CONCRETE FLOODWALL REPAIRS
SOUTHERN NEW YORK FLOOD PROTECTION PROJECT
HORNELL, NEW YORK
GENERAL BID SPECIFICATIONS

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01100 SUMMARY OF WORK

1.01 SCOPE OF WORK: The Contractor shall provide all labor, supervision, plant, equipment, transportation, materials, supervision and supplies to repair concrete floodwalls in Hornell, NY.

1.02 LOCATION: Work is located in Hornell, Steuben County, NY. See attachments for exact locations.

END OF SECTION

01150 SPECIAL CONDITIONS

1.01 Pre-Work Meeting/Site Visit: Upon notification of award, the Contractor shall contact the COR (See Section 01100 SUMMARY OF WORK for phone number) to arrange a meeting date. Unless agreed upon otherwise, this meeting will originate at the Almond Lake project office, Route 21, Hornell, NY, and include a job-site visit. Work under this contract shall commence only after a pre-work meeting has taken place. At this conference, the Contractor shall be orientated with respect to Government procedures and line of authority, contractual, administrative, and construction matters. Additionally, a schedule of required submittals will be discussed.

(a) The Contractor shall bring to this conference the following items in either completed or draft form:

Hazard Analysis Plan
Accident Prevention Plan
Activity Hazard Analyses
Written Hazard Communication Program
Contract Progress Chart/Schedule
Letter Appointing Superintendent(s)
List of Subcontractors

1.02 Records and Reports: In addition to the administrative requirements dictated elsewhere in this contract, the Contractor shall maintain records of contract performance, accident/injury incidences, and observance of project deficiencies. The Daily Construction Quality Control Report (Attachments #7, #8 and #9) shall be completed daily and submitted to the Government on a weekly basis unless specified otherwise. The Risk Assessment form (Attachment #14) shall be completed before commencement of work. The Daily Construction Quality Control Report and the Risk Assessment form are part of the work and shall be submitted to the Government prior to payment. A Contract Progress Chart/Schedule shall be maintained throughout the life of the contract.

1.03 Accident Prevention: In performing this contract, the Contractor shall comply with all current Federal, State, and Local safety regulations, including Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, and shall comply with any subsequent changes. The Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 may be found on the World Wide Web at http://www.hq.usace.army.mil/ceso/cesopub.htm. Prior to commencement of work under this contract the Contractor shall furnish the following for approval by the Government:

(a) Hazard Analysis Plan Section I, Article Ol.A.06, EM 385-1-1, dated 03 Sep 96

(b) Accident Prevention Plan Section I, Article Ol.A.07, EM 385-1-1 dated 03 Sep 96

(c) Activity Hazard Analyses Section I, Article Ol.A.09, EM 385-1- dated 03 Sep 96

(d) Written Hazard Communication Program Section I, Article Ol.B.04 EM 385-1-1, dated 03 Sep 96.

1.04 Accident Reporting: In the event of an accident or injury involving contractor personnel or equipment in performance of work, the Contractor shall immediately notify the Government representative by the most expedient means feasible. If instructed so, the Contractor shall complete forms furnished, and/or provide a written description of the incident within 24 hours of notification to do so.

1.05 Environmental Protection: The Contractor is required to comply with all Federal, State and local environmental laws and regulations.

1.06 Superintendent: The Contractor shall act as, or provide a Superintendent who is responsible for quality control whenever the work specified herein is being performed. The Superintendent shall conduct overall management coordination and be the central point of contact with the Government for performance of all work under this contract. The Superintendent and any individual designated to act for him/her shall have full authority to contractually commit the Contractor for prompt action on matters pertaining to administration of the entire contract. Such authorization shall be submitted in writing to the Government representative. The Superintendent shall deal directly with the designated representative, for normal day-to-day administration of the contract provisions. The Contractor or the Superintendent shall contact the COR or a designated representative daily or as otherwise approved by the COR, to coordinate the work schedule in compliance with the terms of the contract and to arrange satisfactory working agreements. The Contractor shall furnish, in writing, to the COR, the name or names of a Superintendent(s) for on-the-job contact and supervision purposes. The Superintendent(s) shall be required to attend pre-work conferences prior to commencing work under this contract. Contractor's superintendent shall be equipped with a telephone pager or a portable cellular telephone to allow constant communications between the Contractor and Government representatives.

1.06 Storage of Contractor's Equipment: Project parking/storage areas will be designated for the Contractor. Sheltering structures will not be provided, nor will construction of same be permitted. The Contractor may utilize the parking/storage accommodations only while in performance of contract. services. All Contractor equipment shall be removed from parking/storage areas within 3 days of completion of work at the respective project. The Government shall accept no liability for damages to, or theft of, Contractor equipment.

1.07 Contingencies: Delay or interruption of the work shall be brought to the immediate attention of the COR.

1.08 Contractor's work and responsibility shall include, but shall not be limited to: all planning, programming, administration and management necessary to assure that all work is conducted in accordance with the contract and all applicable laws, regulations, codes, or directives. Contractor shall perform all related administrative services necessary to perform the work such as supply, procurement, quality control, Contractor financial control, and maintenance of accurate and complete records and files. Requirements such as preparation of the safety plan, subcontracting plan, payment schedules, meetings, coordination of work, scheduling, payroll records, etc., are a part of the Contractor's overhead. This list is representative of the overhead the Contractor assumes in the administration of this contract but is not inclusive.

1.09 Permits and Licenses: The Contractor shall, at his/her own expense, obtain any licenses or permits required to perform the contract. The Contractor shall comply with all current Federal, State and Local laws and regulations and shall comply with any subsequent changes.

1.10 Operations and Storage Areas: The Contractor shall confine all operations (including storage of materials) to areas authorized or approved by the COR. The Contractor shall hold and save the Government, its officers and agents free and harmless from liability of any nature occasioned by the Contractor's performance. The Contractor shall keep the work area, including storage areas, free from accumulations of waste materials. Before completing work, the Contractor shall remove from the work site and premises any rubbish, tools, equipment, and materials that are not property of the Government. Upon completing the work, the Contractor shall restore the work area to the original condition, satisfactory to the COR.

1.11 DELETED

1.12 Performance of Work: The Contractor shall perform work only during normal Corps of Engineers duty hours (7:00 a.m. to 3:30 p.m., Monday through Friday, excluding national holidays). Exceptions to this condition must be coordinated with and approved in advance by the Contracting Officer's Representative (COR) and Operations Manager, Susquehanna River Project.

1.13 Housekeeping: The Contractor shall keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work site and premises any rubbish, tools, equipment, and materials that are not property of the Government. Upon completing the work, the Contractor shall restore the work area to the original condition, satisfactory to the Contracting Officer.

1.14 Safety And Security Requirements: If the Contractor fails or refuses to promptly comply with safety and security requirements as specified herein, the Contracting Officer shall issue an order stopping all or part of the work for each violation until satisfactory corrective action has been taken. No part of the time lost due to any such stop shall be made subject to claim for extension of time or for excess costs or damages to the Contractor. Also, the Contractor will not be paid for work not performed as a result of the stop order. The Contractor shall comply with the latest edition of the Occupational Safety and Health Act (OSHA) in addition to the standards of The Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1. The Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 may be found on the World Wide Web at http://www.hq.usace.army.mil/ceso/cesopub.htm.

(a) The Contractor shall comply with any and all applicable Federal, State and Local regulations, including safety regulations. The Contractor and his employees shall wear appropriate clothing and safety equipment including, but not limited to, hard hats and safety shoes. The Contractor at Contractor's expense shall provide all clothing and safety equipment. All work shall comply with the latest edition of the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1).

1.15 Utility Protection: The Contractor shall verify the location of all utilities prior to any excavation. The Contractor shall not proceed with any excavation until all utilities, including abandoned utilities, have been marked to the satisfaction of the Contracting Officer. Prior to requesting the marking of utilities, the Contractor shall stake out proposed excavations and limits of work with white lines (White Lining). It is the Contractor's responsibility to ensure that all permits, excavation or otherwise, are current and up-to-date without expiration. In addition to the above requirements the Contractor shall:

(a) Contact the Contracting Officer's representative and the appropriate One-Call service, a minimum of 14 days and 48 hours respectively, prior to any excavation, requesting utility locations and markings.
ONE CALL SERVICE FOR PUBLIC UTILITIES
ONE-CALL NATIONAL REFERRAL CENTER 1-888-258-0808
NY: NEW YORK STATE ONE CALL CENTER 1-800-962-7962
PA: PENNSYLVANIA ONE CALL SYSTEM INCORPORATED 1-800-242-1776

(b) Visually survey and verify that all utility markings are consistent with existing appurtenances such as manholes, valve boxes, poles, pedestals, pad-mounting devices, gas meters, etc prior to any excavation.

(c) Hand dig test holes to verify the depth and location of all utilities prior to any mechanical excavation within the limits of the work. Other non-damaging methods for utility verification, as indicated in (e) below, may be considered subject to approval from the Contracting Officer. Also, verify that any abandoned utilities are not active.

(d) Preserve all utility markings for the duration of the project to the furthest extent possible.

(e) When excavating is performed within 2 feet of any utility line, a non-damaging method of excavation shall be used. The non-damaging method shall be hand digging. Other non-damaging methods, such as soft digging, vacuum excavation, pneumatic hand tools, may be considered subject to approval by the Contracting Officer.

(f) Regardless of the type of excavation, the Contractor shall notify the Contracting Officer a minimum of 72 hours prior to any excavation activity. Failure to notify the Contracting Officer can result in issuance of a "Stop Work" order, which shall not be justification for contract delay or time excavation. The Government reserves the right to have personnel present on site during any excavation.

(g) The Contractor's Quality Control System Manager shall ensure that all excavation requirements herein are met at the time of the preparatory phase of quality control, and that the excavation procedures are reviewed during the preparatory phase meeting. This preparatory phase of control shall also establish and

document contingency plans and sections to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

(h) Any work other than excavation in the vicinity of a utility, that could damage or interrupt a utility, such as, exterior or interior work near transformers, power lines, poles, above ground gas lines, gas meters, etc., shall be done with extreme care. The Contractor shall specifically note during the preparatory phase of quality control, the construction techniques to be used to preclude damaging or interrupting any utility. This preparatory phase of control shall also establish and document contingency plans and actions to be followed in the event that existing utilities are damaged or interrupted. Locations of shut off or isolation devices along with other safety features shall be established and their operation reviewed.

(i) The Contractor shall complete a risk assessment (Attachment #14), at least one week prior to the start of any excavation or other work in the vicinity of a utility. The risk assessment shall be submitted for government approval prior to any excavation or other work in the vicinity of a utility. A risk assessment shall be completed for each definable feature of work encountering utilities and shall include all utilities anticipated to be encountered.

(j) The Contractor shall protect from damage all existing improvements, utilities, communications and vegetation at or near the work site. The Contractor shall be liable for all damages to persons or property that occur as a result of the Contractor's fault or negligence.

1.16 Applicable Publications: The publications referenced in this contract form a part of the specifications to the extent referenced. The publications referenced by the basic designation only, represent the latest edition in force when this contract is awarded.

2.1 Contract Security Clauses: Bidders are responsible for determining in advance of bidding, the federal project security requirements including, but not limited to, access, escort, identification, search procedures, and vehicle registration requirements which may impact contract work performance. At no additional cost to the Government, Contractors will be responsible for complying with all security requirements.

3.0 Emergency Operations: In the event of flooding or approaching flooding conditions, the Contractor shall

(a) have material ready to place and shall place such material when required to maintain the integrity of the flood protection project. The Contractor shall be responsible to insure that all contract specifications are strictly adhered to during emergency backfill operations.

(b) have materials ready to construct watertight floodwall closures where concrete has been removed by the Contractor and shall construct such closures when required to maintain the integrity of the flood protection project. Concrete forms are sufficient closures, however additional bracing may be required by the Government. The Contractor shall be responsible to insure that all contract specifications are strictly adhered to during emergency backfill operations.

4.0 General: Measurement and payment shall be made on the basis of the actual volume of concrete placement as calculated according to G.3 of this section, Measurement for Concrete Volume Payment Items, on a unit price basis, per contract line item, upon satisfactory completion of work. Payment shall constitute full compensation for furnishing all plant, labor, equipment, materials, use of all equipment and tools, supplies, and incidentals required to fulfill all the requirements of this contract.

5.0 Measurement for Concrete Volume Payment Items: In areas where payment for concrete is specified on a volume basis, the quantity to be paid for shall be the volume between the concrete surface of the completed repair shown on the drawings and the limits of concrete removal shown on the drawings or directed by the Contracting Officer. Measurement will be by average depth for the individual repair area. No deductions will be made for beveled edges, space occupied by embedded items, or voids that are less than one square foot in cross section.

6.0 The Invoice should be submitted within five (5) calendar days after notification of acceptance of work. Invoices must provide:

(a) Contractor’s name and mailing address

(b) Contract/Purchase Order Number

(c) Date prepared

(d) Itemized costing where applicable

6.1 Questions regarding preparation and forwarded of invoices may be directed to the Susquehanna River Project Office, telephone: (607) 692-3915.

END OF SECTION

01300 SUBMITTALS

1.01 Description Of Requirements:

(a) Purpose: Submittals are directed for the convenience of the Government in reviewing the Contractors planned approach and compliance with the requirements of the contract. They are also a mechanism whereby the Contractor may propose deviations, shop drawings, etc. at an early point in the contract where changes in approach will have less impact on the materials ordering process.

(b) Definitions: Work-related submittals of this section are categorized for convenience as follows:

(1) A "submittal" is a package of project information, samples drawings, schedules, certificates, etc., submitted to the Contracting Officer for Government review.

(2) A "deviation" is a specific submittal where an item is identified as not agreeing with the contract requirements and the Contractor is requesting a substitution or change.

(3) "Approval/Disapproval" are specific judgements reserved to the CO concerning a submittal's compliance with the plans and specifications.

(4) "Certified test" (or inspection) reports are documents attesting that a product meets a specific level of performance or quality when a prototype specimen is tested or inspected in accordance with a specified procedure, and consist of a certified statement by the product supplier or Contractor accompanied by a complete report of the inspection or test.

2.01 General Submittal Requirements:

(1) All submittals for products other than untreated wood shall be accompanied by a Material Safety Data Sheet to be supplied by the manufacturer. The Government reserves the right to require additional submittals if necessary. The Contractor shall not deliver these items to the construction site unless the certification is marked "APPROVED" and signed. The contract number shall be indicated on each piece of data submitted for approval. Contractor's failure to comply with these requirements shall result in the return of the data for re-submittal. The Contractor shall submit one of each required sample and three copies of each required submittal.

(2) The Contractor is responsible for the total management of work. The quantities, adequacy, and accuracy of information contained in the submittal are the responsibility of the Contractor. Approval actions taken by the Government will not in any way relieve the Contractor of his quality control requirements. Through the physical act of submitting, the Contractor certifies all items, listed or implied, fully meet the intended purpose,

functionality, and quality requirements of the plans and specifications, or are submitted as specific deviations thereto.

(3) Submittals shall be submitted to the COR within 10 days after the date of receipt of the notice to proceed. Submittals shall be made by the Contractor as d minimum on each specific item addressed in the specifications and drawings.

(4) Submittals shall be submitted in four sets. One copy of the list will be returned, marked to indicate approval or disapproval.

(5) A maximum of 30 calendar days shall be allowed for review and approval and possible re-submittal of submittals disapproved by the government.

(6) The Contractor shall ensure that submittal materials provided, including those provided directly by suppliers, accurately describe the items in the necessary detail required for a full review.

(7) The submittal of a "system," either as a routine action or as a deviation, shall be considered a submittal of an integrated collection of component parts.

(8) The Government's approval of a submittal, in whole or in part, shall not be construed as approval of any substitution, of any deviation, or of any factor that places an item not in compliance with the plans and specifications, unless said item is specifically processed as a deviation.

(9) Any and all deviations from the stated requirements of the plans and specifications shall be identified by the Contractor, specifically in writing as a submittal deviation for either the system as a whole or for a specific item of the whole upon which the deviation is to be exercised. The deviation shall be submitted to the COR for review.

(10) All submittals shal1 be made to the COR

(11) Only the Contracting Officer (CO) or Contracting Officer's Representative (COR) can approve or disapprove a submittal. Deviations and variations from the contract requirements contained in the submittal can be approved only by the CO or COR in writing.

3.01 Scheduling: Submit schedule for approval by the COR

3.02 Coordination And Sequencing: Coordinate preparation and processing of submittal with performance of the work so that the work will not be delayed by submittal. Coordinate and sequence different categories of submittal for same work, and for interfacing units of work, so that one will not be delayed for coordination of the COR's review with another.

3.03 Preparation Of Submittal: Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, submittal name, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for the COR's action marking. Package each submittal appropriately for transmittal and handling. Submittals that are received from sources other than through the Contractor's office will be returned without action.

3.04 Reference: The Contractor shall refer to the applicable paragraph in the contract specifications and/or sheet number in the contract drawings and submit the items in the chronological order of requirement.

3.05 Transmittal form: At the time of award, the CO or their authorized representative will furnish forms on which the submittal can be tabulated. In preparing the submittal, the Contractor shall reconcile the times with the approved Contract Progress Chart/Schedule. Furnishing of the submittal shall not be interpreted as relieving the Contractor of his obligation to comply with all the contract requirements for the items listed in the specifications and drawings. Payment will not be made for any material or equipment that does not comply with contract requirements.

4.01 Submittal Register (ENG Form 4288-R): Attachment #20 is one set of ENG Forms 4288-R listing each item for which submittals are required by the specifications. Columns "c" through "p" (abbreviations in column "p" are defined as follows: "AR~' means Area Office; "AE" means architect-engineer; and "ED" means Engineering Division) have been completed by the Government. The Contractor shall complete columns "a," "b," and "q" through "x" and return 2 completed copies to the COR for informal purposes within 30 days after Notice to Proceed. The accepted submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. This register and the progress schedules shall be coordinated.

END OF SECTION

01400 QUALITY CONTROL

1.01 General: The Contractor shall provide and maintain an effective quality control program that complies with the Contract clause entitled: Inspection of Construction. The Contractor's Quality Control Program through inspection and reporting shall demonstrate and document the extent of compliance of all work with the standards and quality established by the contract documents. The burden of proof of contract compliance is placed on the Contractor and not assumed by the Government. The Contractor's Quality Control will not be accepted without question. The Government will assure quality performance according to a Quality Assurance Surveillance Plan. Combined, these two programs form the Government's Quality Assurance Program.

1.02 Control: Contractor Quality Control is the means by which the Contractor verifies that his work complies with the requirements of the contract plans and specifications. The Contractor Quality Control shall be adequate to cover all operations and will be keyed to proposed sequence.

(a) To insure that construction will proceed in an orderly manner, construction will commence until adequate materials and/or equipment are on hand for the stage of the work about to begin

(b) The Contractor shall control construction quality by conducting daily inspections of the work in progress.

2.01 Quality Control Program:

(a) General: The Contractor shall be responsible for maintaining adequate quality control to satisfactorily meet the specification of this contract through the development of a Quality Control Plan. The Government will assure quality performance according to a Quality Assurance Surveillance Plan. Combined, these two programs form the Government's Quality Assurance Program.

(b) Quality Control: The Contractor shall establish a complete quality control program to assure the requirements of the contract are provided as specified under all sections of the contract. Program shall include an inspection system covering all the services stated in the contract specifications. It must specify all areas to be inspected on either a scheduled or unscheduled basis and the individual(s) who shall do the inspection.

(c) Inspections: The Contractor shall maintain a record of all Quality Control Inspection Reports conducted by the Contractor and shall furnish a copy to the COR by close of business each day. The DAILY CONSTRUCTION QUALITY CONTROL REPORT (Attachments #7, #8 and #9) shall be used for these inspections.

3.01 Quality Assurance: The Government will monitor the Contractor's performance in each functional area under this contract and reserves the right to use whatever additional surveillance procedures are deemed appropriate.

(a) If the Contractor fails to perform according to the performance standards, a Notification of Contract Deficiency or Contract Deficiency Report will be issued by the COR. The Contractor shall explain, in writing, why performance was not satisfactory and how recurrence of the problem will be prevented in the future.

(b) The Government will monitor the Contractor's services using the random sampling method, the planned sampling method, and/or the 100% inspection method. The Government reserves the right to alter or change the type of inspection plan at its discretion at any time.

c) The Contractor will be rated either excellent, very good, good, satisfactory, marginal, or unsatisfactory in the following general areas:

(1) Quality Control
(2) Timely Performance
(3) Effectiveness of Management
(4) Compliance with Labor Standards
(5) Compliance with Safety Standards

(d) The Contractor will be advised of any marginal or unsatisfactory rating, either in an individual element or in the overall rating prior to completion of the evaluation, and all Contractor comments will be made a part of the official record.

4.01 Inspection Of Services: The performance by the Contractor and the quality o f work delivered, including documentation or written material in support thereof, shall be subject to inspection, review and acceptance by the Contracting Officer or duly authorized representative (COR).

4.02 Work Deficiencies: The Contractor will not build on nor conceal any work containing uncorrected defects. If deficiencies indicate that the Contractor's quality control is not adequate or does not produce the desired results, the Contractor shall take corrective actions. If the Contractor does not promptly make the necessary corrections, the Contracting Officer may issue an order stopping all or any part of the work until satisfactorily corrective action has been taken. Payment for deficient work will be withheld until work has been satisfactorily corrected or other action is taken pursuant to the contract clause entitled, "Inspection of Construction." If recurring deficiencies in an item or items indicate the quality control is not adequate, the Contracting Officer shall take corrective actions.

4.03 Performance Evaluation Meetings: The Contractor, the Superintendent or both, shall meet with the COR (or a designated representative) weekly or on a schedule determined by the COR. However, a meeting will be held not later than one normal workday after a Contract Deficiency Report (CDR) is issued. Mutual effort shall be made to resolve any and all problems identified. Written minutes of these meetings will be prepared by the COR and signed by the COR, the Contractor, or their designated representatives, as appropriate to the occasion. Should the Contractor not concur with any decision, etc., contained in the minutes, the Contractor shall so state, in writing, and may request a final decision by the Contracting Officer.

END OF SECTION

01600 MATERIALS AND EQUIPMENT

1.01 Demolition Materials

(a) Materials resulting from repair work, except as indicated otherwise, shall become the property of the Contractor and be removed daily from the site, unless otherwise approved. Do not allow accumulations.

2.01 Concrete:

(a) General Requirements: Structural concrete for all work shall have a minimum 28-day compressive strength of 4000 PSI, with a maximum water cement ratio of 0.46. Air entrainment shall range between 5.5 and 9.5 percent. Slump shall be between 2 1/2 and 3 1/2 inches with a maximum slump of 4 inches. The concrete shall be the product of a NYSDOT approved plant, Class DP. The Contractor shall provide plant certification and the mix design to the Government for approval.

(b) Concrete Materials: The following materials are to be used in the manufacture of Portland Cement Concrete and meet the following requirements. Provide certification that materials meet the specifications herein.

1. Portland Cement: Portland Cement shall be Type 1 or 2, and shall meet the requirements of ASTM C 150.

2. Fine Aggregate: Fine aggregate shall be either a natural sand or a sand manufactured from gravel and shall meet the quality requirements of Section 703-07 and the gradation requirements of Section 501-2.02.B.1 of the "Standard Specifications." Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine-aggregate batcher and water batcher shall be adjusted directly or by means of a moisture compensation device.

3. Coarse Aggregate: Coarse aggregate shall be crushed limestone, meeting the gradation requirements of Size CA1 and the other requirements found in Section 501-202.B.2 (NYSDOT Standard Specifications)

4. Water: Water shall meet the requirements of Section 712-10 (NYSDOT Std. Spec.)

5. Fly Ash: Fly Ash Type F and Type C shall meet the requirements of ASTM C618, except Loss-on-Ignition shall be less then 3 1/2 percent.

3.01 Sealant: Sealant shall be one part polyurethane, elastomeric sealant/adhesive and meet ASTM C-920, Type S, Grade NS, Class 25, Sikaflex-1a or equal.

4.01 EQUIPMENT

4.02 Mechanical Tampers: Mechanical tampers shall be hand operated equipment capable of compacting material against walls and in corners adjacent to structures and utilities, or inaccessible areas. The compactors shall be either an internal combustion or pneumatic activated tamper, or a vibratory compactor type. Tampers shall have sufficient weight and striking power to produce the specified compaction. Vibrating plate vibrators are not acceptable in this contract. The character and efficiency of this equipment shall be subject to the approval of the Contracting Officer.

END OF SECTION

02005 EXECUTION

1.01 General: The Contractor shall prepare the areas as described below to the limits specified in the contract or shown or specified by the Contracting Officer or their representative. Replacement materials shall be as specified unless otherwise approved by the Government.

2.01 Concrete Removal And Repair Procedures:

(a) Prior to demolition the exact limits and locations of floodwall repairs shall be marked by the Contractor in the presence of the Contracting Officer or their Representative (COR).

(b) The Contractor shall maintain the numbering of each repair location, legibly on the top of the floodwall next to the repair, or as directed by the Contracting Officer, according to the repair schedule (Attachment #12 and #13) with paint.

(c) As-built drawings are available for Contractor information and review at the Whitney Point, NY field office (607-692-3915). Contractor shall field verify all dimensions, grades, elevations and locations prior to the start of concrete removal and notify the COR of any discrepancies between field measurements and the as-built drawings contract drawings and specifications. Contractor shall remove and replace concrete to the original lines and grades shown on the as-built drawings, modified only as approved by the Contracting Officer or their representative to match the lines and grades of sound concrete construction.

(d) Saw cut periphery of removal area (2 inch minimum depth). The saw cuts shall be located in adjacent sound concrete to minimize over-breaks, feather-edging and spalling at edges of removal. More than one cut may be required if concrete deterioration exceeds estimated repair.

(e) Removal of deteriorated areas of concrete should continue within the areas directed to be marked by the Contracting Officer or their representative until there is no question that sound concrete has been reached or to a minimum depth of 1 foot, whichever is deeper. If sound concrete is reached, demolition shall cease until a decision is made by the Contracting Officer’s Representative to continue demolition or not to continue demolition. However, if deterioration extends outside the limits shown or specified, notify the COR. No removal of concrete outside the limits shown or specified shall be performed except as approved by the Contracting Officer or their representative. The quantity of concrete repair cubic feet is estimated and there shall be no guarantee that the Contractor will repair the estimated amount of concrete. Actual quantities may be more or less than estimated.

(f) The Contractor shall submit, for Government approval, his plan of operations for work under this contract. The plan shall, as a minimum, contain a description of equipment to be used, pertinent drawings and instructions, sequence of removal, time schedule, etc. Light weight chipping hammers shall be used complying with Section 03020 CONCRETE

REMOVAL. Chipping shall continue until coarse aggregate is being broken while still held in place in the existing concrete surface unless otherwise directed by the Contracting Officer's Representative.

(g) Existing reinforcing, where exposed, shall be salvaged, cleaned and coated with epoxy. Reinforcing steel shall be sandblasted and/or wire brushed to remove laminations, loose scale, visible oxidation and rust and then epoxy coated immediately after cleaning to prevent corrosion.

(h) No reinforcing bars are to be cut during removal of deteriorated concrete. Replace all reinforcing bars that are bent, broken or deteriorated 30% or more of the original cross section area. All, reinforcing bar replacement shall be approved by the Contracting Officer or their representative prior to removal of existing bars.

(i) Air and water blasting shall be used to remove dust, loose particles, etc. just prior to the placement of new concrete.

(j) An oil free compressor or a compressor with an adequate oil trap shall be used for all air, sand and water blasting. The oil trap shall be checked daily involving spraying cardboard with air and water supply to check for oil.

(k) Silt screens shall be constructed to resist migration of soils where necessary to comply with Federal, State and Local laws.

(l) The Contractor shall spoil all excess material off-site.

(m) Seal floodwall joints in accordance with Section 03150 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE.

(n) Remove and properly dispose of vegetation, trees and stumps along floodwall that obstructs work under this contract.

(o) Seal all exposed Floodwall expansion joints from the Main Street bridge to the upstream limit of the section of floodwall. Remove all deleterious material from joints, fill with expansion joint material complying with Section 03150 2.02 or approved backer material to 1/4 inch from the exterior of the joint. Fill flush with the exterior of the joint with sealant complying with Section 03150 2.03 according to manufacturers instructions.

(p) Any anchors used to support scaffolding or personnel that cannot be removed shall be cut off 1/2 inch below the surface, epoxy coated and filled in with a nonshrink grout. If they can be removed the holes shall be filled with nonshrink grout.

3.01 Protection of Existing Work:

(a) Contractor shall take necessary precautions to insure against damage to existing facilities and items to remain in place or remain the property of the Government. Any damage to such facilities and items shall be repaired or replaced at no cost to the Government.

(b) Damaged facilities or items shall be restored with new materials equal to existing. Restored work shall meet with satisfaction of the Contracting officer.

(c) Contractor shall construct and maintain shoring and supports as required for excavation.

(d) Safety barriers must be in place around unattended excavations. Plastic tape or ribbon is NOT acceptable. Barriers must be highly visible and approximately four (4) feet high. Excavation protection shall comply with the Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 and all other Federal, State and Local requirements.

4.01 Concrete Placement: Concrete placement shall comply with section 03303 CONCRETE PLACEMENT and all other drawings and/or specifications of the contract.

END OF SECTION

SECTION 02050

MAINTENANCE AND PROTECTION OF TRAFFIC

1.00 GENERAL

1.01 Description: This section of the specifications includes all labor, equipment, plant and materials necessary to maintain traffic and protect the public from damage to person and property within the limits of and for the duration of the contract.

1.02 Work Areas: The Contractor shall have access to the work areas shown on the drawings by means of existing public rights-of-way.

2.00 APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

2.01 New York State Department of Transportation (NYSDOT) "Standard Specifications, Construction and Materials", January 2, 1990 and all addenda.

3.00 BASIC MAINTENANCE AND PROTECTION OF TRAFFIC

3.01 Description: The Contractor shall provide basic maintenance and protection of traffic as required to maintain traffic and protect the public. Such measures may include but shall not be limited to flagging, temporary relocation of street signs, construction area warning signs, barricades, dust control, pavement repair, maintenance of drainage facilities, delineation and guiding devices and temporary fencing.

3.02 Parking: It shall be the Contractor’s responsibility to clear the work area of vehicles for the duration of the contract.

4.00 SUBMITTALS: The Contractor shall submit to the Contracting Officer, not less than 15 days in advance of the intended construction, his intended materials and layout for maintenance and protection of traffic measures for all work areas on the project impacting on vehicular or pedestrian traffic.

5.00 MATERIALS

5.01 Pavement Repair: Asphalt for repairs to pavement damaged by the Contractor shall be in accordance with Section 02242 Bituminous Concrete Base Course and Section 02554 Bituminous wearing Course.

5.02 Construction Signs And Other Signs: Sign panels shall be made of aluminum, galvanized steel or plywood.

5.03 Delineators, Construction Barricades, And Lighting For Construction Barricades: Furnish delineators, barricades, lighting for construction barricades and similar materials that meet the requirements of NYSDOT Standard Specifications.

5.04 Type III Construction Barricades: Furnish Type III construction barricades that conform to the New York State Standard Specifications Section 619-2.06.

5.05 Temporary Fencing: Furnish 4 ft. high orange plastic fencing or snow fence with steel posts. The use of safety tape is not allowed in this contract.

6.00 CONSTRUCTION DETAILS

6.01 General: Conduct construction operations to insure a minimum of delay to traffic. Do not stop traffic for more than five minutes unless specifically authorized in writing by the Contracting Officer.

6.02 Cleaning of Roads: Keep the traveled way free of foreign objects such as spilled earth, rock, timber and other items that may fall from transporting vehicles. Remove immediately materials spilled by or dropped from the undercarriage of any carrying vehicle used in the Contractor's hauling operations along or across any public traveled way both within and outside the work areas.

6.03 Dust Control: Alleviate dusty conditions resulting from the Contractor's operations to the Contracting Officer's satisfaction by the use of calcium chloride and/or water.

6.04 Traffic Control: Whenever it becomes necessary to maintain traffic on one lane, provide adequate traffic controls on the section of highway on which vehicle operation is maintained. Employ a sufficient number of competent flagmen and/or temporary traffic signals to control one lane traffic continuously. In the event the length of the one lane operation is extremely short and conditions are favorable for safe operation, the Contracting Officer may, in writing, authorize the Contractor to dispense with flagmen or traffic control signals. Provide a sufficient number of competent flagmen in areas where construction equipment is operating in potential conflict with public traffic, regardless of the volume of traffic or the site distance. Wear orange hardhats and vests. Sign Paddles, in lieu of flags, may be required by the Contracting Officer. The Contractor shall receive permission from the Police and Fire Department of any road closures and notify them before any closures.

6.05 Drainage: Keep all drainage facilities fully operative at all times.

6.06 Ingress And Egress: Provide and maintain, at all times, safe and adequate ingress and egress to and from intersecting roadways, at existing or at new access points, consistent with the work, unless otherwise authorized by the Contracting Officer.

6.07 Delineation and Guiding Devices for Construction: Furnish, erect, move and remove delineation and guiding devices as required and directed by the Contracting Officer. In areas where grading is being done adjacent to existing roadways provide a safe and reasonable shoulder that is properly delineated at all times, either by the use of guiding devices or flagmen. Delineate areas where there is a drop-off near the edge of the traveled way and areas on which it is unsafe to travel. Thirty to fifty-five gallon drums or containers set on end may be used as delineators, provided they are

properly painted and reflectorized. Keep clean at all times. Furnish and install other markers or delineators that are circular or rectangular in shape and constructed of reflective sheeting having a minimum area of 20 square inches or of reflective buttons having a minimum diameter of 3 inches.

6.08 Signs:

6.08.01 Control and Authority: All existing roadway signs, markers, delineators and their supports within the contract limits will remain under the control and jurisdiction of the Town of Hornellsville, City of Hornell, or the New York State Department of Transportation through the Contracting Officer. Maintain, for the duration of the contract, all existing highway signs, markers, delineators, and their supports within the contract limits as directed by the Contracting Officer.

6.08.02 Temporarily relocate existing street signs where such street signs will interfere with the progress of the work, maintain the signs during the progress of the work, and relocate signs to their original location upon completion of the work.

6.09 Construction Signs, Reflectorized Signs: Furnish and erect, move and remove, as required and as directed by the Contracting Officer, painted and reflectorized signs to adequately and safely inform and direct the motorist, and to satisfy legal requirements.

6.09.01 Keep all signs clean, mounted at the required height on adequate supports and placed in proper position and alignment so as to give maximum visibility both night and day. Paint all wood supports and backs of plywood sign panels with two coats of white paint. Furnish and install signs and markers that indicate actual existing conditions. Move, remove, relocate or change immediately any signs that do not indicate actual conditions. Furnish and install sign sizes and details that conform to New York State Department of Transportation Standards. Have immediately available an adequate quantity of each of these signs for use as required by the Contracting Officer. Furnish and install additional signs as required by the Contracting Officer.

6.09.02 Mount all signs at a height of at least five feet. Under special conditions, signs may be mounted at a greater height, as directed by the Contracting Officer, to fit the situation.

6.09.03 Maintain signs in good condition for the duration of the contract and remove from the work site when the contract is accepted.

6.10 Construction Barricades And Lighting for Construction Barricades:

6.10.01 Furnish, erect, move and remove construction barricades and lighting for construction barricades where and as indicated on the Drawings, or as directed by the Contracting Officer. Posts and painted members or bands used to delineate drop-offs will not be considered barricades. Where indicated on the Contract Drawings, or as directed by the Contracting Officer, supplement construction barricades either by approved flashing or steady burning lights.

6.10.02 Furnish and install steady burning or flashing barricades lights as directed by the Contracting Officer.

6.11 Pavement Repairs: Make repairs to existing pavement and structure wearing surfaces damaged as a result of the Contractor's operations in accordance with the New York State Department of Transportation Standard Specifications, Section 403 and Section 02242 Bituminous Concrete Base Course and Section 02554 Bituminous wearing Course.

6.12 Temporary Fencing: Install temporary fencing to posts spaced at intervals not greater than 6 ft. Drive posts to a depth required to provide adequate attachment of the fencing. Temporary fencing is required at all locations where existing fence must be removed to construct improvements on the land side of floodwalls. The temporary fencing shall be installed to the limits of existing fencing and shall obstruct entry of the public to the work area. Remove temporary fencing when the work is complete.

END OF SECTION

02200 EARTHWORK

1.01 General: This section of the specifications includes furnishing all labor, materials, plant and equipment and performing all miscellaneous and incidental earthwork operations required in connection with the project.

1.02 Applicable Publications: The publications listed below form a part of this specification to the extent referenced. The publications are referred to by the basic designation only and represent the latest edition in force when this contract is awarded.

(a) American Association of State Highway and Transportation 01ficials (AASHTO):

T-180 Moisture-Density Relations of Soils Using a 10-lb (4.54 Kg) Rammer and an 18-in (4.57 mm) Drop

(b) American Society for Testing and Materials (ASTM) Publications:

C 117 Materials Finer than 75 um (No. 200) Sieve in Mineral Aggregates by Washing

C 127 Specific Gravity and Absorption of Coarse Aggregates

C 128 Specific Gravity and Absorption of Fine Aggregates

C 136 Screen Analysis of Fine & Coarse Aggregates

D 422 Particle-Size Analysis of Soils

D 1556 Density of Soil in Place by the Sand-Cone Method

D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb (4.5 kg) Rammer and 18-in (457 mm) Drop

D 2167 Density and Unit Weight of Soil in Place by the Rubber-Balloon Method

D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

D 2487 Classification of Soils for Engineering Purposes

D 2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods(Shallow Depth)

D 2937 Density of Soil in Place by the Drive-Cylinder Method

D 3017 Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index for Soils

E 11 Wire-Cloth Sieves for Testing Purposes.

1.03 Definitions And Materials: Excavation and backfill are defined and designated for payment as herein provided and as shown on the Contract Drawings. The limits of all items of work are shown on the Contract Drawings, or are defined herein.

(a) Common Excavation: Common excavation will include all excavation work, unless otherwise specified. Excavation is anticipated at most of the repairs to expose deteriorated concrete and/or to install forms.

(b) Suitable material: Suitable material from the excavations is defined as any excavated material whose composition falls under any one of the following Unified Soil Classification System categories: GW, GP, GM, GC, SW, SP, SM or SC. In general any mineral that falls into any one of the above referenced categories are considered as satisfactory materials. Determinations of whether a specific material is a satisfactory material will be made by the Contracting Officer on the basis of the Unified Soil Classification System. The maximum dimension of any particle in material to be used for embankments or backfills shall be 4 in and shall not be larger than two thirds of the lift thickness.

(c) Select Granular Fill: Select granular fill is defined as gravel, blast furnace slag, or stone, conforming to the material requirements of the NYSDOT Standard Specifications, Section 304 - 2.02, Type 2 as indicated below:

Sieve Size Designation	Percent Passing By Weight
2 inch	100
1/4 inch	25 - 60
No. 40	5 - 40
No. 200	0 - 10

(d) Unsuitable Material: Unsuitable material is defined, as any material containing trash, frozen soil, snow, ice, vegetable or organic matter such as muck, peat, organic silt, topsoil or sod and soil materials that fall under any one of the following Unified Soil Classification System categories: NM, CL, NM, CH, Pt, OH or OL.

(e) Cohesionless and Cohesive Materials: Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, NM, and CH Materials classified as QM and SM will be identified as cohesionless only when the fines are nonplastic.

1.04 Lines and Grades: The earthwork shall be accomplished to enable restoration to the existing conditions unless otherwise directed by the

Contracting Officer. The government reserves the right to make minor modifications to lines and grades to protect any existing facilities or to produce a safe installation. Changes in the quantities of excavation or backfill resulting from such revisions, will not constitute justification for change in the Contract lump sum or unit prices.

1.05 Utilities: The Contractor shall locate existing underground utilities in the areas of work. If utilities are to remain in place, the Contractor shall provide adequate means of support and protection during earthwork operations. Should uncharted or incorrectly charted underground utilities be encountered during excavations, the Contractor shall cooperate with the Contracting Officer and the utility companies in keeping respective services and facilities in operation. Utilities damaged by the Contractor shall be repaired to the satisfaction of the utility owner at no cost to the Government.

1.06 Conduct of Work: The Contractor shall at all time maintain and protect, the existing levees, floodwalls and appurtenant facilities until final completion and acceptance of all work under the Contract. If, in the opinion of the Contracting Officer equipment used in connection with earthwork operations causes damage to these facilities, the Contractor shall repair such facilities to the satisfaction of the Contracting Officer at no cost to the Government.

1.07 Excavation

(a) Conduct of work: Suitable material from the excavations may be used for backfills and embankments. Suitable materials from the excavations which cannot be placed directly into backfills or embankments shall be removed from the jobsite, at no additional cost to the Government. Materials from the required excavations that are unsuitable or not required for backfills and embankments shall be disposed of outside t limits of the project site at the Contractor's expense.

(b) Excavation Limits: Excavation shall be performed for the purpose of exposing the deteriorated concrete and/or to install forms. The Government reserves the right to increase or decrease the length or extent of any excavation to insure proper installation of formwork a no additional expense to the Government.

(c) Common Excavation: Materials that are designated as unsuitable, and excess suitable materials from the excavations shall be disposed of outside the project limits at the Contractor's expense. If any materials are removed beyond what is necessary to accomplish satisfactory repairs, or as otherwise specified, the Contractor will replace material as necessary to reestablish, to the satisfaction of the Contracting Officer, the correct lines and grades. No payment will be made for replacement of materials in excess of the specified lines and grades, nor for replacement of materials to re-establish the specified lines and grades. Excavation materials shall be stockpiled a locations approved by the Contracting Officer. No payment will be made for stockpiled materials or for the rehandling required to deliver it to its final position. Common excavation shall include topsoil stripping and stockpiling for reuse on the projects.

(d) Preliminary Cleanup: When excavation has been completed, areas designated by the Contracting Officer shall be given a preliminary cleanup. This cleanup shall consist of removing trash and litter. No separate measurement or payment will be made for this work, the cost of which shall be included in the bid line item.

1.08 Explosives: No blasting is allowed in this contract

1.09 Stability of Excavation: Slope sides of excavations shall comply with Federal and State codes and laws. The Contractor shall shore and brace where sloping is not possible because of space restrictions or stability of material excavated. The Contractor shall maintain excavations in safe condition until completion of backfilling.

1.10 Shoring and Bracing: The Contractor shall provide materials for shoring and bracing in good serviceable condition. Trench shoring and bracing shall comply with the Corps of Engineers Safety and Health Requirements Manual EM 385-1-1 and all other Federal, State and Local requirements. The Contractor shall maintain shoring and bracing in excavations regardless of time period excavations will be opened.

1.11 Dewatering: The Contractor shall prevent surface water from flowing into excavations. The Contractor shall establish and maintain temporary drainage ditches and other diversions outside excavations limits to convey rain water and shall not use trench excavations as temporary drainage ditches. All groundwater seepage into the excavations shall be pumped and disposed of by the Contractor.

1.12 Backfilling And Compaction

(a) Placement and Spreading, General: No backfill shall be placed until areas have been inspected and approved. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen earth be incorporated in the embankment. Ruts formed in the surface of any layer of spread material will be filled before that material is compacted. If, in the opinion of the Contracting Officer, the compacted surface of any layer of material is too smooth to bond properly with the succeeding layer, the surface shall be loosened by scarifying or other approved methods before material for the succeeding layer is placed. During the placing and spreading process, the Contractor shall maintain at all times a ' force of men adequate to remove all roots, debris, and oversize stone from all backfill materials.

(b) Drainage: Backfill materials shall be placed and compacted so that the surface will drain freely and shall be so maintained throughout construction.

(c) Lift Thickness: Backfill materials shall be placed in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

(d)Moisture Control: The materials in each layer of the backfill shall contain the amount of moisture, within the limits specified below or as

directed by the Contracting Officer, necessary to obtain the desired compaction. Material that is not within the specified limits after compaction shall be reworked, regardless of density. Where the subgrade, embankment foundation or bottom of trench must be moisture conditioned before compaction, the Contractor shall uniformly apply water to the surface to prevent free water from appearing on the surface during or subsequent to compaction operations. The Contractor shall place and compact backfill at within 2% of optimum moisture content as determined in accordance with ASTM D-1557. The Contractor shall remove and replace, or scarify and air dry soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction shall be stockpiled or spread to allow to dry, and may be disced, harrowed or pulverized until moisture content is reduced to a satisfactory value.

(e) Compaction Equipment: Compaction shall be accomplished by approved equipment well suited to the soil and area being compacted. Mechanical tampers may be used that comply with Section 01600 4.02.

(f) Compaction Density: The Contractor shall provide the following minimum percentages of Modified Proctor Maximum Dry Density ASTM D-1557 Method D specified for each classification listed below:

90% Compaction:
Backfill behind floodwalls. (excavations > 2 ft deep)

85% Compaction:
Backfill in lawn or unpaved areas.

(g) Testing: Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or may be performed by the Contractor subject to approval. Tests shall be performed in sufficient number to insure that the specified density is being obtained. Moisture-density relations shall be determined in accordance with the procedure referenced in Section 02200 1.12. Field in-place density shall be determined in accordance with ASTM D 1556. Approved compacted subgrades that are disturbed by Contractor's operations or adverse weather shall be scarified and compacted as specified herein before to the required density prior to further construction thereon. Recompaction over underground utilities and heating lines shall be by hand tamping. Sieve analyses shall be performed in accordance with ASTM C 117, C 127, C 128, C 136 and D 422; sieves shall conform to ASTM E 11; and liquid limit and plasticity index determinations shall be performed in accordance with ASTM 4318. Copies of test results shall be furnished to the Contracting Officer. Testing will be required when the Contracting Officer determines that conditions warrant.

2.01 Maintenance

(a) The Contractor shall protect newly graded areas from traffic and erosion and keep free of trash and debris.

(b) The Contractor shall repair and re-establish grades in settled, eroded and rutted areas to specified tolerances until final acceptance as directed by the Contracting Officer.

(c) Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, the Contractor shall scarify surface, re-shape, and compact to required density to the satisfaction of the Contracting Officer.

END OF SECTION

02210 ESTABLISHMENT OF TURF

1.01 General: Any area of turf disturbed by the required construction activities shall be graded to approximately the original conditions, and turf shall be re-established.

1.02 Reuse of Excavated Material: Material may generally be reused as backfill. No organic or other undesirable materials such as frozen soil, ice snow, etc., shall be permitted in the fill. In addition, no stones or rock fragments greater than 2/3 the lift thickness shall be permitted in the fill. Any material the Contracting Officer deems unfit to reuse for backfill or extra material shall be disposed of by the Contractor at the Contractor's expense. Any additional material necessary for use in backfilling shall be provided by the Contractor at the Contractor's expense.

2.00 Materials:

2.01 Topsoil: Generally, topsoil from any area of required excavation, and from any area disturbed by construction traffic, shall be stripped to a depth of approximately 6 inches and stockpiled for reuse. If additional topsoil is needed to reestablish turf, it shall consist of materials free of refuse, any material toxic to plant growth, woody vegetation, stumps, roots, brush, stones, clay lumps, and similar objects larger than 2 inches in greatest dimension. The topsoil material shall have a pH between 5.5 and 7.6, and shall have an organic content between 2 percent and 20 percent.

2.02 Seed: State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Weed seed shall not exceed 1 percent by weight of the total seed mixture. Seed mixtures shall consist of the following proportions unless otherwise approved by the Contracting Officer:

Common Name	Mixture Percent By Weight	Percent Live Seed
Fescue Mix	50%	85%
Perennial Ryegrass Mix	30%	85%
Kentucky Bluegrass Blend	20%	85%

Temporary Seed: Temporary seed for erosion control shall be a winter rye (grain).

Soil Amendments: Soil amendments shall consist of lime, fertilizer, organic soil amendments and soil conditioners.

2.03 Mulch: Mulch, consisting of straw, hay, or wood cellulose fiber, shall be free from weeds, mold, and other deleterious material.

3.00 Execution

3.01 Grading: Grading shall be accomplished to re-establish the original

grades and drainage patterns unless otherwise directed by the Contracting Officer. New surfaces shall be blended to existing areas, and the finished grade shall be approximately 1 inch below the grade of adjoining areas.

3.02 Seeding: Seeding shall not take place when wind velocities will prevent uniform distribution. Seed shall be uniformly broadcast at a rate of 5 pounds per 1000 square feet using broadcast seeders. Half the seed shall be broadcast in one direction, and half shall be broadcast perpendicular to the first direction. Seed shall be covered to a depth of 1/4 inch by disc harrow, steel mat drag, or other approved method. Immediately after seeding, except for slopes exceeding 3 horizontal to 1 vertical, the entire area shall be firmed with a roller not exceeding 90 pounds per foot of roller width. Mulch shall be spread uniformly at a rate of 2 tons per acre on the same days seeding. Seed shall be sewn between April 15 and June 15 for spring planting, and between August 15 and October 15 for fall planting. Temporary winter planting shall consist of the placement of 100 percent winter rye at the rate of 100 pounds per acre.

END OF SECTION

02215 LEVEE PROTECTION

1.01 Vehicular traffic: No vehicular traffic of any kind shall be allowed on the levee system of the project except that portion of the levee which is specifically involved in this contract work.

1.02 Levee Protection from Heavy Equipment: When necessary to move heavy equipment on or over the levee system, a protective blanket of granular fill material with a minimum thickness of 2 feet (1 foot for short duration's) shall be placed and maintained in the immediate area of movement. When such protective blanket is no longer required, it shall be carefully removed to maintain the underlying sod. The general area shall be re-graded to its original section and re-seeded where necessary.

END OF SECTION

02242 BITUMINOUS CONCRETE BASE COURSE

1.01 SCOPE OF WORK

A. Work Included: Furnish all labor, material, equipment and services required to complete the work as shown on the drawings and/or herein specified.

1.02 QUALITY ASSURANCE

A. Regulations, Standards and Publications:

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 82	Cut-Back Asphalt (Medium-Curing Type)
AASHTO T 2	Sampling Aggregates
AASHTO T 40	Sampling Bituminous Materials
AASHTO T 164	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
AASHTO T 182	Coating and Stripping of Bitumen-Aggregate mixtures
AASHTO T 191	Density of Soil In-Place by the Sand-Cone Method
AASHTO T 193	The California Bearing Ratio
AASHTO T 238	Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)
AASHTO T 239	Moisture Content of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 75	Sampling Aggregates
ASTM D 140	Sampling Bituminous Materials
ASTM D 977	Emulsified Asphalt
ASTM D 979	Sampling Bituminous Paving Mixtures
ASTM D 1250	Petroleum Measurement Tables
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method

ASTM D 1664	Coating and Stripping of Bitumen-Aggregate mixtures
ASTM D 1883	CBR (California Bearing Ratio) of Laboratory-Compacted soils
ASTM D 2067	Cutback Asphalt (Medium-Curing Type)
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

B. Only thoroughly trained and experienced workmen completely familiar with the items required and the manufacturer's current recommended methods of installation shall perform the work under this section.

C. All work on this project will conform to the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, except as herein modified or changed.

2.01 MATERIALS

A. Materials shall conform the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, Section 400.

B. Bituminous Material: Asphalt cement Class AC-20 NYSDOT Standard Specifications, Construction And Materials, Table 401-1, Type 2.

3.01 INSTALLATION

A. Placement and materials shall conform the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, and related/referenced sections therein.

B. Saw cut all edges.

C. Repair/replacement area shall be backfilled and compacted in accordance with Section 02200 Earthwork.

D. Place 12 inches after compaction of Item 304 Subbase Course, Type 1.

E. Tack coat entire repair area and seal edges and along floodwall with Item 407 Tack Coat.

F. Bituminous Concrete Base Course, AC-20, Type 1 shall be 5 inches thick after compaction.

G. See Section 02554 BITUMINOUS WEARING COURSE for placement of wearing surface.

END OF SECTION

02245 ENVIRONMENTAL PROTECTION

1.01 General: The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during, and as the result of, construction operations under this contract.

(a) Provisions of these specifications. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life or affect other species of importance to man. The control of environmental pollution requires consideration of air, water, and land.

(b) The Contractor shall comply with Federal, state and local laws, regulations and standards regarding environmental protection. The Contractor shall exercise care and safety in the performance of the contract and shall take necessary precautions to avoid contamination of the water, damage to private property and injury to employees and the public. The Contractor shall be liable for any and all damages to the environment, Government property, private property, trees and shrubs as well as injuries to the public and employees while in performance of this contract. All environmental protection matters shall be coordinated with the COR.

(c) The Canisteo River above the Seneca Street bridge is a protected resource stream. No work will be performed in the stream from April I through May 31 unless emergency conditions exist. Instream work in the Canisteo River below the Seneca Street bridge shall not be performed from March 15 to July 1 due to warm water fishery. Steps shall be taken to limit downstream silt contamination in accordance with New York State Department of Environmental Conservation (NYSDEC) guidelines.

1.02 Applicable Regulations: The Contractor and his subcontractors in the performance of this contract, shall comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement in effect on the date of this solicitation, as well as the specific requirements stated elsewhere in the contract specifications.

1.03 Notification: The Contracting Officer will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of time lost due to any such stop order shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.04 Subcontractors: Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

1.05 Protection Of Water Resources: The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acid construction wastes or other harmful materials. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in streams through or adjacent to the project areas.

1.06 Burning: Burning will not be allowed.

1.07 Dust Control: The Contractor shall maintain all work area free from dust which would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling, or similar methods will be permitted to control dust. Sprinkling, where used, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

1.08 Protection Of Land Resources

(a) General: It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the plans and specifications.

(b) Location Of Storage And Service Facilities: The location on Government property of the Contractor's storage and service facilities, required temporarily in the performance of the work shall be approved by the Government prior to commencement of the work. The preservation of the landscape shall be an imperative consideration in the selection of all sites.

(c) Temporary Excavation And Embankments: If the Contractor proposes to construct temporary roads, embankments or excavations for access, plant and/or work areas, he shall submit a plan for approval prior to scheduled start of such temporary work for approval by the Government.

END OF SECTION

02554 BITUMINOUS WEARING COURSE

1.01 SCOPE OF WORK

A. Work Included: Furnish all labor, material, equipment and services required to complete the construction of plant-mix bituminous concrete on a prepared surface.

1.02 QUALITY ASSURANCE

A. Regulations, Standards and Publications:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 29	Unit Weight and Voids in Aggregate
ASTM C 131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 183	Sampling and the Amount of Testing of Hydraulic-Cement
ASTM D 75	Sampling Aggregates
ASTM D 140	Sampling Bituminous materials
ASTM D 977	Emulsified Asphalt
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures

MILITARY STANDARDS (MIL-STD)

MIL-STD 620	Test Methods for Bituminous Paving Materials

B. Only thoroughly trained and experienced workmen completely familiar with the items required and the manufacturer's current recommended methods of installation shall perform the work under this section.

C. All work on this project will conform to the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, except as herein modified or changed.

2.01 MATERIALS

A. Materials shall conform the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, Section 400.

B. Bituminous Material: Asphalt cement Class AC-20, NYSDOT Standard Specifications, Construction And Materials, Table 401-1, Type 7F.

3.01 INSTALLATION

H. Placement and materials shall conform the latest edition and addendums of the New York State Department Of Transportation (NYSDOT), Standard Specifications, Construction And Materials, and related/referenced sections therein.

I. After placement of Bituminous Concrete Base Course as described in Section 02242 Bituminous Concrete Base Course, apply Item 407 Tack Coat to all edges including along floodwall.

J. Bituminous Wearing Surface of asphalt cement Class AC-20, NYSDOT Standard Specifications, Construction And Materials, Table 401-1, Type 7F shall be 1 1/2 inches thick after compaction.

K. Apply Item 407 Tack Coat material along all joints and along floowall to seal joints.

L. Apply sand to 407 Tack Coat surface to avoid tracking by vehicles.

END OF SECTION

03020 CONCRETE REMOVAL

1.01 Scope: The work covered by this section consists of furnishing all equipment, labor, and materials necessary for the removal and disposal of structural concrete as specified in this contract, indicated on the drawings or where ordered by the Contracting Officer.

1.02 Construction Methods:

(a) Extent of Removal. Limits of removal for each repair area have been shown on the drawings. The Contracting Officer or their representative shall be the judge in decisions to remove more or less concrete than the removal limits shown on the drawings. The objective of the removal is to eliminate deteriorated concrete and provide a sound base for the various repair details.

1.03 Removal Techniques:

(a) General: Blasting shall not be allowed on the project. Removal by impact equipment is allowable, with the restrictions noted below. The Contractor has the option of removing concrete to the removal limits shown by alternate techniques, such as drilling and expansive agents or hydraulic splitters. If such methods are used by the Contractor, checking of the resulting surface for soundness using impact hammers noted in 03020 1.03 (c) shall be required. All removal techniques shall be approved by the Contracting Officer.

(b) Wall Stem Removal: When removing total wall section down to a noted limit, the impact equipment shall not exceed 150 foot-pounds. Contractor shall saw cut the perimeter of the repair area and remove concrete as required using maximum 20 pound chipping hammers and then either hydroblasting with maximum 3,000 psi hose pressure or sand blasting and washing with water.

(c) Wall Surface Removal: When removing wall surface areas only, the Contractor shall saw cut the perimeter of the repair area and remove concrete as required using maximum 20 pound chipping hammers and then either hydroblasting with maximum 3,000 psi hose pressure or sand blasting and washing with water.

(d) Coring: Coring of holes through existing walls for utility lines, weep holes, dowels, anchor bolts, expansion bolts or other embedded items shall be performed using water cooled power drills with hardened steel or diamond bits.

1.04 Protection of Existing Facilities: Adjacent existing concrete and masonry walls, channel invert slabs, private buildings, drainage structures, utility lines, power poles, fences, trees, shrubs and any other existing construction shall be protected from damage during concrete removal operations. Existing construction has been shown on the drawings based on available data. It is the Contractor's responsibility to verify all locations and dimensions, and to execute his work with equipment, methods and degree of care which will protect all existing work.

1.05 Disposal Requirements: The Contractor shall remove all Contractor generated debris from the channel and from adjacent properties. Debris shall be removed from the contract site and disposed of at the Contractor's expense.

END OF SECTION

03100 CONCRETE FORMWORK

1.01 Design: The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Contractor shall make structural provision for all required openings. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03100, 1.12 or as indicated otherwise. Forms shall be well braced and stiffened against deformation and shall be accurately constructed. The forms shall be such as to produce a smooth dense surface. A bond-breaking substance may be applied to the forms. Exposed edges shall be chamfered as indicated. Form ties shall either be threaded or snap-off type, so that no form wires or metal pieces will be within 2 inches of the surface. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances. For Class A finish, the design shall be made to limit deflection of facing material between studs as well as deflection of studs and walers to 0.0025 times the span. Formwork shall be designed to match as-built design unless indicated otherwise.

2.01 Materials

2.02 Forms: Forms shall be fabricated with facing materials that produce the specified construction tolerance requirements of Section 03100 1.01 and the surface requirements of section 03100 1.12.

2.03 Form Accessories: Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 2-inches from any concrete surface either exposed to view or exposed to water. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

2.04 Form Coating: Form coating shall be a commercial formulation of satisfactory and proven performance that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

2.05 Installation: Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements of Section 03100, 1.12 and conforming to Section 03100, 1.11. Where concrete surfaces are to be permanently exposed to view, joints in form panels shall be arranged to provide a pleasing appearance. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. All surfaces of forms and embedded materials shall be cleaned of any mortar from previous concreting and of all other foreign material before concrete is placed in them.

2.06 Chamfering: All exposed joints, edges and external comers shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified.

2.07 Coating: Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

2.08 Removal: Forms shall be removed in a manner that will prevent injury to the concrete and ensure the complete safety to the structure. Formwork for walls, and other parts not supporting the weight of the concrete may be removed when the concrete has obtained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed until the structural units are strong enough to carry their own weight and any other construction or natural loads. In no case will supporting forms or shores be removed before the concrete strength has reached 70 percent of design strengths as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent. When conditions of the work are such as to justify the requirement, forms will be required to remain in place for a longer period.

2.09 Unsupported Concrete: Formwork for walls, columns, sides of beams, gravity structures and other vertical type forms not supporting the weight of concrete shall not be removed in less than 24 hours. The time depends on temperature, lift heights and type and amount of cementitious material in the concrete. Where forms for columns, walls and sides of beams also support formwork for slabs or beam soffits, the removal time of the latter shall govern.

2.10 Supported Concrete: Supporting forms and shoring shall not be removed until structural members have acquired sufficient strength to support safely their own weight and any construction load to which concrete may be subjected. In no case shall forms and shoring be removed until both minimum time and sufficient strength have been attained. Results of control tests conducted in accordance with ASTM C-31 and C-39 will be used as evidence that concrete has attained sufficient strength to permit removal of forms. Concrete cylinders shall be stored in the structure or as near the structure as possible, shall receive insofar as possible the same curing and protection as given those portions of the structure they represent and shall be tested within 24 hours after removal from the structure. Cylinders will be tested at the expense of the Contractor. Supporting forms shall not be removed

until after minimum time and control test specimens have attained at least 75 percent of strength required for the structure.

2.11 Construction Tolerances: Variation in alignment, grade, and dimensions of the structures from the established alignment, grade, and dimensions shown on the drawings shall be within following specified tolerances.

(a) Departure from established alignment ..... 1 inch

(b) Departure from established grades ..... 1 inch

(c) Variation from the plumb or the specified batter in the lines and surfaces of floodwalls:

Exposed, in 10 feet ..... 1/2 inch
Backfilled, in 10 feet..... 1 inch

(d) Variation from the level or from the grades indicated on the drawings in the floodwalls:

Exposed, in 10 feet ..... 1/2 inch
Backfilled, in 10 feet ..... 1 inch

(e) Variation in cross-sectional dimensions of floodwalls

Minus ..... 1/4 inch
Plus ..... 1/2 inch

(f) Variation in the sizes and locations of slab and wall openings:

1/2 inch

2.12 Surface Requirements: The surface requirements for the classes of finish required by this contract, shall be as hereinafter specified. Allowable irregularities are designated "abrupt" or "gradual" for purposes of providing for surface variations. Offsets resulting from displaced, misplaced, or mismatched forms, or sheathing, or by loose knots in sheathing, or other similar form defects, shall be considered "abrupt" irregularities. Irregularities resulting from warping, unplaneness, or similar uniform variations from planeness, or true curvature, shall be considered "gradual" irregularities. "Gradual" irregularities will be checked for compliance with the prescribed limits with a 5-foot template, consisting of a straightedge for plane surfaces and a shaped template for curved or warped surfaces. In measuring irregularities, the straightedge or template may be placed anywhere on the surface in any direction, with the testing edge held parallel to the intended surface.

Class of Finish	Irregularities Abrupt. Inches	Gradual inches
1/8	1/8	1/4

2.13 Appearance: Permanently exposed surfaces shall be cleaned, if stained or otherwise discolored, by a method that does not harm the concrete and that is approved by the Contracting Officer.

2.14 Field Quality Control: Forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

END OF SECTION

03150 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE

1.01 Scope: This section covers the materials, techniques and workmanship requirements for forming expansion, contraction and construction joints in concrete structures and sealing existing joints as required in this contract.

1.02 Applicable Publications: The following publications of the issues listed below form a part of this specification to the extent indicated by the references thereto:

2.01 American Society for Testing and Materials (ASTM) Standards

(With corresponding U.S. Army Corps of Engineers Handbook for Concrete and Cement (CRD Specifications where indicated.)

D 1751 (CRD-C 508)	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
C-920	Standard Specifications for Elastomeric Joint Sealants

2.02 Expansion Joint Filler Strips, Premolded: Premolded expansion joint filler strips shall conform to ASTM D1751. Unless otherwise indicated, filler material shall be 1/2 inch thick and a width applicable for the joint formed.

2.03 Joint Sealant: Sikaflex-1a or equal. Color shall be limestone. Sealant shall conform to ASTM 920, Type S, Grade NS, Class 25. Provide one sample tube, Product Data, Manufacturer’s Instructions and Material Safety Data Sheet.

2.05 Installation: Joint locations and details, including materials and methods of installation of joint fillers and sealants, shall be as specified, shown on the drawings and as directed. In no case shall any fixed metal be continuous through an expansion or contraction joint.

2.07 Expansion Joint Sealant: Joints shall not be sealed when the sealant, air or concrete temperature is less than 40 degrees F. Joints shall be filled to 1/4 inch from the surface with 03150, 2.02 expansion joint filler material, premolded, or Government approved material. Joint surfaces shall be clean, dry and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joints shall be filled with a minimum 1/4 inch thick and flush with joint sealant in accordance with the manufacturer's recommendations.

2.09 Construction Joints: Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval by the Contracting Officer or their representative. Unless otherwise indicated and except for slab on grade, reinforcing steel shall extend through construction joints. Prior to placing additional concrete horizontal construction joints, surfaces to receive concrete shall be free from frost, ice, mud, and water. Embedded items shall be clean of any deleterious substance and coated with epoxy.

END OF SECTION

03200 CONCRETE REINFORCEMENT

1.01 Scope: The work covered by this section consists of furnishing all equipment, materials and labor for providing and placing steel bars, steel welded wire fabric, and accessories for concrete reinforcement.

1.02 Related Work-Specified Elsewhere-

1. 03100 FORMWORK FOR CONCRETE

2. 03250 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE

3. 03300 CAST IN PLACE STRUCTURAL CONCRETE

1.03 Applicable Publications: The following publications of the issues listed below form a part of this specification to the extent indicate by the references thereto:

1. American Concrete Institute (ACI) Standards

ACI 315
Details and Detailing of Concrete Reinforcement

ACI 318
Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM) Standards

A 185
Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

A 370
Mechanical Testing of Steel Products

A 615
Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

A 767
Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

A 775
Epoxy-Coated Reinforcing Steel Bars

American Welding Society (AWS) Code:

D 1.4
Structural Welding Code - Reinforcing Steel

1.04 Quality Assurance: The Contractor shall assure that all workmanship and materials comply with contract specifications.

1.04 Materials

(a) Fabricated Bar Mats: Fabricated bar mats shall conform to ASTM A 184

(b) Reinforcing Steel: Reinforcing steel shall be deformed bars conforming to ASTM A 615, #5, Grade 60 unless otherwise indicated. All bars shall be epoxy coated in accordance with ASTM A 775. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82. Minimum concrete cover over bars shall be 2 inches unless otherwise indicated. Steel reinforcing shall be fabricated as indicated and placed in position in the forms within the tolerances specified in ACI 318. Reinforcement shall be adequately secured as so to remain in the proper position during the placement of the concrete. Where cover over reinforcing steel is not indicated, it shall be in accordance with ACI 318.

Welded Wire Fabric: Welded wire fabric shall conform to ASTM,185 or ASTM 497

(d) Wire Ties: Wire ties shall be 16-gage or heavier black annealed wire. Ties for epoxy coated bars shall be vinyl coated or epoxy coated. Tie wires for galvanized bars shall be galvanized.

(e) Supports: Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI DA4 and shall be steel or precast concrete blocks. Precast concrete shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates or specially designed wire-fabric supports fabricated of plastic.

1.05 Reinforcement: Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety.

1.06 Placement: Reinforcement steel and accessories shall be placed as specified and as shown on contract drawings and approved shop drawings. Placement details of steel and accessories not specified or shown on the drawings shall be in accordance with ACI 315 and ACI 318 or as directed by the Contracting Officer. Steel shall be fabricated to shapes and dimensions shown, placed where indicated within specified tolerances, and adequately supported during concrete placement. At the time of concrete placement all steel shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease, or any other coating that might reduce the bond with the concrete.

(a) Placement: Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be place in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid

interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars required to meet structural requirements, shall be approved before concrete is placed.

(b) Splicing: Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Bars may be spliced at alternate or additional locations at no additional cost to the Government, subject to the approval of the Contracting Officer. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of-each bar in the concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

1.07 Hooks and Bends: Steel may be mill or field bent. All steel shall be bent cold unless otherwise authorized. No steel bars shall be bent after being partially embedded in concrete unless indicated on the drawings or otherwise authorized.

1.08 Fabrication of Epoxy Coated Steel: Damage to the epoxy coating resulting from fabrication or subsequent to fabrication shall be repaired per ASTM A775.

1.09 Welding: Welding of steel will be permitted only where indicated on the drawings or as otherwise directed by the Contracting Officer. Welding shall be performed in accordance with AWS D 1.4 except where otherwise specified or indicated on the drawings.

1.10 Placing Tolerances

(a) Spacing: The spacing between adjacent bars and the distance between layers of bars may not vary from the indicated position by more than one bar diameter nor more than one inch.

(b) Concrete Cover: The minimum concrete cover of main reinforcement steel shall be as shown on the drawings. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER	VARIATION
6″	+ 1/2″
4″	+ 3/8″
3″	+ 3/8″
2″	+ 1/4″
1-1/2″	+ 1/4″
1″	+ 1/8″
3/4″	+ 1/8″

1.11 Installation of Dowels

(a) Drilling shall be done with a rotary or rotary-impact drill. Drilling lubricants shall not be used. Water is not considered a lubricant. Hole diameter shall be as recommended by the grout manufacturer's literature. Hole depth shall be as shown on the drawings.

(b) Drilling methods shall not cause spalling, cracking, or other damage to the concrete or masonry. Concrete spalled or otherwise damaged by the Contractor's operations shall be repaired in a manner satisfactory to the Contracting Officer. Such repair shall be done at the expense of the Contractor. The hole shall be cleaned before installation of dowels.

(c) Grouting shall be performed according to the grout manufacturer's literature. The dowel shall be inserted at least the specified depth into the hole. After insertion of the dowel, all excess grout shall be struck-off flush with the concrete face. Should the grout fail to fill the hole, additional grout shall be added to the hole to allow a flush strike-off.

1.12 Installation Of Embedded Items: Embedded items shall be free of oil, loose scale or rust, paint or other deleterious materials. Embedded items shall be installed where indicated and required to serve as the intended purpose.

END OF SECTION

03300 CAST IN PLACE STRUCTURAL CONCRETE

1.01 Related Work Specified Elsewhere:

(a) 03020 CONCRETE REMOVAL

(b) 03100 CONCRETE FORMWORK

(c) 03200 CONCRETE REINFORCEMENT

(d) 03150 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE

1.02 Reference Standards

(a) American Concrete lnstitute (ACI) Standards with Corresponding CRD Standard indicated Where Available

ACI 211.1
Standard Practice for Selecting Proportions (CRD-C 99) for Normal Heavyweight and Mass Concrete

ACI 214
Evaluation of Strength Test Results of Concrete

ACI 305
Hot Weather Concreting

ACI 318
Building Code Requirements for Reinforced Concrete

(b) American Society for Testing and Materials (ASTM) with Corresponding CRD Standard Indicated Where Available

C 31
Making and Curing Concrete Test Specimens in the Field

C 33 (CRD-C 133)
Concrete Aggregates

C 39 (CRD-C 14)
Compressive Strength of Cylindrical Concrete Specimens

C 70 (R 1985) (CRD-C 111)
Surface Moisture of Fine Aggregate

C 94 (CRD-C 31)
Ready-Mixed Concrete

C 125 (CRD-C 43)
Terms Relating to Concrete and Concrete Aggregates

C 136 (CRD-C 103)
Sieve Analysis of Fine and Coarse Aggregates

C 143 (CRD-C 5)
Slump of Portland Cement Concrete

C 150 (CRD-C 201
Portland Cement

C 171 (R 1986) (CRD-C 310)
Sheet Materials for Curing Concrete

C 172 (CRD-C 4)
Sampling Fresh Concrete

C 192 (CRD-C 10)
Making and Curing Concrete Test Specimens in the Laboratory

C 231 (CRD-C 41)
Air Content of Freshly Mixed Concrete by the Pressure Method

C 260 (CRD-C 13)
Air-Entraining Admixtures for Concrete

C 309 (CRD-C 304)
Liquid Membrane Forming Compounds for Curing Concrete

C 494 (CRD-C 87)
Chemical Admixtures for Concrete

C 566 (CRD-C 113)
Total Moisture Content of Aggregate by Drying

C 595 (CRD-C 203)
Blended Hydraulic Cements

C 618 (CRD-C 255)
Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

C881
Epoxy-Resin-Base Bonding Systems for Concrete

C 1017
Specification for Chemical Admixtures for use in Producing Flowing Concrete

D 75 (CRD-C 155)
Sampling Aggregates

D 98 (CRD-C 505)
Calcium Chloride

E 329 (CRD-C 500)
Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

(c) Concrete Plant Manufacturer's Bureau (CPMB)

(CRD-C 95 Concrete Plant Standards, 8th Rev., 1986 Printing.

(d) National Bureau of Standards (NBS) Handbook

H44 Specifications, Tolerance and Other Technical Requirements for Commercial Weighing and Measuring Devices (1986)

(e) U.S. Army Corps of Engineers Handbook for Cement and Concrete (CRD)

CRD-C 55
Concrete Mixer Performance

CRD-C 100
Concrete Aggregate and Aggregate Sources and Selection of Material for
Testing

CRD-C 112
Surface Moisture in Aggregate by Water Displacement

CRD-C 143
Meters for Automatic Indication of Moisture in Fine Aggregate

CRD-C 400
Water for Use in Mixing or Curing Concrete

CRD-C 521
Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

CRD-C 621
Nonshrink Grout

1.03 Quality Assurance: The contractor shall assure that all workmanship and materials comply With contract specifications.

1.04 Evaluation And Acceptance:

(a) Concrete Strength: One set of two cylinders shall be taken for each truck load of concrete. The strength of the concrete will be considered satisfactory so long as the average of the sets of test results equals or exceeds the required specified strength fc and no individual test (average of two cylinders) result falls below the specified strength fc by more than 500 pounds per square inch. Additional analysis or testing may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

(b) Investigation of Low-Strength Test Results: When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 pounds per square inch or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load carrying capacity of the

structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, C 803, or C 805 may be permitted by the Contracting Officer to determine the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.

1.05 Materials:

(a) Cementitious Materials: Cementious materials shall be portland cement in combination with portland-pozzolan cement, or portland cement in combination with pozzolan and shall conform to appropriate specifications listed below.

(b) Portland Cement: ASTM C 150, Type II low alkali when required.

(c) Portland-Pozzolan Cement: ASTM C 595, Type IP

(d) Pozzolan: Pozzolan shall conform to ASTM C 618, Class F, with the optional requirements for multiple factor, drying shrinkage, and uniformity of Table 2A.

(e) Pozzolan-Modified Portland Cement: ASTM C 595, Type I (PM)

(f) Aggregates: Aggregates shall be produced from the sources and under the conditions described in paragraph 3.1.1. Fine and coarse aggregates shall conform to the grading requirements of ASTM C 33. the nominal maximum size shall be as listed in paragraph 7.2. Where the use of highway department gradations are permitted, proposed gradations shall be submitted for approval.

(g) Admixtures: Admixtures to be used, when required or permitted, shall conform to the appropriate specification listed below:

(h) Air-Entraining Admixture: ASTM C 260

(i) Accelerating Admixture: Calcium chloride shall not be used. Other accelerators shall meet the requirements of ASTM C 494, Type C.

(j) Water-Reducing or Retarding Admixtures: ASTM C 494, Type A, B, or D

(k) High-Range Water Reducer: ASTM C 494, Type F or G. The admixture may be used only when approved by the Contracting Officer, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan.

1.06 Water: Water for mixing and curing shall be fresh, clean, drinkable, and free of injurious amounts of oil, acid, salt, or alkali, except that undrinkable water may be used if it meets the requirements of CRD-C 400.

1.07 Nonshrink grout: Nonshrink grout shall conform to CRD-C 621 and shall be a commercial formulation suitable for the application proposed. Installation shall follow all manufacturers recommendations.

1.08 Mixture Proportioning:

(a) Quality and Location: For each portion of the structure, mixture proportions shall be selected so that the following strength and water-cement ratio requirements are met.

Strength: Specified compressive strength fc shall be as follows

Compressive Strength, PST	Structure or Portion of Structure
4,000 @ 28 days	All

Maximum Water-Cement Ratio: Maximum water-cement ratio shall be as follows:

Water-Cement Ratio, by wt	Structure or Portion of Structure
.4	All

(b) Nominal Maximum-Size Coarse Aggregate: Nominal maximum-size coarse aggregate shall be 1 inch, except 3/4-inch nominal maximum-size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 7-1/2 inches, the depth of the slab is less than 4-1/2 inches, or the minimum clear spacing between reinforcing is less than 2 inches, and 3/8 inch nominal maximum-size coarse aggregate shall be used for surface patching of existing concrete.

(c) Air Content: Air content as determined by ASTM C 231 shall be between 5.5 and 9.5 percent except that when the nominal maximum-size coarse aggregate is 3/4 inch or less, it shall be between 6.5 and 9.5 percent

(d) Slump: The slump shall be determined in accordance with ASTM C 143 and shall be within the range of 2 1/2 to 4 inches. Where placement by pump is approved, the slump shall not exceed 6 inches and shall remain within a 3-inch band. Samples of approved aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer’s test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI Standard 211.1, using at least three different water-cement ratios, which will produce a range of strength encompassing those required for the work. The target water-cement ratios required in paragraph 7.1.2 will be converted to a weight ratio of water to cement plus pozzolan by weight equivalency as described in ACI Standard 211.1. Trial mixtures shall be designed for maximum permitted slump and air content. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39.

(e) Average Strength: In meeting the strength requirements specified in Section 03300 CAST IN PLACE STRUCTURAL CONCRETE 1.08 (a) above, the selected mixture proportion shall produce an average strength fcr exceeding the specified strength fc by the amount indicated below. Where a concrete production facility has test records, a standard deviation shall be established. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected, shall represent concrete produced to meet a specified strength or strengths (fc) within 1,000 pounds per square inch of that specified for proposed work, and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another test age designated for determination of fc.

(f) Required Average Compressive Strength fcr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

fcr = f c + 1 34S where S = standard deviation

fcr = f c + 2.33S - 500

(g) Modification Factor for Standard Deviation: Where a concrete production Facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation may be established as the product of the calculated standard deviation and a modification factor from the following table:

No. of Tests*	Modification Factor for Standard Deviation
less than 15	Use tabulation in C.3.16 (h)
15	1.16
20	1.08
25	1.03
30 or more	1.00

* Interpolate for intermediate numbers of tests.

(h) Determining Required Average Strength: When a concrete production facility does not have field strength test records for calculation of the standard deviation, the required average strength fcr shall be determined as follows:

If the specified compressive strength fc is 3,000 to 5,000 psi, fcr = fc + 1,200.

1.07 Batching Tolerances:

(a)Weighing, Tolerances: Whichever of the following tolerances is greater shall apply, based on required scale reading.

Material	Percent of Required Weight	Percent of Scale Capacity
Cementitious materials	+1	±0.3
Aggregate	±2	±0.3
Water	+1	±0.3
Admixture	±3	±0.3

(b)Volumetric Tolerances: For volumetric batching equipment, the following tolerances shall apply to the required volume of material being batched:

Water: Plus or minus 1 percent.

Admixtures: Plus or minus 3 percent

(c) Moisture Control: The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and t change the weights of the materials being hatched. (An electric moisture meter complying with the provisions of CRD-C 143 shall be provided for measuring moisture in the fine aggregate. The sensing element shall be arranged so that the measurement is made near the batcher charging gate of the sand bin or in the sand batcher.)

(d) Grading: When the amount of fine aggregate passing any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Contracting Officer, and immediate steps shall be taken to rectify the situation.

(e) Scales: Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracy’s shall be corrected immediately.

END OF SECTION

03302 CONVEYING CONCRETE

1.01 General: Concrete shall be conveyed from a mixer to forms as rapidly as practicable and within the time interval in Section 03303 CONCRETE PLACEMENT 1.01 (c) by methods that will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper that is conical in shape and shall not be dropped vertically more than 8 feet, except where suitable equipment is provided to prevent segregation and where specifically authorized.

(a) Buckets: Bucket design shall be such that concrete of the required slump can be readily discharged. The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

(b) Transfer Hoppers: Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and have conical-shaped discharge features. The machine shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete and facile discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

(c) Trucks: Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94. Nonagitating equipment may be used for transporting plant-mixed concrete over a smooth road when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded comers to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

(d) Chutes: When concrete can be placed directly from a truck mixer or other transporting equipment, chutes attached to the equipment may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete except when specifically approved.

(e) Belt Conveyors: Belt conveyors may be used when approved. Belt conveyors shall be designed for conveying concrete and shall be operated to assure a uniform flow of concrete to the final place

of deposit without segregation or loss of mortar. Such conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars. In no case shall concrete be discharged to free fall through the reinforcing bars. Conveyors shall be provided with positive means for preventing segregation of the concrete at transfer points and point of placement.

(f) Pumps: Concrete may be conveyed by positive placement pumps when approved. Pump shall be the piston or squeeze pressure type. Pipeline shall be steel pipe or heavy duty flexible hose. Inside diameter of the pipe shall be at least three times the maximum size of the coarse aggregate. Distance to be pumped shall not exceed the limits recommended by pump manufacturer. Concrete shall be supplied to the pump continuously. When pumping is completed, the concrete remaining in the pipeline shall be ejected without contaminating the concrete in place. After each use, the equipment shall be thoroughly cleaned. Flushing water shall be wasted outside the forms.

END OF SECTION

03303 CONCRETE PLACEMENT

1.01 Preparation For Placing:

(a) General: Foundation or construction joints, forms, and embedded items shall be inspected in sufficient time prior to each placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

(b) Embedded Items: Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids.

(c) Concrete on Earth Foundations: Earth surfaces upon which concrete is to be placed shall be clean, damp, and free from frost, ice, and standing or running water. Prior to placement of concrete, the earth foundation shall have been satisfactorily compacted in accordance with the provisions of Section 02200 EARTHWORK.

(d) Concrete on Rock Foundations: Rock surfaces upon which concrete is to be placed shall be clean, free from oil, standing or running water, ice, mud, droumy rock, coating, debris, and loose, semidetached or unsound fragments. Faults or seams shall be cleaned to a satisfactory depth and to firm rock on the sides. Immediately before the concrete is placed, all rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as defined in Section 03303 CONCRETE PLACEMENT 1.01 (e through j). All rock surfaces shall be kept continuously wet for at least 24 hours immediately prior to placing concrete thereon. All approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar approximately similar to that in the concrete mixture.

(e) General: Concrete surfaces to which other concrete is to be bonded shall be prepared for receiving the next lift or adjacent concrete by cleaning with either air-water cutting, sandblasting, high- pressure water jet, or other approved method.

(f) Air-Water Cutting: Air-water cutting of a construction joint shall be performed at the proper time and only on horizontal construction joints. The surface shall be cut with an air-water jet to remove all laitance and to expose clean, sound, fine aggregate, but not so as to undercut the edges of the larger particles of aggregate. The air pressure used in the jet shall be 100 pounds per square inch plus-or minus 10 pounds per square inch, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Contracting Officer, a retarder complying with the requirements of CRD-C 94 may

be applied to the surface of the lift in order to prolong the period of time during which air-water cutting is effective. Prior to receiving approval, the Contractor shall furnish samples of the material to be used and shall demonstrate the method to be used in applications. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. The surface shall again be washed just prior to placing the succeeding lift. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, sandblasting will be required as the last operation before placing the next lift.

(g) High-Pressure Water Jet: A stream of water under a pressure of not less than 3,000 pounds per square inch may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard s' that only the surface skin or mortar is removed and there is no undercutting of coarse aggregate particles. Where the cleaning occurs more than 2 days prior to placing the next lift or where work in the area subsequent to the cleaning causes dirt or debris to be deposited on the surface, the surface shall be cleaned again as the last operation prior to placing the next lift. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

(h) Sandblast: When employed in the preparation of construction joints, sandblasting shall be performed as the final operation completed before placing the following lift. The operation shall be continued until all accumulated laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall then be washed thoroughly to remove all loose materials. The surface shall again be washed just prior to placing the succeeding lift.

(i) Waste Disposal: The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

(j) Surface Condition: The surface of the lift shall be damp at the time of placement of the next lift and shall be free of standinq water.

1.02 Placing:

(a) General: Concrete shall be handled from mixer to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 4 feet except where suitable equipment is provided to prevent

segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screed to the proper level to avoid excess shimming or grouting. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation. Concrete shall be deposited as close as possible to its final position in the forms and, in so depositing, there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it may be effectively consolidated in horizontal layers 1-1/2 feet or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. The surfaces of construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing concrete. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed.

(b) Placing: The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed, and method of placement. A report shall be submitted in writing to the Contracting Officer. The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

(c) Time Interval Between Mixing and Placing: Concrete shall be placed within 30 minutes after discharge into nonagitating equipment. Mixed concrete which is transported in truck mixers or agitators or concrete which is truck mixed, shall be discharged within 1 1/2 hours or before the drum has revolved 300 revolutions, whichever comes first after the introduction of the cement to the aggregates. When the length of haul makes it impossible to deliver truck-mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the construction site. These limitations may be waved by the Government if the concrete is of such slump after the 1 1/2 hour time or 300 revolution limit has been reached that it can be placed, without the addition of water to the batch. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the truck.

(d) Cold Weather Requirements: Special protection measures, approved by the Contracting Officer or their representative, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of the surfaces to receive concrete shall be shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, calcium chloride or chemical admixture conforming to ASTM C 494 Type C or E may be used. The amount of calcium chloride shall not exceed 3 percent by weight of the cement, and it shall be batched in solution form. Calcium chloride shall not be used where concrete will be in contact with aluminum or zinc-coated items, or where sulfate resistant or prestressed concrete is specified. Concrete shall not be placed without an approved procedure when the concrete is likely to be subjected to freezing temperatures before the expiration of the curing period. Heating of the mixing water or aggregates will be required to regulate the concrete-placing temperatures.

(e) Hot Weather Requirements: The concrete placing temperature shall not exceed 80 degrees F. Cooling of the mixing water and/or aggregates will be required to obtain an adequate placing temperature. An approved retarder may be used to facilitate placing and finishing. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature. In no case shall the placing temperature exceed 95 degrees F.

(f) Consolidation: Immediately after placing, each layer of concrete shall be consolidated by internal vibrators. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 8000 vibrations per minute, and the head diameter and amplitude shall be appropriate for the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1 1/2 times the radius of action of the vibrator so that area being vibrated will overlap the adjacent just-vibrated area by a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then withdrawn slowly. The use of form vibrators must be specifically approved. Vibrators shall not be used to transport concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation and flotation of course aggregate shall be avoided. Vibrators shall not be

used to transport concrete within the forms. Hand spading may be required if necessary with internal vibrating along formed surfaces permanently exposed to view. Form or surface vibrators shall not be used unless specifically approved. Vibrators of the proper size, frequency, and amplitude shall be used for the type of work being performed.

(g) Vibrators: The frequency and amplitude of each vibrator shall be determined in accordance with CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing.

(h) Admixtures: Admixtures shall be batched within an accuracy of 3 percent. Where two or more admixtures are used in the same batch, they shall be batched separately and must be compatible. Retarding admixture shall be added one minute after addition of water is complete or in the first quarter of the required mixing time, whichever is first. Concrete that shows evidence of total collapse or segregation caused by the use of admixture shall be removed from the site.

(i) Control of Mixing Water: No water from the truck system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the jobsite, the slump of the concrete is less than specified. Water added to bring the slump within the specified range shall not change the total water in the concrete to the point that the approved water-cement ratio is exceeded. The drum shall be turned an additional 30 revolutions, or more, if necessary, until the added water is uniformly mixed into the concrete. Water shall not be added to the batch at any later time.

END OF SECTION

03304 FINISHING CONCRETE

1.01 Formed surfaces:

(a) General: After form removal, all fins and loose materials shall be removed. All voids and honeycombs exceeding 1/2 inch in diameter and all tie-rod holes permanently exposed to view shall be reamed or chipped and filled with dry-pack mortar. Defective areas larger than 36 square inches in any surface, permanently exposed or not, shall be delineated in a rectangular shape by a saw cut a minimum depth of 1 inch. All defective concrete in the delineated area shall be removed and replaced with carefully placed and compacted concrete. The cement used in the mortar or concrete for all surfaces permanently exposed to view shall be a blend of portland cement and white cement properly proportioned so that the final color when cured will be the same as adjacent concrete. Temperature of the concrete, ambient air, replacement concrete, or mortar during remedial work including curing shall be above 50 degrees F. The prepared area shall be dampened, brush-coated with a neat cement grout or with an approved epoxy resin, and filled with mortar or concrete. The mortar shall consist of I part cement to 2-1/2 parts fine aggregate. The quantity of mixing water shall be the minimum necessary to obtain a uniform mixture and to permit placing. Mortar shall be thoroughly compacted in place and struck off to adjacent concrete. Replacement concrete shall be drier than the usual mixture and thoroughly tamped into place and finished. Forms shall be used if required. Metal tools shall not be used to finish permanently exposed surfaces. The patched areas shall be cured for 7 days. Forms shall not be reused if there is any evidence of surface wear or defects that would impair the quality of the surface.

(b) Repair Of Surface defects: Surface defects shall be repaired within 24 hours after the removal of forms. Honeycombed and other defective areas shall be cut back to solid concrete or to a depth of not less than 2 inch, whichever is greater. Edges shall be cut perpendicular to the surface of the concrete. The prepared areas shall be dampened and brush-coated with a neat cement grout. The repair shall be made using mortar consisting of not more than one part cement to 2 1/2 parts sand. The mixed mortar shall be allowed to stand to stiffen (approximately 45 minutes), during which time the mortar shall be intermittently remixed without the addition of water. After the water has attained the stiffest consistency that will permit placing, the patching mix shall be thoroughly tamped into place by means approved by the contracting Officer or their representative and finished slightly higher than the surrounding surface. Holes left after the removal of form ties shall be cleaned and filled with patching mortar. Holes left by removal of tie rods shall be reamed and filled by dry-packing. Repaired surfaces shall be cured as required. The temperature of concrete, mortar patching material, and ambient air shall be above 50 degrees F while making repairs and during the curing period. Concrete with defect which affect the strength of the member or with excessive honeycombs will be rejected, or the defects shall be corrected as directed.

(c) Rubbed Finish: A rubbed finish shall be applied to exposed wall surfaces, unless indicated otherwise. Fins exceeding 1/8 inch in height shall be chipped, rubbed or ground off. After removal of forms, the prepared areas shall be dampened and brush-coated with a neat cement grout as specified in Section 03304 FINISHING CONCRETE 1.01 (a).

(d) Class "A" Finish: This class of finish shall apply to all formed surfaces. The form facing material shall be composed of new, well-matched tongue and groove lumber; or new plywood panels conforming to NBS Product Standard PS-1 grade B-B concrete form class 1.

2.01 Unformed Surfaces:

(a) General: The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 50 degrees F. In hot weather when the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305, may reasonably be expected to exceed 0.2 pound per square foot per hour, provisions for windbreaks, shading, fog spraying, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow. All unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, unless a trowel finish is specified, and shall be true to the elevation shown on the drawings. Surfaces to receive-additional concrete or backfill shall be brought to the elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless otherwise shown on the drawing or as directed. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions.

(b) Float Finish: Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No water, cement, or mortar shall be added to the surface during the finishing operation. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of suitable hand floats or power-driven equipment. Hand floats shall be made of magnesium or aluminum. Tolerance for a floated finish shall be true plane within 5/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

(c) Trowel Finish: Trowel finish shall be given immediately following floating. Surfaces shall be trowelled to produce smooth, dense finish free from blemishes including trowel marks. In lieu of hand finishing, an approved power finishing machine may be used in accordance with the directions of the machine manufacturer. A final hard steel troweling shall be done by hand. Trowel finish will be specified for most wearing surfaces and where a smooth finish is required. Tolerance shall be true planes within 5/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

(d) Broom Finish: A broom finish shall be applied to concrete inverts and other walking surfaces, unless indicated otherwise. The concrete surface shall be finished with a float finish and trowel finish. The troweled surface shall be broomed with a fiber-bristle brush in a direction transverse to that of the main traffic.

(e) Rubbed Finish: A rubbed finish shall be applied to exposed wall surfaces, unless indicated otherwise. Fins exceeding 1/8 inch in height shall be chipped, rubbed or ground off. After removal of forms, the prepared areas shall be dampened and brush-coated with a neat cement grout as specified in 03304, 1.01 (a).

END OF SECTION

03305 CONCRETE CURING

1.01 General: All concrete shall be cured by an approved method for 7 days.

1.02 Curing: Immediately after placement, concrete shall be protected from premature drying extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. Air and forms in contact with the concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure and heaters and ducts shall be placed and directed so as not to create fire hazards. All materials and equipment needed for adequate curing and protection shall. be available and at the site prior to placing concrete. Concrete shall be protected from the damaging effects of rain for 12 hours and from flowing water for 7 days. Concrete shall be protected until hardened enough to prevent deformation by humans. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time. Curing shall conform to ACI 308, as approved.

1.03 Moist Curing: Concrete moist-cured shall be maintained continuously (not periodically) wet for the entire curing period. If water or curing materials stain or discolor concrete surfaces that are to be permanently exposed, they shall be cleaned as required in 03100, 2.13. Where wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Horizontal surfaces may be moist cured by ponding, by covering with a minimum uniform thickness of 2 inches of continuously saturated sand, or by covering with saturated nonstaining burlap or cotton mats.

1.04 Cold Weather: When the daily outdoor low temperature is less than 32 degrees F, the temperature of the concrete shall be maintained above 40 degrees F for the first 7 days after placing. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by observation of ambient and concrete temperatures indicated by suitable thermometers furnished by the Contractor as required and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed.

1.05 Cold Weather Protection: At least once a day during the curing period, an inspection shall be made of all areas subject to cold-weather protection. Deficiencies shall be noted. During removal of protection, measurement of concrete and ambient temperature shall be made at least hourly. A report shall be submitted in writing to the Contracting Officer.

1.06 Inspection: At least once each day during the curing period, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be reported in writing. When a daily inspection report lists an area of inadequate curing, the required curing period for that area shall be extended by 1 day.

1.07 Protection: When any concrete temperature during the period of protection or protection removal fails to comply with the specifications, that fact shall be reported to the Contracting Officer, and immediate steps should be taken to correct the situation.

1.08 Reports: All results of tests shall be reported as required. The Contracting Officer has the right to examine all Contractor quality control records.

2.01 Curing Materials:

2.02 Burlap: This material shall meet the requirements of Section 711-06 (NYSDOT Std. Spec.)

2.03 The use of curing compounds will not be allowed in this contract.

END OF SECTION

03315 CONCRETE SAMPLING AND TESTING

1.01 General. Sampling and testing is the responsibility of the Contractor and shall be performed by an approved independent commercial testing laboratory. Field testing shall be performed in the presence of the Government Representative. The Contractor shall perform the inspection and tests described in this contract, and based upon the results of these inspections and tests, shall take appropriate action. The individuals who sample and test concrete or the constituents of concrete as required in this contract shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing technicians, Grade 1.

1.02 Slump: One slump test shall be made per truckload or per batch of concrete mixed, on site in accordance with ASTM C 143. Tests shall be performed in accordance with ASTM C 143. Whenever tests approach the upper or lower limits, an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total free water does not exceed that amount specified in the approved mixture proportions based on the free water available with the fine aggregate and that amount of water batched. If the adjustments to the batch weights or water and fine aggregate do not satisfactorily produce the required slump, the mixture shall be reproportioned to meet the specified criteria and resubmitted to the Contracting Officer for approval. When a single slump is outside the control limits, such adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever the slump exceeds the upper limit, the concrete shall not be delivered to the forms. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a slump above the upper control limit, the slump shall be considered to be out of control, and additional testing for aggregate moisture content shall be undertaken. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector.

1.03 Aggregates: Aggregates for normal weight concrete shall be sampled and tested in accordance with ASTM C 33. Gradation tests shall be performed on the first day and every day thereafter during concrete construction.

(a) Deleterious Substances: When in the opinion of the Contracting Officer a problem exists in connection with deleterious substances in fine or coarse aggregates, tests shall be made in accordance with ASTM C 33 at a frequency not less than one per week. Results of tests shall be reported in writing. When the results for a deleterious substance are outside the specification limit, the aggregate shall be resampled and retested for the deleterious substance that failed. If the second sample fails, that fact shall be reported-to the Contracting Officer. When material finer than No. 200 sieve for coarse aggregate exceeds the specification limit, immediate steps, such as washing or other corrective actions, shall be initiated.

1.04 Sampling of Concrete: Samples of concrete for air, slump, unit weight, and strength tests shall be taken in accordance with ASTM C 172

1.05 Air Content: Test for air content shall be performed in accordance with ASTM C 173 or ASTM C 231. A minimum of one test per truckload of concrete mixed shall be conducted on site. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Whenever air content approachs the upper or lower limits, an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit, such adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever a test falls above the upper limit, the dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility. Whenever two consecutive tests are outside the limits, the Contracting Officer shall be notified. Whenever the air content departs from the specified range, the concrete shall not be delivered to the forms.

1.06 Test Cylinders: Cylinders for acceptance tests shall be molded and cured in accordance with ASTM C 31. Cylinders shall be tested in accordance with ASTM C 39. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days.

1.07 Evaluation Of Results: The compressive strength will be considered satisfactory if the averages of all sets of two consecutive strength test results equal or exceed the specified strength and no individual strength test result falls below the required strength by more than 500 pounds per square inch.

1.08 Investigation Of Low-Strength Results: When any strength test of standard-cured test cylinder falls below the specified strength requirement by more than 500 pounds per square inch, steps shall be taken to insure the integrity of the structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, ASTM C 803 or ASTM C 805 may be permitted by the Contracting Officer to determine the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.

1.09 Mixer Uniformity:

(a) General: The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The-mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased or adjustments shall be made to the mixer until compliance is achieved.

(b) Concrete Plant Mixer: Concrete plant mixers shall be tilting, nontilting, horizontal-shaft, vertical-shaft type, or pug mill type and shall be provided with an acceptable device to lock the discharge ' mechanism until the required mixing time has elapsed. The mixing time

and uniformity shall conform to all the paragraphs in ASTM C 94 applicable to central-mixed concrete. At the start of concrete placing, and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined. The tests shall be performed in accordance with ASTM C 94. Whenever adjustments in mixer or increased mixing times are necessary because of failure of any mixer to comply, the mixer shall be retested after adjustment. Results of tests shall be reported in writing.

(c) Truck Mixers: Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. At the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of blades may be regarded as satisfactory. Results of tests shall be reported in writing.

(d) Batch-Plant Control: The measurement of all constituent materials including cement, pozzolan, slag, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining admixture shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batched aggregate and water weights per cubic yard for each class of concrete batched during plant operation. The report shall be submitted to the Contracting Officer.

1.10 Results Of Testing: The results of all testing shall be forwarded to the Contracting Officer's Representative as soon possible in writing.

END OF SECTION