expedite the lacing operation, adjacent lids may be wired to the vertical panels in one operation.

Fig. No. 11

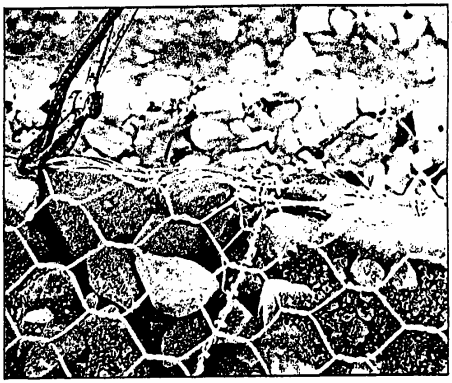


Fig No. 12

General Notes:

Gabions may be readily cut or bent to form regular shapes to fit bridge piers, culverts, transitions, etc. Part of the mesh may also be cut to allow the laying of pipelines. Where this is done the cut or bent edges of the mesh must not be left loose but shall be fastened securely to another part of the structure.

Hand tools are available to assist these operations. Please inquire at the Area Office listed below. Field assistance by members of our technical staff is also available on request.

The construction process is shown in a movie/video film which is available on loan.

Corporate Offices & Plant:-

MACCAFERRI GABIONS, INC.
GOVERNOR LANE BLVD.
WILLIAMSPORT, MD. 21795
TELEPHONE: (301) 223-6910
TELEX: 292338

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AE1/A (Rev. 10-85)

EROSION CONTROL BLANKETS

NORTH AMERICAN GREEN

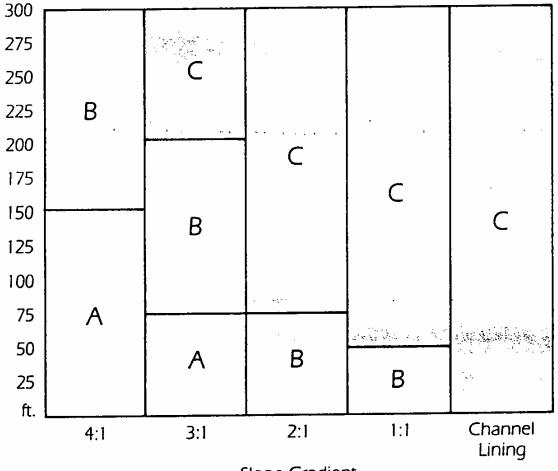
Nature's Blanket

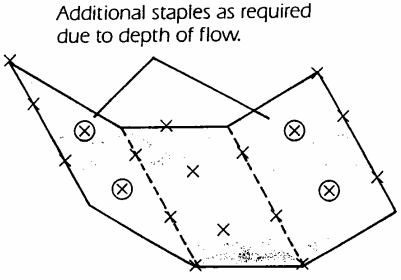
Staple Patterns Guide

e patterns apply to all North American Green
on control blankets. Staple patterns may vary
nding upon soil type and average annual
all.

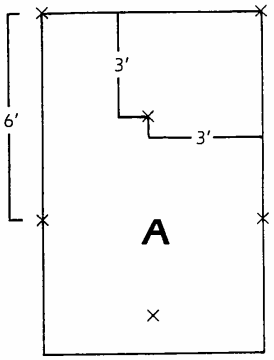
ope lengths greater than 300 feet or where
age over large areas is directed onto the
kets, staple pattern "C" should be utilized.

eneral Staple Recommendations

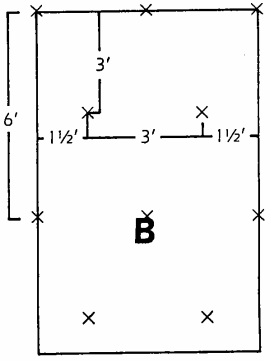




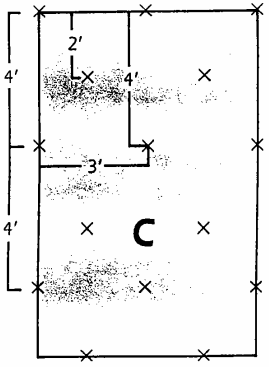
Channel linings utilize staple pattern "C" with additional staples on side slopes at projected water line.



1 staple per sq. yd.



1½ staples per sq. yd.



2 staples per sq. yd.

General Material Specifications

Erosion Control Blankets

S-75, S-150, SC-150, SCC-225, C-125 and P-300
- Increase moisture retention
- Stay in place until vegetation is established
- Reduce rainfall impact
- Reduce water velocity
- Reduce soil loss

North American Green Erosion Control Blankets provide water velocity reductions of **56-78%**, leading the industry. Lower velocities mean less soil scouring and less sediment transport.

North American Green Erosion Control Blankets are clearly superior to alternative mulching products in reducing the concentration of sediment in runoff water.

In University tests, North American Green Erosion Control Blankets reduced soil losses by up to 99% when compared to bare soil losses.

North American Green erosion control blankets are the most cost-effective products available today for channel linings and critical, erodible sites.

S-75

For use on Moderate Slopes

MATERIAL CONTENT:

Straw . . . . . .100% .75 lb/ sq. yd.

Netting (light wt.) . . .(1) side only photo-degradable

Thread . . . . . .Biodegradable cotton

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . .83.5 ft.
Weight . . . . .45 lbs.
Area . . . . . .60 sq. yd.

S-150

For use on Moderate to Heavy Slopes

MATERIAL CONTENT:

Straw . . . . . .100% .75 lb/ sq. yd.

Netting (light wt.) . . .(1) side only photo-degradable

Netting (heavy wt.). .(1) side only photo-degradable

Thread . . . . . .Biodegradable cotton

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . .83.5 ft.
Weight . . . . .45 lbs.
Area . . . . . .60 sq. yd.

SPECIFIED

SC-150

For use on Severe Slopes with High Velocity Run-Offs

MATERIAL CONTENT:

Straw . . . . . .70% .53 lb/ sq. yd.

Coconut Fiber. . . . . .30% .23 lb/ sq. yd.

Netting (light wt.) . . .(1) side only photo-degradable

Netting (heavy wt.). .(1) side only photo-degradable

Thread . . . . . .Biodegradable cotton

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . .83.5 ft.
Weight . . . . .46 lbs.
Area . . . . . .60 sq. yd.

SCC-225

For use on Severe Slopes with High Velocity Run-Offs

MATERIAL CONTENT:

Straw . . . . . .70% .53 lb/ sq. yd.

Coconut Fiber. . . . . .30% .23 lb/ sq. yd.

Netting (light wt.) . . .(1) side only photo-degradable

Netting (heavy wt.). .(1) side only photo-degradable

Thread . . . . . .Biodegradable cotton

Paper . . . . . .Biodegradable tissue

Seed. . . . . .KY-31 Fescue 200 lb/ acre-.04 lb/ sq. yd.

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . . .70 ft.
Weight . . . . . .65 lbs.
Area . . . . . .50 sq. yd.

Channel Liners

C-125 and P-300
- Stay in place under peak flows
- Minimize channel erosion, even on steep slopes

North American Green C-125 and P-300 blankets can withstand flows up to 12 fps at slopes of 12%, and even higher flows at lower slopes.

P-300

For use as Permanent Ditch Liner

MATERIAL CONTENT:

Nylon Fiber. . . . . .100% .90 lb/ sq. yd.

Netting (heavy wt.). .Both sides nondegradable

Thread . . . . . .100% Polyester

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . .83.5 ft.
Weight . . . . .54 lbs.
Area . . . . . .60 sq. yd.

C-125

For use on Extreme Slopes and Ditch Linings

MATERIAL CONTENT:

Coconut Fiber. . . . . .100% .92 lb/ sq. yd.

Netting (heavy wt.). .Both sides nondegradable

Thread . . . . . .100% Polyester

PHYSICAL SPECS:

Width. . . . . .6.5 ft.
Length . . . . .83.5 ft.
Weight . . . . .55 lbs.
Area . . . . . .60 sq. yd.

The above length and weight specifications are approximate and may vary.