RFP NO. W912DW-12

DATE: 24 JUN 2012

US Army Corps
of Engineers
Seattle District

Qwuloolt Estuary Restoration

Marysville, WA

95% Review

DB-SP JOB# 12026

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BID SCHEDULE

Item No.	Description of Item	QTY	Unit	Unit Price	Amount
BASE ITEMS					
0001	All work for Phase 1 to Restore Qwuloolt Estuary.	1	JOB	L.S.	_____
0002	All work for Phase 2 to Restore Qwuloolt Estuary, except item 0004.	1	JOB	L.S.	_____
0003	All work for As-Built Drawings as specified in Section 01 78 00 from preparation to final approval.	1	JOB	L.S.	$25,000
				TOTAL BASE ITEMS	_____
OPTIONAL ITEMS					
0004	All work to Breach Ebey Slough Dike.	1	JOB	L.S.	_____
				TOTAL OPTIONAL ITEMS	_____
				TOTAL ALL ITEMS	_____

NOTES:

L.S.: Lump Sum

1. The dollar amounts established in Items No. 0003 shall not be revised by bidders.

-- End of Bid Schedule --

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SC-1. COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK (APR 1984) (FAR 52.211-10):

The Contractor will be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) to prosecute the work diligently, and (c) to complete the entire work ready for use as shown below. The time stated for completion shall include final cleanup of the premises.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed by __ . The completion date will be extended by the number of calendar days after the above date that the Contractor receives the notice to proceed, except to the extent that the delay in issuance of the notice to proceed results from the failure of the Contractor to execute the contract and give the required performance and payment bonds within the time specified in the offer.

Exception to Completion Period(s): However, the time of completion may be extended for seeding, sodding, and planting, if the establishment of same is not feasible within the above stated completion period(s). As directed or approved by the Contracting Officer, an extension will be predicated on the Contractor accomplishing the work in the first subsequent planting period.

SC-2 OPTION FOR INCREASED QUANTITY:

a. The Government may increase the quantity of work awarded by exercising (one or more of the) (the) Optional Bid Item(s) at any time, or not at all, but no later than calendar days after receipt by Contractor of notice to proceed. Notice to proceed on work Item(s) added by exercise of the option(s) will be given upon execution of consent of surety.

b. The parties hereto further agree that any option herein shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mail.

c. The time allowed for completion of any optional items awarded under this contract will run concurrently with the performance period for the base item(s), and will be measured from the date of receipt of the notice to proceed for the base item(s).

SC-3. LIQUIDATED DAMAGES - CONSTRUCTION (SEP 2000) (FAR 52.211-12):

a. If the Contractor fails to complete the work within the time specified in the Contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of $859 for each day of delay until the work is completed or accepted.

b. If the Government terminates the Contractor's right to proceed, the resulting damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess cost of repurchase under the Termination clause of the CONTRACT CLAUSES.

c. Exception to Liquidated Damage: In case the Contracting Officer determines that completion of work stated above in paragraph Exception to Completion Period(s) is not feasible during the completion period(s) stated in SC-1, such work will be exempted from liquidated damages.

SC-4. TIME EXTENSIONS (SEPT 2000) (FAR 52.211-13):

Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the Contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

SC-5. INSURANCE - WORK ON A GOVERNMENT INSTALLATION (JAN 1997) (FAR 52.228-5):

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance period of this Contract at least the kinds and minimum amounts of insurance required in the Insurance Liability Schedule or elsewhere in the Contract.

(b) Before commencing work under this Contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective:

(1) For such period as the laws of the State in which this Contract is to be performed prescribe; or

(2) Until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this Contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the Contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

SC-6. REQUIRED INSURANCE IN ACCORDANCE WITH FAR 28.307-2:

(a) Workers’ compensation and employer's liability: Contractors are required to comply with applicable Federal and State workers' compensation and occupational disease statutes. If occupational diseases are not compensable under those statutes, they shall be covered under the employer's liability section of the insurance policy, except when Contract operations are so commingled with a Contractor's commercial operation that it would not be practical to require this coverage. Employer's liability coverage of at least $100,000 shall be required, except in states with exclusive or monopolistic funds that do not permit workers' compensation to be written by private carriers.

(b) General Liability:

(1) The Contracting Officer shall require bodily injury liability insurance coverage written on the comprehensive form of policy of at least $500,000 per occurrence.

(2) Property damage liability insurance shall be required only in special circumstances as determined by the agency.

(c) Automobile liability: The Contracting Officer shall require automobile liability insurance written on the comprehensive form of policy. The policy shall provide for bodily injury and property damage liability covering the operation of all automobiles used in connection with performing the Contract. Policies covering automobiles operated in the United States shall provide coverage of at least $200,000 per person and $500,000 per occurrence for bodily injury and $20,000 per occurrence for property damage. The amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

(d) Aircraft public and passenger liability: When aircraft are used in connection with performing the Contract, the Contracting Officer shall require aircraft public and passenger liability insurance. Coverage shall be at least $200,000 per person and $500,000 per occurrence for bodily injury, other than passenger liability, and $200,000 per occurrence for property damage. Coverage for passenger

liability bodily injury shall be at least $200,000 multiplied by the number of seats or passengers, whichever is greater.

(e) Vessel liability: When Contract performance involves use of vessels, the Contracting Officer shall require, as determined by the agency, vessel collision liability and protection and indemnity liability insurance.

(f) Environmental Liability: If this contract includes the transport, treatment, storage, or disposal of hazardous material waste the following coverage is required.

The Contractor shall ensure the transporter and disposal facility have liability insurance if effect for claims arising out of the death or bodily injury and property damage from hazardous material/waste transport, treatment, storage and disposal, including vehicle liability and legal defense costs in the amount of $1,000,000.00 as evidenced by a certificate of insurance for General, Automobile, and Environmental Liability Coverage. Proof of this insurance shall be provided to the Contracting Officer.

SC-7. PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) (FAR 52.236-1):

The Contractor shall perform on the site, and with its own organization, work equivalent to at least 15% of the total amount of work to be performed under the Contract. The percentage may be reduced by a supplemental agreement to this Contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

SC-8. PHYSICAL DATA (APR 1984) (FAR 52.236-4):

Data and information furnished or referred to below is for the Contractor's information. The Government will not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) Physical Conditions: The indications of physical conditions on the drawings and in the specifications are the result of site investigations by test holes shown on the drawings.

(b) Weather Conditions: Each bidder shall be satisfied before submitting his bid as to the hazards likely to arise from weather conditions. Complete weather records and reports may be obtained from any National Weather Service Office.

(c) Transportation Facilities: Each bidder, before submitting his bid, shall make an investigation of the conditions of existing public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress at the jobsite. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of the work.

(d) Right-of-Way: The right-of-way for the work covered by these specifications will be furnished by the Government, except that the Contractor shall provide right-of-way for ingress and egress across private property where necessary to gain access to the jobsite. The Contractor may use such portions of the land within the right-of-way not otherwise occupied as may be designated by the Contracting Officer. The Contractor shall, without expense to the Government, and at any time during the progress of the work when space is needed within the right-of-way for any other purposes, promptly vacate and clean up any part of the grounds that have been allotted to, or have been in use by, him when directed to do so by the Contracting Officer. The Contractor shall keep the buildings and grounds in use by him at the site of the work in an orderly and sanitary condition. Should the Contractor require additional working space or lands for material yards, job offices, or other purposes, he shall obtain such additional lands or easements at his expense.

(e) Condition of Area: The condition of the area when last surveyed is shown on the drawings. Topography is in feet and represents elevation with reference to mean lower low water (M.L.L.W.).

(f) Obstruction of Channel: The Government will not undertake to keep the channel free from vessels or other obstructions, except to the extent of such regulations, if any, as may be prescribed by the Secretary of the Army, in accordance with the provisions of Section 7 of the Rivers and Harbors Act approved 8 August 1917. The Contractor will be required to conduct the work in such manner as to obstruct navigation as little as possible, and in case the Contractor's plant so obstructs the channel as to make difficult or endanger the passage of vessels, said plant shall be promptly moved on the approach of any vessel to such an extent as may be necessary to afford a practicable passage. Upon the completion of the work, the Contractor shall promptly remove his plant, including ranges, buoys, piles, and other marks placed by him under the Contract in navigable waters or on shore.

(g) Datum and Bench Marks: The plane of reference of M.L.L.W. as used in these specifications is that determined by the benchmarks, as shown on the drawings.

SC-9. LAYOUT OF WORK (APR 1984) (FAR 52.236-17):

The Contractor shall lay out its work from Government-established base lines and benchmarks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due, or to become due, to the Contractor.

SC-10. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)-(EFARS 52.231-5000):

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region _____. {VIII Oregon, Washington & Idaho, IV Montana } Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that

actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

(e) Copies of EP1110-1-8 “Construction Equipment Ownership and Operating Expense Schedule” Volumes 1 through 12 are available in Portable Document Format (PDF) and can be viewed or downloaded at http://www.nww.usace.army.mil/cost/obtain_current.asp. A CD-ROM containing (Volumes 1-12) is available through either the Superintendent of Documents or Government bookstores. For additional information telephone 202-512-2250, or access on the Internet at http://bookstore.gpo.gov/.

SC-11. PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAR 1995)-(EFARS 52.232-5000):

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to: (1) materials required by the technical provisions; or (2) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: Any other construction material stored offsite may be conidered in determining the amount of a progress payment.

SC-12. FIELD OFFICE OVERHEAD (JUL 2006)

Notice to Offerors: You must declare the accounting practice that you apply to contracts to calculate field office overhead for all change orders, modifications, and requests for equitable adjustment. Pursuant to Federal Acquisition Regulation (FAR) Parts 31. 105(d)(3) and 31.203(d)(1), an accounting practice that varies from modification to modification is not allowable. Select one of the following:

(a) TIME DISTRIBUTION BASE FOR A PER DIEM RATE:

If you use this practice, see Special Contract Requirement "Field Office Overhead - Per Diem Rate"

(b) DIRECT COST DISTRIBUTION BASE FOR A PERCENTAGE MARKUP:

If you use this practice, see Special Contract Requirement "Field Office Overhead - Percentage Markup"

(c) OTHER ACCOUNTING PRACTICE THAT IS ALLOWABLE UNDER THE FAR AND THAT USES A SINGLE DISTRIBUTION BASE:

If you choose (c), you must describe the accounting practice in sufficient detail below to allow the Contracting Officer to determine what accounting practice IS being utilized by your company and that it complies with the criteria for acceptable accounting practices as set out in FAR Parts 31. 105(d)(3) and 31.203(d)(1).

SC-13. FIELD OFFICE OVERHEAD – PER DIEM RATE (JUL 2006):

The Contracting Officer shall make an equitable adjustment and modify the contract in writing for any change to the contract, issued pursuant to the Changes clause or otherwise, for which the Government is responsible, and which causes either an increase or decrease in the Contractor's costs as to time or performance under the contract. Under such an equitable adjustment, the Contractor's field office overhead shall be an allowable cost, in accordance with the Contractor's accounting practice as identified by the Contractor in its bid schedule.

The Contractor shall declare which standard form of accounting practice it applies to field overhead costs: if a contractor indicates that it follows a per diem basis, no overhead percentage markup rate for office overhead costs shall be allowed.

Under such an equitable adjustment, the Contractor shall be reimbursed for field office overhead on a per diem basis when the completion of the contract is extended by reason of the change issued under any clause, except the Default clause, subject to the Contractor substantiating the variable expense by providing a detailed breakdown of its proposed increase or decrease of costs as required by the Contract Clause DFARS 252.236-7000 MODIFICATION OF PROPOSALS- PRICE BREAKDOWN. No payment of field office overhead on a per diem basis shall be allowed for any change when the completion of the contract is not extended by reason of the change.

SC-14. FIELD OFFICE OVERHEAD – PERCENTAGE MARKUP (JUL 2006):

The Contracting Officer shall make an equitable adjustment and modify the contract in writing for any change to the contract, issued pursuant to the Changes clause or otherwise, for which the Government is responsible, and which causes either an increase or decrease in the Contractor's costs as to time or performance under the contract. Under such an equitable adjustment, the Contractor's field office overhead shall be an allowable cost, in accordance with the Contractor's accounting practice as identified by the Contractor in its bid schedule.

The Contractor shall declare which standard form of accounting practice it applies to field overhead costs: if a contractor indicates that it follows a percentage basis, no per diem rate for office overhead costs shall be allowed.

Under such an equitable adjustment, payment of office overhead costs shall be allowed for any change on a percentage markup basis regardless of whether the completion of the contract is, or, is not, extended by reason of the change, except for modifications issued pursuant to the Default Clause. The Contractor shall provide a detailed breakdown of its proposed increase or decrease of costs as required by Contract Clause DFARS 252.236 - 7000 MODIFICATION OF PROPOSALS - PRICE BREAKDOWN.

SC-15. CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)(DOD FAR SUPP 252.236-7001):

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall:

(1) Check all drawings furnished immediately upon receipt.

(2) Compare all drawings and verify the figures before laying out the work.

(3) Promptly notify the Contracting Officer of any discrepancies.

(4) Be responsible for any errors which might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general—

(1) Large scale drawings shall govern small scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified in the index of drawings [attached at the end of the Special Clauses][included in Appendix B].

SC-16. PARTNERING

In order to most effectively accomplish this contract, the Government proposes to form a partnership with the Contractor to develop a cohesive building team. It is anticipated that this partnership would involve the Corps of Engineers, the End User, the Contractor, primary subcontractors and the designers. This partnership would strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership would be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs.

SC-17. PERFORMANCE EVALUATIONS:

In accordance with the provisions of Subpart 36.201(Evaluation of Contractor Performance) of the Federal Acquisition Regulation (FAR), construction contractor's performance shall be evaluated throughout the performance of the contract. The United States Army Corps of Engineers (USACE) follows the procedures outlined in Engineering Regulation 415-1-17 to fulfill this FAR requirement. For construction contracts awarded at or above $700,000.00, the USACE will evaluate contractor's performance and prepare a performance report using the Construction Contractor Appraisal Support System (CCASS), which is now a web-based system. After an evaluation (interim or final) is written up by the USACE, the contractor will have the ability to access, review and comment on the evaluation for a period of 30 days. Accessing and using CCASS requires specific software, called PKI certification, which is installed on the user's computer. The certification is a Department of Defense requirement and was implemented to provide security in electronic transactions. The certification software could cost approximately $110 - $125 per certificate per year and is purchased from an External Certificate Authorities (ECA) vendor. Current information about the PKI certification process and for contacting vendors can be found on the web site: http://www.cpars.csd.disa.mil/. If the Contractor wishes to participate in the performance evaluation process, access to CCASS and PKI certification is the sole responsibility of the Contractor.

SC-18. EPA ENERGY STAR:

Provide equipment that is rated EPA Energy Star compliant when available.

SC-19. RECOVERED MATERIALS:

The Corps of Engineers encourages all bidders to utilize recovered materials to the maximum extent practicable. The attached APPENDIX R contains procurement guidelines for products containing recovered materials.

APPENDIX R

PART 247 - COMPREHENSIVE PROCUREMENT GUIDELINE FOR PRODUCTS CONTAINING RECOVERED MATERIALS

40 CFR Ch. 1

Subpart B-Item Designations

§ 247.10 Paper and paper products.

Paper and paper products, excluding building and construction paper grades

§ 247.11 Vehicular products.

(a) Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, excluding marine and aviation oils.

(b) Tires, excluding airplane tires.

(c) Reclaimed engine coolants, excluding coolants used in non-vehicular applications.

(d) Rebuilt vehicular parts.

[60 FR 21381, May 1, 1995, as amended at 69 FR 24038, Apr. 30, 2004]

§ 247.12 Construction products.

(a) Building insulation products, including the following items:

(1) Loose-fill insulation, including but not limited to cellulose fiber, mineral fibers (fiberglass and rock wool), vermiculite, and perlite;

(2) Blanket and batt insulation, including but not limited to mineral fibers (fiberglass and rock wool);

(3) Board (sheathing, roof decking, wall panel) insulation, including but not limited to structural fiberboard and laminated paperboard products, perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites; and

(4) Spray-in-place insulation, including but not limited to foam-in-place polyurethane and polyisocyanurate, and spray-on cellulose.

(b) Structural fiberboard and laminated paperboard products for applications other than building insulation, including building board, sheathing, shingle backer, sound deadening board, roof insulating board, insulating wallboard, acoustical and non-acoustical ceiling tile, acoustical and non-acoustical lay-in panels, floor underlayments, and roof overlay (coverboard).

(c) Cement and concrete, including concrete products such as pipe and block containing:

(1) Coal fly ash;

(2) Ground granulated blast furnace slag (GGBF);

(3) Cenospheres; or

(4) Silica fume from silicon and ferrosilicon metal production.

(d) Carpet made from polyester fiber made from recovered materials for use in moderate-wear applications such as single-family housing and similar wear applications.

(e) Floor tiles and patio blocks containing recovered rubber or plastic.

(f) Shower and restroom dividers/partitions containing recovered plastic or steel.

(g)(1) Consolidated latex paint used for covering graffiti; and

(2) Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceilings, and trim; gutter boards; and concrete, stucco, masonry, wood, and metal surfaces.

(h) Carpet cushion made from bonded polyurethane, jute, synthetic fibers, or rubber containing recovered materials.

(i) Flowable fill containing coal fly ash and/or ferrous foundry sands.

(j) Railroad grade crossing surfaces made from cement and concrete containing fly ash, recovered rubber, recovered steel, recovered wood, or recovered plastic.

(k) Modular threshold ramps containing recovered steel, rubber, or aluminum.

(l) Nonpressure pipe containing recovered steel, plastic, or cement.

(m) Roofing materials containing recovered steel, aluminum, fiber, rubber, plastic or plastic composites, or cement.

[60 FR 21381, May 1, 1995, as amended at 62 FR 60974, Nov. 13, 1997; 65 FR 3081, Jan. 19, 2000; 69 FR 24038, Apr. 30, 2004]

§247.13 Transportation products.

(a) Traffic barricades and traffic cones used in controlling or restricting vehicular traffic.

(b) Parking stops made from concrete or containing recovered plastic or rubber.

(c) Channelizers containing recovered plastic or rubber.

(d) Delineators containing recovered plastic, rubber, or steel.

(e) Flexible delineators containing recovered plastic.

[60 FR 21381, May 1, 1995, as amended at 62 FR 60974, Nov. 13, 1997]

§ 247.14 Park and recreation products

(a) Playground surfaces and running tracks containing recovered rubber or plastic.

(b) Plastic fencing containing recovered plastic for use in controlling snow or sand drifting and as a warning/safety barrier in construction or other applications.

(c) Park benches and picnic tables containing recovered steel, aluminum, plastic, or concrete.

(d) Playground equipment containing recovered plastic, steel, or aluminum.

[60 FR 21381, May 1, 1995, as amended at 62 FR 60974, Nov. 13, 1997; 65 FR 3081, Jan. 19, 2000]

§ 247.15 Landscaping products.

(a) Hydraulic mulch products containing recovered paper or recovered wood used for hydroseeding and as an over-spray for straw mulch in landscaping, erosion control, and soil reclamation.

(b) Compost made from yard trimmings, leaves, grass clippings, and/or food waste for use in landscaping, seeding of grass or other plants on roadsides and embankments, as a nutritious mulch under trees and shrubs, and in erosion control and soil reclamation.

(c) Garden and soaker hoses containing recovered plastic or rubber.

(d) Lawn and garden edging containing recovered plastic or rubber.

(e) Plastic lumber landscaping timbers and posts containing recovered materials.

[60 FR 21381, May 1, 1995, as amended at 62 FR 60974, Nov. 13, 1997; 65 FR 3081, Jan. 19, 2000]

§ 247.16 Non-paper office product.

(a) Office recycling containers and office waste receptacles.

(b) Plastic desktop accessories.

(c) Toner cartridges.

(d) Plastic-covered binders containing recovered plastic; chipboard and pressboard binders containing recovered paper; and solid plastic binders containing recovered plastic.

(e) Plastic trash bags.

(f) Printer ribbons.

(g) Plastic envelopes.

(h) Plastic clipboards containing recovered plastic.

(i) Plastic file folders containing recovered plastic.

(j) Plastic clip portfolios containing recovered plastic.

(k) Plastic presentation folders containing recovered plastic.

(1) Office furniture containing recovered steel, aluminum, wood, agricultural fiber, or plastic.

[60 FR 21381, May 1, 1995, as amended at 62 FR 60974, Nov. 13, 1997; 65 FR 3081, Jan. 19, 2000; 69 FR 24038, Apr. 30, 2004]

§ 247.17 Miscellaneous products.

(a) Pallets containing recovered wood, plastic, or paperboard.

(b) Sorbents containing recovered materials for use in oil and solvent clean-ups and as animal bedding.

(c) Industrial drums containing recovered steel, plastic, or paper.

(d) Awards and plaques containing recovered glass, wood, paper, or plastic.

(e) Mats containing recovered rubber and/or plastic.

(f)(1) Non-road signs containing recovered plastic or aluminum and road signs containing recovered aluminum.

(2) Sign supports and posts containing recovered plastic or steel.

(g) Manual-grade strapping containing recovered steel or plastic.

(h) Bike racks containing recovered steel or plastic.

(i) Blasting grit containing recovered steel, coal and metal slag, bottom ash, glass, plastic, fused alumina oxide, or walnut shells.

[62 FR 60974, Nov. 13, 1997, as amended at 65 FR 3081, Jan. 19, 2000; 69 FR 24038, Apr. 30, 2004]

END OF SECTION

ATTACHMENT 00 73 00-A

INDEX OF DRAWINGS

Date:DRAWING NO. xxxx-xx.xx

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
1				
2				
3				
4				
5				

REFERENCE DRAWINGS

Reference drawings provided show conditions at time of construction. These drawings are furnished for information only and the Government does not warrant that conditions will be exactly as shown. Minor deviations can be anticipated and shall not be the basis for a claim for extra compensation.

The list of reference drawings set out in the index on the drawings, Sheet No. G-002 is hereby incorporated by reference into these specifications.

End of Attachment 00 73 00-A

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TECHNICAL SPECIFICATIONS

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SUMMARY OF WORK

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

The construction is planned for two phases over two construction seasons:

a. Phase 1 (FY12):

(1) Allen Creek moved east of levee alignment.
(2) Re-route drainage ditches to construction drainage ditches.
(3) Overbuild levee section, for full alignment.
(4) Install erosion control, and construct partial storm water pond.

b. Phase 2(FY13):

(1) Survey levee and shaping (remove/move surcharge material.
(2) Place erosion and scour protection/hydroseed.
(3) Complete storm water pond and install outfall culvert(s).
(4) Construct main tidal channel. Breach levee.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

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SECTION 01 14 00

WORK RESTRICTIONS

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SECTION 01 14 00

WORK RESTRICTIONS

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Progress Charts; G

Employee Listing

1.2 COORDINATION AND CONDUCT OF WORK:

Coordination with using agencies shall be made through the Contracting Officer to assist the Contractor in completing the work with a minimum of interference and inconvenience.

1.2.1 Contractor Work Hours

Work hours in the construction area will be restricted to 6:30 a.m. to 5:00 p.m. daily, Monday through Friday, excluding holidays. The Contractor shall not access the construction area before 6:30 a.m. and shall be off site no later than 5:00 p.m. Requests for alternate work schedules may be considered, but will be approved only by the Contracting Officer. Alternate work schedules will not be approved if a Government quality assurance inspector is not available to be on site full time during all hours outside those previously stated.

1.2.2 Water Levels

See attachment 01 14 00-A for a description of historical water levels onsite.

1.2.3 CONTRACTOR SECURITY

The Corps of Engineers will not be responsible for providing security for Contractor-owned/controlled equipment, supplies, or materials. The Contractor shall provide security measures that are necessary.

1.2.4 KEYS

If keys are required to access the construction site they will be provided by the Contracting Officer. The Contractor shall be responsible for any keys issued. Upon completion of the work, or upon request of the Contracting Officer, key(s) shall be returned. Should the Contractor lose a key:

a. the Contracting Officer shall be notified, in writing, within three (3) working days after the loss is discovered, and

b. should the key not be found before final acceptance, the final contract

payment shall be reduced by $100.00 for re-keying.

1.3 Construction Progress Charts

The instructions and information herein supplement the requirements of Paragraph SCHEDULE FOR CONSTRUCTION CONTRACTS IN THE CONTRACT CLAUSES. The proposed Construction Progress Chart shall be prepared on ENG Form 2454 or an approved Gantt-type chart of suitable scale. Additional instructions are obtained in INSTRUCTIONS AND INFORMATION FOR CONTRACTORS, a manual furnished to the Contractor by the Contracting Officer. This manual is available for inspection in the Office of the Seattle District, Corps of Engineers 4735 East Marginal Way South, Seattle, Washington.

1.3.1 Minimum Principal Contract Features

The Minimum principal contract features (activities) to be included on ENG Form 2454 or approved Gantt-type chart are:

a. Mobilization
b. Channel Excavation
c. Channel substrate placement
d. Culvert Replacement
e. LWD Placement
f. Revegitation
g. Punch-out Inspection
h. Pre-Final Inspection
i. Final Acceptance
j. Demobilization

1.3.2 Construction Progress Chart

The Construction Progress Chart shall show the total bid amount distributed among the features shown on the chart. The schedule shall show the percentage of completion at the close of each weekly period. This percentage shall be based on percentage of physical completion of the work.

1.3.3 Submission

The Construction Progress Chart shall be submitted within 10 calendar days after the date of receipt of notice to proceed.

1.3.4 Project Status Report

The Contractor shall prepare and submit a monthly project status report. The report shall tell whether the project as a whole is on, ahead of, or behind schedule. If the project is behind schedule, the Contractor shall explain what actions he will take to regain his schedule. The report shall include a description of problem areas, delaying factors and their impact, and an explanation of corrective actions taken or proposed. Any delays caused by the Government shall be identified. Any significant items or events that occurred during the report month shall also be detailed.

1.4 EMPLOYEE LISTING

The Contractor shall submit a complete listing of Contractor personnel, including job title and identification credential number, who will be working on the project. This listing shall be updated as needed to ensure that the Government has been notified of any changes of Contractor Personnel in advance of new personnel engaging in work on the project. The Government will allow access to the controlled areas of only the Contractor Personnel authorized in advance and included on the employee listing.

1.5 Identification Credentials

Contractor personnel shall either be issued a photo identification card (ID) by the Contractor or agree to provide their individual vehicle driver's license as an appropriate identification credential. In either case, the identification number shall be included on the listing required above. If the Contractor determines to issue ID cards to its employees, the following information shall be included:

Contractor Identification and Card Number Indicating Employees:

a. Full Name
b. Height
c. Current Address

d. Weight
e. Birth Date
f. Hair Color
g. Recent Photograph
h. Eye Color

1.6 Employee Termination

If a Contractor employee resigns or is terminated the Contracting Officer, or designated representative shall be so notified at the earliest opportunity, but in no case later than the start of the succeeding workday.

1.7 Access Control

Contractor personnel shall be instructed to present identification credential upon request by proper authority as established by the Contracting Officer.

1.8 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15 31 OCT 89)

This Paragraph specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE entitled "Default (Fixed Price Construction)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

1.8.1 Unusually Severe

The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

1.8.2 Delay

The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.8.3 Anticipated Adverse Weather

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
10	7	7	4	4	3	1	2	3	6	8	10

1.8.4 Record of Occurrence

Upon acknowledgment of the notice to proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC

report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delays must prevent work on critical activities for 50 percent or more of the contractor's scheduled workday.

1.8.5 Consideration

The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph Anticipated Adverse Weather, above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled Default (Fixed Price Construction)".

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

ATTACHMENT 01 14 00-A

WATER LEVELS MFR

MFR

14-June 2012

Z. Corum, PE, Hydraulic Engineer

CENWS-EN-HH-HE

SUBJECT: Information on precipitation, flood sources, and water levels for construction of the Qwuloolt Restoration project

1. Purpose: The following provide data and links to apprise construction staff of potential water levels and flooding during construction.

2. Background: The Qwulloolt restoration site near Marysville, WA sits behind nearly a mile of levee that prevents the high tides of Ebey Slough from flooding commercial properties and former agricultural lands, slated for restoration. Ebey Slough is one of several distributary channels of the Snohomish River, the 2nd largest river basin draining to Puget Sound in western Washington State. Generally the highest water levels experienced at the site are related to prolonged wet periods in the fall and winter, high astronomic "spring" tides, high tides coupled with storm surge, and high tides coupled with river flooding.

3. USACE measured water levels in 2007 and 2008 in the industrial park and in Allen Creek adjacent to the industrial park (Figure 1). While this data set represents only one year, it includes at least two high intensity rainstorms and clear evidence of prolonged ponding above the ground surface. The source of this water is primarily Allen Creek, Jones Creek, and local runoff. The water drains through a series of 4 large tide gates to Ebey Slough near the Marysville WWTP and one smaller tide gate near the breach location.

4. If the contractor does not separate Allen Creek from the work area prior to proceeding with grading, water levels may be excessive and prevent successful placement and compaction of levee fill material. Figure 1 provides an estimate of water levels for Allen Creek in 2007 and 2008 for all 4 tide gates in operation. Once fill is placed across the old Allen Creek channel near the tide gates, about ¼ of the site drainage capacity will be separated from the area east of the levee. This will cause site water levels east of the levee to rise and remain higher than average, but will significantly reduce water levels west of the levee. Temporary cofferdams should include consideration of adequate freeboard to account for variations in water levels, including the potential for widespread flooding from known flood sources.

5. Because they are not relevant to the design of the setback levee or breach, USACE has not evaluated the combined contribution of Allen, Jones, and local runoff on site water levels. These runoff sources may be important for management stormwater during construction. The

average, minimum, and maximum water levels measured in Allen Creek provide some indication of what to expect during construction. See Figure 1.

6. A runoff model for the work site behind the levee is available to estimate the daily likelihood of runoff exceeding a certain value. See Tables 1 and 2.

7. The provision of the ditch that connects the new stormwater pond with the Allen Creek tide gate will provide adequate drainage during construction when water rises to 4 feet within the work area, during times that the Snohomish River is not flooding. The contractor may elect to locally dewater work areas with pumping or other schemes.

8. The Snohomish River, including Ebey Slough, is tidally affected up to the City of Snohomish gage. The highest flood levels at the site occur due to storm surge coupled with high astronomic tides and/or major flood events on the Snohomish River (Figure 2). Table 3 provides links to water level gage data that may provide useful information for predicting tides and flooding near the Qwuloolt site. Flow is measured at the Monroe stream gage, about 20 miles upriver from the site. No flood control dams are available in this basin. Time from the onset of flooding to the crest at the site is typically 1.5-3 days due to the large basin area. The national weather service provides flood predictions for the Snohomish River at Monroe, Snohomish, and Ebey Slough. See Table 3.

9. While NOAA publishes tide tables for Marysville, there is no active tide station in operation at the site. A temporary tide station set up near the Qwulloolt site showed that tides on Ebey Slough track well with Seattle, with the exception that low tides are higher, and river flows can noticeably affect stages during floods. Tracking the Seattle gage is one way to see it atmospheric conditions are affecting tide levels. Note that Snohomish County has a stage recorders on Ebey Slough near river mile 10 that can be used to measure the progression of the flood wave from Snohomish down Ebey Slough in real time. See Table 3.

10. Historic data is available from most if not all of the provided links to allow contractors to research past flood events, rainstorms, and tides to help schedule and plan their operations. Establishing a local tide-gage on site to correlate with predicted tides and river flows will benefit the contractor by increasing their understanding of the sensitivity of site water levels to levels elsewhere, or to observed precipitation.

11. The following data are provided for information only. Predictions are subject to change and should be treated accordingly.

Table 1: Simulated total average daily runoff within site, used to design stormwater pond (the following represent the probability of runoff exceeding a given value by time of year, and do not include contributions from groundwater)

Percent of time flow exceeded in month in simulation years*	Estimated hourly flow rate for total runoff behind new levee, **cubic feet per second**, for current conditions											
< 0.1 not shown	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.1	3.734	3.368	3.175	2.874	2.702	2.935	2.030	2.248	3.111	3.234	3.396	3.972
0.2	2.839	2.637	2.535	2.235	1.959	2.174	1.655	1.730	2.278	2.681	2.801	3.249
0.5	2.116	1.889	1.816	1.615	1.409	1.382	0.927	1.051	1.427	1.802	2.044	2.167
1	1.655	1.424	1.318	1.157	0.876	0.867	0.482	0.648	0.940	1.299	1.684	1.658
2	1.133	0.988	0.912	0.737	0.505	0.434	0.165	0.308	0.488	0.818	1.204	1.188
5	0.614	0.513	0.422	0.281	0.165	0.116	0.020	0.041	0.113	0.343	0.621	0.654
10	0.317	0.235	0.188	0.090	0.043	0.027	0.005	0.004	0.014	0.123	0.301	0.334
15	0.175	0.134	0.105	0.047	0.022	0.013	0.002	0.001	0.003	0.038	0.150	0.179
20	0.107	0.080	0.065	0.032	0.014	0.008	0.001	0.001	0.002	0.014	0.075	0.108
30	0.051	0.043	0.035	0.018	0.007	0.004	0.000	0.000	0.000	0.003	0.025	0.047
40	0.029	0.026	0.022	0.012	0.004	0.002	0.000	0.000	0.000	0.001	0.009	0.024
50	0.017	0.016	0.014	0.007	0.002	0.001	0.000	0.000	0.000	0.000	0.003	0.013
60	0.009	0.010	0.008	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.007
75	0.005	0.005	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004
80	0.002	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
85	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
90	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Percent of time flow exceeded	Estimated hourly flow rate for total runoff behind new levee, **gallons per minute**, for current conditions											
< 0.1 not shown	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.1	1680	1516	1429	1293	1216	1321	913	1011	1400	1455	1528	1787
0.2	1277	1187	1141	1006	882	978	745	779	1025	1207	1260	1462
0.5	952	850	817	727	634	622	417	473	642	811	920	975
1	745	641	593	520	394	390	217	292	423	584	758	746
2	510	445	410	332	227	195	74	138	220	368	542	535
5	276	231	190	126	74	52	9	18	51	154	280	294
10	143	106	84	41	19	12	2	2	6	55	135	150
15	79	60	47	21	10	6	1	1	2	17	68	80
20	48.0	36.0	29.4	14.4	6.1	3.6	1	0	1	6	34	49
30	22.7	19.2	15.8	8.1	3.2	1.6	0	0	0	1	11	21
40	13.0	11.8	9.7	5.2	1.8	0.7	0	0	0	0	4	11
50	7.5	7.2	6.1	3.2	0.9	0.3	0	0	0	0	1	6
60	4.2	4.3	3.7	1.8	0.5	0.1	0	0	0	0	1	3
75	2.0	2.1	2.2	0.9	0.2	0.0	0	0	0	0	0	2
80	0.9	0.8	1.0	0.5	0	0	0	0	0	0	0.1	0.6
85	0.5	0.5	0.6	0.2	0	0	0	0	0	0	0.0	0.3
90	0.3	0.1	0.3	0	0	0	0	0	0	0	0	0.1
95	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

* This is the percent chance that on a given day in a month, flows will exceed a particular value for an hour or more. THESE VALUES CAN BE EXCEEDED AT ANY TIME.

Table 2: Simulated flood runoff within site, used to design stormwater pond (ASSUMING LEVEE IS IN PLACE)

100-year peak inflow rate (cfs)	13.3
100-year peak inflow volume (24 hour) (acre-ft)	10.85
100-year peak pond stage (coincident with 2-year high tide) (ft)	5.3
100-year peak pond stage (due to 100-year event levee overtopping) (ft)	4.6
10-year peak inflow rate (cfs)	8.6
10-year peak inflow volume (24 hour) (acre-ft)	6.9
10-year peak pond stage (ft)	4.6
2-year peak inflow rate (cfs)	5.3
2-year peak inflow volume (24 hour) (acre-ft)	4.1
2-year peak pond stage (ft)	4.3
0.5-year 24-hour peak inflow rate (cfs)	2.7
0.5-year 24-hour inflow volume (acre-ft) – Water Quality Storm	2.0
Water Quality Storm peak pond stage (ft)	4.0

Table 3: Useful links for precipitation, tides, and river stage and discharge data

Location/Data	Web link
Marysville tide tables and predictions (need to convert data from MLLW to NAVD88)	http://tidesandcurrents.noaa.gov/noaatidepredictions/NOAATidesFacade.jsp?Stationid=TWC1125
Seattle tide levels (observed data, proxy for Marysville)	http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=9447130%20Seattle,%20Puget%20Sound,%20WA&type=Tide%20Data
Ebey Slough water levels upstream from project (several miles upstream from site)	http://www.co.snohomish.wa.us/PWApp/SWM/floodwarn/index.html
Ebey Slough water level predictions (several miles upstream from site – useful for estimating time to peak of flood)	http://www.nwrfc.noaa.gov/river/station/flowplot/flowplot.cgi?id=EBYW1
Snohomish River gage observations (for river stages, historic data)	http://waterdata.usgs.gov/wa/nwis/uv?station=12155500
Snohomish River gage predictions	http://www.nwrfc.noaa.gov/river/station/flowplot/flowplot.cgi?lid=SNAW1
Monroe gage observations (for river flows, historic data)	http://waterdata.usgs.gov/wa/nwis/uv?station=12150800
Monroe gage predictions	http://www.nwrfc.noaa.gov/river/station/flowplot/flowplot.cgi?lid=MROW1
Quantitative precipitation forecasts	http://water.weather.gov/ahps2/precip.php?wfo=SEW
Everett WA precipitation data (proxy for Marysville)	http://www.weather.gov/xml/current_obs/display.php?stid=KPAE

Figure 1

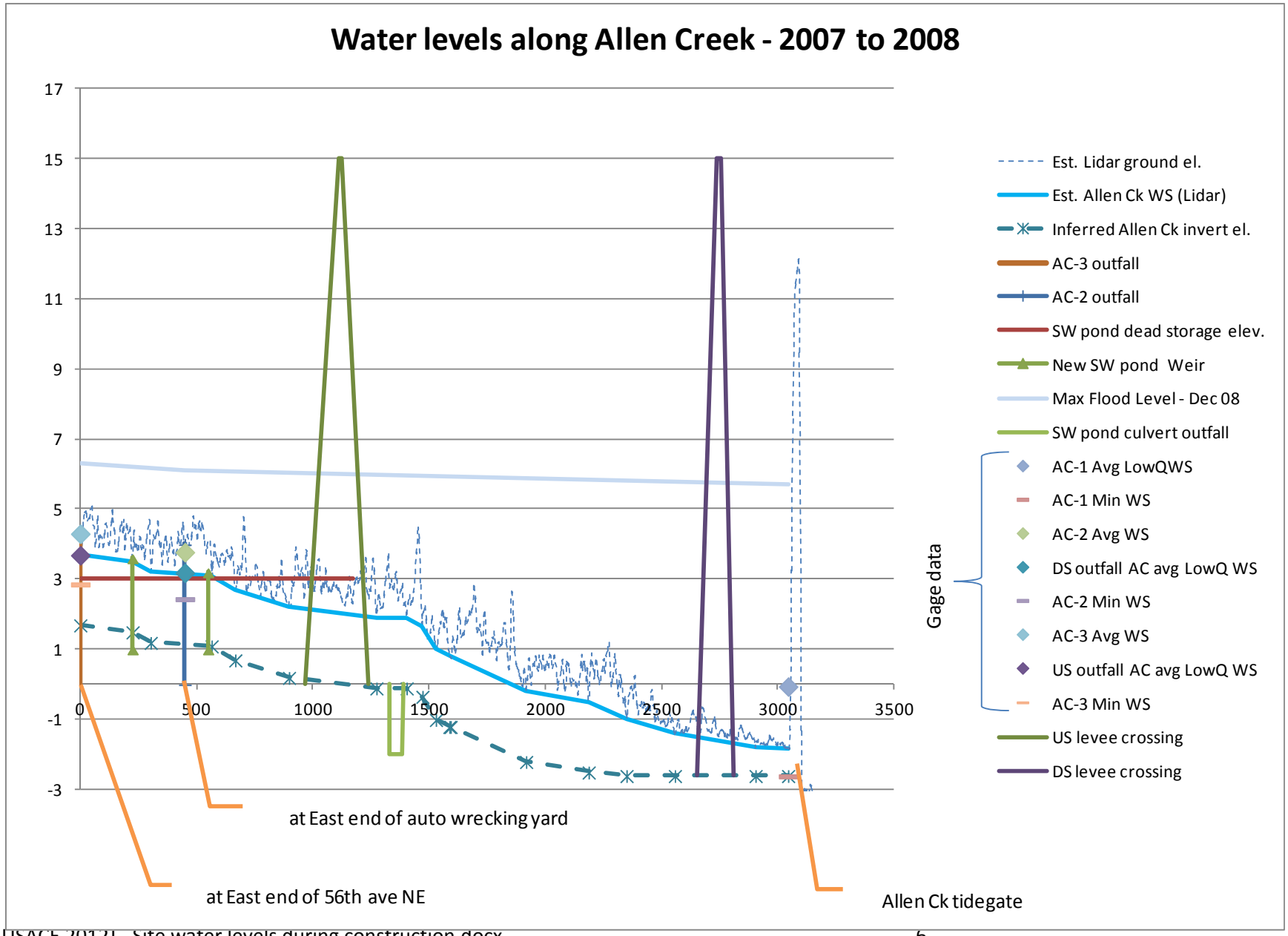
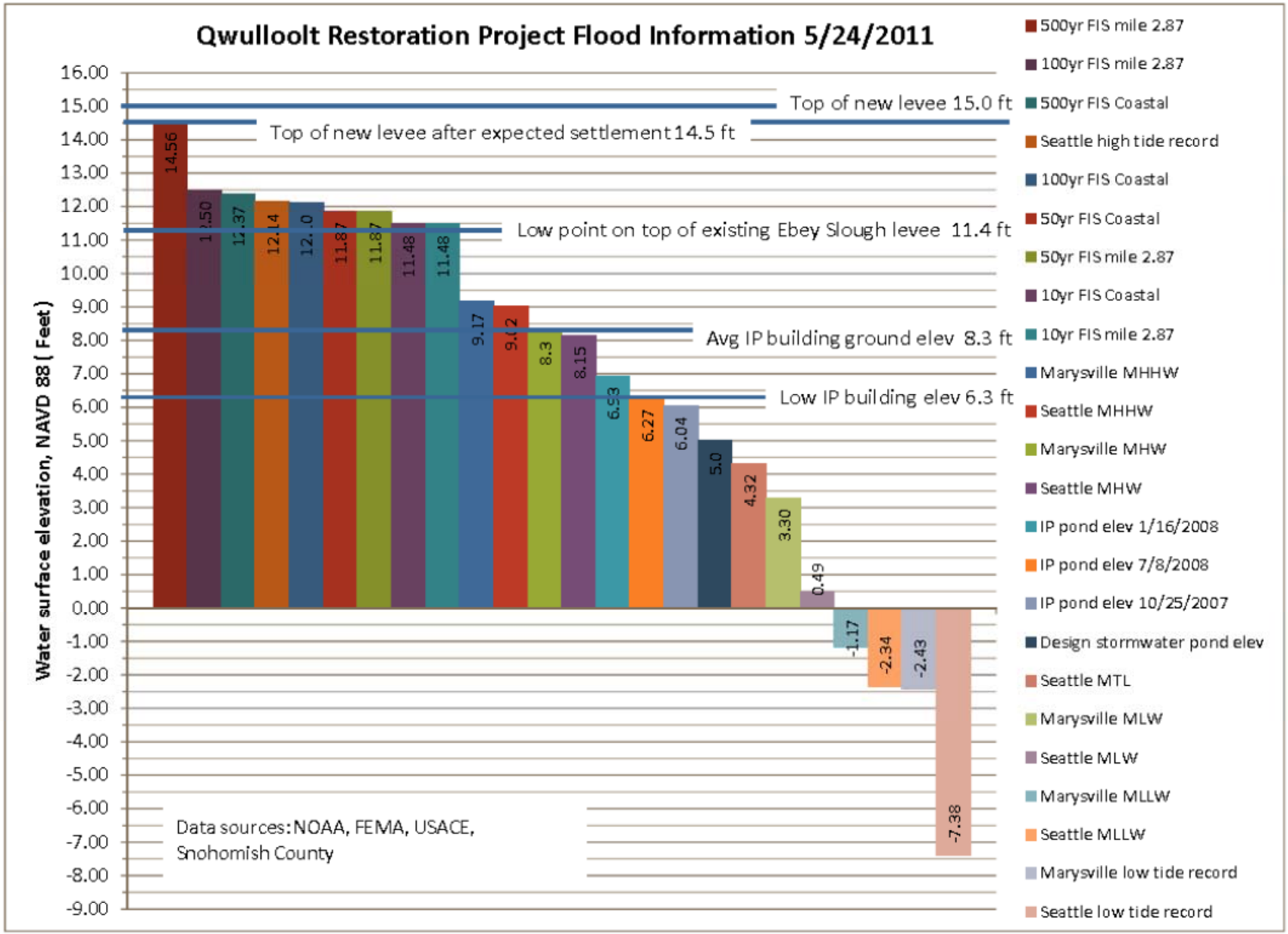

Water levels along Allen Creek - 2007 to 2008
17
15
13
11
9
7
5
3
1
-1
-3
0
500
1000
1500
2000
2500
3000
3500
Est. Lidar ground el.
Est. Allen Ck WS (Lidar)
Inferred Allen Ck invert el.
AC-3 outfall
AC-2 outfall
SW pond dead storage elev.
New SW pond Weir
Max Flood Level - Dec 08
SW pond culvert outfall
Gage data
AC-1 Avg LowQWS
AC-1 Min WS
AC-2 Avg WS
DS outfall AC avg LowQ WS
AC-2 Min WS
AC-3 Avg WS
US outfall AC avg LowQ WS
AC-3 Min WS
US levee crossing
DS levee crossing
at East end of auto wrecking yard
at East end of 56th ave NE
Allen Ck tidegate

Figure 2


Qwulloolt Restoration Project Flood Information 5/24/2011
Water surface elevation, NAVD 88 (Feet)
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
-9.00
Top of new levee 15.0 ft
Top of new levee after expected settlement 14.5 ft
Low point on top of existing Ebey Slough levee 11.4 ft
Avg IP building ground elev 8.3 ft
Low IP building elev 6.3 ft
14.56
11.87
11.87
11.48
11.48
9.17
8.3
8.15
6.27
6.04
5.0
4.32
3.30
0.49
-1.17
-2.34
-2.43
-7.38
Data sources: NOAA, FEMA, USACE, Snohomish County
500yr FIS mile 2.87
100yr FIS mile 2.87
500yr FIS Coastal
Seattle high tide record
100yr FIS Coastal
50yr FIS Coastal
50yr FIS mile 2.87
10yr FIS Coastal
10yr FIS mile 2.87
Marysville MHHW
Seattle MHHW
Marysville MHW
Seattle MHW
IP pond elev 1/16/2008
IP pond elev 7/8/2008
IP pond elev 10/25/2007
Design stormwater pond elev
Seattle MTL
Marysville MLW
Seattle MLW
Marysville MLLW
Seattle MLLW
Marysville low tide record
Seattle low tide record

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3.2.1 Contractor POC
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SECTION 01 22 00

MEASUREMENT AND PAYMENT

PART 1 GENERAL

Payment items for the work of this contract for which payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular payment item, shall be included in the listed lump sum item most closely associated with the work involved. Payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1 BASE ITEMS

1.1.1 Item 0001

Payment will be made at the contract lump sum price for Item No. 0001 - All work for Phase 1 to Restore Qwuloolt Estuary. Payment shall constitute full compensation for Item No. 0001, complete.

1.1.2 Item 0002

Payment will be made at the contract lump sum price for Item No. 0002 - All work for Phase 2 to Restore Qwuloolt Estuary, except item 0004. Payment shall constitute full compensation for Item No. 0002, complete.

1.1.3 Item 0003

Payment will be made at the contract lump sum price for Item No. 0003 - All work for As-Built Drawings as specified in Section 01 78 00 from preparation to final approval. Payment shall constitute full compensation for Item No. 0003, complete.

1.2 OPTIONAL ITEMS

1.2.1 Item 0004

Payment will be made at the contract lump sum price for Item No. 0004 - All work to Breach Ebey Slough Dike. Payment shall constitute full compensation for Item No. 0004, complete.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PROGRESS PAYMENT INVOICE

See Section 01 45 00.10 QUALITY CONTROL SYSTEM for payment requests.

3.2 COMPLIANCE WITH DAVIS-BACON ACT

3.2.1 Contractor POC

Within 14 days after award of the contract, the Contractor shall designate a point of contact (POC) within their organization who will be responsible for the Davis-Bacon Act Labor Program for the Contractor and all subcontractors under this contract as required by the Contract Clauses and FAR 52.222.

3.2.2 Responsibilities

The designated Contractor POC shall be responsible for Davis-Bacon Act Labor Program activities including, but not limited to:

a. Documentation and record keeping;

b. Submittal and accuracy of certified payrolls;

c. Submittal of required labor forms including requests for additional classifications and rates, Statements and Acknowledgement, etc.;

d. Posting of the wage determination, approved additional classifications and rates, labor and EEO posters;

e. Coordination with the Contracting Officer's Labor Program POC;

Prior to submittal to the Government, payrolls shall be reviewed for compliance to all applicable labor standards, to include, but not be limited to the following items: correct wage rates, correct overtime classification and pay, misclassification of workers for work actually performed, apprentice to journeyman ratios, and registration of apprentice. Corrective actions shall be taken as necessary to ensure Contractor compliance with applicable contract and FAR clauses.

3.2.3 Certification

The Contractor POC shall provide a signed certification stating the following: "I certify that the submitted items being forwarded have been reviewed in detail and are correct and in strict conformance with the Labor Standards of the contract except as otherwise stated."

3.2.4 Electronic Software for Processing

The contractor is encouraged to use a commercially-available electronic system to process and submit certified payrolls electronically to the Government. The requirements for preparing, processing and providing certified labor payrolls are established by the Davis-Bacon Act as stated in FAR 52.222-8, PAYROLLS AND BASIC RECORDS and FAR 52.222-13, COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS.

a. If the contractor elects to use an electronic Davis-Bacon payroll processing system, then the contractor shall be responsible for obtaining and providing for all access, licenses, and other services required to provide for receipt, processing, certifying, electronically transmitting to the Government, and storing weekly payrolls and other data required for the contractor to comply with Davis-Bacon and related Act regulations. When the contractor uses an electronic Davis-Bacon payroll system, the electronic payroll service shall be used by the

contractor to prepare, process, and maintain the relevant payrolls and basic records during all work under this construction contract and the electronic payroll service shall be capable of preserving these payrolls and related basic records for the required 3 years after contract completion. If the contractor chooses to use an electronic Davis-Bacon payroll system, then the contractor shall obtain and provide electronic system access to the Government, as required to comply with the Davis-Bacon and related Act regulations over the duration of this construction contract. The access shall include electronic review access by the Government contract administration office to the electronic payroll processing system used by the contractor.

b. The contractor's provision and use of an electronic payroll processing system shall meet the following basic functional criteria: commercially available; compliant with appropriate Davis Bacon Act payroll provisions in the FAR; able to accommodate the required numbers of employees and subcontractors planned to be employed under the contract; capable of producing an Excel spreadsheet-compatible electronic output of weekly payroll records (format at http://www.rmssupport.com/guides.aspx) for export in an Excel spreadsheet to be imported into the contractor's Quality Control System (QCS) version of Resident Management System (RMS), that in turn shall export payroll data to the Government's Resident Management System (RMS); demonstrated security of data and data entry rights; ability to produce contractor-certified electronic versions of weekly payroll data; ability to identify erroneous entries and track the data/time of all versions of the certified Davis Bacon payrolls submitted to the government over the life of the contract; capable of generating a durable record copy, that is, a CD or DVD and PDF file record of data from the system database at end of the contract closeout.

c. This durable record copy of data from the electronic Davis-Bacon payroll processing system shall be provided to the Government during contract closeout. All contractor-incurred costs related to the contractor's provision and use of an electronic payroll processing service shall be included in the contractor's price for the overall work under the contract. The costs for Davis-Bacon Act compliance using electronic payroll processing services shall not be a separately bid/proposed or reimbursed item under this contract.

3.3 PROPOSED PROJECT MODIFICATIONS

Price proposals for contract modifications shall be submitted in accordance with the requirements of the Contract Clause MODIFICATION PROPOSALS - PRICE BREAKDOWNS. If change order work impacts or delays other unchanged contract work, the costs of such impacts or delays shall be included in the proposals and separately identified. The current threshold for requiring cost or pricing data is $700,000 but is subject to change. See FAR 15.403 (a) (1) iii. Any modification proposal that exceeds the cost and pricing data threshold shall meet the requirements of FAR 15.403. See instructions for Change Orders/Modification and Claims in Table 15-2 of FAR 15.408.

-- End of Section --

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SECTION 01 32 01

PROJECT SCHEDULE
08/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Administration -- Progress, Schedules, and Network Analysis Systems

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Schedule; G

1.3 QUALITY ASSURANCE

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating (activity status) and preparation of reports. The authorized representative shall have previously developed, created, and maintained at least 2 electronic schedules for projects similar in nature and complexity to this project and shall be experienced in the use of the scheduling software Primavera 6.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS. Show in the schedule the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences, is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool.

3.1.1 Approved Project Schedule

Use the approved Project Schedule to measure the progress of the work and to aid in evaluating time extensions. Make the schedule cost loaded and activity coded. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

3.1.2 Schedule Status Reports

Provide a Schedule Status Report on at least a monthly basis. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

3.1.3 Default Terms

Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination, by the Contracting Officer, that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

3.2 BASIS FOR PAYMENT AND COST LOADING

Use the schedule as the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update, or qualified scheduling personnel, will result in the inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all required information will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the Project Schedule have been made. Activity cost loading shall be reasonable, as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN shall equal the value of the CLIN on the Schedule.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the Project Schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule.

3.3.1 Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the

Project Schedule. Prepare the Project Schedule using the Precedence Diagram Method (PDM).

3.3.2 Level of Detail Required

Develop the Project Schedule to an appropriate level of detail. Failure to develop the Project Schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2.1 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

3.3.2.2 Procurement Activities

The schedule must include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

3.3.2.3 Mandatory Tasks

The following tasks must be included and properly scheduled:

c. Sabmission and approval of O & M manuals.

b. Submission and approval of as-built drawings.

o. Ocher systems testing, if required.

d. Contractor's pre-final inspection.

e. Correction of punchlist from Contractor's pre-final inspection.

f. Government's pre-final inspection.

g. Correction of punch list from Government's pre-final inspection.

h. Final inspection.

3.3.2.4 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: approvals, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.2.5 Activity Responsibility Coding (RESP)

Assign responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the

activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.6 Activity Work Area Coding

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew, from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.7 Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by the Contracting Officer, with a Contract Changes/REA Code. Key all Code values to the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and, therefore, liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code.

3.3.2.8 Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

3.3.2.9 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities based upon the phase of work in which the activity occurs. Code activities to a Construction Phase. Code fast track construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately

defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall be identified with a single project phase and have only one Phase of Work code.

3.3.2.10 Category of Work Coding (CATW)

Assign Category of Work Code to all Activities based upon the category of work to which the activity belongs. Category of Work Code must include, but is not limited to: construction submittal approvals, Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start-Up, Test and Turnover. Assign a Category of Work Code to each activity. Each activity shall have only one Category of Work Code.

3.3.2.11 Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 00 CONTRACTOR QUALITY CONTROL. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

3.3.3 Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration in the accepted contract proposal, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is received by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

3.3.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project"(or NTP). The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in a negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date

for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

3.3.3.3 Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

3.3.4 Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

3.3.4.1 Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

3.3.4.3 Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes.

Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

3.3.6 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

3.3.7 Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish (SF) relationships.

3.3.8 Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

3.3.9 Milestones

The schedule must include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as

design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer.

3.4.3 Periodic Schedule Updates

Based on the result of the meeting, specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions will enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

3.4.4 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: http://rms.usace.army.mil/. The SDEF format is as follows:

SDEF Format			
Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)

SDEF Format			
Field	Activity Code	Length	Description
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule shall have a unique file name as determined by the Contractor.

3.5.2 Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.3 Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number.

3.5.4.2 Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.4.4 Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has furnished a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5 Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.5.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3 Critical Path

Clearly show the critical path.

3.5.5.4 Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity to review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

3.6.1 Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

3.6.2 Status of Activities

Update information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting.

3.6.2.1 Start and Finish Dates

Accurately show the status of the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

3.6.2.2 Remaining Duration

Update the estimated RD for all incomplete activities independent of

Percent Complete. Remaining Durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

3.6.2.3 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1 percent of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

3.6.2.4 Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, Contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

3.6.2.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other

factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.7.2 Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.

b. A brief explanation of the causes of the change.

c. An analysis of the overall impact of the changes proposed.

d. A sub-network of the affected area.

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

3.8 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. Include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 WEEKLY PROGRESS MEETINGS

a. Meet weekly with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and

approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

b. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

c. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

3.10 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

-- End of Section --

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SECTION 01 33 00

SUBMITTAL PROCEDURES
05/11

PART 1 GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to start of construction (work) or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

List of proposed Subcontractors
List of proposed products
Construction Progress Schedule
Submittal Register
Health and safety plan
Work plan

Quality Control(QC) plan
Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on

sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS)concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

1.2.2 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 PAYMENT

Separate payment will not be made for submittals, and all costs associated therein shall be included in the applicable unit prices or lump sum prices contained in the schedule. Payment will not be made for any material or equipment which does not comply with contract requirements.

1.5 SUBMITTAL CLASSIFICATION

1.5.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.5.2 For Information Only (F)

Submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.6 GOVERNMENT APPROVED SUBMITTALS

The approval of submittals by the Government shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory.

Approval will not relieve the Contractor of the responsibility for any error which may exist. The Contractor, under the CQC requirements of this contract, is responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. After submittals have been approved by the COR, no resubmittal for the purpose of substituting materials or equipment will be given consideration.

1.7 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the format and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, written notice, as required under the Contract Clause entitled "Changes," shall be given to the COR.

1.8 CONTROL AND SCHEDULING OF SUBMITTALS

1.8.1 Submittal Coordination Meeting

After the Preconstruction conference and before any submittals are sent to the Government, the Contractor shall meet with the Contracting Officer to develop a preliminary submittal register, ENG Form 4288 using the attached initial submittal register. The Contractor shall further develop the initial submittal register prior to the submittal coordination meeting and list each item of equipment and material for which a submittion is required by the Technical Specifications. During the meeting all submittal items will be identified and grouped into the classifications identified in paragraph SUBMITTAL CLASSIFICATION.

1.8.2 Scheduling

Schedule and submit concurrently items covering components forming a system or that are interrelated. Include certifications with the pertinent drawings at the same time. Delay damages or time extensions will not be allowed for time lost due to late submittals. An additional 10 calendar days will be allowed and shown on the register for review and approval of items related to refrigeration and HVAC control systems.

a. Coordinate the scheduling, sequencing, preparing, and processing of items to be submitted with the performance of the work so that the work will not be delayed by the submittal process. Allocate time in the schedule for potential resubmittal of items.

b. Submittal items called for by the contract documents will be listed on the submittal register. If a submittal item is called for but does not pertain to the contract work, the Contractor is to include that item in the submittal register and annotate it "N/A" with a brief explanation of why it is not neccessary. Approval of the final submittal register does not relieve the Contractor of the responsiblility to submit items required by the contract documents but which have been omitted from the submittal register or marked "N/A".

c. Re-submit the submittal register monthly and annotate the actual dates of transmittal and approval. Once all items on the submittal register are complete, further re-submittal is not required.

d. Carefully control procurement operations to ensure that each

individual item is submitted on or before the Contractor scheduled dates as shown on the approved "Submittal Register."

1.8.3 Final Submittal Register

The final submittal register shall be coordinated with the progress schedule and submitted within 40 days of Notice to Proceed. In preparing the final submittal register, adequate time (a minimum of 30 days) shall be allowed for the review and approval, and possible resubmittal, of each item on the register.

1.8.4 Submittal Register Updates

The Contractor's quality control representative shall review the submittal register at least every 30 days and take appropriate action to maintain an effective system.

1.9 PREPARATION

1.9.1 Submittal in PDF Format

In addition to the copies specified in paragraph GOVERNMENT APPROVING AUTHORITY, submit 1 copy of each submittal item in PDF format via CD, FTP, or e-mail attachment as approved by the Contracting Officer.

1.9.2 Transmittal Form

Use the attached sample transmittal form (ENG Form 4025) for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.10 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.11 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.11.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting

with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.11.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.11.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.11.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 30 working days will be allowed for consideration by the Government of submittals with variations.

1.12 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Maintain a submittal register for the project in accordance with Section 01 45 00.10 QUALITY CONTROL SYSTEM (QCS).

1.12.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

a. Activity Number: Activity number from the project schedule.

b. Contractor Submit Date: Scheduled date for approving authority to receive submittals.

c. Contractor Approval Date: Date Contractor needs approval of submittal.

d. Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.12.2 Contractor Use of Submittal Register

Update the following fields with each submittal throughout contract.

a. Transmittal Number: Contractor assigned list of consecutive numbers.

b. Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

1.12.3 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.13 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

d. Upon completion of review of submittals requiring Government approval, stamp and date approved submittals. 4 copies of the approved submittal will be retained by the Contracting Officer and 1 copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.14 DISAPPROVED OR REJECTED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.15 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.16 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.17 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.18 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s)

SIGNATURE: _____

TITLE: _____

DATE: _____

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTA_____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS	**I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.** _____ NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for “Transmittal No.”. This number, in addition to the Contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The “Item No.” will be the same “Item No.” as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the “Variation” column when a submittal is not in accordance with the plans and specifications – also, a written statement to that effect shall be included in the space provided for “Remarks”.

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer’s Certificate of Compliance is transmitted, indicate “Sample” or “Certificate” in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the Contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A	--	Approved as submitted.	E	--	Disapproved (See Attached)
B	--	Approved, except as noted on drawings.	F	--	Receipt acknowledged.
C	--	Approved, except as noted on drawings. Refer to attached sheet resubmission required.	FX	--	Receipt acknowledged, does not comply as noted with contract requirements.
D	--	Will be returned by separate correspondence.	G	--	Other *(Specify)*.

10. Approval of items does not relieve the Contractor from complying with all the requirements of the Contract plans and specifications.

(Reverse of ENG FORM 4025-R)

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		01 14 00	SD-01 Preconstruction Submittals															
			Construction Progress Charts	1.3	G													
			Employee Listing	1.4														
		01 32 01	SD-01 Preconstruction Submittals															
			Project Schedule	3.4	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.12	G													
		01 35 26	SD-01 Preconstruction Submittals															
			Accident Prevention Plan (APP)	1.6	G	A												
			Crane Operators		G	A												
			SD-06 Test Reports															
			Notifications and Reports	1.11														
			Accident Reports	1.11.2														
			SD-07 Certificates															
			Confined Space Entry Permit	1.8														
			Hot work permit	1.8														
			License Certificates	1.13														
			Certificate of Compliance															
		01 35 29.13	SD-02 Shop Drawings															
			Work Zones	1.34.1	G													
			Decontamination Facilities	1.35.1	G													
			SD-03 Product Data															
			Exposure Monitoring/Air	1.13														
			Sampling Program															
			Site Control Log	1.34.2														
			Employee Certificates	1.12.4														

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		01 45 00	SD-01 Preconstruction Submittals															
			Quality Control Plan	3.2	G	RO												
		01 50 00	SD-01 Preconstruction Submittals															
			Construction site plan	1.4	G	RO												
			Traffic control plan	3.7.1	G	RO												
			SD-07 Certificates															
			Original Site Photos	3.2	F													
			Progress Photographs	3.3	F													
			SD-11 Closeout Submittals															
			Completion Photographs	3.4	F													
		01 57 20	SD-01 Preconstruction Submittals															
			ENVIRONMENTAL	1.7	G	DO												
			PROTECTION PLAN															
			WATER QUALITY MONITORING	1.7.3.1	G	DO												
			AND PROTECTION PLAN															
		01 57 23	SD-01 Preconstruction Submittals															
			Storm Water Pollution Prevention	1.3.3														
			Plan															
			Storm Water Notice of Intent															
			SD-06 Test Reports															
			Erosion and Sediment Controls	1.3														
			SD-07 Certificates															
			Mill Certificate or Affidavit	2.1.3														
		01 78 00	SD-03 Product Data															
			As-Built Record of Equipment	1.3.2														
			and Materials															

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		01 78 00	Warranty Management Plan	1.5.1														
			SD-08 Manufacturer's Instructions															
			Preventative Maintenance	1.4														
			Condition Monitoring (Predictive	1.4														
			Testing)															
			Inspection	1.4														
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.6														
			Manuals															
			SD-11 Closeout Submittals															
			Record Drawings	1.3.1														
		02 32 00	SD-02 Shop Drawings															
			Drilling Log	3.8	G													
			SD-03 Product Data															
			Permits, Certifications, and	1.4														
			Licenses															
			Schedule of Drilling, Sampling,	1.2.4.1	G													
			and Testing															
		03 20 00.00 10	SD-02 Shop Drawings															
			Reinforcement	3.1	G													
			SD-03 Product Data															
			Welding	1.4.1														
			Butt-Splices	3.1.4.2	G													
			Material	2.6	G													
			SD-04 Samples															

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		03 20 00.00 10	Epoxy-Coated Bars	2.3.2														
			SD-06 Test Reports															
			Material	2.6	G													
			Tests, Inspections, and	2.6	G													
			Verifications															
			SD-07 Certificates															
			Reinforcing Steel	2.3														
			Qualification of Steel Bar	1.4.2														
			Butt-Splicers															
		03 30 53	SD-03 Product Data															
			Air-Entraining Admixture	2.1.3.1														
			Accelerating Admixture	2.1.3.2														
			Water-Reducing or Retarding	2.1.3.3														
			Admixture															
			Curing Materials	2.1.11														
			Reinforcing Steel	2.1.5														
			Expansion Joint Filler Strips,	2.1.6														
			Premolded															
			Joint Sealants - Field Molded	2.1.7														
			Sealants															
			Waterstops	2.1.8														
			Waterstops	2.5.1														
			Conveying and Placing Concrete	3.2														
			Formwork; G, DO															
			Forms	2.4														
			Installation Drawings; G, DO															

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		03 30 53	Concrete Placement															
			Ready-Mix Concrete	2.2														
			Mix Design Data; G, DO															
			Air-Entraining Admixtures	2.2														
			Fly Ash	2.2														
			Steel Reinforcement	2.3														
			Accessories	2.5														
			Curing Compound	2.5.2														
			Concrete	3.10														
			SD-06 Test Reports															
			Aggregates; G, DO															
			Concrete Mixture Proportions; G,															
			DO															
			Compressive Strength Testing;															
			G, DO															
			Slump; G, DO															
			SD-07 Certificates															
			Cementitious Materials	2.1.1														
			Aggregates	2.1.2														
			Bill of Lading	2.2														
		03 40 00.00 10	SD-01 Preconstruction Submittals															
			Quality Control Procedures	1.4.2.2														
			SD-02 Shop Drawings															
			Standard Precast Units	1.2.1	G DO													
			Custom-Made Precast Units	1.2.2	G DO													
			SD-03 Product Data															

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		03 40 00.00 10	Standard Precast Units	1.2.1														
			Proprietary Precast Units	1.2.3														
			Embedded Items	3.1.3														
			Accessories	2.1.9														
			SD-05 Design Data															
			Design Calculations	1.2.2														
			Concrete Mix Proportions	1.2.5.1														
			SD-06 Test Reports															
			Test Reports; G, DO															
			SD-07 Certificates															
			Quality Control Procedures	1.4.2.2														
		31 00 00	SD-01 Preconstruction Submittals															
			Shoring	3.4	G													
			Dewatering Work Plan	1.4.3	G													
			SD-03 Product Data															
			Utilization of Excavated Materials	3.8	G													
			Rock Excavation	1.4.1.2														
			Opening of any Excavation or	3.3														
			Borrow Pit															
			Shoulder Construction															
			SD-06 Test Reports															
			Testing	3.15														
			Borrow Site Testing	2.1														
			SD-07 Certificates															
			Testing	3.15														
		31 05 19	SD-03 Product Data															

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		31 05 19	Thread	2.1.2														
			Manufacturing Quality Control	2.2														
			Sampling and Testing															
			SD-04 Samples															
			Quality Assurance Samples and	3.1														
			Tests															
			SD-07 Certificates															
			Geotextile	2.1.1														
		31 05 21	SD-02 Shop Drawings															
			Installation	3.1	G													
			SD-03 Product Data															
			Allowable Strength	2.1.1.1														
			Manufacturer	1.3	G													
			SD-04 Samples															
			Geogrid Reinforcement	2.1														
			SD-06 Test Reports															
			Geogrid Reinforcement	2.1														
			Coefficient of Interaction	2.1.1														
			Interface Friction Testing	2.1.1.2														
			Conformance Testing	3.4														
			SD-07 Certificates															
			Certificates of Compliance	2.1														
		32 11 23	SD-03 Product Data															
			Plant, Equipment, and Tools	1.3														
			Waybills and Delivery Tickets															
			SD-06 Test Reports															

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		32 11 23	Sampling and Testing	1.5	G													
			Field Density Tests	1.5.2.4	G													
			SD-07 Certificates															
			Testing		G													
		32 15 00	SD-02 Shop Drawings															
			Road Grade															
			SD-03 Product Data															
			Equipment	1.3.4														
			SD-06 Test Reports															
			Sampling and Testing	1.3	G													
			Density Test															
			Smoothness Test		G													
			Thickness Test		G													
			Wear Test															
			SD-07 Certificates															
			Testing		G													
		32 92 19	SD-03 Product Data															
			Wood cellulose fiber mulch															
			Fertilizer															
			SD-06 Test Reports															
			Topsoil composition tests															
			SD-07 Certificates															
			seed	2.1														
			SD-08 Manufacturer's Instructions															
			Erosion Control Materials	2.6														
		33 40 00	SD-03 Product Data															

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		33 40 00	Placing Pipe	3.3														
			SD-04 Samples															
			Pipe for Culverts and Storm	2.1														
			Drains															
			SD-07 Certificates															
			Pipeline Testing	3.8														
			Determination of Density	3.7.5														
			Frame and Cover for Gratings															
		35 31 19	SD-01 Preconstruction Submittals															
			Placement Plan	3.4	G													
			SD-03 Product Data															
			Riprap	2.2.2	G													
			Quarry Spalls	2.1	G													
			SD-04 Samples															
			Stone	1.5.1	G													
			SD-06 Test Reports															
			Evaluation Testing of Stone	2.2.1.1	G													
			Bedding Material		G													
			Bulk Specific Gravity	3.5.1.1														
			Gradation Test at Quarry	2.2.1.3	G													
			Drop test record	1.5.1.5	G													
			Quarry Inspection Report	2.2.1.1	G													
			SD-07 Certificates															
			Stone	1.5.1	G													
			Bedding Material		G													
			Laboratory	2.2.1.1	G													

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		35 31 19	Certification	3.5.1.1														
			Certified Weight Scale Ticket	3.5.1.1														
		35 41 00	SD-01 Preconstruction Submittals															
			Haul Road Site Plan		G DO													
			Property Owner Drainage	1.3.7	G DO													
			Right-of-Way Agreement															
			Borrow Source Plan	1.3.1	G DO													
			Contractor Selected Borrow Site	1.3.1	G DO													
			Plan															
			Property Rights and Access Plan	1.3.7	G DO													
			Shoring, Sheeting, and Bracing	3.7	G DO													
			Plan															
			Excavation Plan	3.9	G DO													
			Backfill Plan		G DO													
			Surcharge Lift Placement Plan		G DO													
			SD-02 Shop Drawings															
			Drainage Requirements	1.3.7														
			SD-03 Product Data															
			Shoring, Sheeting, and Bracing	3.7	G DO													
			Excavation	3.9	G													
			Borrow Areas	3.9.7	G DO													
			Plan of Operations		G DO													
			Embankment and Backfill		G DO													
			Materials															
			Nuclear Density		G													
			SD-06 Test Reports															

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		35 41 00	Measurement of Fill Material		G	DO												
			Materials Testing		G	DO												
			SD-07 Certificates															
			Testing		G	DO												

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02/12

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1.5.2 Meetings
1.5.2.1 Preconstruction Conference
1.5.2.2 Safety Meetings
1.6 ACCIDENT PREVENTION PLAN (APP)
1.7 ACTIVITY HAZARD ANALYSIS (AHA)
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3.5 USE OF EXPLOSIVES
3.6 EXCAVATIONS
3.7 WORK IN CONFINED SPACES

-- End of Section Table of Contents --

SECTION 01 35 26

SAFETY REQUIREMENTS
02/12

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2009) Standard for Safeguarding Construction,Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 20	Standards for Protection Against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1926	Safety and Health Regulations for Construction
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

WASHINGTON ADMINISTRATIVE CODE (WAC)

WAC 296-155	Safety standards for construction work

1.2 DEFINITIONS

b. High Visibility Accident. Any mishap which may generate publicity or high visibility.

c. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

e. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

(2) Days away from work (any time lost after day of injury/illness onset);

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

f. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Government acceptance, as defined in EM 385-1-1, is required for submittals with a "G, A" designation.

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G, A

Crane Operators; G, A

SD-06 Test Reports

Notifications and Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph, "Notifications and Reports."

Accident Reports

Submit reports using the Excel Spreadsheet provided by the Government.

SD-07 Certificates

Confined Space Entry Permit

Hot work permit

License Certificates

Certificate of Compliance (Crane)

Submit one copy of each permit/certificate attached to each Daily Quality Control Report.

1.4 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent addition of USACE EM 385-1-1, and the following federal and state regulations: 29 CFR 1926 and WAC 296-155. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.5.1 Personnel Qualifications

1.5.1.1 Site Safety and Health Officer (SSHO)

The Site Safety and Health Officer may have duties other than safety duties; he/she will meet the requirements identified in EM 385-1-1, 01.A.17.

1.5.2 Meetings

1.5.2.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

d. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

1.5.2.2 Safety Meetings

Conduct and document meetings as required by EM 385-1-1. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractors' daily quality control report.

1.6 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan". Specific requirements for some of the APP elements are described below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer, the Contractor Quality control Manager, and any designated CSP or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office and at the job site.
Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE

EM 385-1-1, Section 1. Submit the AHA for review at least 72 hours prior to the start of each preperatory control phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the Contracting Officer.

1.8 DISPLAY OF SAFETY INFORMATION

Within one calendar day(s) after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, section 01.A.06. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.9 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.10 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.11 NOTIFICATIONS and REPORTS

1.11.1 Accident Notification

Notify the Contracting Officer as soon as practical, but no more than four hours after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

1.11.2 Accident Reports

Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, property damage accidents resulting in at least $20,000 in damages, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable USACE Accident Report Form 3394, and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

1.11.3 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix I and as specified herein with Daily Reports of Inspections.

1.12 HOT WORK

Submit and obtain a written permit prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the Fire Division.

1.13 RADIATION SAFETY REQUIREMENTS

License Certificates for radiation materials and equipment shall be submitted to the Contracting Officer and Radiation Safety Office (RSO)for all specialized and licensed material and equipment that could cause fatal harm to construction personnel or to the construction project.

Workers shall be protected from radiation exposure in accordance with 10 CFR 20. Standards for Protection Against Radiation

Loss of radioactive material shall be reported immediately to the Contracting Officer.

Actual exposure of the radiographic film or unshielding the source shall not be initiated until after 5 p.m. on weekdays.

In instances where radiography is scheduled near or adjacent to buildings or areas having limited access or one-way doors, no assumptions shall be made as to building occupancy. Where necessary, the Contracting Officer will direct the Contractor to conduct an actual building entry, search, and alert. Where removal of personnel from such a building cannot be accomplished and it is otherwise safe to proceed with the radiography, a fully instructed employee shall be positioned inside such building or area to prevent exiting while external radiographic operations are in process. Transportation of Regulated Amounts of Radioactive Material will comply with 49 CFR, Subchapter C, Hazardous Material Regulations. Local Fire authorities and the site Radiation Safety officer (RSO) shall be notified of any Radioactive Material use.

Transmitter Requirements: The base policy concerning the use of transmitters such as radios, cell phones, etc., must be adhered to by all contractor personnel. They must also obey Emissions control (EMCON) restrictions.

1.14 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government

shall not be closed or obstructed without written permission from the Contracting Officer.

1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with USACE EM 385-1-1, NFPA 241, the APP, the AHA, Federal and/or State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

3.2 PRE-OUTAGE COORDINATION MEETING

Apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the Contracting Officer and the Installation representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Ensure that each employee is familiar with and complies with these procedures and USACE EM 385-1-1, Section 12, Control of Hazardous Energy.

3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards in accordance with EM 385-1-1.

3.4.1 Fall Protection Equipment and Systems

In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, Paragraphs 21.N through 21.N.04. Personal fall arrest systems are required when working from an

articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase or if the manufacturer provides a hardened point for tying off. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel.

3.4.1.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ASSE/SAFE Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 6 feet. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.4.2 Rescue and Evacuation Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.5 USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval shall not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, shall be only where directed and in approved storage facilities. These facilities shall be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.6 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.7 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, OSHA Directive CPL 2.100 and OSHA

29 CFR 1926. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 34 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

-- End of Section --

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ *State* _____

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
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					Page totals ➤	____	____	____	____	____	____	____	____	____	____	____	____
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

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Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

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DIVISION 01 - GENERAL REQUIREMENTS

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HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES

01/08

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SECTION 01 35 29.13

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES
01/08

PART 1 GENERAL

TContamination was discovered at the Brower Property. Site reports are attached to this Section.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API RP 2219	(2005) Safe Operation of Vacuum Trucks in Petroleum Service

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z358.1	(2009) American National Standard for Emergency Eyewash and Shower Equipment

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 85-115	(1985) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011) Safety and Health Requirements Manual
ER 385-1-95	(2007; Errata 2007) Safety -- Safety and Health Requirements for Munitions and Explosives of Concern (MEC) Operations

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926	Safety and Health Regulations for Construction

29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

1.2 DESCRIPTION OF WORK

This section requires Contractors to implement practices and procedures for working safely and in compliance with OSHA and USACE regulation while performing cleanup activities on uncontrolled hazardous waste sites.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Work Zones; G,

Decontamination Facilities; G

Drawings showing the layout of the personnel and equipment decontamination areas .

SD-03 Product Data

Exposure Monitoring/Air Sampling Program

Personnel exposure monitoring/sampling results.

Site Control Log

Record of each entry and exit into the site, as specified.

Employee Certificates

1.4 REGULATORY REQUIREMENTS

Comply with EM 385-1-1, OSHA requirements in 29 CFR 1910 and 29 CFR 1926 with work performed under this contract, especially OSHA's Standards 29 CFR 1926.65 and 29 CFR 1910.120 and state specific OSHA requirements where applicable. Submit to the Contracting Officer for resolution matters of interpretation of standards before starting work. The most stringent requirements apply where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary.

1.5 PRECONSTRUCTION SAFETY CONFERENCE

Conduct a preconstruction safety conference prior to the start of site activities and after submission of the Contractor's APP/SSHP. The objective of the meeting will be to discuss health and safety concerns related to the impending work, discuss project health and safety organization and expectations, review and answer comments and concerns regarding the APP/SSHP or other health and safety concerns the Contractor may have. Ensure that those individuals responsible for health and safety at the project level are available and attend this meeting.

1.6 ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN (APP/SSHP)

Develop and implement a Site Safety and Health Plan and attach to the Accident Prevention Plan (APP) as an appendix (APP/SSHP). Address all occupational safety and health hazards (traditional construction as well as contaminant-related hazards) associated with cleanup operations within the APP/SSHP. Cover each SSHP element in section 28.A.01 of EM 385-1-1 and each APP element in Appendix A of EM 385-1-1. There are overlapping elements in Section 28.A.01 and Appendix A of EM 385-1-1. SSHP appendix elements that overlap with APP elements need not be duplicated in the APP/SSHP provided each SOH issue receives adequate attention and is documented in the APP/SSHP. The APP/SSHP is a dynamic document, subject to change as project operations/execution change. The APP/SSHP will require modification to address changing and previously unidentified health and safety conditions. It is the Contractor's responsibility to ensure that the APP/SSHP is updated accordingly. Submit amendments to the APP/SSHP to the COR as the APP/SSHP is updated. For long duration projects resubmit the APP/SSHP to the COR annually for review. The APP/SSHP must contain all updates.

1.6.1 Acceptance and Modifications

Prior to submittal, the APP/SSHP must be signed and dated by the Safety and Health Manager and the Site Superintendent. Submit for review 30 days prior to the Preconstruction Safety Conference. Deficiencies in the APP/SSHP will be discussed at the preconstruction safety conference, and be revised to correct the deficiencies and resubmitted for acceptance. Onsite work must not begin until the plan has been accepted. Maintain a copy of the written APP/SSHP onsite. Changes and modifications to must be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Bring to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer any unforeseen hazard that becomes evident during the performance of the work, through the Site Safety and Health Officer (SSHO) for resolution as soon as possible. In the interim, take necessary action to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted APP/SSHP will be cause for stopping work until the matter has been rectified.

1.6.2 Availability

Make available the APP/SSHP in accordance with 29 CFR 1910.120, (b)(1)(v) and 29 CFR 1926.65, (b)(1)(v).

1.7 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.7.1 Project/Site Conditions

TContamination was discovered at the Brower Property. Refer to the following reports and information for the site description and contamination characterization. They are attached to the end of this Section.

1.7.1.1 CERCLA Documents

[_____].

1.7.1.2 RCRA Documents

[_____].

1.7.1.3 UST Documents

[_____].

1.7.2 Ordnance and Explosives (OE)

Stop work and contact the Contracting Officer (CO) if ordnance and explosives (OE), explosive media or chemical agent contaminated media (CACM) are discovered during hazardous waste site cleanup activities. Proceed with work after the CO gives permission and, according to ER 385-1-95 requirements.

1.8 TASK SPECIFIC HAZARDS, INITIAL PPE, HAZWOPER MEDICAL SURVEILLANCE AND TRAINING APPLICABILITY

Task specific occupational hazards, task specific HAZWOPER medical surveillance and training applicability and task specific initial PPE requirements for the project are listed on the Task Hazard and Control Sheets at the end of this section. It is the Contractor's responsibility to reevaluate occupational safety and health hazards as the work progresses and to adjust the PPE and onsite operations, if necessary, so that the work is performed safely and in compliance with occupational safety and health regulations.

1.9 STAFF ORGANIZATION, QUALIFICATION AND RESPONSIBILITIES

1.9.1 Safety and Health Manager

Safety and Health Manager must be [an Industrial Hygienist certified by the American Board of Industrial Hygiene] [a safety professional certified by the Board of Certified Safety Professionals] [a health physicist certified by the American Board of Health Physicists].

1.9.1.1 Additional Qualifications

The Safety and Health Manager must have the following additional qualifications:

a. A minimum of 5 years experience in developing and implementing safety and health programs at hazardous waste sites .

b. Documented experience in supervising professional and technician level

personnel.

c. Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.

d. Documented experience in managing personal protective equipment programs and conducting PPE hazard evaluations for the types of activities and hazards likely to be encountered on the project.

e. Working knowledge of state and Federal occupational safety and health regulations.

1.9.1.2 Responsibilities and Duties

The Safety and Health Manager shall:

a. Be responsible for the development, implementation, oversight, and enforcement of the APP/SSHP.

b. Sign and date the APP/SSHP prior to submittal.

c. Conduct initial site-specific training.

d. Be available for consultation during the of remedial activities and at the startup of each new major phase of work.

e. Visit the site as needed and at least once per week for the duration of activities, to audit the effectiveness of the APP/SSHP.

f. Be available for emergencies.

g. Provide onsite consultation as needed to ensure the APP/SSHP is fully implemented.

h. Coordinate any modifications to the APP/SSHP with the Site Superintendent, the SSHO, and the Contracting Officer.

i. Provide continued support for upgrading/downgrading of the level of personal protection.

j. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.

k. Review accident reports and results of daily inspections.

l. Serve as a member of the Contractor's quality control staff.

1.9.2 Site Safety and Health Officer

Designate an individual and one alternate as the Site Safety and Health Officer (SSHO). The name, qualifications (education and training summary and documentation), and include work experience of the Site Safety and Health Officer and alternate in the APP/SSHP.

1.9.2.1 Qualifications

The SSHO shall meet the following qualifications:

a. A minimum of 2 years experience in implementing safety and health

programs at hazardous waste sites where Level B personal protective equipment was required.

b. Documented experience in construction techniques and construction safety procedures.

c. Working knowledge of Federal and state occupational safety and health regulations.

d. Specific training in personal and respiratory protective equipment, confined space entry and in the proper use of air monitoring instruments and air sampling methods including monitoring for ionizing radiation.

1.9.2.2 Responsibilities and Duties

The Site Safety and Health Officer shall:

a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted APP/SSHP.

b. Be assigned to the site on a full time basis for the duration of field activities. The SSHO will have no duties other than Safety and Health related duties. If operations are performed during more than 1 work shift per day, a site Safety and Health Officer must be present for each shift and when applicable, act as the radiation safety officer (RSO) as defined in paragraph 06.E.02 of EM 385-1-1 on radioactive waste cleanup projects.

c. Have authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the APP/SSHP including, but not limited to, activity hazard analyses, air monitoring, monitoring for ionizing radiation, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log in accordance with 29 CFR 1904.

d. Have authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

e. Consult with and coordinate any modifications to the APP/SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.

f. Serve as a member of the Contractor's quality control staff on matters relating to safety and health.

g. Conduct accident investigations and prepare accident reports.

h. Conduct daily safety inspection and document safety and health findings into the Daily Safety Inspection Log. Track noted safety and health deficiencies to ensure that they are corrected.

i. In coordination with site management and the Safety and Health Manager,

recommend corrective actions for identified deficiencies and oversee the corrective actions.

1.9.3 Occupational Physician

Utilize the services of a licensed physician, who is certified in occupational medicine by the American Board of Preventative Medicine, or who, by necessary training and experience is Board eligible. The physician must be familiar with this site's hazards and the scope of this project. Include the medical consultant's name, qualifications, and knowledge of the site's conditions and proposed activities in the APP/SSHP. The physician will be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910.120, (f) and 29 CFR 1926.65, (f) and paragraph MEDICAL SURVEILLANCE.

1.9.4 Persons Certified in First Aid and CPR

At least two persons who are currently certified in first aid and CPR by the American Red Cross or other approved agency must be onsite at all times during site operations. They must be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard of 29 CFR 1910, Section .1030. These persons may perform other duties but will be immediately available to render first aid when needed.

1.9.5 Safety and Health Technicians

For each work crew in the exclusion zone, one person, designated as a Safety and Health technician, must perform activities such as air monitoring, decontamination, and safety oversight on behalf of the SSHO. They must have appropriate training equivalent to the SSHO in each specific area for which they have responsibility and report to and be under the supervision of the SSHO.

1.10 TRAINING

Meet the following requirements in the Contractor's training program for workers performing cleanup operations and who will be exposed to contaminants.

1.10.1 General Hazardous Waste Operations Training

All Personnel performing duties with potential for exposure to onsite contaminants must meet and maintain the following 29 CFR 1910.120/ 29 CFR 1926.65 (e) training requirements:

a. 40 hours of off site hazardous waste instruction.

b. 3 days actual field experience under the direct supervision of a trained, experienced supervisor.

c. 8 hours refresher training annually.

Onsite supervisors must have an additional 8 hours management and supervisor training specified in 29 CFR 1910.120/29 CFR 1926.65 (e) (4).

1.10.2 Pre-entry Briefing

Prior to commencement of onsite field activities, all site employees,

including those assigned only to the Support Zone, must attend a site-specific safety and health training session. This session will be conducted by the Safety and Health Manager and the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Thoroughly discuss procedures and contents of the accepted APP/SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1 . Each employee must sign a training log to acknowledge attendance and understanding of the training. Notify the Contracting Officer at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

1.10.3 Periodic Sessions

Conduct periodic onsite training by the SSHO at least daily for personnel assigned to work at the site during the following day. Address safety and health procedures, work practices, any changes in the APP/SSHP, activity hazard analyses, work tasks, or schedule; results of previous week's air monitoring, review of safety discrepancies and accidents. Convene a meeting prior to implementation of the change must be convened should an operational change affecting onsite field work be made, to explain safety and health procedures. Conduct a site-specific training sessions for new personnel, visitors, and suppliers by the SSHO using the training curriculum outlines developed by the Safety and Health Manager. Each employee must sign a training log to acknowledge attendance and understanding of the training.

1.11 PERSONAL PROTECTIVE EQUIPMENT

1.11.1 Site Specific PPE Program

Provide onsite personnel exposed to contaminants with appropriate personal protective equipment. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions, including heat and cold stress potential and safety hazards. Use only respirators approved by NIOSH. Commercially available PPE, used to protect against chemical agent, must be approved by [the director of Army Safety through the Chemical Agent Safety and Health Policy Action Committee (CASHPAC)][ ]. Keep protective equipment and clothing clean and well maintained. Include site-specific procedures to determine PPE program effectiveness and for onsite fit-testing of respirators, cleaning, maintenance, inspection, and storage of PPE within the PPE section of the APP/SSHP.

1.11.2 Levels of Protection

The Safety and Health Manager must establish and evaluate as the work progresses the levels of protection for each work activity. Also establish action levels for upgrade or downgrade in levels of PPE. Describe in the SSHP the protocols and the communication network for changing the level of protection. Address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, individual medical considerations, etc. within the PPE evaluation protocol.

1.11.2.1 Initial PPE Components

The following items constitute initial minimum protective clothing and equipment ensembles.

a. Level D. [_____].

b. Modified Level D. [_____].

c. Level C. [_____].

d. Level B. [_____].

1.11.3 PPE for Government Personnel

Three clean sets of personal protective equipment and personal dosimeters for work on radioactive waste cleanup sites and clothing (excluding air-purifying negative-pressure respirators and safety shoes, which will be provided by individual visitors), as required for entry into the Exclusion Zone and/or Contamination Reduction Zone, must be available for use by the Contracting Officer or official visitors. The items must be cleaned and maintained by the Contractor and stored in the clean room of the decontamination facility and clearly marked: "FOR USE BY GOVERNMENT ONLY." Provide basic training in the use and limitations of the PPE provided.

1.12 MEDICAL SURVEILLANCE PROGRAM

Meet 29 CFR 1910.120/29 CFR 1926.65 (f) and the following requirements for medical surveillance program for workers performing cleanup operations and who will be exposed to contaminants. Assure the Occupational Physician or the physician's designee performs the physical examinations and reviews examination results. Participation in the medical surveillance program will be without cost to the employee, without loss of pay and at a reasonable time and place.

1.12.1 Frequency of Examinations

Medical surveillance program participants must receive medical examinations and consultations on the following schedule:

a. Every 12 months

b. If and when the participant develops signs and symptoms indicating a possible overexposure due to an uncontrolled release of a hazardous substance on the project.

c. Upon termination or reassignment to a job where medical surveillance program participation is not required, unless his/her previous annual examination/consultation was less than 6 months prior to reassignment or termination.

d. On a schedule specified by the occupational physician.

1.12.2 Content of Physical Examinations/Consultation

Verify the following information about medical surveillance program participants:

a. Baseline health conditions and exposure history.

b. Allergies/sensitivity/susceptibility to hazardous substances exposure.

c. Ability to wear personal protective equipment inclusive of NIOSH certified respirators under extreme temperature conditions.

d. Fitness to perform assigned duties.

Provide the occupational physician with the following information for each medical surveillance program participant:

a. Information on the employee's anticipated or measured exposure.

b. A description of any PPE used or to be used.

c. A description of the employee's duties as they relate to the employee's exposures (including physical demands on the employee and heat/cold stress).

d. A copy of 29 CFR 1910.120, or 29 CFR 1926.65.

e. Information from previous examinations not readily available to the examining physician.

f. A copy of Section 5.0 of NIOSH 85-115.

g. Information required by 29 CFR 1910 Section .134.

1.12.3 Physician's Written Opinion

Obtain and furnish to the Safety and Health Manager; and the employee before work begins, a copy of the physician's written opinion for each employee. Address the employee's ability to perform hazardous waste site remediation work and containing the following:

a. The physician's verification of the employee's fitness to perform duties as well as recommended limitations upon the employee's assigned work and/or PPE usage.

b. The physician's opinion about increased risk to the employee's health resulting from work; and

c. A statement that the employee has been informed and advised about the results of the examination.

1.12.4 Employee Certificates

Provided on employee certificates for each worker performing cleanup operations with potential for contaminant-related occupational exposure signed by the safety and health manager and the occupational physician indicating the workers meet the training and medical surveillance requirements of this contract.

1.12.5 Site Specific Medical Surveillance

Prior to onsite work, medical surveillance program participants must undergo the following medical testing: [_____]. Provide an explanation of the site specific medical surveillance testing in the APP/SSHP.

1.13 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Prepare and implement by the Safety and Health Manager an exposure monitoring/air sampling program to identify and quantify safety and health hazards and airborne levels of hazardous substances in order to assure

proper selection of engineering controls, work practices and personal protective equipment for affected site personnel. Include action levels for upgrading/downgrading PPE in the program. Monitor for the following gasses and vapors [_____]. Monitor for the following aerosolized contaminants.

1.14 HEAT STRESS MONITORING AND MANAGEMENT

Document in the APP/SSHP and implement the procedures and practices in section 06.J. in EM 385-1-1 to monitor and manage heat stress.

1.15 SPILL AND DISCHARGE CONTROL

Develop and implement written spill and discharge containment/control procedures. Address radioactive wastes, shock sensitive wastes, laboratory waste packs, material handling equipment, as well as drum and container handling, opening, sampling, shipping and transport. Describe prevention measures, such as building berms or dikes; spill control measures and material to be used (e.g. booms, vermiculite); location of the spill control material; personal protective equipment required to cleanup spills; disposal of contaminated material; and who is responsible to report the spill. Storage of contaminated material or hazardous materials must be appropriately bermed, diked and/or contained to prevent any spillage of material on uncontaminated soil. If the spill or discharge is reportable, and/or human health or the environment are threatened, the National Response Center, the state, and the Contracting Officer must be notified as soon as possible. Reporting requirements must be in accordance with [_____].

1.16 MATERIALS TRANSFER SAFETY

Remove liquids and residues from the tanks using explosion-proof or air-driven pumps. Bond to the tank and ground pump motors and suction hoses to prevent electrostatic ignition hazards. Use of a hand pump will be permitted to remove the last of the liquid from the bottom of the tanks. If a vacuum truck is used for removal of liquids or residues, the area of operation for the vacuum truck must be vapor free. locate the truck upwind from the tank and outside the path of probable vapor travel. Discharge the vacuum pump exhaust gases through a hose of adequate size and length downwind of the truck and tank area. Vacuum truck operating and safety practices must conform to API RP 2219. Collect tank residues in drums, tanks, or tank trucks labeled according to 49 CFR 171 and 49 CFR 172 and disposed of as specified. Disconnect and drain fittings and lines of their contents after the materials have been transferred and the tanks have been exposed. Do not spill contents into the environment during cutting or disconnecting of tank fittings. Transfer materials drained into DOT-approved drums for storage and/or transportation. Only non-sparking or non-heat producing tools shall be used to disconnect and drain or to cut through tank fittings. Electrical equipment (e.g., pumps, portable hand tools, etc.) used for tank preparation must be explosion-proof. Following cutting or disconnecting of the fittings, plug openings leading to the tanks.

1.17 DRUM AND CONTAINER HANDLING

Procedures and Precautions (opening, sampling, overpacking): [_____].

1.18 CONFINED SPACE ENTRY PROCEDURES

[_____].

1.19 HOT WORK

Hot work will not be permitted on or within the tanks or anywhere else not previously specified as a hot work area, except as outlined herein. Prior to conducting hot work, a hot work permit must be prepared by the person to be conducting the hot work and reviewed and signed off by the Contractor's qualified person. An additional hot work permit may need to be obtained from local authorities or in the case of military or other federal installations, the fire marshal. An example format for a hot work permit must be included in the AAPP/SSHP. Describe compliance with the following procedures. After tank interiors have been decontaminated, hot work may be conducted only when the tank is inerted, and to the extent necessary to begin dismantling the tanks. After decontamination of tank interiors, hot work must not be performed unless monitoring indicates atmospheres within and immediately surrounding the tanks are less than 8% oxygen inside the tank and less than 10% of the LFL outside the tank; continuous monitoring must continue until the hot work is completed. The hot work prohibition includes welding, cutting, grinding, sawing, or other similar operations which could be expected to potentially generate combustion-producing temperatures or sparks, or which could produce potentially hazardous fumes or vapors. Designate an individual at each hot work site as a fire watch. This person's sole responsibility is to monitor the hot work and have immediate access to the fire extinguisher located at each hot work site. A new permit must be obtained at the start of each work shift during which hot work will be conducted.

1.20 IGNITION SOURCES

[_____].

1.21 FIRE PROTECTION AND PREVENTION

[_____].

1.22 ELECTRICAL SAFETY

[_____].

1.23 EXCAVATION AND TRENCH SAFETY

[_____].

1.24 GUARDING OF MACHINERY AND EQUIPMENT

[_____].

1.25 LOCKOUT/TAGOUT

[_____].

1.26 FALL PROTECTION

[_____].

1.27 HAZARD COMMUNICATION

[_____].

1.28 ILLUMINATION

[_____].

1.29 SANITATION

[_____].

1.30 ENGINEERING CONTROLS

[_____].

1.31 PROCESS SAFETY MANAGEMENT

[_____].

1.32 SIGNS AND LABELS

[_____].

1.33 WASTE DISPOSAL

[_____].

1.34 SITE CONTROL MEASURES

1.34.1 Work Zones

Initial anticipated work zone boundaries (exclusion zone, contamination reduction zone, support zone, all access points and decontamination areas) are to be clearly delineated on the site drawings. Base delineation of work zone boundaries on the contamination characterization data and the hazard/risk analysis to be performed as described in paragraph: HAZARD/RISK ANALYSIS. As work progresses and field conditions are monitored, work zone boundaries may be modified (and site drawings modified) with approval of the Contracting Officer. Clearly identify work zones and marked in the field (using fences, tape, signs, etc.). Submit and post a site map, showing work zone boundaries and locations of decontamination facilities in the onsite office. Work zones must consist of the following:

a. Exclusion Zone (EZ): The exclusion zone is the area where hazardous contamination is either known or expected to occur and the greatest potential for exposure exists. Control entry into this area and exit may only be made through the CRZ.

b. Contamination Reduction Zone (CRZ): The CRZ is the transition area between the Exclusion Zone and the Support Zone. The personnel and equipment decontamination areas must be separate and unique areas located in the CRZ.

c. Support Zone (SZ): The Support Zone is defined as areas of the site, other than exclusion zones and contamination reduction zones, where workers do not have the potential to be exposed to hazardous substances or dangerous conditions resulting from hazardous waste operations. Secure the Support Zone against active or passive contamination. Site

offices, parking areas, and other support facilities must be located in the Support Zone.

1.34.2 Site Control Log

A log of personnel visiting, entering, or working on the site must be maintained. Include the following: date, name, agency or company, time entering and exiting site, time entering and exiting the exclusion zone (if applicable). Before visitors are allowed to enter the Contamination Reduction Zone or Exclusion Zone, they must show proof of current training, medical surveillance and respirator fit testing (if respirators are required for the tasks to be performed) and fill out a Certificate of Worker or Visitor Acknowledgment. Record this visitor information, including date, in the log.

1.34.3 Communication

Provide and install an employee alarm system that has adequate means of on and off site communication in accordance with 29 CFR 1910 Section .165. The means of communication must be able to be perceived above ambient noise or light levels by employees in the affected portions of the workplace. The signals must be distinctive and recognizable as messages to evacuate or to perform critical operations. This includes: [_____].

1.34.4 Site Security

Provide the following site security: [_____]. Print signs in bold large letters on contrasting backgrounds. Signs must be visible from all points where entry might occur and at such distances from the restricted area that employees may read the signs and take necessary protective steps before entering.

1.35 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion or Contamination Reduction Zones or otherwise exposed to hazardous chemical vapors, gases, liquids, or contaminated solids must decontaminate themselves and their equipment prior to exiting the contamination reduction zone (CRZ) and entering the support zone. Consult Chapter 10.0 of NIOSH 85-115 when preparing decontamination procedures. Submit a detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers as part of the APP/SSHP. Train employees in the procedures and enforce the procedures throughout site operations.

1.35.1 Decontamination Facilities

Initially set up a decontamination line in the CRZ. Employees must exit the exclusion zone through the CRZ and implement the following decontamination procedures and techniques: [Scrub and rinse water proof outer garments] [remove all outer garments] [hand and face wash] [shower]. Showers, if needed, must comply with 29 CFR 1910, Section.141 and EM 385-1-1, 02 C, Washing Facilities. Following are additional decontamination procedures Contractor personnel are to follow: [_____]. It is the Site Safety and Health Officer's responsibility to recommend techniques to improve personnel decontamination procedures, if necessary. Initial personnel decontamination equipment includes the following: [_____].

1.35.2 Equipment Decontamination

Decontaminate the vehicles and equipment used in the EZ shall be decontaminated in the CRZ prior to leaving the site.

1.35.2.1 Facilities for Equipment and Personnel

Provide a [vehicle][/][equipment] decontamination station within the CRZ for decontaminating vehicles and equipment leaving the EZ. [Construct a decontamination station pad, which meets the site decontamination needs for all vehicles and larger equipment decontamination. Construct the pad to capture decontamination water, including overspray, and allow for collection and removal of the decontamination water using sumps, dikes and ditches as required.] [High pressure, low volume, water wash area for equipment and vehicles.] [A steam cleaning system for use after the mud and/or site material has been cleaned from the equipment.] [Dry decontamination using a broom to remove dry/loose spilled materials on accessible surfaces.] [A designated "clean area" in the CRZ for performing equipment maintenance. Use this area when personnel are required by normal practices to come in contact with the ground, i.e., crawling under a vehicle to change engine oil. Equipment within the EZ or CRZ must be decontaminated before maintenance is performed.] [_____].

1.35.2.2 Procedures

Procedures for equipment decontamination must be developed and utilized to prevent the spread of contamination into the SZ and offsite areas. These procedures must address disposal of contaminated products and spent materials used on the site, including containers, fluids, oils, etc. Assume any item taken into the EZ to be contaminated and perform an inspection and decontaminate. Vehicles, equipment, and materials must be cleaned and decontaminated prior to leaving the site. Handle construction material in such a way as to minimize the potential for contaminants being spread and/or carried offsite. Prior to exiting the site, vehicles and equipment must be monitored to ensure the adequacy of decontamination.

1.36 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

Maintain, as a minimum, the following items onsite and available for immediate use:

a. First aid equipment and supplies approved by the consulting physician.

b. Emergency eyewashes and showers that comply with ANSI/ISEA Z358.1.

c. Emergency-use respirators. For escape purposes, supply [_____] 5- to 15-minute emergency escape masks. For rescue purposes, Supply [2] [_____] positive pressure self-contained breathing apparatus (SCBA). Dedicate these for emergency use only and maintained onsite in the Contamination Reduction Zone.

d. Provide fire extinguishers of sufficient size and type at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.

[
e. [_____].]

1.37 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

An Emergency Response Plan, that meets the requirements of 29 CFR 1910.120 (l) and 29 CFR 1926.65 (l), must be developed and implemented as a section of the APP/SSHP. In the event of any emergency associated with remedial action, without delay, alert all onsite employees and as necessary offsite emergency responders that there is an emergency situation; take action to remove or otherwise minimize the cause of the emergency; alert the Contracting Officer; and institute measures necessary to prevent repetition of the conditions or actions leading to, or resulting in, the emergency. Train employees that are required to respond to hazardous emergency situations to their level of responsibility according to 29 CFR 1910.120 (q) and 29 CFR 1926.65 (q) requirements. Rehearse the plan regularly as part of the overall training program for site operations. Review the plan periodically and revised as necessary to reflect new or changing site conditions or information. Provide copies of the Emergency Response Portion of the accepted APP/SSHP to the affected local emergency response agencies. Address, as a minimum, the following elements in the plan:

a. Pre-emergency planning. Coordinate with local emergency response providers during preparation of the Emergency Response Plan. At a minimum, coordinate with local fire, rescue, hazardous materials response teams, police and emergency medical providers to assure all organizations are capable and willing to respond to and provide services for on-site emergencies. Ensure the Emergency Response Plan for the site is compatible and integrated with the local fire, rescue, medical and police security services available from local emergency response planning agencies.

b. Personnel roles, lines of authority, communications for emergencies.

c. Emergency recognition and prevention.

d. Site topography, layout, and prevailing weather conditions.

e. Criteria and procedures for site evacuation (emergency alerting procedures, employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security and control).

f. Specific procedures for decontamination and medical treatment of injured personnel.

g. Route maps to nearest prenotified medical facility. Site-support vehicles must be equipped with maps. At the beginning of project operations, drivers of the support vehicles must become familiar with the emergency route and the travel time required.

h. Emergency alerting and response procedures including posted instructions and a list of names and telephone numbers of emergency contacts (physician, nearby medical facility, fire and police departments, ambulance service, Federal, state, and local environmental agencies; as well as Safety and Health Manager, the Site Superintendent, the Contracting Officer and/or their alternates).

i. Criteria for initiating community alert program, contacts, and responsibilities.

j. Procedures for reporting incidents to appropriate government agencies.

In the event that an incident such as an explosion or fire, or a spill or release of toxic materials occurs during the course of the project, the appropriate government agencies must be immediately notified. In addition, verbally notify the Contracting Officer and the local district safety office immediately and receive a written notification within 24 hours. Include within the report the following items:

(1) Name, organization, telephone number, and location of the Contractor.

(2) Name and title of the person(s) reporting.

(3) Date and time of the incident.

(4) Location of the incident, i.e., site location, facility name.

(5) Brief summary of the incident giving pertinent details including type of operation ongoing at the time of the incident.

(6) Cause of the incident, if known.

(7) Casualties (fatalities, disabling injuries).

(8) Details of any existing chemical hazard or contamination.

(9) Estimated property damage, if applicable.

(10) Nature of damage, effect on contract schedule.

(11) Action taken to ensure safety and security.

(12) Other damage or injuries sustained, public or private.

k. Procedures for critique of emergency responses and follow-up.

1.38 CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGEMENT

A copy of a Contractor-generated certificate of worker/visitor acknowledgement must be completed and submitted for each visitor allowed to enter contamination reduction or exclusion zones, and for each employee, following the example certificate at the end of this section.

1.39 INSPECTIONS

Attach to and submit with the Daily Quality Control reports the SSHO's Daily Inspection Logs. Include with each entry the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special safety and health issues and notes, and signature of preparer.

1.40 SAFETY AND HEALTH PHASE-OUT REPORT

Submit a Safety and Health Phase-Out Report in conjunction with the project close out report and will be received prior to final acceptance of the work. Include the following minimum information :

a. Summary of the overall performance of safety and health (accidents or incidents including near misses, unusual events, lessons learned, etc.).

b. Final decontamination documentation including procedures and techniques used to decontaminate equipment, vehicles, and on site facilities.

c. Summary of exposure monitoring and air sampling accomplished during the project.

d. Signatures of Safety and Health Manager and SSHO.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

Task Hazard and Control Requirements Sheet	
Task	
Initial Anticipated Hazards	
Initial PPE	
Initial Controls	
Initial Exposure Monitoring	
[Yes][No]	HAZWOPER Medical Surveillance Required
[Yes][No]	HAZWOPER Training Required

-- End of Section --

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ENVIRONMENTAL MANAGEMENT
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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z400.1/Z129.1	(2004) Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation

ASTM INTERNATIONAL (ASTM)

ASTM D4840	(1999; R 2010) Sampling Chain-Of-Custody Procedures
ASTM D5663	(1997; R 2003) Validating Recycled Content in Packaging Paper and Paperboard
ASTM E1991	(2005) Environmental Life Cycle Assessment of Building Materials/Products
ASTM E2114	(2008) Standard Terminology for Sustainability Relative to the Performance of Buildings

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 14040	(2006) Environmental Management - Life Cycle Assessment - Principles and Framework

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST BEES 4.0	(2007) Building for Environmental and Economic Sustainability

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Biomass R&D Act	(2000) Biomass Research and Development Act
U.S. Farm Bill	(2002) U.S. Farm Bill of May 2002

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

NPDES	(1972; R 2005) National Pollutant Discharge Elimination System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR	Protection of Environment

40 CFR 261	Identification and Listing of Hazardous Waste

1.2 DEFINITIONS

Definitions pertaining to sustainable development are as defined in ASTM E2114 and as specified.

a. "Biobased content" is calculated as the weight of the biobased material divided by the total weight of the product, and is expressed as a percentage by weight.

b. "Biobased materials" include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by the Biomass R&D Act. Minimum biobased content shall be as defined in the U.S. Farm Bill.

c. "Chain-of-custody" is a process whereby a product or material is maintained under the physical possession or control during its entire life cycle.

d. "Pollution and environmental damage" is caused by the presence of chemical, physical, or biological elements or agents. Human health or welfare is adversely affected; ecological balances are unfavorably altered; the utility of the environment for aesthetic, cultural, or historical purposes degrades.

1.3 PRECONSTRUCTION MEETING

After award of Contract and prior to commencement of the work, the Contractor shall schedule and conduct a meeting with the Contracting Officer to discuss the proposed Environmental Protection Plan and to develop a mutual understanding relative to the details of environmental protection. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting as specified in Section 01 45 00 CONTRACTOR QUALITY CONTROL.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G,

Instructor Qualifications

Submit reference data to demonstrate instructors' individual and firm's capabilities and experience.

SD-03 Product Data

[Life Cycle Assessments]

SD-06 Test Reports

Field Quality Control Reports

SD-07 Certificates

Environmental Regulatory Requirements

For Government's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with environmental regulations bearing on performance of the work.

SD-08 Manufacturer's Instructions

[Material Safety Data Sheets]

SD-11 Closeout Submittals

Training Program

Submit [two] [_____] copies of instructional program outline for demonstration and training, including a schedule of dates, times, length of instruction, instructors' names, learning objective, and teaching outline for each training module. At completion of training, submit [one] [_____] complete training manual[s] for Government's use, and a list of participants with each participant's results of performance-based test for each training module. For Government's records, submit Contractor 40 CFR employee training records [upon request of the Contracting Officer].

Protection of Natural Resources

1.5 CONTRACTOR'S ENVIRONMENTAL MANAGER

Designate an on-site Environmental Manager responsible for overseeing the environmental goals for the project and implementing procedures for environmental protection.

1.5.1 Duties

The Environmental Manager shall be responsible for the following:

a. Compliance with applicable federal, state, and local environmental regulations, including maintaining required documentation.

b. Implementation of the Waste Management Plan.

c. Implementation of the Indoor Air Quality (IAQ) Management Plan.

d. Implementation of the Environmental Protection Plan.

e. Environmental training for Contractor personnel in accordance with their position requirements.

f. Monitoring and documentation of environmental procedures.

1.5.2 Qualifications

Minimum 5 years construction experience on projects of similar size and scope; minimum 2 years experience with environmental procedures similar to those of this project; familiarity with Environmental Management Systems (EMSs); familiarity with environmental regulations applicable to construction operations.

1.6 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Contractor shall be responsible for knowing federal, state, and local regulatory requirements pertaining to legal disposal of all construction and demolition waste materials. Comply with all applicable regulations and maintain records of permits, licenses, certificates, and other environmental regulatory requirement correspondences.

1.7 ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

[1.7.1 Material Safety Data Sheets (MSDS)

Submit an MSDS for each product specified in other sections or required by OSHA to have an MSDS. MSDS shall be prepared [no earlier than June 1998] [within the previous five years] [_____]. Include information for MSDS Sections 1 through 16 in accordance with ANSI Z400.1/Z129.1 and as follows:

a. Section 11: Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects. [Provide written description of the process used in evaluating chemical hazards relative to preparation of the MSDS.]

b. Section 12: Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in the event of an accidental release.

c. Section 13: Include data regarding the proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not the product is considered to be "hazardous waste" according to 40 CFR 261.

d. Section 14: Identify hazard class for shipping.

e. Section 15: Identify federal, state, and local regulations applicable to the material.

f. Section 16: Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts. [Identify the date MSDS was prepared.]

][1.7.2 Life Cycle Assessments (LCAs)

For the following products, submit LCA data developed in accordance with [ASTM E1991] [ISO 14040] [_____][; and where BEES data exists, submit NIST BEES 4.0 analysis using [100][50][_____] percent Environmental Performance Weighting and the [EPA Scientific Advisory Board] [Harvard University] [Equal] [_____] Environmental Impact Category Weights].

a. Masonry

b. Finish Carpentry

c. Plastic Fabrications

d. Building Insulation

e. Roofing

f. Joint Sealers

g. Wood & Plastic Doors

h. Windows

i. Skylights

j. Glazed Curtain Wall

k. Gypsum Board

l. Tile

m. Acoustical Ceilings

n. Resilient Flooring

o. Carpet

p. Toilet Compartments

q. Loading Dock Equipment

r. Office Equipment

s. Furnishings & Accessories

t. Renewable Energy Equipment

u. Elevators

v. HVAC equipment

x. Lighting equipment

]1.8 ENVIRONMENTAL PROTECTION PLAN

Prepare and submit an Environmental Protection Plan not less than 10 days before the preconstruction meeting. At a minimum, address the following elements in accordance with this section:

a. Identification and contact information for Environmental Manager.

b. General site information, including preconstruction description and photographs.

c. Summary of training program.

d. Procedures to address water resources.

e. Procedures to address land resources.

f. Procedures to address air resources.

g. Procedures to address fish and wildlife resources.

h. Monitoring and quality control procedures.

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

1.9 ENVIRONMENTAL DEMONSTRATION AND TRAINING

Contractor shall provide environmental training for workers performing work on the project site.

1.9.1 Instructor Qualifications

Training shall be given by a firm or individual experienced in providing training or education similar in content and extent to that indicated for this project.

1.9.2 Coordination

Coordinate instruction schedule with Government operations. Adjust schedule as required to minimize disruption of Government operations. Coordinate instruction with demonstration and training of general building systems.

1.9.3 Training Program

Develop a training program for all site workers that includes the following topics:

a. Overview of environmental and sustainability issues related to the building industry.

b. Overview of environmental and sustainability issues related to the project.

c. Compliance with applicable federal, state, and local environmental regulations.

d. Review of site specific procedures and management plans implemented during construction, including the Waste Management Plan, Indoor Air Quality (IAQ) Management Plan, Environmental Protection Plan, and procedures for noise and acoustics management.

1.9.3.1 Scheduling

Provide instruction at mutually agreeable time[s].

1.9.3.2 Training Modules

Develop a learning objective and teaching outline for each topic in the Training Program. Include a description of specific skills and knowledge

that each participant is expected to acquire. Instructors shall be well-versed in the particular topics that they are presenting.

1.9.3.3 Evaluation

At the conclusion of each training module, assess and document each participant's understanding of the module by use of [an oral][a written][a demonstration]performance-based test.

PART 2 PRODUCTS

2.1 ENVIRONMENTALLY PREFERABLE PRODUCTS

Consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of products, and provide products and materials with the least effect on the environment, determined by LCA analysis, released toxins, and other methods.

2.1.1 Prohibited Materials

The use of the following materials is prohibited:

a. Products containing asbestos.

b. Products containing urea formaldehyde.

c. Products containing polychlorinated biphenyls.

d. Products containing chlorinated fluorocarbons.

e. Solder or flux containing more than 0.2 percent lead and domestic water pipe or pipe fittings containing more than 8 percent lead.

f. Paint containing more than 0.06 percent lead.

2.1.2 Packaging

Where Contractor has the option to provide one of the listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging, and to manufacturers with policies that take back product packaging.

2.1.2.1 Industrial Paperboard

Minimum [45][100][_____] percent post-consumer recycled content in accordance with ASTM D5663.

2.1.2.2 Carrier Board

Minimum [10][100][_____] percent recycled content with a minimum of [10][15][_____] percent post-consumer recycled content in accordance with ASTM D5663.

2.1.2.3 Brown Papers

Minimum [5][40][_____] percent recycled content with a minimum of [5][20][_____] percent post-consumer recycled content in accordance with ASTM D5663.

2.1.3 Substitutions

Notify the Contracting Officer when Contractor is aware of materials, equipment, or products that meet the aesthetic and programmatic intent of Contract Documents, but which are more environmentally responsible than materials, equipment, or products specified or indicated in the Contract Documents. Submit the following for initial review by the Contracting Officer:

a. Product data including manufacturer's name, address, and phone number.

b. Description of environmental advantages of proposed substitution over specified product.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Comply with applicable regulations and these specifications. Preserve the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the Contracting Officer. Where violation of environmental procedures requirements will irreversibly damage the site, documentation of progress at [_____] intervals shall be required.

3.1.1 General Disturbance

Confine demolition and construction activities to [work area limits indicated on the Drawings] [maximum 40 feet beyond the building perimeter, 5 feet beyond solid paving, and 25 feetbeyond pervious paving]. Remove debris, rubbish, and other waste materials resulting from demolition and construction operations from site. Transport materials with appropriate vehicles and dispose of them off site to areas that are approved for disposal by governing authorities having jurisdiction. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways. Burning is prohibited.

3.1.2 Water Resources

Comply with requirements of the NPDES and the applicable State Pollutant Discharge Elimination System (SPDES). Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Store and service construction equipment at areas designated for collection of oil wastes. Prevent ponding of stagnant water conducive to mosquito breeding habitat. Prevent run-off from site during demolition and construction operations. [Equipment will not be permitted to ford live streams.] [Equipment will be permitted to ford live streams if temporary culverts or bridges are constructed for the purpose. Remove temporary culverts and bridges upon completion of work and repair the area to its original condition, unless otherwise accepted in writing by the Contracting Officer.]

3.1.3 Land Resources

Prior to construction, identify land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without

permission from the Contracting Officer. Coordinate protection practices with work specified in Division 2 EXISTING CONDITIONS.

3.1.3.1 Erodible Soils

Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.

3.1.3.2 Erosion and Sedimentation Control Devices

Construct or install temporary and permanent erosion and sedimentation control features as required.

3.1.3.3 Tree and Plant Protection

Protect as specified in Division 2 EXISTING CONDITIONS and as specified. Prior to start of construction, tag each tree and plant scheduled to remain. In the event of damage to tree or plant, the Government may, at the Contracting Officer's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.

3.1.4 Air Resources

Comply with Indoor Air Quality (IAQ) Management Plan and as follows:

a. Prevent creation of dust, air pollution, and odors.

b. Sequence construction to avoid unnecessary disturbance to site.

c. Use mulch, water sprinkling, temporary enclosures, and other appropriate methods as needed to limit dust and dirt rising and scattering in air. Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.

d. Store volatile liquids, including fuels and solvents, in closed containers. Do not store with materials that have a high capacity to adsorb VOC emissions or in occupied spaces.

e. Properly maintain equipment to reduce gaseous pollutant emissions.

3.1.5 Fish and Wildlife Resources

Manage and control construction activities to minimize interference with and damage to fish and wildlife. Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.2 FIELD QUALITY CONTROL

Comply with requirements of agencies having jurisdiction and as specified

herein. Provide field practices, shipping, and handling of samples in accordance with ASTM D4840. Provide Field Quality Control Reports in accordance with approved Environmental Protection Plan.

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QUALITY CONTROL SYSTEM (QCS)
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PART 1 GENERAL

1.1 Contract Administration

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor must use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site (www.rmssupport.com). This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

1.1.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record will also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.1.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01 PROJECT SCHEDULE, Section 01 33 00 SUBMITTAL PROCEDURES, and Section 01 45 00 CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith will be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor will be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program

updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.3 SYSTEM REQUIREMENTS

The following is the minimum system configuration that the Contractor must have to run QCS:

QCS and Quality Assurance System (QAS) System

Hardware

IBM-compatible PC with 1000 MHz Pentium or higher processor

256+ MB RAM for workstation / 512+ MB RAM for server

1 GB hard drive disk space for sole use by the QCS system

Compact Disk (CD) Reader 8x speed or higher

SVGA or higher resolution monitor (1024x768, 256 colors)

Mouse or other pointing device

Windows compatible printer. (Laser printer must have 4 MB+ of RAM)

Connection to the Internet, minimum 56k BPS

Software

MS Windows 2000, XP, Vista or Windows 7

QAS-Word Processing software: MS Word 2000 or newer

Latest version of: Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher

Electronic mail (E-mail) MAPI compatible

Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control (CQC) Training

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the

Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the Government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

Establish, maintain, and update data in the QCS database throughout the duration of the contract at the Contractor's site office. Submit data updates to the Government (e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc.) using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, e-mail or CD-ROM may be used instead of E-mail (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically includes current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

Contain within the database the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, deliver Contractor administrative data in electronic format.

1.6.1.2 Subcontractor Information

Contain within the database the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Assign each subcontractor/trade a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, deliver subcontractor administrative data in electronic format.

1.6.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters must be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

Contain within the Contractor's QCS database a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Control checklists.

1.6.1.6 Request For Information (RFI)

Exchange all Requests For Information (RFI) using the Built-in RFI generator and tracker in QCS.

1.6.2 Finances

1.6.2.1 Pay Activity Data

Include within the QCS database a list of pay activities that the Contractor must develop in conjunction with the construction schedule. The sum of all pay activities must be equal to the total contract amount, including modifications. Group pay activities Contract Line Item Number (CLIN); the sum of the activities must equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

Prepare all progress payment requests using QCS. Complete the payment request worksheet, prompt payment certification, and payment invoice in QCS. Update the work completed under the contract, measured as percent or as specific quantities, at least monthly. After the update, generate a payment request report using QCS. Submit the payment request, prompt payment certification, and payment invoice with supporting data using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, e-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which will govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements. Maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. Provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 00 CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS must be the Contractor's official report. Summarize data from any supplemental reports by the Contractor and consolidate onto the QCS-generated Daily CQC Report. Submit daily CQC Reports as required by Section 01 45 00 CONTRACTOR QUALITY CONTROL. Electronically submit reports to the Government within 24 hours after the date covered by the report. Also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

Use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. Maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The

Government's QA punch list items will be included in its export file to the Contractor. Regularly update the correction status of both QC and QA punch list items.

1.6.3.3 QC Requirements

Develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. Update all data on these QC requirements as work progresses, and promptly provide this information to the Government via QCS.

1.6.3.4 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.5 Labor and Equipment Hours

Log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.6.3.6 Accident/Safety Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. Regularly update the correction status of the safety comments. In addition, utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 300.

1.6.3.7 Features of Work

Include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.8 Hazard Analysis

Use QCS to develop a hazard analysis for each feature of work included in the CQC Plan. Address any hazards, or potential hazards, that may be associated with the work.

1.6.4 Submittal Management

The Government will provide the initial submittal register in electronic format. Thereafter, maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. Use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update must be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

Develop a construction schedule consisting of pay activities, in accordance with Section 01 32 01 PROJECT SCHEDULE. Input and maintain in the QCS database this schedule either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01 PROJECT SCHEDULE). Include with each pay request the updated schedule.

1.6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION VIA CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the Government's SFTP repository built into QCS export function. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Export data onto CDs using the QCS built-in export function. If used, submit CD-ROMs in accordance with the following:

1.8.1 File Medium

Submit in English required data on CD-ROM conforming to industry standards used in the United States.

1.8.2 CD-ROM Labels

Affix a permanent exterior label to each CD-ROM submitted. Indicate on the label in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software must not be altered.

1.9 MONTHLY COORDINATION MEETING

Update the QCS database each workday. At least monthly, generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, meet with the Government representative to review the planned progress payment data submission for errors and omissions.

Make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by

incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 45 00

CONTRACTOR QUALITY CONTROL (CQC)
02/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D3740	(2011) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2011b) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or lump-sum prices.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Plan; G, RO

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. Cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements

specified in the contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent must maintain a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 QUALITY CONTROL PLAN

Submit no later than 20 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 60 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer must be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification

through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must receive direction and authority from the CQC System Manager and serve as a member of the CQC staff. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress

of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties . Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: materials technician, and geotechnical. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan

Experience Matrix	
Area	Qualifications
Soils	Materials Technician with 2 yrs experience with piezometers, inclinometers, settlement plates, etc.
Geotechnical	Graduate engineer or engineering geologist who is licensed by the State of Washington with 5 years of experience in work similar to the scope and complexity of this project.

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager must have completed the course entitled "Construction Quality Management For Contractors". This course is periodically offered by AGC at various locations throughout the Northwest.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the contract drawings.

c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. Review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government must be notified at least 72 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government must be notified at least 24 hours in advance of beginning the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel must meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $1,000 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the

Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

k. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Sample forms can be found through COntractor link of the RMS website http://www.rmssupport.com.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. 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 the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

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SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
08/09

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2009) Standard for Safeguarding Construction,Alteration, and Demolition Operations
NFPA 70	(2011; TIA 11-1; Errata 2011; TIA 11-2; TIA 11-3; TIA 11-4) National Electrical Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2007; Rev K) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual of Uniform Traffic Control Devices

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction site plan; G, RO
Traffic control plan; G, RO

SD-07 Certificates

Original Site Photos; F
Progress Photographs; F

SD-11 Closeout Submittals

Completion Photographs; F

1.4 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer.

2.1.2 Project and Safety Signs

The requirements for the signs, their content, and location are are attached at the end of this section (01 50 00-A. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

At contractors expense construct access and haul roads necessary for proper prosecution of the work under this contract. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are be avoided. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.3 Fencing

Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.

2.2.4 Temporary Wiring

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Include frequent inspection of all equipment and apparatus.

PART 3 EXECUTION

3.1 General

The Contractor shall furnish photographs depicting construction as specified herein. The photographs shall be in digital JPEG format, with a resolution of 1024 x 768 pixels or better, size limited to less than 300KB. Photos shall be submitted in a Word document, with a caption under each photo showing date taken, project location, contract title and number, and a brief description of what the photo depicts. The photos shall be submitted on a 133 mm ISO-9660 CD-ROM.

3.2 Original Site Photos

Provide digital photos of the site's original condition prior to constructing temporary facilities. The photos will be used to substantiate the work at the completion of the project as required by paragraph RESTORATION OF STORAGE AREA

3.3 Progress Photographs

Construction progress photographs shall be taken between the 1st and 15th of each month and delivered to the Contracting Officer with the payment request for the month taken. Photos shall be taken from 10 positions. Location of positions shall be coordinated with or may be selected by the Contracting Officer. They shall show, inasmuch as practicable, work accomplished during the previous month. Photographic quality and composition of photos shall be such that they can be used for briefings and/or to illustrate articles on the construction progress of the project.

3.4 Completion Photographs

Construction completion photographs (in digital JPEG format) shall be taken upon completion of construction and delivered to the Contracting Officer not later than 15 days prior to project completion. It is the intention of the Government to obtain slides whose color, clarity, and composition are such that they can be used for briefings and/or to illustrate articles on the completed project. Slides shall be taken from 10 positions. Location of positions shall be coordinated with or may be selected by the Contracting Officer. Slides shall show the completed project to the best advantage, and shall include overall site photos as well as photos of major features.

3.5 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking

must not interfere with existing and established parking requirements of the government installation.

3.6 AVAILABILITY AND USE OF UTILITY SERVICES

3.6.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.6.2 Payment for Utility Services

The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Carefully conserve any utilities furnished without charge.

The point at which the Government will deliver such utilities or services and the quantity available is as indicated. Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; and providing transformers; and make disconnections.

3.6.3 Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.6.4 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.6.5 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

3.6.6 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials weekly to minimize potential hazards.

3.7 TRAFFIC PROVISIONS

3.7.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.7.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.7.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

3.7.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

3.8 CONTRACTOR'S TEMPORARY FACILITIES

3.8.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in

order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.8.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

3.8.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store Trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

3.8.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

3.8.5 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.8.6 Maintenance of Storage Area

a. Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings,

under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

b. Cut grass (or annual weeds) within the construction and storage sites to a maximum 4 inch height at least once a week during the growing season unless the grass area is not visible to the public. Trim the grass around fences at time of grass cutting. Maintain grass or weeds on stockpiled earth as descried above.

3.8.7 New Building

In the event a new building is constructed for the temporary project field office, it will be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities must be furnished. Screen the windows and doors and provide the doors with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins will be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh screens to prevent easy access. In warm weather, furnish air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Any new building erected for a temporary field office must be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work become the property of the Contractor and removed from the site. All charges for telephone service for the temporary field office will be borne by the Contractor, including long distance charges up to a maximum of $75.00 per month.

3.8.8 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.8.9 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.8.9.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings;

removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.9 GOVERNMENT FIELD OFFICE

3.9.1 Resident Engineer's Office

The office space shall include approximately 600 square feet for the exclusive use of the Government (1 office and one restroom) with power, water, appropriate office furniture, internet access, heat and air-conditioning, and perform any necessary maintenance.

(1) The office shall have a minimum of one window with operable window blinds. Two 3-foot x 5-foot desks and two 3-foot x 5-foot plans tables. The desks shall have side drawers and a lockable center drawer, for a minimum of five drawers. The plans tables shall have one central drawer. Provide one five-wheeled, padded, ergonomic desk chair for each desk. The office shall have two four-legged, padded "Guest Chairs" similar to the Ergonomic Swivel Chair and roller mat. The office shall be furnished with a 12-inch x 18-inch x 6-foot metal locker with a shelf, coat hanger rod, and three clothes hooks. Provide one ten-pound, multi-purpose, dry chemical fire extinguishers, rated for type A, B, and C fires. Mount extinguisher at a strategic location, coordinated with the Contracting Office. One shelf, 12 inches x 24 inches, mounted on wall within 18 inches of punch down block. Provide one minimum 3-foot x 4-foot whiteboard. Provide one walk-off mat at each building entrance.

(2) Electrical and communications outlets shall be provided. Telephone service shall be provided for the duration of time that the Contractor provides telephone service for himself. The Government will pay only charges for long distance calls made by Government personnel.

(3) Provide janitorial services for the field office trailer, twice per month.

(4) Provide adequate parking for 2 cars.

(5) The office and furnishings will remain the property of the Contractor. The Contractor shall be responsible for installing all utility hookups, tie downs, skirting, slabs, foundations, steps and landings to meet all local, county, state and Federal codes and regulations. Upon completion of the project, the trailer shall be removed from the site, all utilities and site improvements associated with the office shall be removed, and the site restored to match surrounding conditions.

3.9.2 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds.

3.10 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory,

the Contractor must install a satisfactory means of communication, such as telephone or other suitable devices and made available for use by Government personnel.

3.11 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.12 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store within the fenced area described above or at the supplemental storage area any materials resulting from demolition activities which are salvageable. Neatly stacked stored materials not in trailers, whether new or salvaged.

3.13 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletinboard, signs, barricades, haulroads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore to the original or better condition, areas used by the Contractor for the storage of equipment or material, or other use. Gravel used to traverse grassed areas must be removed and the area restored to its original condition, including top soil and seeding as necessary.

-- End of Section --

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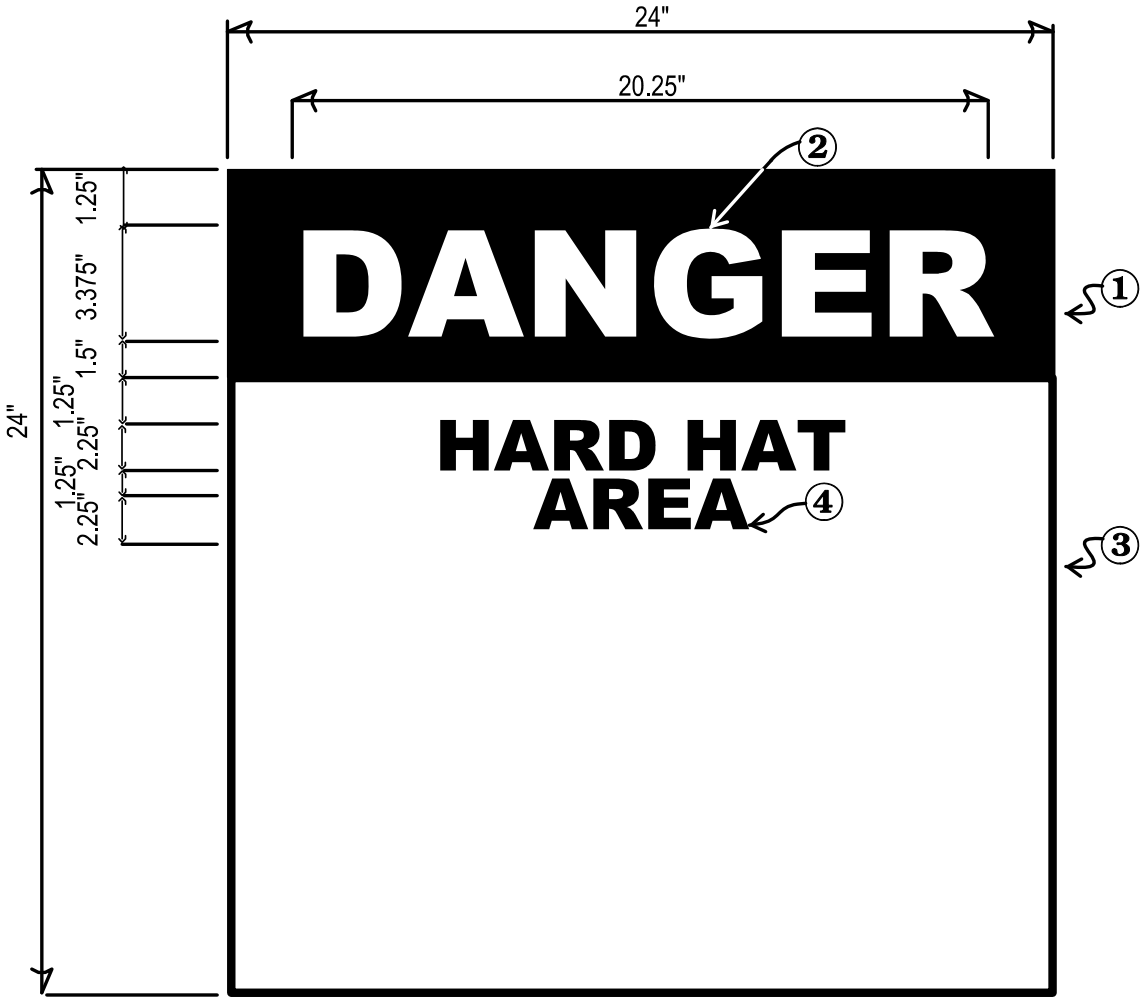
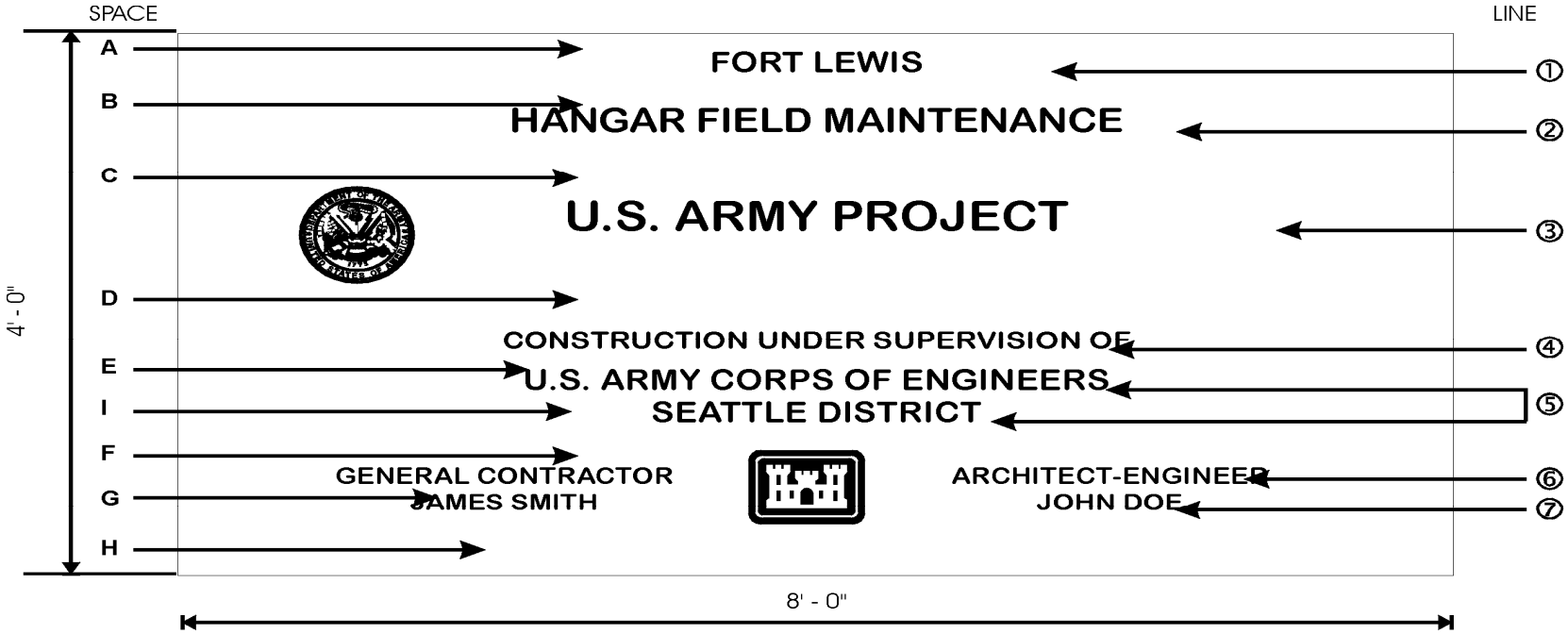
ATTACHMENT 01 50 00-A

PROJECT AND SAFETY SIGNS



- SIGN SHALL BE FABRICATED FROM .125 THICK 6061-T6 ALUMINUM PANEL
- COLOR
    1. SAFETY RED (SR)
    2. WHITE
    3. WHITE
    4. BLACK
- LETTERING SHALL BE HELVETICA BOLD TYPOGRAPHY.
- LETTERS AND BACKGROUND SHALL BE REFLECTIVE SHEETING MATERIAL.
- SIGNS SHALL BE POSTED AT 6’-6” (BOTTOM SIGN TO GRADE) OR AS DIRECTED BY THE CONTRACTING OFFICER.
- LETTERING TO BE CENTERED ON PANEL.



SAMPLE CONSTRUCTION SIGN FOR MCP PROJECTS
SCHEDULE

SPACE	HT.	LINE	DESCRIPTION	LETTER HT.	STROKE
A	2"	1	LOCATION	2 3/8"	1/4"
B	2 5/8"	2	PROJECT NOMENCLATURE *	2 3/4"	3/8"
C	5 3/4"	3	U.S. ARMY PROJECT	4"	1/2"
D	8"	4	CONSTRUCTION UNDER SUP.	1 1/2"	1/8"
E	4"	5	CONSTRUCTION AGENCY *	2 3/8"	1/4"
F	4"	6	GENERAL CONTRACTOR *	1 3/8"	3/16"
G	1"	7	GENERAL CONTRACTOR*	1 3/8"	3/16"
H	2 7/8"	*	WILL VARY TO SUIT PROJECT REQUIREMENTS		
I	2		SEATTLE DISTRICT		

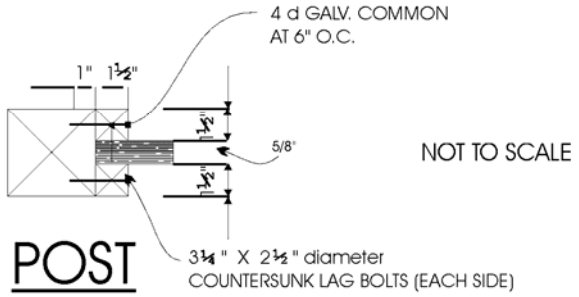
U.S. ARMY

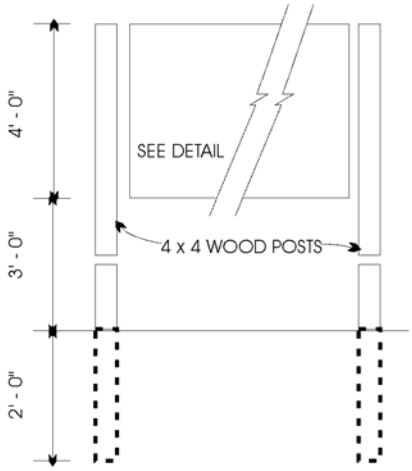
PROJECT
CONSTRUCTION SIGN

Sheet 1 of 2 Scales As shown
U.S. Army Engr. Dist. Seattle, WA.

Dr:	R.L.W.	Transmitted with report
Tr:	R.L.W.	DATED: 20 JUNE 84
Ck:	R.L.W.	File No. 49s/40-05-15

PROJECT SIGN





NOTES:

1. Signboard 4' x 8' x 5/8" grade A-C exterior type plywood with medium density overlay on both sides.
2. Paint both sides and edges with one prime coat and two coats of paint, color white exterior type enamel. Lettering shall be as shown on drawing and shall be black gloss exterior type enamel.
3. Lettering shall be Helvetica medium.
4. Acceptable abbreviations may be used for Contractor's name.
5. Department of Air Force Seal and Corps of Engineers' Castle to be Government furnished.
6. No company logo shall be used.
7. Sign posts and 1½" wood trim shall be painted white.
8. Upon completion of work under this contract, the project sign shall be removed from the job site and shall remain the property of the Contractor.

NOTE: The Contractor shall verify the colors to be used with the Contracting Officer prior to constructing the sign.

SHEET 2 OF 2

SAFETY PERFORMANCE SIGN

Each contractor's safety record is to be posted on Corps managed or supervised construction projects and mounted with the construction project identification sign.

The graphic format, color, size and typefaces used on the sign are to be reproduced exactly as specified below. The title with First Aid logo in the top section of the sign and the performance record captions are standard for all signs of the type. Legend Groups 2 and 3 below identify the project and the contractor and are to be placed on the sign as shown.

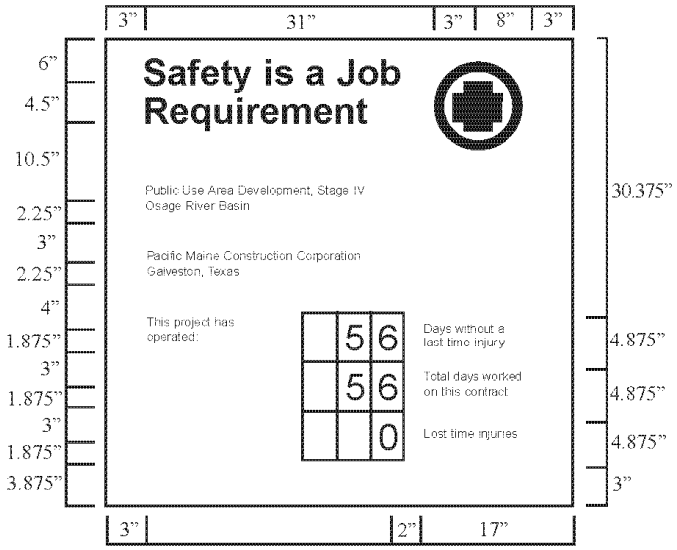
Safety record numbers are mounted on individual metal plates and are screw mounted to the background to allow for daily revisions to posted safety performance record.

Legend Group 1: Standard two-line title "Safety is a Job requirement" with (8 od.) Safety Green First Aid logo.
Color: to match PMS 347
Typeface: 3" Helvetica Bold
Color: Black

Legend Group 2: One to two-line project title legend describes the work being done under this contract and name of host project.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 3: One to two-line identification; name of prime contractor and city, state address.
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Legend Group 4: Standard safety record captions as shown.
Color: Black
Typeface: 12.5" Helvetica Regular



Sign Type	Legend Size	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-02	Various	4' X 4'	4" X 4"	HDO-3	48"	WH/BK - GR

Replaceable numbers are to be mounted on white .060 aluminum plates and screw-mounted to background.
Color: Black
Typeface: 3" Helvetica Regular
Plate size: 2.5" X 5"

All typography is flush left and rag right. Upper and lower case with initial capitals only as shown. Letter - and word - spacing to follow Corps standards.

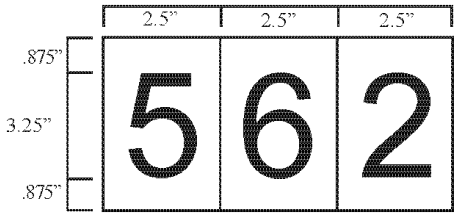


Fig. 2

End of Attachment 01 50 00-A

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SECTION 01 57 20

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appendix

-- End of Section Table of Contents --

SECTION 01 57 20

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011) Safety and Health Requirements Manual
WETLANDS DELINEATION MANUAL	(1987) Corps of Engineers Wetlands Delineation Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328	Definitions of Waters of the United States
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
49 CFR 171 - 178	Hazardous Materials Regulations
43 CFR 10.4	Inadvertent Discoveries
36 CFR 800	36 CFR 800.13 Protection Of Historic Properties (Post Review Discoveries)

WASHINGTON DEPARTMENT OF ECOLOGY

WAC 173-303	Dangerous Waste Regulations

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is 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; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners,excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor must discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Land Application must be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.5 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.6 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.7 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters

that are surface discharged may terminate in drainage ditches, storm sewers,creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.8 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.9 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLANDS DELINEATION MANUAL.

1.3 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. Payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor, and payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations are the Contractor's responsibility. All costs associated with this section must be included in the contract price.

1.6 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

ENVIRONMENTAL PROTECTION PLAN; G, DO

WATER QUALITY MONITORING AND PROTECTION PLAN; G, DO

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental

issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

Include in the environmental protection plan, but not limit it to, the following:

a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the

area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1 . Include in this plan, as a minimum:

(1) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify the Contracting Officer and the local Fire Department, in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.

(2) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

(3) Training requirements for Contractor's personnel and methods of accomplishing the training.

(4) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

(5) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

(6) The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.

(1) Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.

(2) Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).

(3) Indicate in the report the total amount of waste generated and

total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

(4) A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

l. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

m. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.

n. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan must include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan must include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan must include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

o. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include in the plan methods to assure the protection of known or discovered resources, identifying lines of communication between Contractor personnel and the Contracting Officer.

p. Specific procedures to ensure compliance with the inadvertent discovery regulations applicable to the National Historic Preservation Act (36 CFR 800.13) and the Native American Graves Protection and Repatriation Act (43 CFR 10.4)

1.7.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.7.3.1 WATER QUALITY MONITORING AND PROTECTION PLAN

At least 60 days prior to beginning in-water work, the Contractor shall submit a AWater Quality Monitoring and Protection Plan (WQMPP) to the Corps for review and submittal to The Washington State Department of Ecology. In-water workshall not occur until Ecology approves the WQMPP.

1.8.1 Contents

At a minimum, the report should include:

a. Name(s) and phone number(s) of person(s) responsible for onsite monitoring and reporting.

b. The BMPs and procedures to be used to protect water quality during the specific proposed in-water activities.

c. A water sampling plan for turbidity and dissolved oxygen.

d. A map with numbered or named sampling locations associated with the in-water activities that require monitoring.

1.7.3.2 Procedure

a. A background sample shall be collected at the beginning of each sampling event.

b. Ecology must approve, in writing, any changes or additions to the WQMPP.

c. Monitoring results shall be submitted to the Corps weekly, who will submit the results to Ecology.

d. Additional monitoring may be required if the monitoring results indicate that the water quality standards have not been met.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report will be signed by both the the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.9 SPECIAL ENVIRONMENTAL REQUIREMENTS

Comply with the special environmental requirements listed in .

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings,plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.11 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. After receipt of such notice, the Contractor will inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

This paragraph supplements the Contractor's responsibility under the contract clause "PERMITS AND RESPONSIBILITIES" to the extent that the Government has obtained the Endangered Species Act concurrence, Section 404 permit conditions, and 401 Water Quality Certification. The Contractor shall comply with the terms and conditions of the attached 401 Water Quality Certification at the end of this section.

3.2 LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Identify any land resources to be preserved within the work area prior to the beginning of any construction. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval, except in areas indicated on the drawings or specified to be cleared. Ropes, cables, or guys will not be fastened to or attached to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times, as defined in the following subparagraphs. Remove stone, soil, or other materials displaced into uncleared areas.

3.2.1 Work Area Limits

Mark the areas that need not be disturbed under this contract prior to commencing construction activities. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. The Contractor's personnel must be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved must be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

Providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations is the Contractor's responsibility. Select and maintain the erosion and sediment controls such that water quality standards are not violated as a result of construction activities.

The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices must also be in accordance with the Environmental Protection Agency’s National Pollutant National Pollutant Discharge Elimination System (NPDES) Storm Water Pollution Prevention Plan (SWPPP). Remove any temporary measures after the area has been stabilized.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities will be made only when approved. Erosion and sediment controls must be provided for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas must be controlled to protect adjacent areas.

3.3 WATER RESOURCES

Monitor all water areas affected by construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. For construction activities immediately adjacent to impaired surface waters, the Contractor must be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.3.1 Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands, except as authorized herein.

3.4 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with all Federal and State air emission and performance laws and standards.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; must be controlled at all times, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.4.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.4.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of Washington and City of Marysville rules.

3.4.4 Burning

Burning is prohibited.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Handling, storage, and disposal must be conducted to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill will be the minimum

acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

3.5.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the Government. Collect chemical waste in corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with WAC 173-303, 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations is the Contractor's responsibility.

Transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations.

Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the Contracting Officer and the Facility Environmental Office. Cleanup and cleanup costs due to spills are the Contractor's responsibility.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. For equipment used in, over, or adjacent to water bodies, the Contractor will use vegetable based lubricants.

3.5.5 Waste Water

Disposal of waste water will be as specified below.

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed to

enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and regulations.

b. Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing will be discharged into the sanitary sewer with prior approval and/or notification to the Waste Water Treatment Plant's Operator.

c. For discharge of ground water, the Contractor shall obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharging in accordance with the requirements of the NPDES permit.

3.6 RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project.

3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

Maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to Facility Environmental Office through the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. Include the following in the report:

a. Construction and Demolition (C&D) Debris Disposed = _____ in cubic yards or tons, as appropriate.

b. Construction and Demolition (C&D) Debris Recycled = _____ in cubic yards or tons, as appropriate.

c. Total C&D Debris Generated = _____ in cubic yards or tons, as appropriate.

d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = _____ in cubic yards or tons, as appropriate.

3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect these resources and be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources will be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the appropriate

authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.9 BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. During construction, the Contractor will employ measures to protect aquatic life, assuring the aquatic life is excluded from the construction area, including providing egress avenues. The protection of threatened and endangered animal and plant species, including their habitat, is the Contractor's responsibility in accordance with Federal, State, Regional, and local laws and regulations.

3.10 PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.11 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.12 EMERGENCY UNEXPLODED ORDNANCE (UXO) RESPONSE

In the event military munitions, as defined in 40 CFR 260, is encountered during construction activities that are deemed to be a threat to human health or the environment, Military Police and EOD professionals shall be immediately contacted to conduct an emergency response. Additionally, immediately contact the Contracting Officer if UXO is encountered. An evaluation of this scenario and procedures, with contact numbers, shall be included in the health and safety plan (HASP) for the fieldwork.

3.13 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all personnel prior to commencing construction activities. Additional meetings must be conducted for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.14 POST CONSTRUCTION CLEANUP

The Contractor will clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in

writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area must be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

04/08

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SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL
04/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4439	(2004) Geosynthetics
ASTM D4491	(1999a; R 2009) Water Permeability of Geotextiles by Permittivity
ASTM D4533	(2011) Trapezoid Tearing Strength of Geotextiles
ASTM D4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D4873	(2002; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 SYSTEM DESCRIPTION

The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of Section 01 57 20 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollutant Discharge Elimination System (NPDES).

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required of the Contractor are described below.

1.3.1 Storm Water Pollution Prevention Plan (SWPPP)

The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the Washington State Department of Ecology guidelines and prepare a schedule for SWPPP implementation and incorporate it into the Contractor's progress schedule. The SWPPP and schedule shall be submitted to the Contracting Officer for approval at least 14 days prior to construction. The Contractor assumes full responsibility for assuring compliance of the SWPPP with all regulatory requirements and for the implementation of all requirements contained within the SWPPP.

The SWPPP is considered a "living" document, in that it should be constantly revised to account for additional erosion control/pollution prevention BMPs as they become necessary, and are implemented in the field during project construction. A copy of the most current SWPPP shall remain on-site at all times, and an additional copy shall be forwarded to the Contracting Officer. At the Contractor's preference, revisions to the SWPPP may be forwarded to the Contracting Officer, rather than submitting a complete document. Likewise, revisions to the SWPPP shall be kept on site in a file along with the original SWPPP document.

1.3.2 Stabilization Practices

The stabilization practices to be implemented shall be selected from the Best Management Practices (BMPs) of the Washington State Department of Ecology. On the daily CQC Report, record the dates when the major grading activities occur; when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

1.3.2.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.

1.3.2.2 Burnoff

Burnoff of the ground cover is not permitted.

1.3.2.3 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

1.3.3 Erosion, Sediment and Stormwater Control

Submit a Storm Water Pollution Prevention Plan (SWPPP) for the project to the Contracting Officer prior to the commencement of work. The SWPPP shall meet the requirements of the construction general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, via the Contracting Officer, to the Ecology Department for approval, a minimum of 14 calendar days prior to the start of any land disturbing activities. Maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, to reflect current site conditions. Include within the SWPPP:

a. Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

b. Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.

c. Ensure compliance with terms of the construction general permit for storm water discharge.

d. Select applicable best management practices from EPA 832-R-92-005.

e. Install, inspect, and maintain best management practices (BMPs) as required by the general permit. Prepare and submit to Ecology Department, BMP Inspection Reports as required by the general permit.

f. Once construction is complete and the site has been stabilized with a final, sustainable cover, submit a request for Termination to Ecology Department within 30 days after all land disturbing activities end.

1.3.4 Structural Practices

Implement structural practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan
Storm Water Notice of Intent

Pollution prevention plan and Notice of intent for NPDES coverage under the general permit for construction activities

SD-06 Test Reports

Erosion and Sediment Controls

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

Identify, store and handle filter fabric in accordance with ASTM D4873.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

Provide geotextile that complies with the requirements of ASTM D4439, and consists of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight

of ester, propylene, or amide, and contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE		
PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile Elongation (percent)	ASTM D4632	100 lbs. min. 30 percent max.
Trapezoid Tear	ASTM D4533	55 lbs. min.
Permittivity	ASTM D4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D4751	20-100

2.1.2 Silt Fence Stakes and Posts

Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 by 2 inches when oak is used and 4 by 4 inches when pine is used, and have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. Specify in the mill certificate or affidavit the actual Minimum Average Roll Values and identify the fabric supplied by roll identification numbers. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.2 INSPECTIONS

3.2.1 General

Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation,

stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Conduct inspections at least once every month where sites have been finally stabilized.

3.2.2 Inspections Details

Inspect disturbed areas and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.2.3 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

At a minimum, the inspection report must include:

a. The inspection date.
b. Names, titles, and qualifications of personnel making the inspection.
c. Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred.
d. Weather information and description of any discharges occurring at the time of the inspection.
e. Location(s) of discharges of sediment or other pollutants from the site.
f. Location(s) of BMPs that need to be maintained.
g. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location.
h. Location(s) where additional BMPs are needed that did not exist at the time of inspection.
i. Corrective action required including any changes to the SWPPP necessary and implementation dates.

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SECTION 01 78 00

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08/11

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CLOSEOUT SUBMITTALS
08/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

TR-06-X	(2006; Supplement 2009) A/E/C (Architectural, Engineering, and Construction) CADD Standard - Release 3.0

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

As-Built Record of Equipment and Materials
Warranty Management Plan

SD-08 Manufacturer's Instructions

Preventative Maintenance
Condition Monitoring (Predictive Testing)
Inspection

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

Record Drawings

1.3 PROJECT RECORD DOCUMENTS

1.3.1 Record Drawings

Drawings showing final as-built conditions of the project. This paragraph covers record drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working record drawings" and "final record drawings" refer to contract drawings which are revised to be used for final record drawings showing as-built conditions. The final CAD record drawings must consist of one set of electronic CAD drawing files in the specified format, 2 sets of prints, and one set of the approved working Record drawings.

1.3.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format revised to reflect all bid amendments will be provided by the Government at the preconstruction conference for projects requiring CADD file record drawings.

1.3.1.2 Working Record and Final Record Drawings

Revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Prepare final record (as-built) drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final record (as-built) drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final record drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the record drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Show on the working and final record drawings , but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

c. borrect grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

c. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, dimensions of equipment foundations, etc.

d. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

e. Changes or modifications which result from the final inspection.

f. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.

g. Furnish a contour map of the final borrow pit/spoil area elevations.

h. hodifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.

(1) Follow directions in the modification for posting descriptive changes.

(2) Place a Modification Delta at the location of each deletion.

(3) For new details or sections which are added to a drawing, place a Modification Delta by the detail or section title.

(4) For minor changes, place a Modification Delta by the area changed on the drawing (each location).

(5) For major changes to a drawing, place a Modification Delta by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, place a Modification Delta either by the schedule heading or by the change in the schedule.

(7) The Modification Delta size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.3.1.3 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and must be returned to the Contracting Officer after approval by the Government. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor at no expense to the Government.

1.3.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only employ personnel proficient in the preparation of CADD drawings to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If additional drawings are required, prepare them using the specified electronic file format applying TR-06-X. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CADD files. The Contractor will be furnished "as-designed" drawings in Microstation . The electronic files will be supplied on compact disc, read-only memory (CD-ROM). Provide all program files and hardware necessary to prepare final record drawings. The Contracting Officer will review final record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

a. Provide CADD "base" colors of red, green, and blue. Color code for changes as follows:

(1) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(2) Additions (Green) - Added items, lettering in notes and leaders.

(3) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

b. Rename the Contract Drawing files in a manner related to the contract number (i.e., 98-C-10.DGN) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. All changes shall be made on the layer/level as the original item.

c. When final revisions have been completed, show the wording "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Mark all other contract drawings either "Record" drawing denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date original contract drawings in the revision block.

d. Within 20 days for contracts $5 million and above after Government approval of all of the working record drawings for a phase of work, prepare the final CADD record drawings for that phase of work and submit two sets of blue-lined prints of these drawings for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days for contracts $5 million and above revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 20 days for contracts $5 million and above of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit one set of electronic files on compact disc, read-only memory (CD-ROM), one set of mylars, two sets of blue-line prints and one set of the approved working record drawings. They must be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record drawing files and marked prints as specified will be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made to the Contractor.

1.3.1.5 Payment

No separate payment will be made for record drawings required under this contract, and all costs accrued in connection with such drawings are considered a subsidiary obligation of the Contractor.

1.3.2 As-Built Record of Equipment and Materials

Furnish one copy of preliminary record of equipment and materials used on

the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Submit 2 sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

1.3.3 Final Approved Shop Drawings

Furnish final approved project shop drawings 30 days after final inspection.

1.3.4 Real Property Equipment

Furnish a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Furnish a draft list at time of transfer. Furnish the final list 30 days after transfer of the completed facility.

1.4 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

1.5 WARRANTY MANAGEMENT

1.5.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled.

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subContractors, manufacturers or suppliers involved.

b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

1.5.2 Performance Bond

The Contractor's Performance Bond must remain effective throughout the

construction period.

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.5.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.6 OPERATION AND MAINTENANCE MANUALS

Submit 3 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

1.6.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals must have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Organize data by separate index and tabbed sheets, in a loose-leaf binder. Binder must lie flat with printed sheets that are easy to read. Caution and warning indications must

be clearly labeled.

1.6.2 Training and Instruction

Submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Contracting Officer will be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, must be made available to the Contracting Officer.

1.7 CLEANUP

Leave premises "broom clean." Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

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07/06

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SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
07/06

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of Government personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.1.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.1.2 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.2.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown

operating procedures including the control sequence for each procedure.

1.2.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.2.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.2.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and

procedures for each separate operation.

1.2.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.2.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.2.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.2.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.2.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.2.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.2.5.6 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.2.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.2.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.2.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

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SECTION 02 32 00

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05/10

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SECTION 02 32 00

SUBSURFACE DRILLING, SAMPLING, AND TESTING
05/10

PART 1 GENERAL

This specificationi is for the drilling, sampling, and installation of the settlement gages, inclinometers, and virbrating wire piezometers.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D1452	(2009) Soil Investigation and Sampling by Auger Borings
ASTM D1586	(2008a) Penetration Test and Split-Barrel Sampling of Soils
ASTM D1587	(2008) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	(2009a) Description and Identification of Soils (Visual-Manual Procedure)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-1804	(2001) Engineering and Design -- Geotechnical Investigations

1.2 SYSTEM DESCRIPTION

Provide the data to determine the type, nature, and characteristics of subsurface materials and the extent and conditions of the various materials as they exist to the depths and at the locations specified. This is to be accomplished by means of auger borings, drive sample borings undisturbed sample borings .

1.2.1 Auger Borings and Sampling

An auger boring is any boring made in unconsolidated soils with a conventional manually or power-driven earth auger for the purpose of obtaining samples of subsurface materials. Auger boring and sampling shall be performed in accordance with Chapter [_____], EM 1110-1-1804 ASTM D1452, .

1.2.2 Drive Sample Borings and Sampling

A drive sample boring is a boring made through unconsolidated or partly

consolidated sediments or decomposed rock by means of a mechanically driven sampler. The purpose of these borings is to obtain knowledge of the composition, the thickness, the depth, the sequence, the structure, and the pertinent physical properties of foundation or borrow materials. Drive sample boring and sampling shall be performed in accordance with Chapter [_____] of EM 1110-1-1804 ASTM D1587 . Standard Penetration Tests (SPT) shall be performed in accordance with Appendix [_____] of EM 1110-1-1804 ASTM D1586.

1.2.3 Undisturbed Sample Borings and Sampling

An undisturbed sample boring is a boring made to obtain soil samples which, when tested, will show properties as close to the in situ (in place) properties as any sample which can be obtained. All undisturbed sampling shall be accomplished in accordance with Chapter [_____] of EM 1110-1-1804 ASTM D1587 .

1.2.4 Sequencing and Scheduling

1.2.4.1 Schedule of Drilling, Sampling, and Testing

Prior to starting work, submit a plan for drilling, sampling, testing, and safety. The plan shall include, but shall not be limited to, the proposed method of drilling and sampling including a description of the equipment and sampling tools that will be used, a listing of any subContractors to include a description of how the subContractors will be used and a description of all methods and procedures that will be utilized to insure a safe operation and to protect the environment. No work shall be performed until this plan has been approved and no deviation from the approved plan will be permitted without prior approval by the Contracting Officer. The schedule of Drilling, Sampling, and Testing is listed in the following schedule:

SCHEDULE OF DRILLING, SAMPLING AND TESTING				
HOLE NO.	METHOD	DEPTH (FEET)	VERTICAL OR INCLINED	SPECIAL INSTRUCTIONS

1.2.4.2 Order of Work

The order in which the work is to be accomplished will be determined in the field by the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Drilling Log; G

SD-03 Product Data

Permits, Certifications, and Licenses
Schedule of Drilling, Sampling, and Testing; G

1.4 QUALITY ASSURANCE

Comply with all Federal, State and local laws, regulations and ordinances relating to the performance of this work. Procure all required permits, certifications and licenses required by Federal, State, and local law for the execution of this work. Submit copies of all permits, certifications, and licenses prior to starting work. This submittal shall also include a statement of the prior experience, in the type of work described in these specifications, of the person or persons designated to perform the work specified herein.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 General

The Contractor is solely responsible for preserving all samples in good condition. Samples shall be kept from freezing and from undue exposure to the weather, and shall keep all descriptive labels and designations on sample jars, tubes, and boxes clean and legible until final delivery of samples to, and acceptance by, the Contracting Officer. Except as otherwise specified, deliver samples to [_____]. Samples shall be delivered within the time limits specified for each type of investigation or in accordance with schedules prepared by the Contracting Officer.

1.5.2 Undisturbed Samples

Take every precaution to avoid damage to samples as a result of careless handling and undue delay in shipping. Samples shall be shipped in containers approved by the Contracting Officer and shall be of sufficient durability to protect the samples from any damage during shipment. The sample tubes shall be well packed in vermiculite or other equal material approved by the Contracting Officer to protect the samples against vibration. Avoid exposing sealed and crated samples to precipitation, direct sunlight, freezing and temperatures in excess of 100 degrees F. Samples permitted to freeze, even partially, shall be replaced by the Contractor. In general, no undisturbed samples shall remain on the site of sampling for more than one week before shipment. Samples shall be stored and shipped with the tube in a vertical position in order to prevent consolidation and segregation or change of water content.

1.6 PROJECT/SITE CONDITIONS

1.6.1 Environmental Requirements

In order to prevent and to provide for abatement and control of any environmental pollution arising from Contractor activities in the performance of this contract, the Contractor and its subContractors shall comply with all applicable Federal, State, and local laws, regulations, and ordinances concerning environmental pollution control and abatement.

a. The Contractor is responsible for keeping informed of all updates and changes in all applicable laws, regulations, and ordinances.

b. Do not pollute lakes, ditches, rivers, springs, canals, waterways, groundwaters, or reservoirs with drill fluids, fuels, oils, bitumens, calcium chloride, insecticides, herbicides, or other materials that may be harmful to the environment or a detriment to outdoor recreation.

1.6.2 Field Measurements

The approximate locations of drill holes are shown on the attached drawings. The actual locations will be established in the field by the Contracting Officer prior to the start of work. The elevations of the established locations will also be provided by the Contracting Officer prior to the start of work. The Contractor will provide access to the locations as necessary for the prosecution of the work. Since no separate payment will be made for access construction, all costs associated with this shall be included in the cost of drilling .

PART 2 PRODUCTS

2.1 CONTAINERS

Furnish jars, tubes, and boxes that meet the following requirements. All such containers will become the property of the Government and the cost thereof will be included in the contract price for the applicable item for which payment is provided.

2.1.1 Sample Jars

Sample jars shall be 1 pint capacity, wide-mouth glass jars with moisture-tight screw tops.

2.1.2 Shipping Boxes

Boxes for shipping sample jars shall be corrugated cardboard boxes that have the capacity to hold no more than 12 sample jars and the strength to contain and protect the jars and their contents under ordinary handling and environmental conditions.

2.1.3 Tubes and Crates

Undisturbed samples shall be shipped in thin walled Shelby tubes packed in crates.

2.2 LABELS

2.2.1 Sample Jar Labels

A printed or type-written, fade resistant and waterproof label shall be affixed to the outside of each jar and shall contain the following information:

PROJECT _____ LOCATION _____
(Such as Table Rock Dam) (Such as Borrow Area B)

HOLE NO. _____ STATION _____

JAR NO. _____ of _____ JARS

TOP ELEV. OF HOLE _____ DEPTH OF SAMPLE _____

DESCRIPTION OF MATERIAL _____
(Such as Moist, silty, medium sand)

2.2.2 Shipping Box Labels

Each box of jar samples shall be identified with weatherproof and wear-proof labels indicating the following:

PROJECT	[_____]
LOCATION	[_____]
JAR SAMPLES FROM HOLE OR HOLES	[_____]

2.2.3 Core Box Labels

Core boxes shall be identified with stenciled labels. The information on this label shall contain the following:

PROJECT	[_____]
HOLE NO.	[_____]
BOX NO.	[_____]
TOTAL NUMBER OF BOXES FOR THE HOLE	[_____]

2.3 EQUIPMENT AND SUPPLIES

2.3.1 Auger Boring and Sampling

Furnish the equipment for making auger borings including, but not limited to, standard continuous flight augers and/or standard cup-type earth augers, similar or equal to the Iwan Auger and not less than 4 inches in diameter unless otherwise approved. The augers shall be completely equipped with all the accessories necessary for boring and sampling of overburden materials to the depths and diameters specified or shown on the drawings.

2.3.2 Drive Sample Boring and Sampling

Furnish equipment for making drive sample borings including, but not limited to, standard 2-inch OD split barrel drive samplers and power-driven drilling machinery of a type or types approved by the Contracting Officer, complete with a drive-hammer of [_____]-pound weight and all other accessories for taking samples of all types of soils or decomposed rock at the locations and to the depths indicated in the schedule in paragraph SCHEDULE OF DRILLING, SAMPLING, AND TESTING. The drive shoe for the split barrel samplers shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. Supplies shall include, but not be limited to, all casing, drill stem, drill bits, drill fluid and additives, pumps, and power necessary to accomplish the required boring and sampling.

2.3.3 Undisturbed Sample Boring and Sampling

Furnish equipment for making undisturbed sample borings including, but not limited to, power-driven drilling machinery of an approved type or types complete with the special devices and accessories enumerated and described hereinafter. Drilling machinery shall be of the hydraulic feed type. Supplies shall include, but not be limited to, all samplers, casing, drill stem, drill bits, drill fluid and additives, pumps, and power necessary to accomplish the required boring and sampling. Drill casing, if used, shall be of such minimum inside diameter as to allow use of the selected sampler.

a. Sands and Cohesive Soils: The sampling device used to sample fine to medium grain sands and cohesive soils shall be a fixed or stationary piston type that uses a 3-inch diameter thin wall Shelby tube. Subject to the approval of the Contracting Officer, floating or free piston and non-piston type samplers may be used provided adequate means, such as check valve or vacuum system, are provided to prevent loss of samples.

b. Stiff and Dense Soils: The sampling device for obtaining samples of stiff and dense soils shall be similar or equal to a Denison double tube, swivel head core barrel, or a Pitcher sampler and must be approved by the Contracting Officer prior to use.

PART 3 EXECUTION

3.1 MOBILIZATION AND DEMOBILIZATION

3.1.1 Mobilization

Mobilization consists of the delivery to the site of all plant, equipment, materials and supplies to be furnished by the Contractor, the complete assembly in satisfactory working order of all such plant and equipment at the jobsite and the satisfactory storage at the site of all such materials and supplies.

3.1.2 Demobilization

Demobilization consists of the removal from the site of all plant, equipment, materials and supplies after completion of the work and also includes, at the direction of the Contracting Officer, the cleanup and removal of all scrap, waste backfill material, waste drilling fluid, soil contaminated with engine/hydraulic oil, backfilling all sumps or excavations resulting from the operations and, in general, returning the site as close to its original condition as possible.

3.2 IDENTIFYING SAMPLES

Sample jars, shipping boxes, and labels shall comply with PART 2, paragraphs SAMPLE JARS, SHIPPING BOXES, and LABELS, respectively. In addition, a moisture proof label containing the project name, hole number and sample number shall be placed inside the jar or this information can be written using a waterproof pen or scribed on the jar lid. Take all precautions required to insure that the shipping boxes are not subjected to rough handling or damaging environmental conditions , and complies with paragraph CARE AND DELIVERY OF SAMPLES. A copy of the boring log for the portion of the boring that the samples came from shall be enclosed in the shipping box.

3.3 AUGER BORING AND SAMPLING

Samples shall be labeled in accordance with paragraph IDENTIFYING SAMPLES. Samples shall be obtained for each change of overburden material and at maximum vertical intervals of [1] [3] [5] [_____] feet [as directed by the Contracting Officer]. In order to retain the natural moisture content of the material to the fullest extent possible, all samples shall be of sufficient volume to completely fill the sample jars and the samples shall be placed in the sample jars as soon as possible after they are taken from the hole. All sample jars shall be labeled. In general, no sample shall remain on the site of boring for more than 1 week after being taken from the boring and placed in a jar.

3.4 DRIVE SAMPLE BORING AND SAMPLING

Samples shall be labeled in accordance with paragraph IDENTIFYING SAMPLES. Drive sample borings drilled through overburden materials shall be suitably cased to permit obtaining drive samples of the size or sizes specified or as directed. Samples shall be taken either continuously or at maximum vertical intervals of [3] [5] [_____] feet or at a change in materials in accordance with instructions contained in the SCHEDULE OF DRILLING, SAMPLING, AND TESTING or as otherwise directed by the Contracting Officer. The sampler shall be driven with the force of the [140] [_____] pound drive hammer under a free fall of [_____] inches. To minimize the compacting effect of casing driving when casing is used to stabilize a boring, the bottom of the casing shall be kept as high above the soil sampling zone as conditions permit. If hollow stem auger is used as a casing and/or to advance the boring, a plug assembly must be used to keep soil from entering the inside of the auger. Above the water table, samples shall be obtained from a dry hole. Below the water table, water shall be maintained within the hole at or above the groundwater level. Where information on the natural water content of soils above the water table is not needed and when approved by the Contacting Officer, boreholes may be drilled without casing by using a suitable drilling fluid to prevent collapse of sidewalls. When a drilling fluid is used, soil sampling shall be done by such means that will prevent inclusion of drilling fluid in the samples. The samples shall be placed in sample jars as soon as possible after they are taken from the hole and, when possible, the volume of the sample shall be large enough to completely fill the sample jar in order that the natural moisture content of the material may be retained to the fullest extent possible. All samples shall be labeled. No sample shall remain at the site of boring for more than one week after being taken from the hole.

3.5 UNDISTURBED SAMPLE BORING AND SAMPLING

In general, labeling of undisturbed samples shall conform to paragraph IDENTIFYING SAMPLES. Particular care shall be taken to indicate the top and bottom of each sample tube. Tubes and crates for undisturbed samples shall be labeled "DO NOT JAR OR VIBRATE" and "HANDLE, HAUL, AND SHIP IN A VERTICAL POSITION".

3.5.1 Procedure

The procedure for Undisturbed Sample Boring and Sampling shall be the same as outlined in paragraph DRIVE SAMPLE BORING AND SAMPLING, except that the sampling device shall be advanced downward by one continuous, smooth drive using the drill rig's hydraulic feed system. The hydraulic down pressure shall be read and recorded at 6 inch intervals during each sample drive.

The sampling device for stiff and dense soils shall be advanced by continuous rotation of the outer cutting barrel in conjunction with use of drill fluid circulation. Driving of any undisturbed sampling device by means such as a drop hammer will not be permitted.

3.5.2 Sealing

3.5.2.1 Alternate 1

The soil sample obtained in a thin wall Shelby tube shall be retained in the tube and sealed on both ends with a mechanically expandable O-ring sealing disk of the appropriate size.

3.6 SUPPLEMENTAL BORINGS

Borings that are abandoned or from which unsatisfactory samples or cores are obtained will be supplemented by other borings adjacent to the original in order that satisfactory samples or the required information will be obtained. Actual locations of any supplemental borings will be established by the Contracting Officer. Penetration to the depth where the original was abandoned or to the depths where unsatisfactory samples were obtained may be made by any method selected by the Contractor that in the opinion of the Contracting Officer will permit satisfactory completion and sampling below the elevation where the last satisfactory sample was obtained in the abandoned or satisfactory sampling in the reaches where satisfactory samples were not obtained in the original borings . No payment will be made for supplemental borings that are required to be drilled to replace borings that were abandoned or from which satisfactory samples were not obtained because of mechanical failure of drilling and sampling equipment, negligence on the part of the Contractor, or other preventable cause for which the Contractor is responsible except that payment will be made for acceptable portions of these supplementary borings below the depths or outside the reaches for which payment was made for the original borings .

3.7 BACKFILLING

3.7.1 Drill Holes

Unless otherwise noted in these specifications or directed by the Contracting Officer, all drill holes shall be backfilled and abandoned in accordance with all Federal, State, and local laws, regulations and ordinances. Preserve all holes in good condition until final measurement and until the records and samples have been accepted. As a minimum, all holes shall be grouted from the bottom of the hole to within 2 feet of the ground surface using a grout mixture of six to eight gallons of water per sack (94 pounds) of portland cement. All grout shall be pumped through a tremie pipe that is inserted to the bottom of the boring to insure that the grout fills the full extent of the hole. The remaining ungrouted top 2 feet of the hole shall be backfilled with local soil and tamped. All backfilling operations shall be performed in the presence of the Contracting Officer and, if required by regulation, Federal, State, and local officials. No separate payment will be made for backfilling drill holes. The cost of this work shall be included in the drilling costs.

3.8 RECORDS

Submit complete, legible copies of DRILLING LOG, ENG FORM 1836 and 1836A, and records to the Contracting Officer within one days after a hole is completed. Keep accurate driller's logs (DRILLING LOG, ENG FORM 1836, and

1836-A will be provided by the Contacting Officer) and records of all work accomplished under this contract and deliver complete, legible copies of these logs and records to the Contracting Officer [upon completion of the work or at such other time or times as directed] [within [_____] days after a [hole] [test pit] is completed]. All such records shall be recorded during the actual performance of the work and shall be preserved in good condition and order until they are delivered and accepted. The Contracting Officer has the right to examine and review all such records at any time prior to their delivery and has the right to request changes to the record keeping procedure. The following information shall be included on the logs or in the records for each [hole] [test pit]:

a. Hole number or designation and elevation of top of hole .

b. Driller's name and Geologist's name.

c. Make, size, and manufacturer's model designation of drilling, sampling, equipment.

d. Type of drilling, sampling, operation by depth.

e. Hole diameter.

f. Dates and time by depths when drilling, sampling, operations were performed.

g. Time required for drilling each run .

h. Drill action, rotation speed, hydraulic pressure, water pressure, tool drops, and any other unusual and non-ordinary experience which could indicate the subsurface conditions encountered.

i. Depths at which samples or cores were recovered or attempts made to sample or core including top and bottom depth of each run .

j. Classification or description by depths of the materials sampled, or penetrated using the Unified Soil Classification System (ASTM D2487) and including a description of moisture conditions, consistency and other appropriate descriptive information described in paragraph SUPPLEMENTAL BORINGS of ASTM D2488. This classification or description shall be made immediately after the samples or cores are retrieved.

k. Classification and description by depths of rock materials sampled including rock type, composition, texture, presence and orientation of bedding, floiation, or fractures, presence of vugs or other interstices, and the RQD for each cored interval.

l. Indication of penetration resistance such as drive-hammer blows given in blows per foot for driving sample spoons and casing .

m. Weight of drive hammer.

n. Percentage of sample or core recovered per run.

o. Depth at which groundwater is encountered initially and when stabilized.

p. Depths at which drill water is lost and regained and amounts.

q. Depths at which the color of the drill water return changes.

r. Type and weight of drill fluid.

s. Depth of bottom of hole.

t. Pressures employed in pressure testing.

TABLE 1 - COMMON CORE DIAMETERS		
	CORE DIAMETER INCHES	HOLE DIAMETER INCHES
Conventional Core Barrels		
AWG	1.185	1.890
BWG	1.655	2.360
NWG	2.155	2.980
HWG	3.000	3.907
Wireline Core Barrels*		
A	1.064	1.890
B	1.432	2.360
N	1.875	2.980
H	2.450	3.716
	3.345	4.827
Large Diameter Series		
2-3/4" X 3-7/8"	2.690	3.875
4" X 5-1/2"	3.970	5.495
6" X 7-3/4"	5.970	7.750
* No Industry Standard for Wireline Sizes. Diameters shown for wireline core barrels are nominal and vary between manufacturers.		

-- End of Section --

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CONCRETE REINFORCING
08/10

PART 1 GENERAL

1.1 UNIT PRICES

1.1.1 Deformed Steel Bars

1.1.1.1 Payment

Payment will be made for costs associated with furnishing and placing deformed steel bars for concrete reinforcement. Payment for steel in laps will be made as indicated or required. No payment will be made for additional steel in laps wherein the additional steel lap was made for the convenience of the Contractor.

1.1.1.2 Measurement

Deformed Steel Bars for Concrete Reinforcement will be measured for payment based upon the quantity of pounds in place. The measured lengths will be converted to weights for the size of bars listed by the use of the nominal weights per linear foot specified in ASTM A615/A615M.

1.1.1.3 Unit of Measure

Unit of measure: per pound.

1.1.2 Fabricated Deformed Steel Bar Mats

1.1.2.1 Payment

Payment will be made for costs associated with furnishing and placing fabricated deformed steel bar mats for concrete reinforcement. Payment for steel in laps will be made as indicated or required. No payment will be made for additional steel in laps wherein the additional steel lap was made for the convenience of the Contractor.

1.1.2.2 Measurement

Fabricated Deformed Steel Bar Mats for Concrete Reinforcement will be measured for payment based upon the quantity of pounds in place. The weights shall be determined by weighing or by manufacturer's or catalog weights when weighing is not practicable.

1.1.2.3 Unit of Measure

Unit of measure: per pound.

1.1.3 Butt-Splices in Deformed Steel Bars

1.1.3.1 Payment

Payment will be made for costs associated with making butt-splices in

deformed steel bars for concrete reinforcement. No separate payment will be made for test splices, tension testing, or radiographic examination of butt-splices since these costs are included in the contract unit price for Butt-Splices in Deformed Steel Bars for Concrete Reinforcement.

1.1.3.2 Measurement

Butt-Splices in Deformed Steel Bars for Concrete Reinforcement will be measured for payment based upon each butt-splice in place.

1.1.3.3 Unit of Measure

Unit of measure: each.

1.1.4 Resplicing Bars

1.1.4.1 Payment

Payment will be made for costs associated with resplicing bars selected for supplemental examinations and tests for those splices found to be acceptable. No payment will be made for costs associated with resplicing bars selected for supplemental examinations and tests for those splices found to be defective. No payment will be made for costs associated with the supplemental examinations and tests performed by the Government.

1.1.4.2 Measurement

Resplicing Bars, selected for examinations and tests and found to be acceptable, will be measured for payment based upon 150 percent of the applicable contract unit price for pay item Butt-Splices in Deformed Steel Bars for Concrete Reinforcement. Resplicing Bars, selected for examinations and tests and found to be defective, will not be measured for payment.

1.1.4.3 Unit of Measure

Unit of measure: each.

1.1.5 Accessories

No payment will be made for costs associated with furnishing and placing accessories incidental to and included in the payment for other items of work.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318	(2011; Errata 2011) Building Code Requirements for Structural Concrete and Commentary
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1035/A1035M	(2011) Standard Specification for Deformed and Plain, Low-carbon, Chromium, Steel Bars for Concrete Reinforcement
ASTM A184/A184M	(2006e1) Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A370	(2011a) Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A53/A53M	(2010) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A615/A615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A675/A675M	(2003; R 2009) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A706/A706M	(2009b) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A767/A767M	(2009) Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
ASTM A775/A775M	(2007b) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A82/A82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A934/A934M	(2007) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM E94	(2004; R 2010) Radiographic Examination

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2009; 28th Ed) Manual of Standard Practice

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04	(2007; Change 1) Seismic Design for Buildings

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement[; G][; G, [_____]]

SD-03 Product Data

Welding
Butt-Splices[; G][; G, [_____]]
Material[; G][; G, [_____]]

[SD-04 Samples

Epoxy-Coated Bars
]

SD-06 Test Reports

Material[; G][; G, [_____]]
Tests, Inspections, and Verifications[; G][; G, [_____]]

SD-07 Certificates

Reinforcing Steel
Qualification of Steel Bar Butt-Splicers

1.4 QUALITY ASSURANCE

1.4.1 Welding Qualifications

Welders shall be qualified in accordance with AWS D1.4/D1.4M. Qualification test shall be performed at the worksite and notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4/D1.4M. Submit a list of qualified welders names.

1.4.2 Qualification of Steel Bar Butt-Splicers

Qualification of steel bar butt-splicers shall be certified to have satisfactorily completed a course of instruction in the proposed method of butt-splicing or have satisfactorily performed such work within the preceding year. Submit certificates on the Qualifications of Steel Bar Butt-Splicers prior to commencing butt-splicing.

1.4.3 Qualification of Butt-Splicing Procedure

As a condition of approval of the butt-splicing procedure, make three test butt-splices of steel bars of each size to be spliced using the proposed butt-splicing method, in the presence of the Contracting Officer. These test butt-splices and unspliced bars of the same size shall be tension tested to destruction with stress-strain curves plotted for each test.

Test results shall show that the butt-splices meet the specified strength and deformation requirements in order for the splicing procedure to be approved.

1.5 DELIVERY, STORAGE, AND HANDLING

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A675/A675M, Grade 80[or ASTM A1035/A1035M]. Steel pipe conforming to ASTM A53/A53M, Schedule 80, may be used as dowels provided the ends are closed with metal or plastic inserts or with mortar.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A184/A184M.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A615/A615M, ASTM A706/A706M, or ASTM A1035/A1035M grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A82/A82M. In highly corrosive environments or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A767/A767M, ASTM A775/A775M, ASTM A1035/A1035M or ASTM A934/A934M as appropriate.[If Grade 40 bars are unavailable the Contractor may substitute Grade 50 or Grade 60 bars of the same size and spacing as indicated for Grade 40 bars when authorized.]

Submit certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

[2.3.1 Zinc-Coated (Galvanized) Bars

Zinc-coated (galvanized) bars shall comply with the requirements of ASTM A767/A767M, Class [_____] coating, galvanized after fabrication.

][2.3.2 Epoxy-Coated Bars

Epoxy-coated steel bars shall comply with the requirements of [ASTM A775/A775M][ASTM A934/A934M], including written certifications for coating material and coated bars, sample of coating material, and 1.5 pounds of patching material.

]2.4 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.[Ties for epoxy-coated bars shall be vinyl-coated or epoxy-coated.][Ties for zinc-coated bars shall be zinc-coated.]

2.5 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI 10MSP and shall be steel or precast concrete blocks.

Precast concrete blocks shall have wire ties and 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. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

Bar supports shall comply with the requirements of ACI SP-66. Supports for bars in concrete with formed surfaces exposed to view or to be painted shall be plastic-coated wire, stainless steel or precast concrete supports. Precast concrete supports shall be wedged-shaped, not larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and have an embedded hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view shall be the same quality, texture and color as the finish surfaces.

2.6 TESTS, INSPECTIONS, AND VERIFICATIONS

Perform material tests, specified and required by applicable standards, by an approved laboratory and certified to demonstrate that the materials are in conformance with the specifications. Tests, inspections, and verifications shall be performed and certified at the Contractor's expense. Submit certified tests reports of reinforcement steel showing that the steel complies with the applicable specifications for each steel shipment and identified with specific lots prior to placement. Submit three copies of the heat analyses for each lot of steel furnished certifying that the steel conforms to the heat analyses.

2.6.1 Reinforcement Steel Tests

Mechanical testing of steel shall be in accordance with ASTM A370 except as otherwise specified or required by the material specifications. Tension tests shall be performed on full cross-section specimens using a gage length that spans the extremities of specimens with welds or sleeves included. Chemical analyses of steel heats shall show the percentages of carbon, phosphorous, manganese, sulphur and silicon present in the steel.

2.6.2 Radiographic Examination of Welds

Radiographic examination of welds shall be in accordance with ASTM E94 and shall be performed and evaluated by an approved testing agency adequately equipped to perform such services. Radiographs of welds and evaluations of the radiographs submitted for approval shall become the property of the Government.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement steel and accessories shall be fabricated and placed as specified and shown and approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in accordance with ACI SP-66 and ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or

at the mill.[Zinc-Coated and epoxy-coated bars shall be mill-bent prior to coating. All steel shall be bent cold unless authorized.] 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. Wire tie ends shall face away from the forms. Submit detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

3.1.1 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 placed 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, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. 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/D1.4M. 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 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.

3.1.3 Placing Tolerances

3.1.3.1 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 1 inch.

3.1.3.2 Concrete Cover

The minimum concrete cover of main reinforcement steel bars shall be as shown. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER (inch)	VARIATION (inch)
6	plus 1/2

MINIMUM COVER (inch)	VARIATION (inch)
4	plus 3/8
3	plus 3/8
2	plus 1/4
1-1/2	plus 1/4
1	plus 1/8
3/4	plus 1/8

3.1.4 Splicing

Splices in steel bars shall be made only as required. Bars may be spliced at alternate or additional locations at no additional cost to the Government subject to approval.

3.1.4.1 Lap Splices

Lap splices shall be used only for bars smaller than size 14. Lapped bars may be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than 1/5 the required length of lap or 6 inches.

3.1.4.2 Butt-Splices

Use butt-splices only for splicing size 14 and 18 bars and for splicing #11 bars to larger bars except where otherwise shown or authorized. Make butt-splices by a method which develops splices suitable for tension, compression and stress reversal applications. Welded butt-splices shall be full penetration butt welds. Butt-splices shall develop 90 percent of the specified minimum ultimate tensile strength of the smallest bar of each splice. Bars shall be cleaned of all oil, grease, dirt, rust, scale and other foreign substances and shall be flame dried before 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. Submit proposed procedure for butt-splicing steel bars prior to making the test butt-splices for qualification of the procedure. Properties and analyses of steel bars and splicing materials shall be included in the submitted procedure. Physical properties of splicing sleeves shall include length, inside and outside diameters, and inside surface details.. Butt-splices shall be as follows:

a. Thermit Welded Butt Splices - Bars to be thermit welded shall be restricted to steel shown by heat analysis to have a sulfur content not exceeding 0.05 percent. The ends of bars to be thermit welded shall be cut square and smooth. Flame cutting will be permitted provided grinding is employed to remove the resulting scale and to square and smooth the cut ends to a condition equivalent to a saw cut. No shearing will be permitted. Bars shall be cleaned and flame dried before splicing. The joint shall be properly aligned in the mold with a gap opening in accordance with the manufacturer's recommendations. Charging and firing shall conform to the manufacturer's

recommendations. The end of bars and the welded mold shall be preheated before welding to a temperature of not less than 100 degrees F and the mold shall be left in place for at least 15 minutes after ignition. Risers shall be broken or burned off after removing the mold. Tension splices shall be staggered longitudinally a minimum of 5 feet so that no more than half of the bars are spliced at any one section or as otherwise indicated.

b. Mechanical Butt-Splices - Mechanical butt-splices shall be an approved exothermic, threaded coupling, swaged sleeve or other positive connecting type. Bars to be spliced by a mechanical butt-splicing process may be sawed, sheared or flame cut provided the ends of sheared bars are reshaped after shearing and all slag is removed from the ends of flame cut bars by chipping and wire brushing prior to splicing. Surfaces to be enclosed within a splice sleeve or coupling shall be cleaned by wire brushing or other approved method prior to splicing. Splices shall be made using manufacturer's standard jigs, clamps, ignition devices and other required accessories. In addition to the strength requirements specified paragraph BUTT-SPLICES the additional deformation of number 14 and smaller bars due to slippage or other movement within the splice sleeve shall not exceed 0.015 inches (unit strain 0.0015 inches/inch) beyond the elongation of an unspliced bar based upon a 10 inch gage length spanning the extremities of the sleeve at a stress of 30,000 psi. The additional deformation of number 18 bars shall not exceed 0.03 inches (unit strain 0.003 inches/inch) beyond the elongation of an unspliced bar based upon a 10 inch gage length spanning the extremities of the sleeve at a stress of 30,000 psi. The amount of the additional deformation shall be determined from the stress-strain curves of the unspliced and spliced bars tested as required paragraph QUALIFICATION OF BUTT-SPLICING PROCEDURE for qualification of the butt-splicing procedure. Tension splices of number 14 or smaller bar shall be staggered longitudinally a minimum of 5 feet or as otherwise indicated so that no more than half of the bars are spliced at any one section. Tension splices of number 18 bars shall be staggered longitudinally a minimum of 5 feet so that no more than 1/3 of the bars are spliced at any one section.

3.2 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

3.3 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

Special inspections and testing for seismic-resisting systems and components shall be done in accordance with UFC 3-310-04 and Section 01 45 35 SPECIAL INSPECTION FOR SEISMIC-RESISTING SYSTEMS.

3.4 FIELD TESTS AND INSPECTIONS

3.4.1 Identification of Splices

Establish and maintain an approved method of identification of all field butt-splices which will indicate the splicer and the number assigned each splice made by the splicer.

3.4.2 Examining, Testing, and Correcting

Perform the following during the butt-splicing operations as specified and as directed:

a. Visual Examination - All welded splices shall be visually examined for the presence of cracks, undercuts, inadequate size and other visible defects. Respliced connections resulting from correction of visual defects may be radiographically examined at the option of the Contracting Officer as specified in paragraph SUPPLEMENTAL EXAMINATION. Exothermic mechanical butt-splices shall be visually examined to determine if the filler metal is clearly visible at the tap holes and completely fills the sleeves at both ends except for spaces of not more than 3/8 inch occupied by packing.

b. Tension Tests - Tensions tests to 90 percent of the minimum specified ultimate tensile strength of the spliced bars or to destruction shall be performed on one test specimen made in the field for every 25 splices made. Test specimens shall be made by the splicers engaged in the work, using the approved splicing procedure and the same size bars placed in the same relative position, and under the same conditions as those in the groups represented by the specimens. Stress-strain curves shall be furnished for each butt-splice tested.

c. Radiographic Examination - Not less than one of each 25 welded splices selected at random by the Contracting Officer shall be examined radiographically and evaluated for defects. The greatest dimension of any porosity (gas pocket or similar void) or fusion-type defect (slag inclusion, incomplete fusion or similar generally elongated defect in weld fusion) shall not exceed 1/4 inch. The minimum clearance between edges of porosity or fusion-type defects shall not be less than 1 inch.

d. Correction of Deficiencies - No splice shall be embedded in concrete until satisfactory results of visual examination and the required tests or examinations have been obtained. All splices having visible defects or represented by test specimens which do not satisfy the tests or examinations shall be removed. If any of the tension test specimens fail to meet the strength requirements or deformation limitations two production splices from the same lot represented by the test specimens which failed shall be cut out and tension tested. If both of the retests pass the strength requirements and deformation limitations all of the splices in the lot will be accepted. If one or both of the retests fail to meet the strength requirements or deformation limitations all of the splices in the lot will be rejected. All costs of removal, testing and resplicing of the additional production splices shall be borne by the Contractor. The bars of rejected splices shall be cut off outside the splice zone of weld metal, filler metal contact, coupling or sleeve. The cut ends shall be finished as specified and the joints shall be respliced and reinspected at no additional cost.

e. Supplemental Examination - The Contracting Officer may require additional or supplemental radiographic examination and/or tension test of any completed splice. For costs of such examinations and tests see paragraph UNIT PRICES.

-- End of Section --

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SECTION 03 30 53

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 GENERAL

This section applies to the construction of cast-in-place wing walls, head walls, and weir box drainage structure for the Qwuloolt restoration project. Cast-in-place work represents an alternative to pre-cast concrete structures.

1.1 SUMMARY

Perform all work in accordance with ACI MCP SET Parts 2 and 3.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI MCP SET	(2009) Manual of Concrete Practice

ASTM INTERNATIONAL (ASTM)

ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 615/A 615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(2008) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(2009a) Standard Test Method for Air

	Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2009) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 685/C 685M	(2007) Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM C 94/C 94M	(2009a) Standard Specification for Ready-Mixed Concrete
ASTM C 990	(2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM D 1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates
ASTM D 98	(2005) Calcium Chloride

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.3 SYSTEM DESCRIPTION

The Government retains the option to sample and test joint sealer, joint filler material, waterstop, aggregates and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Obtain samples of aggregates at the point of batching in accordance with ASTM D 75/D 75M. Sample concrete in accordance with ASTM C 172. Determine slump and air content in accordance with ASTM C 143/C 143M and ASTM C 231, respectively, when cylinders are molded. Prepare, cure, and transport compression test specimens in accordance with ASTM C 31/C 31M. Test compression test specimens in accordance with ASTM C 39/C 39M. Take samples for strength tests not less than once each shift in which concrete is produced from each class of concrete required. Provide a minimum of three specimens from each sample; two to be tested at 28 days (90 days if pozzolan is used) for acceptance, and one will be tested at 7 days for information.

1.3.1 Strength

Acceptance test results are the average strengths of two specimens tested at 28 days (90 days if pozzolan is used). The strength of the concrete is considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'c, and no individual acceptance test result falls below f'c by more than 500 psi for mixtures other than controlled density fill (CDF) and 100 psi for CDF.

1.3.2 Construction Tolerances

Apply a Class "C" finish to all surfaces except those specified to receive a Class "D" finish. Apply a Class "D" finish to all post-construction surfaces which will be permanently concealed. Surface requirements for the classes of finish required are as specified in Part 4 of ACI MCP SET.

1.3.3 Concrete Mixture Proportions

Concrete mixture proportions are the responsibility of the Contractor. Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. Provide materials included in the mixture proportions of the same type and from the same source as will be used on the project. The specified compressive strength f'c shall be 4,000 psi at 28 days (90 days if pozzolan is used). The maximum nominal size coarse aggregate varies based upon the design of the concrete unit, in accordance with ACI MCP SET Part 3. The air content shall be between 4.5 and 7.5 percent with a slump between 2 and 5 inches. The maximum water cement ratio is 0.50.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Air-Entraining Admixture
Accelerating Admixture
Water-Reducing or Retarding Admixture
Curing Materials
Reinforcing Steel
Expansion Joint Filler Strips, Premolded
Joint Sealants - Field Molded Sealants
Waterstops

Manufacturer's literature from suppliers which demonstrates compliance with applicable specifications for the above materials.

Conveying and Placing Concrete

Methods and equipment for transporting, handling, depositing, and consolidating the concrete prior to the first concrete placement.

Formwork; G, DO

Formwork design prior to the first concrete placement.

Forms
Installation Drawings; G, DO
Concrete Placement
Ready-Mix Concrete
Mix Design Data; G, DO
Air-Entraining Admixtures
Fly Ash
Steel Reinforcement
Accessories
Curing Compound

Concrete

SD-06 Test Reports

Aggregates; G, DO

Test reports for aggregates showing the material(s) meets the quality and grading requirements of the specifications.

Concrete Mixture Proportions; G, DO

The mixture proportions that will produce concrete of the quality required, ten days prior to placement of concrete. Applicable test reports to verify that the concrete mixture proportions selected will produce concrete of the quality specified.

Compressive Strength Testing; G, DO

Slump; G, DO

SD-07 Certificates

Cementitious Materials

Manufacturer's certificates of compliance, accompanied by mill test reports, attesting that the concrete materials meet the requirements of the specifications in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Certificates for all material conforming to EPA's Comprehensive Procurement Guidelines (CPG), in accordance with 40 CFR 247.

Aggregates

Certificates of compliance stating that the material(s) meet the quality and grading requirements of the specifications under which it is furnished.

Bill of Lading

1.5 QUALITY ASSURANCE

Indicate specific locations of Steel Reinforcement, Accessories, Expansion Joints, Construction Joints, Contraction Joints, Control Joints, on installation drawings and include, but not be limited to, square feet of concrete placements, thicknesses and widths, plan dimensions, and arrangement of cast-in-place concrete section.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Provide cementitious materials that conform to the appropriate specifications listed:

2.1.1.1 Portland Cement

ASTM C 150/C 150M, Type II.

2.1.1.2 Pozzolan

Provide pozzolan that conforms to ASTM C 618, Class C or F, including requirements of Tables 1A and 2A.

2.1.2 Aggregates

Fine and coarse aggregates shall meet the quality and grading requirements of ASTM C 33/C 33M Class Designations 4M or better.

2.1.3 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate specification listed. Retest chemical admixtures that have been in storage at the project site, for longer than 6 months or that have been subjected to freezing, at the expense of the Contractor at the request

of the Contracting Officer and will be rejected if test results are not satisfactory.

2.1.3.1 Air-Entraining Admixture

Provide air-entraining admixture that meets the requirements of ASTM C 260.

2.1.3.2 Accelerating Admixture

Provide calcium chloride meeting the requirements of ASTM D 98. Other accelerators shall meet the requirements of ASTM C 494/C 494M, Type C or E.

2.1.3.3 Water-Reducing or Retarding Admixture

Provide water-reducing or retarding admixture meeting the requirements of ASTM C 494/C 494M, Type A, B, or D. High-range water reducing admixture Type F may be used only when approved, approval being contingent upon particular placement requirements as described in the Contractor's Quality Control Plan.

2.1.4 Water

Use fresh, clean, potable water for mixing and curing, free from injurious amounts of oil, acid, salt, or alkali, except that unpotable water may be used if it meets the requirements of COE CRD-C 400.

2.1.5 Reinforcing Steel

Provide reinforcing bars conforming to the requirements of ASTM A 615/A 615M, Grade 60. Welded steel wire fabric shall conform to the requirements of ASTM A 185/A 185M. Details of reinforcement not shown shall be in accordance with ACI MCP SET Part 3, Chapters 7 and 12.

2.1.6 Expansion Joint Filler Strips, Premolded

Expansion joint filler strips, premolded shall be sponge rubber conforming to ASTM D 1752, Type I.

2.1.7 Joint Sealants - Field Molded Sealants

Joint sealants - field molded sealants shall conform to ASTM C 920, Type M, Grade NS, Class 25, use NT for vertical joints and Type M, Grade P, Class 25, use T for horizontal joints. Provide polyethylene tape, coated paper, metal foil, or similar type bond breaker materials. The backup material needs to be compressible, nonshrink, nonreactive with the sealant, and a nonabsorptive material such as extruded butyl or polychloroprene foam rubber. Immediately prior to installation of field-molded sealants, clean the joint of all debris and further cleaned using water, chemical solvents, or other means as recommended by the sealant manufacturer or directed.

2.1.8 Waterstops

Waterstops shall conform to COE CRD-C 572.

2.1.9 Formwork

The design and engineering of the formwork as well as its construction, will be the responsibility of the Contractor.

2.1.10 Form Coatings

Coat forms, for exposed surfaces, with a nonstaining form oil to be applied shortly before concrete is placed.

2.1.11 Curing Materials

Provide curing materials conforming to the following requirements.

2.1.11.1 Impervious Sheet Materials

Impervious sheet materials, ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

2.1.11.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or 2, Class A.

2.2 READY-MIX CONCRETE

a. Concrete shall be ready-mix concrete with mix design data conforming to ACI MCP SET Part 2. Bill of Lading for each ready-mix concrete delivery shall be in accordance with ASTM C 94/C 94M.

b. Non-exposed concrete elements: 4000 psi minimum compressive strength.

c. Direct-exposed concrete elements: 4000 psi minimum compressive strength as determined in 28 calendar days.

d. Slump: 1 to 4 inch according to ASTM C 143/C 143M and ACI MCP SET Part 1.

e. Portland Cement conforming to ASTM C 150/C 150M, Type II.

f. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

g. Air-Entraining Admixtures conforming to ASTM C 260. Exterior concrete exposed to freezing needs to be air-entrained 5 to 6 percent by volume.

h. Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and accelerating admixtures, and water-reducing and retarding admixtures shall conform to ASTM C 494/C 494M.

i. Fly Ash used as an admixture shall conform to ASTM C 618, Class C or F with 4 percent maximum loss on ignition and 35 percent maximum cement replacement by weight. Submit documentation in compliance with 40 CFR 247.

2.3 STEEL REINFORCEMENT

2.3.1 Deformed Steel Bars

Provide steel bars conforming to ASTM A 615/A 615M, Grade 60 ACI MCP SET Parts 2 and 3.

2.3.2 Welded Wire Fabric

Provide welded wire fabric conforming to ASTM A 185/A 185M.

2.4 FORMS

Forms shall be of wood, steel, or other approved material and conform to ACI MCP SET, Parts 2 and 3.

Provide form release conforming to ACI MCP SET, Part 4.

2.5 ACCESSORIES

2.5.1 Waterstops

a. Provide waterstops of the flat dumbbell type not less than 3/16-inch thick for widths up to 5 inches and not less than 3/8-inch thick for widths 5 inches and over.

b. Provide waterstops made of polyvinylchloride (PVC) and conforming to ASTM C 990.

2.5.2 Curing Compound

Provide curing compound conforming to ASTM C 309.

PART 3 EXECUTION

3.1 PREPARATION

Prepare construction joints to expose coarse aggregate. The surface shall be clean, damp, and free of laitance. Construct ramps and walkways, as necessary, to allow safe and expeditious access for concrete and workmen. Remove snow, ice, standing or flowing water, loose particles, debris, and foreign matter. Earth foundations shall be satisfactorily compacted. Ensure spare vibrators are available. The entire preparation shall be accepted by the Government prior to placing.

3.1.1 Embedded Items

Secure reinforcement in place after joints, anchors, and other embedded items have been positioned. Arrange internal ties so that when the forms are removed the metal part of the tie is not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Embedded items shall be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete is permitted only when specifically authorized or directed. All equipment needed to place, consolidate, protect, and cure the concrete shall be at the placement site and in good operating condition.

3.1.2 Formwork Installation

Forms shall be properly aligned, adequately supported, and mortar-tight. Provide smooth form surfaces, free from irregularities, dents, sags, or holes when used for permanently exposed faces. Chamfer all exposed joints and edges , unless otherwise indicated.

3.1.3 Production of Concrete

3.1.3.1 Ready-Mixed Concrete

Provide ready-mixed concrete conforming to ASTM C 94/C 94M except as otherwise specified.

3.1.3.2 Concrete Made by Volumetric Batching and Continuous Mixing

Concrete made by volumetric batching and continuous mixing shall conform to ASTM C 685/C 685M.

3.1.4 Waterstops

Install and splice waterstops as directed by the manufacturer.

3.2 CONVEYING AND PLACING CONCRETE

Concrete placement is not permitted when weather conditions prevent proper placement and consolidation without approval. When concrete is mixed and/or transported by a truck mixer, deliver the concrete to the site of the work completing the discharge within 1-1/2 hours or 45 minutes when the placing temperature is 86 degrees F or greater unless a retarding admixture is used. Convey concrete from the mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Deposit concrete as close as possible to its final position in the forms and regulate it so that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. Carry on the placement at such a rate that the formation of cold joints will be prevented. Perform conveying and placing concrete in conformance with the following requirements.

3.2.1 Consolidation

Consolidate each layer of concrete by rodding, spading, or internal vibrating equipment. External vibrating equipment may be used when authorized. Systematically accomplish internal vibration by inserting the vibrator through the fresh concrete in the layer below at a uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just-vibrated area by approximately 4 inches. Ensure that the vibrator penetrates rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. Hold vibrator stationary until the concrete is consolidated and then withdraw it slowly at the rate of about 3 inches per second.

3.2.2 Cold-Weather Requirements

No concrete is to be mixed or placed when the ambient temperature is below 36 degrees F or if the ambient temperature is below 41 degrees F and falling. Provide suitable covering and other means as approved for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Do not mix salt, chemicals, or other foreign materials with the concrete to prevent freezing. Remove and replace concrete damaged by freezing at the expense of the Contractor.

3.2.3 Hot-Weather Requirements

When the rate of evaporation of surface moisture, as determined by use of Figure 1 of ACI MCP SET Part 2, is expected to exceed 0.2 psf per hour, provisions for windbreaks, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement, and such protective measures taken as quickly as finishing operations will allow.

3.2.4 Lifts in Concrete

Deposit concrete in horizontal layers not to exceed 24 inches in thickness. Carry on placement at a rate that prevents the formation of cold joints. Place slabs in one lift.

3.3 FORM REMOVAL

Do not remove forms before 24 hours after concrete placement, except as otherwise specifically authorized. Do not remove supporting forms and shoring until the concrete has cured for at least 5 days. When conditions require longer curing periods, forms shall remain in place.

3.4 FINISHING

3.4.1 Temperature Requirement

Do not finish or repair concrete when either the concrete or the ambient temperature is below 50 degrees F.

3.4.2 Finishing Formed Surfaces

Remove all fins and loose materials , and surface defects including filling of tie holes. Repair all honeycomb areas and other defects. Remove all unsound concrete from areas to be repaired. Surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. Brush-coat the prepared area with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete. The cement used in mortar or concrete for repairs to all surfaces permanently exposed to view shall be a blend of portland cement and white cement so that the final color when cured is the same as adjacent concrete.

3.4.3 Finishing Unformed Surfaces

Float finish all unformed surfaces, that are not to be covered by additional concrete or backfill, to elevations shown, unless otherwise specified. Surfaces to receive additional concrete or backfill shall be brought to the elevations shown and left as a true and regular surface. Slope exterior surfaces for drainage unless otherwise shown. Carefully make joints with a jointing tool. Finish unformed surfaces to a tolerance of 3/8 inch for a float finish as determined by a 10 foot straightedge placed on surfaces shown on the drawings to be level or having a constant slope. Do not perform finishing while there is excess moisture or bleeding water on the surface. No water or cement is to be added to the surface during finishing.

3.4.3.1 Float Finish

Provide float finished surfaces, screeded and darbied or bullfloated to

eliminate the ridges and to fill in the voids left by the screed. In addition, the darby or bullfloat shall fill all surface voids and only slightly embed the coarse aggregate below the surface of the fresh concrete. When the water sheen disappears and the concrete supports a person's weight without deep imprint, complete floating. Floating shall embed large aggregates just beneath the surface, remove slight imperfections, humps, and voids to produce a plane surface, compact the concrete, and consolidate mortar at the surface.

3.4.3.2 Expansion and Contraction Joints

Make expansion and contraction joints in accordance with the details shown or as otherwise specified. Refer to ACI/MCP-3 for guidance on expansion joints. The depth of contraction joints must be 1/4 to 1/3 of the thickness of the slab. The maximum spacing between adjacent joints shall be 30 times the concrete thickness for slabs exposed to the environment. Provide 1/2 inch thick transverse expansion joints where new work abuts an existing concrete. Cut contraction joints at a minimum of 1 inch(es) deep with a jointing tool after the surface has been finished.

3.5 CURING AND PROTECTION

Beginning immediately after placement, and continuing for at least 7 days, cure and protect all concrete from premature drying, extremes in temperature, rapid temperature change, freezing, mechanical damage, and exposure to rain or flowing water. Provide all materials and equipment needed for adequate curing and protection at the site of the placement prior to the start of concrete placement. Accomplish moisture preservation of moisture for concrete surfaces not in contact with forms by one of the following methods:

a. Continuous sprinkling or ponding.

b. Application of absorptive mats or fabrics kept continuously wet.

c. Application of sand kept continuously wet.

d. Application of impervious sheet material conforming to ASTM C 171.

e. Application of membrane-forming curing compound conforming to ASTM C 309, Type 1-D, on surfaces permanently exposed to view. Accomplish Type 2 on other surfaces in accordance with manufacturer's instructions.

Accomplish the preservation of moisture for concrete surfaces placed against wooden forms by keeping the forms continuously wet for 7 days. If forms are removed prior to end of the required curing period, use other curing methods for the balance of the curing period. Do not perform protection removal if the temperature of the air in contact with the concrete may drop more than 60 degrees F within a 24 hour period.

3.6 TESTS AND INSPECTIONS

3.6.1 Field Testing Technicians

The individuals who sample and test concrete, as required in this specification, 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 I.

3.6.2 Inspection Details and Frequency of Testing

3.6.2.1 Preparations for Placing

Inspect foundation or construction joints, forms, and embedded items in sufficient time prior to each concrete placement by the Contractor to certify that it is ready to receive concrete.

3.6.2.2 Air Content

Check air content at least once during each shift that concrete is placed for each class of concrete required. Obtain samples in accordance with ASTM C 172 and tested in accordance with ASTM C 231.

3.6.2.3 Slump

Check slump once during each shift that concrete is produced for each class of concrete required. Obtain samples in accordance with ASTM C 172 and tested in accordance with ASTM C 143/C 143M.

3.6.2.4 Consolidation and Protection

Ensure that the concrete is properly consolidated, finished, protected, and cured.

3.6.3 Action Required

3.6.3.1 Placing

Do not permit placing to begin until the availability of an adequate number of acceptable vibrators, which are in working order and have competent operators, has been verified. Do not continue placing if any pile is inadequately consolidated.

3.6.3.2 Air Content

Whenever an air content test result is outside the specification limits, adjust the dosage of the air-entrainment admixture prior to delivery of concrete to forms.

3.6.3.3 Slump

Whenever a slump test result is outside the specification limits, adjust the batch weights of water and fine aggregate prior to delivery of concrete to the forms. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion.

3.6.4 Reports

Report the results of all tests and inspections conducted at the project site informally at the end of each shift. Submit written reports weekly. Deliver within 3 days after the end of each weekly reporting period. See Section 01 45 00 CONTRACTOR QUALITY CONTROL.

3.7 FORM WORK

Form work shall conform to ACI MCP SET Parts 2 through 5.

3.7.1 Preparation of Form Surfaces

Forms shall be true to line and grade, mortar-tight, and sufficiently rigid to prevent objectionable deformation under load. Form surfaces for permanently exposed faces shall be smooth, free from irregularities, dents, sags, or holes. Chamfer exposed joints and exposed edges. Arrange internal ties so that when the forms are removed, the form ties are not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structure.

3.7.2 Form Coating

Coat forms, for exposed surfaces, with a nonstaining form release coating applied shortly before concrete is placed. Forms for unexposed surfaces may be wetted in lieu of coating immediately before the placing of concrete, except that in freezing weather form release coating shall be used.

3.7.3 Removal of Forms

Remove forms carefully to prevent damage to the concrete. Do not remove forms before the expiration of the minimum time indicated below:

Columns and walls (lifts 15 feet and under)	24 hours
Columns and walls (lifts over 15 feet)	48 hours

3.8 STEEL REINFORCING

Reinforcement shall be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the concrete.

3.8.1 Fabrication

Shop fabricate steel reinforcement in accordance with ACI MCP SET Parts 2 and 3. Shop details and bending shall be in accordance with ACI MCP SET Parts 2 and 3.

3.8.2 Splicing

Perform splices in accordance with ACI MCP SET Parts 2 and 3.

3.8.3 Supports

Secure reinforcement in place by the use of metal or concrete supports, spacers, or ties.

3.9 EMBEDDED ITEMS

Before placing concrete, take care to determine that all embedded items are firmly and securely fastened in place. Provide embedded items free of oil and other foreign matter, such as loose coatings of rust, paint and scale. Embedding of wood in concrete is permitted only when specifically authorized or directed.

3.10 FIELD TESTING

a. Provide samples and test concrete for quality control during placement. Sampling of fresh concrete for testing shall be in accordance with ASTM C 172.

b. Test concrete for compressive strength at 7 and 28 days for each design mix. Concrete test specimens shall conform to ASTM C 31/C 31M. Perform Compressive strength testing conforming to ASTM C 39/C 39M.

c. Test Slump at the site of discharge for each design mix in accordance with ASTM C 143/C 143M.

d. Test air content for air-entrained concrete in accordance with ASTM C 231. Test concrete using lightweight or test extremely porous aggregates in accordance with ASTM C 173/C 173M.

e. Determine temperature of concrete at time of placement in accordance with ASTM C 1064/C 1064M.

-- End of Section --

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PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION

PART 1 GENERAL

This section applies to the construction of pre-cast wing walls, head walls, and weir box drainage structure for the Qwuloolt restoration project. Pre-cast work represents an alternative to cast-in-place concrete structures.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 305R	(1999; Errata 2006) Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318	(2008; Errata 2008; Errata 2009; Errata 2009; Errata 2009; Errata 2009; Errata 2009) Building Code Requirements for Structural Concrete and Commentary

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA 01-102	(2000) Concrete Pipe Handbook
ACPA 01-110	(1984) Design Manual for Sulfide and Corrosion Prediction and Control
ACPA QPC	(2005; Ver 3.0) QCast Plant Certification Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2008; Errata 2009) Structural Welding Code - Steel
AWS D1.4/D1.4M	(2005; Errata 2005) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 496/A 496M	(2007) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497/A 497M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2009) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A 706/A 706M	(2009) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 767/A 767M	(2009) Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
ASTM A 775/A 775M	(2007b) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A 82/A 82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 884/A 884M	(2006) Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM C 1064/C 1064M	(2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C 1107/C 1107M	(2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1116/C 1116M	(2008a) Standard Specification for Fiber-Reinforced Concrete
ASTM C 138/C 138M	(2009) Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143/C 143M	(2009) Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C 1478	(2008) Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 173/C 173M	(2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2007) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	(2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 330	(2005) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C 39/C 39M	(2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 443	(2005a) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 494/C 494M	(2008a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 595/C 595M	(2008a) Standard Specification for Blended Hydraulic Cements
ASTM C 618	(2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C 877	(2008) External Sealing Bands for Concrete

	Pipe, Manholes, and Precast Box Sections
ASTM C 891	(1990; R 2003) Installation of Underground Precast Concrete Utility Structures
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM C 923	(2008) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C 990	(2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants

CANADIAN STANDARDS ASSOCIATION (CSA)

CAN/CSA A23.4	(2005) Precast Concrete - Materials and Construction

NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA)

NPCA QC Manual	(2005; R 2006) Quality Control Manual for Precast Plants

1.2 SYSTEM DESCRIPTION

Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been, for at least 3 years, regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings. Coordinate precast work with the work of other trades.

1.2.1 Standard Precast Units

Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards ACI 318, ASTM, ACPA 01-102, Chapter 7-Design for Sulfide Control. Design shall also consider stresses induced during handling, shipping and installation as to avoid product cracking or other handling damage. Indicate design loads for precast concrete units on the shop drawings.

1.2.2 Custom-Made Precast Units

Submit design calculations and drawings of custom-made precast units, prepared and sealed by a registered professional engineer, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices.

1.2.3 Proprietary Precast Units

Products manufactured under franchise arrangements shall conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, shall conform to the requirements in this specification.

1.2.4 Joints and Sealants

Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

1.2.5 Concrete Mix Design

1.2.5.1 Concrete Mix Proportions

Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete and ACI 211.2 for lightweight concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Do not use calcium chloride in precast concrete containing reinforcing steel or other embedded metal items. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and constituents meet the requirements of this specification.

1.2.5.2 Concrete Strength

Provide precast concrete units with a 28-day compressive strength (f'c) of at least 4,000 psi.

1.2.5.3 Water-to-Cement Ratio

Furnish concrete, that will be exposed to freezing and thawing, containing entrained air and with water-cement ratios of 0.45 or less. Furnish concrete which will not be exposed to freezing, but which is required to be watertight, with a water-cement ratio of 0.48 or less if the concrete is exposed to fresh water, or 0.45 or less if exposed to brackish water or sea water. Furnish reinforced concrete exposed to deicer salts, brackish water or seawater with a water-cement ratio of 0.40 or less for corrosion protection.

1.2.5.4 Air Content

The air content of concrete that will be exposed to freezing conditions shall be within the limits given below.

NOMINAL MAXIMUM AGGREGATE SIZE	AIR CONTENT % SEVERE EXPOSURE	MODERATE EXPOSURE
10 mm (3/8 inch)	6.0 to 9.0	4.5 to 7.5
13 mm (1/2 inch)	5.5 to 8.5	4.0 to 7.0
19 mm (3/4 inch)	4.5 to 7.5	3.5 to 6.5
25 mm (1.0 inch)	4.5 to 7.5	3.0 to 6.0
38 mm (1.5 inch)	4.5 to 7.0	3.0 to 6.0

Note: For specified compressive strengths greater than 5000 psi, air content may be reduced 1 percent

1.2.5.5 Corrosion Control for Sanitary Sewer Systems

Follow design recommendations outlined in Chapter 7 of ACPA 01-102 or the ACPA 01-110 when hydrogen sulfide is indicated as a potential problem.

1.3 SUBMITTALS

All submittals are the responsibility of the precast concrete producer. Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Procedures

Quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and/or ACPA QPC.

SD-02 Shop Drawings

Standard Precast Units; G, DO

Drawings for standard precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. These drawings shall demonstrate that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

Custom-Made Precast Units; G, DO

Drawings for custom-made precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. Show on these drawings complete design, installation, and construction information in such detail as to enable the Contracting Officer to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

SD-03 Product Data

Standard Precast Units

Cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.

Proprietary Precast Units

Standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information

as to demonstrate that such products will perform the intended task.

Embedded Items

Product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.

Accessories

Proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, steps, cable racks and other items installed before or after delivery.

SD-05 Design Data

Design Calculations; G, DO
Concrete Mix Proportions; G, DO

Precast concrete unit design calculations, and concrete mix proportions.

SD-06 Test Reports

Test Reports; G, DO

Test reports and documentation to demonstrate compliance with the specifications.

SD-07 Certificates

Quality Control Procedures

Quality control procedures established in accordance with NPCA QC Manual and/or ACPA QPC.

1.4 QUALITY ASSURANCE

Demonstrate adherence to the standards set forth in NPCA QC Manual and/or ACPA QPC. Meet requirements written in the subparagraphs below.

1.4.1 NPCA and ACPA Plant Certification

The precast concrete producer shall be certified by the National Precast Concrete Association's and/or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.

1.4.2 Qualifications, Quality Control and Inspection

1.4.2.1 Qualifications

Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of 3 years. The precast concrete producer shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis.

1.4.2.2 Quality Control Procedures

Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.

a. Slump: Perform a slump test for each 150 cu yd of concrete produced, or once a day, whichever comes first. Perform slump tests in accordance with ASTM C 143/C 143M.

b. Temperature: Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064/C 1064M.

c. Compressive Strength: Make at least four compressive strength specimens for each 150 cubic yards of concrete of each mix in accordance with the following Standards: ASTM C 31/C 31M, ASTM C 192/C 192M, ASTM C 39/C 39M.

d. Air Content: Perform tests for air content on air-entrained, wet-cast concrete for each 150 cu yd of concrete, but not less often than once each day when air-entrained concrete is used. Determine the air content in accordance with either ASTM C 231 or ASTM C 173/C 173M for normal weight aggregates and ASTM C 173/C 173M for lightweight aggregates.

e. Unit Weight: Perform tests for unit weight a minimum of once per week to verify the yield of batch mixes. Perform unit weight tests for each 100 cu yd of lightweight concrete in accordance with ASTM C 138/C 138M.

Submit test reports as Follows:

a. Copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

b. Copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze thaw durability, abrasion and absorption. Clearly detail in the specifications special tests for precast concrete or cast-in items.

c. Sufficient documentation, when the use of self-consolidating concrete (SCC) is proposed, showing a minimum of 30-days production track records demonstrating that SCC is appropriate for casting of the product.

d. Copies of in-plant QA/QC inspection reports, upon the request of the Contracting Officer.

1.4.2.3 Inspection

The Contracting Officer may place an inspector in the plant when the units covered by this specification are being manufactured. The precast concrete

producer shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Government's right to enforce contractual provisions after units are transported or erected.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the Contracting Officer for quality and final acceptance.

1.5.2 Storage

Store units off the ground or in a manner that will minimize potential damage.

1.5.3 Handling

Handle, transport, and store products in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS

Except as otherwise specified in the following paragraphs, conform material to Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

2.1.1 Cement

Furnish cement conforming to ASTM C 150/C 150M, Type I, II, III or V. Furnish blended cements that conform to ASTM C 595/C 595M.

2.1.2 Fly Ash and Pozzolans

Fly ash is used as an admixture conforming to ASTM C 618, Class C or F with 4 percent maximum loss on ignition and 35 percent maximum cement replacement by weight.

2.1.3 Water

Furnish water potable or free of deleterious substances in amounts harmful to concrete or embedded metals.

2.1.4 Aggregates

2.1.4.1 Selection

Furnish aggregates conforming to ASTM C 33/C 33M. Provide aggregates not containing any substance, which may be deleteriously reactive with the alkalies in the cement. The nominal maximum aggregate size may not exceed one-fifth the narrowest dimension between sides of forms, nor three-quarters the minimum clear spacing between individual reinforcing bars or wires.

2.1.4.2 Aggregates for Lightweight Concrete

ASTM C 330

2.1.5 Admixtures

2.1.5.1 Air-Entraining

ASTM C 260

2.1.5.2 Accelerating, Retarding, Water Reducing

ASTM C 494/C 494M

2.1.5.3 Pigments

Non-fading and lime-resistant

2.1.6 Reinforcement

2.1.6.1 Reinforcing Bars

a. Deformed Billet-steel: ASTM A 615/A 615M
b. Deformed Low-alloy steel: ASTM A 706/A 706M

2.1.6.2 Reinforcing Wire

a. Plain Wire: ASTM A 82/A 82M
b. Deformed Wire: ASTM A 496/A 496M

2.1.6.3 Welded Wire Fabric

a. Plain Wire: ASTM A 185/A 185M
b. Deformed Wire: ASTM A 497/A 497M

2.1.6.4 Epoxy Coated Reinforcement

a. Reinforcing Bars: ASTM A 775/A 775M
b. Wires and Fabric: ASTM A 884/A 884M

2.1.6.5 Galvanized Reinforcement

Provide galvanized reinforcement conforming to ASTM A 767/A 767M.

2.1.7 Synthetic Fiber Reinforcement

Synthetic fiber shall be polypropylene with a denier less than 100 and a nominal fiber length of 2 inch.

2.1.8 Inserts and Embedded Metal

All items embedded in concrete shall be of the type required for the intended task, and meet the following standards.

a. Structural Steel Plates, Angles, etc.: ASTM A 36/A 36M
b. Hot-dipped Galvanized: ASTM A 153/A 153M
c. Proprietary Items: In accordance with manufacturers published literature

2.1.9 Accessories

a. Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe: ASTM C 443.

b. External Sealing Bands for Noncircular Sewer, Storm Drain and Culvert Pipe: ASTM C 877.

c. Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections: ASTM C 990.

d. Elastomeric Joint Sealants: ASTM C 920

2.1.10 Pipe Entry Connectors

Pipe entry connectors shall conform to ASTM C 923 or ASTM C 1478.

2.1.11 Grout

Nonshrink Grout shall conform to ASTM C 1107/C 1107M. Cementitious grout shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Perform fabrication in accordance with NPCA QC Manual and/or ACPA QPC unless specified otherwise.

3.1.1 Forms

Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Construct forms so that the forces and vibrations to which the forms will be subjected can cause no product damage. Clean forms of concrete build-up after each use. Apply form release agents according to the manufacturers recommendations and do not allow to build up on the form casting surfaces.

3.1.2 Reinforcement

Follow applicable ASTM Standard or ACI 318 for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4/D1.4M. Position reinforcing as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.

3.1.3 Embedded Items

Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1/D1.1M when necessary. Hold

rigidly in place inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations.

3.1.4 Synthetic Fiber Reinforced Concrete

Add fiber reinforcement to the concrete mix in accordance with the applicable sections of ASTM C 1116/C 1116M and the recommendations of the manufacturer, and in an amount of 0.1 percent by volume.

3.2 CONCRETE

3.2.1 Concrete Mixing

Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

3.2.2 Concrete Placing

Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.

3.2.2.1 Cold Weather Concreting

Perform cold weather concreting in accordance with ACI 306.1.

a. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather.

b. Free from frost all concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact.

c. Do not use frozen materials or materials containing ice.

d. In cold weather the temperature of concrete at the time of placing shall not be below 45 degrees F. Discard concrete that freezes before its compressive strength reaches 500 psi.

3.2.2.2 Hot Weather Concreting

Recommendations for hot weather concreting are given in detail in ACI 305R. During hot weather, give proper attention to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90 degrees F.

3.2.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing.

3.2.3.1 Curing by Moisture Retention

Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:

a. Cover with polyethylene sheets a minimum of 6 mils thick in accordance with ASTM C 171.

b. Cover with burlap or other absorptive material and keep continually moist.

c. Use of a membrane-curing compound applied at a rate not to exceed 200 square ft/gallon, or in accordance with manufacturers' recommendations according to ASTM C 309.

3.2.3.2 Curing with Heat and Moisture

Do not subject concrete to steam or hot air until after the concrete has attained its initial set. Apply steam, if used, within a suitable enclosure, which permits free circulation of the steam in accordance with CAN/CSA A23.4. If hot air is used for curing, take precautions to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150 degrees F. These requirements do not apply to products cured with steam under pressure in an autoclave.

3.2.4 Surface Finish

Finish unformed surfaces of wet-cast precast concrete products as specified. If no finishing procedure is specified, finish such surfaces using a strike-off to level the concrete with the top of the form.

3.2.4.1 Formed Non-Architectural Surfaces

Cast surfaces against approved forms following industry practices in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles, and minor chips and spalls will be accepted but no major imperfections, honeycombs or other major defects will be permitted.

3.2.4.2 Unformed Surfaces

Finish unformed surfaces with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be accepted but no major imperfections, honeycombs, or other major defects shall be permitted.

3.2.4.3 Special Finishes

Troweled, broom or other finishes shall be according to the requirements of project documents and performed in accordance with industry standards or supplier specifications. Submit finishes for approval when required by the project documents. The sample finishes shall be approved prior to the start of production.

3.2.5 Stripping Products from Forms

Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

3.2.6 Patching and Repair

No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

3.2.6.1 Repairing Minor Defects

Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.

3.2.6.2 Repairing Honeycombed Areas

When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

3.2.6.3 Repairing Major Defects

Evaluate, by qualified personnel, defects in precast concrete products which impair the functional use or the expected life of products to determine if repairs are feasible and, if so, to establish the repair procedure.

3.2.7 Shipping Products

Do not ship products until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75 percent of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.3 INSTALLATION

3.3.1 Site Access

It is the Contractor's responsibility to provide adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.

3.3.2 General Requirements

a. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.

b. Lift products by suitable lifting devices at points provided by the precast concrete producer.

c. Install products in accordance with the precast concrete producer's instructions. In the absence of such instructions, install underground utility structures in accordance with ASTM C 891. Install pipe and manhole sections in accordance with the procedures outlined by the American Concrete Pipe Association.

d. Field modifications to the product will relieve the precast producer of liability even if such modifications result in the failure of the product.

3.3.3 Water Tightness

Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system.

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SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 [Enter Appropriate Subpart Title Here]1.1.1 [Enter Appropriate Subpart Title Here]

This Section is for Earthworks for the Qwuloolt Project for breach excavation, breach excavated material disposal, and channel/ditch excavation and filling. Soils at the site are composed of saturated, very soft to soft silt or silt with sand. The surface is covered with one to two feet of vegetative grass and root mats. Groundwater varies from five feet below surface in the summer to two feet above ground surface in the winter. The Geotechnical Reports for the site are attached to this Section

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600	(2010) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA C2	(2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA P5	(2009) Standard for Waterborne Preservatives

ASTM INTERNATIONAL (ASTM)

ASTM A139/A139M	(2004; R 2010) Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4 and over)

ASTM A252	(2010) Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2434	(1968; R 2006) Permeability of Granular Soils (Constant Head)
ASTM D 2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2010) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4318	(2010) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes
EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D 2487 as GP-GM, GW-GM, GC, SM, SW-SM. Satisfactory materials for grading comprise stones less than 3 inches.Satisfactory material shall be free of hazardous and toxic compounds or materials.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.3.3 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, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C136, ASTM D 422, and ASTM D 1140.

1.3.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.3.5 Topsoil

Material suitable for topsoils obtained from offsite areas is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.3.6 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.3.7 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.3.8 Unstable Material

Unstable materials are too wet to properly support a utility pipe, conduit, embankments, or appurtenant structure.

1.3.9 Select Granular Material

1.3.9.1 General Requirements

Select granular material consist of materials classified as GW, GP, SW, SP, or by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 35 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 12 percent when tested in accordance with ASTM D 4318, and not more than 35 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D 1140. Provide a minimum coefficient of permeability of 0.002 feet per minute when tested in accordance with ASTM D 2434.

1.3.10 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 3 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, free the initial backfill material of stones larger than 3 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.4 SYSTEM DESCRIPTION

Subsurface soil boring and test pit logs are shown on the drawings and appended to this Section. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.4.1 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.4.1.1 Common Excavation

Include common excavation with the satisfactory removal and disposal of all materials not classified as rock excavation.

1.4.1.2 Rock Excavation

Rock excavation shall not be required.

1.4.2 Blasting

Blasting will not be permitted.

1.4.3 Dewatering Work Plan

Submit procedures for accomplishing dewatering work.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring; G
Dewatering Work Plan; G

SD-03 Product Data

Utilization of Excavated Materials; G
Rock Excavation
Opening of any Excavation or Borrow Pit
Shoulder Construction

SD-06 Test Reports

Testing
Borrow Site Testing

SD-07 Certificates

Testing

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill shall contain a maximum of 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and a maximum of 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall pass the TCPL test. Determine TPH concentrations by using EPA 600/4-79/020 Method 418.1. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5030/8020. Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Within 24 hours of conclusion of physical tests, submit three copies of test results, including calibration curves and results of calibration tests. Do not bring material onsite until tests have been approved by the Contracting Officer.

2.2 MATERIAL FOR RIP-RAP

Provide riprap and quarry spalls conforming to requirements in Section 35 31 19 Stone Protection for Strucutres.

2.3 PIPE CASING

2.3.1 Casing Pipe

ASTM A139/A139M, Grade B, or ASTM A252, Grade 2, smooth wall pipe. Match casing size to the outside diameter and wall thickness as indicated on Drawing Sheet No. [_____]. Protective coating is not required on casing pipe.

2.3.2 Wood Supports

[Treated Yellow Pine or Douglas Fir][Locally available], rough, structural grade. Provide wood with nonleaching water-borne pressure preservative (ACA or CCA) and treatment conforming to AWPA P5 and AWPA C2, respectively. Secure wood supports to carrier pipe with stainless steel or zinc-coated steel bands.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, strip topsoil to a depth of 12 inches. Spread topsoil on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Stockpile in locations indicated.

3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on the

Drawings. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed. Where pile foundations are to be used, stop the excavation of each pit at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, remove loose and displaced material and complete excavation, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.2.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity [and] [or] provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.4 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Do not permit French drains, sumps, ditches or trenches within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Take control measures by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, maintain the water level continuously, at least [_____] feet below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system. Relieve hydrostatic head in previous zones below

subgrade elevation in layered soils to prevent uplift.

3.2.5 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than [_____] feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Shore vertical trench walls more than [_____] feet high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and do not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.2.5.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of [_____] inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.2.5.2 Removal of Unyielding Material

Where [overdepth is not indicated and] unyielding material is encountered in the bottom of the trench, remove such material [_____] inch below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.5.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.2.5.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade

level until just before the concrete or masonry is to be placed.

3.2.6 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2.7 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Excavate to bottom of pile cap prior to placing or driving piles, unless authorized otherwise by the Contracting Officer. Backfill and compact over excavations and changes in grade due to pile driving operations to 95 percent of ASTM D 698 maximum density.

3.3 OPENING AND DRAINAGE OF EXCAVATION

Notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, excavation areas providing adequate drainage. Transport overburden and other spoil material to designated spoil areas or otherwise dispose of as directed. Ensure that excavation of any area, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 SHORING

3.4.1 General Requirements

Submit a Shoring and Sheeting plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Finish shoring, including sheet piling, and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheeting as excavations are backfilled, in a manner to prevent caving.

3.4.2 Geotechnical Engineer

Hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer is responsible for updating the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and submit an updated plan if necessary. Submit a

monthly written report, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Contracting Officer is responsible for arranging meetings with the Geotechnical Engineer at any time throughout the contract duration.

3.5 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and unsatisfactory and wasted materials as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.6 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. [For pile foundations, stop the excavation at an elevation of from 6 to 12 inches above the bottom of the footing before driving piles. After pile driving has been completed, complete the remainder of the excavation to the elevations shown.] Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.7 GROUND SURFACE PREPARATION

3.7.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inches before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inches, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inches and compact it as specified for the adjacent fill.

3.7.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary [to plus or minus [_____] percent of optimum moisture] [to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment

used].

3.8 UTILIZATION OF EXCAVATED MATERIALS

Dispose unsatisfactory materials removing from excavations into designated waste disposal or spoil areas. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.9 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.9.1 Trench Backfill

Backfill trenches to the grade shown. [Backfill the trench to [_____] feet above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test.] [Do not backfill the trench until all specified tests are performed.]

3.9.1.1 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 6 inches loose thickness.

3.9.1.2 Bedding and Initial Backfill

[Provide bedding of the type and thickness shown.] Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 95 percent of ASTM D 698 maximum density. Provide plastic piping with bedding to spring line of pipe. Provide materials as follows:

a. Class I: Angular, 0.25 to 1.5 inch, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

b. Class II: Coarse sands and gravels with maximum particle size of 1.5 inch, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

c. Clean, coarse-grained sand classified as [_____] in accordance with

Section 31 23 00.00 20 EXCAVATION AND FILL, [gradation [_____] of the [DOT] [State Standard] or [SW] [or] [SP] by ASTM D 2487 for [bedding] [and] [backfill] [as indicated]].

d. Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as [_____] in accordance with Section 31 23 00.00 20 EXCAVATION AND FILL, [gradation [_____] of the [DOT] [State Standard]] or having a classification of [GW] [GP] in accordance with ASTM D 2487 for [bedding] [and] [backfill] [as indicated]. [Do not exceed maximum particle size of [3] [_____] inches.]

3.9.1.3 Final Backfill

Fill the remainder of the trench, except for special materials for roadways, railroads and airfields, with satisfactory material. Place backfill material and compact as follows:

a. Roadways, Railroads, and Airfields: Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Deposit backfill in layers of a maximum of 12 inches loose thickness, and compact it to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. [Allow water flooding or jetting methods of compaction for granular noncohesive backfill material. Do not allow water jetting to penetrate the initial backfill.] [Do not permit compaction by water flooding or jetting.] Apply this requirement to all other areas not specifically designated above.

3.9.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed [and the concrete has been allowed to cure for [_____] days], place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.10 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.10.1 [Enter Appropriate Subpart Title Here]3.10.2 [Enter Appropriate Subpart Title Here]3.10.2.1 [Enter Appropriate Subpart Title Here]

3.10.3 Rip-Rap Construction

Construct rip-rap [on bedding material] [on filter fabric] [with grout] [in accordance with [DOT] [_____] State Standard, paragraph [_____]] in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.10.3.1 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance

with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.11 EMBANKMENTS

3.11.1 Earth Embankments

Construct new levee embankment in accordance with Section 35 41 00 Levee Construction. Dispose of excavated material in berms as noted in the Drawings and compact in lifts not greater than one foot with three passes of a bulldozer.steel drum rollers, vibratory compactors, or other approved equipment.

3.12 SUBGRADE PREPARATION

3.12.1 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inches below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.12.2 Compaction

Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. C compact each layer of the embankment to at least 95 percent of laboratory maximum density except as noted in Section 35 41 00 Levee Construction..

3.12.2.1 Subgrade for Pavements

Compact subgrade for pavements to at least [_____] percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact the top [_____] inch of subgrade.

3.13 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.13.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, or frozen subgrade.

3.13.2 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.14 PLACING TOPSOIL

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of [_____] inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from [offsite areas] [areas indicated].

3.15 TESTING

Perform testing by a Corps validated commercial testing laboratory or the Contractor's validated testing facility. Submit qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, Corps validated and approved by the Contracting Officer.

a. Determine field in-place density in accordance with [ASTM D 1556] [ASTM D 2167] [ASTM D 6938]. [When ASTM D 6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D 1556. ASTM D 6938 results in a wet unit weight of soil in determining the moisture content of the soil when using this method.

b. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D 6938; check the calibration of both the density and moisture gauges at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer.] [ASTM D 2937, use the Drive Cylinder Method only for soft, fine-grained, cohesive soils.] When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements.

c. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under

the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.15.1 Fill and Backfill Material Gradation

One test per [_____] cubic yards stockpiled or in-place source material. Determine gradation of fill and backfill material in accordance with [ASTM C136] [ASTM D 422] [ASTM D 1140].

3.15.2 In-Place Densities

a. One test per [_____] square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per [_____] square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.15.3 Check Tests on In-Place Densities

If ASTM D 6938 is used, check in-place densities by ASTM D 1556 as follows:

a. One check test per lift for each [_____] square feet, or fraction thereof, of each lift of fill or backfill compacted by other than hand-operated machines.

b. One check test per lift for each [_____] square feet, of fill or backfill areas compacted by hand-operated machines.

3.15.4 Moisture Contents

In the stockpile, excavation, or borrow areas, perform a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Contracting Officer.

3.15.5 Optimum Moisture and Laboratory Maximum Density

Perform tests for each type material or source of material to determine the optimum moisture and laboratory maximum density values. One representative test per [_____] cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.15.6 Tolerance Tests for Subgrades

Perform continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION during construction of the subgrades.

3.16 DISPOSITION OF SURPLUS MATERIAL

Provide surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber as removed from Government property as directed by the Contracting Officer.

-- End of Section --

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DIVISION 31 - EARTHWORK

SECTION 31 05 19

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SECTION 31 05 19

GEOTEXTILE

PART 1 GENERAL

This specification is for the geotextile to be placed on the ground surface as a separation barrier between the ground and temporary haul road aggregate base course and as a separation layer between the bottom of the levee excavation and overlying select fill and aggregate base course of the excavation roadway.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4354	(1999; R 2009) Sampling of Geosynthetics for Testing
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2009) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004; R 2009) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4759	(2002; R 2007) Determining the Specification Conformance of Geosynthetics
ASTM D 4873	(2002; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Thread
Manufacturing Quality Control Sampling and Testing

SD-04 Samples

Quality Assurance Samples and Tests

SD-07 Certificates

Geotextile

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle geotextile in accordance with ASTM D 4873.

1.3.1 Delivery

Notify the Contracting Officer a minimum of 72 hours prior to delivery and unloading of geotextile rolls packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until deployment. If quality assurance samples are collected, immediately rewrap rolls with the plastic wrapping. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Label each roll with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

1.3.2 Storage

Protect rolls of geotextile from construction equipment, chemicals, sparks and flames, temperatures in excess of 160 degrees F, or any other environmental condition that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, either elevate rolls off the ground or place them on a sacrificial sheet of plastic in an area where water will not accumulate.

1.3.3 Handling

Handle and unload geotextile rolls with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

PART 2 PRODUCTS

2.1 RAW MATERIALS

A minimum of 157 days prior to scheduled use, submit manufacturer's certificate of compliance stating that the geotextile meets the requirements of this section. For needle punched geotextiles, the manufacturer shall also certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers. The certificate of compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer.

2.1.1 Geotextile

Provide geotextile that is a woven pervious sheet of polymeric material consisting of long-chain synthetic polymers composed of at least 95 percent

by weight polyolefins, polyesters, or polyamides. The use of woven slit film geotextiles (i.e. geotextiles made from yarns of a flat, tape-like character) will not be allowed. Add stabilizers and/or inhibitors to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may also be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction. Values for AOS represent maximum average roll values.

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
GRAB STRENGTH	LBS	315	ASTM D 4632
SEAM STRENGTH	LBS	315	ASTM D 4632
PUNCTURE	LBS	620	ASTM D 6241
TRAPEZOID TEAR	LBS	112	ASTM D 4533
APPARENT OPENING SIZE	U.S. SIEVE	40	ASTM D 4751
PERMITTIVITY	SEC -1	0.1	ASTM D 4491
ULTRAVIOLET DEGRADATION	PERCENT	50 AT 500 HRS	ASTM D 4355

2.1.2 Thread

A minimum of 15 days prior to scheduled use, submit proposed thread type for sewn seams along with data sheets showing the physical properties of the thread. Construct sewn seams with high-strength polyester, nylon, or other approved thread type. Thread shall have ultraviolet light stability equivalent to the geotextile and the color shall contrast with the geotextile.

2.2 MANUFACTURING QUALITY CONTROL SAMPLING AND TESTING

The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. A minimum of 15 days prior to scheduled use, submit manufacturer's quality control manual. Documentation describing the quality control program shall be made available upon request. Perform manufacturing quality control sampling and testing in accordance with the manufacturer's approved quality control manual. As a minimum, geotextiles shall be randomly sampled for testing in accordance with ASTM D 4354, Procedure A. Acceptance of geotextile shall be in accordance with ASTM D 4759. Tests not meeting the specified requirements will result in

the rejection of applicable rolls.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE SAMPLES AND TESTS

3.1.1 Quality Assurance Samples

Provide assistance to the Contracting Officer in the collection of quality assurance samples for quality assurance testing; assign 7 days in the schedule to allow for testing. Collect samples upon delivery to the site in accordance with ASTM D 4354, Procedure B. Lot size for quality assurance sampling shall be considered to be the shipment quantity of the product or a truckload of the product, whichever is smaller. The unit size shall be considered one roll of geotextile. at a frequency of one per 100,000 square feet. Identify samples with a waterproof marker by manufacturer's name, product identification, lot number, roll number, and machine direction. The date and a unique sample number shall also be noted on the sample. Discard the outer layer of the geotextile roll prior to sampling a roll. Samples shall then be collected by cutting the full-width of the geotextile sheet a minimum of 3 feet long in the machine direction. Rolls which are sampled shall be immediately resealed in their protective covering.

3.1.2 Quality Assurance Tests

The Contractor shall provide quality assurance samples to an Independent Laboratory. Samples will be tested to verify that geotextile meets the requirements specified in Table 1. Test method ASTM D 4355 shall not be performed on the collected samples. Geotextile product acceptance shall be based on ASTM D 4759. Tests not meeting the specified requirements will result in the rejection of applicable rolls.

3.2 INSTALLATION

3.2.1 Subgrade Preparation

The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Subgrade materials shall be the ground surface and shall be free of all debris, trash, stumps, brush, limbs, or other material that could puncture the geotextile.

3.2.2 Placement

Notify the Contracting Officer a minimum of 72 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 10 horizontal on 1 vertical, lay the geotextile with the machine direction of the fabric parallel to the slope direction.

3.3 SEAMS

3.3.1 Overlap Seams

Continuously overlap geotextile panels a minimum of 18 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope, lap the upper panel over the lower panel. If approved, sewn

seams may be used instead of overlapped seams.

3.4 PROTECTION

Protect the geotextile during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Use adequate ballast (e.g. sand bags) to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

3.5 REPAIRS

Repair torn or damaged geotextile. Clogged areas of geotextile shall be removed. Perform repairs by placing a patch of the same type of geotextile over the damaged area. The patch shall extend a minimum of 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. The machine direction of the patch shall be aligned with the machine direction of the geotextile being repaired. Remove and replace geotextile rolls which cannot be repaired. Repairs shall be performed at no additional cost to the Government

3.6 PENETRATIONS

Construct engineered penetrations of the geotextile by methods recommended by the geotextile manufacturer.

3.7 COVERING

Do not cover geotextile prior to inspection and approval by the Contracting Officer. Place cover aggregate base course in a manner that prevents aggregate base course from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. On side slopes, aggregate base course shall be placed from the bottom of the slope upward. Cover aggregate base course shall not be dropped onto the geotextile from a height greater than 3 feet. No equipment shall be operated directly on top of the geotextile without approval of the Contracting Officer. Use equipment with ground pressures less than 7 psi to place the first lift over the geotextile. A minimum of 12 inches of aggregate base course shall be maintained between full-scale construction equipment and the geotextile. Cover soil material type, compaction, and testing requirements are described in Section 31 00 00 EARTHWORK and Section 32 11 23 Aggregate Base Course. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

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SECTION 31 05 21

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SECTION 31 05 21

GEOGRID SOIL REINFORCEMENT

PART 1 GENERAL

This specification is for the geogrid soil reinforcement that shall be installed at the bottom of the excavation, under and within the new levee embankment.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4873	(2002; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 5262	(2007) Evaluating the Unconfined Tension Creep Behavior of Geosynthetics
ASTM D 5321	(2008) Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM D 6637	(2011) Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method
ASTM D 6706	(2001; R 2007) Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil

GEOSYNTHETIC INSTITUTE (GSI)

GSI GRI GG4a	(1991) Determination of the Long-Term Design Strength of Stiff Geogrids
GSI GRI GG4b	(1991) Determination of the Long-Term Design Strength of Flexible Geogrids

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office

that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G

SD-03 Product Data

Allowable Strength
Manufacturer

SD-04 Samples; G

Geogrid Reinforcement

SD-06 Test Reports

Geogrid Reinforcement
Coefficient of Interaction
Interface Friction Testing
Conformance Testing

SD-07 Certificates

Certificates of Compliance

1.3 QUALITY ASSURANCE

Submit a summary of the manufacturer's qualifications and 3 copies of the manufacturer's quality control (QC) manual a minimum of 30 days prior to delivery of geogrid to the site. The reinforcement manufacturer shall provide a qualified and experienced representative to be available on an as-needed basis during construction. The representative shall visit the site for consultation at least once during construction .

1.4 DELIVERY, STORAGE, AND HANDLING

Check products upon delivery to ensure that the proper material has been received and is dry and undamaged. Protect the materials from damage and exposure following the guidelines presented in ASTM D 4873.

1.4.1 Labeling

Label each roll with the manufacturer's name, product identification, roll dimensions, lot number, and date manufactured.

1.4.2 Handling

Handle and unload geogrid rolls by hand, or with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Geosynthetic rolls shall not be dragged, lifted by one end, lifted by cables or chains, or dropped to the ground.

1.4.3 Storage

Protect geogrid from deleterious materials, chemicals, sparks and flames, temperatures in excess of 160 degrees F, and any other environmental condition that may degrade the physical properties. If stored outdoors,

the rolls shall be elevated from the ground surface in a well drained area. Protect geogrids, except for extruded grids, with an opaque waterproof cover.

PART 2 PRODUCTS

2.1 GEOGRID REINFORCEMENT

Submit one properly identified 24 by 24 inches minimum size geogrid sample with the fasteners proposed for use. Provide a geogrid that is a geosynthetic manufactured for reinforcement applications and a regular network of integrally connected polymer tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials.

a. Submit manufacturer's certified raw and roll material test reports including ultimate strength performed in accordance with ASTM D 6637. Test results not meeting the requirements in Table 1 or in the approved Manufacturer's Quality Control Manual will result in rejection of applicable rolls. Provide certified test reports a minimum of 7 days prior to delivery of geogrid to the site.

b. The geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport and installation. The geogrid shall be manufactured with 100 percent virgin resin consisting of polyethylene, polypropylene, polyester, or other approved material and with a maximum of 5 percent in-plant regrind material. Polyester resin shall have a minimum molecular weight of 25,000 and a carboxyl end group number less than 30. Polyethylene and polypropylene shall be stabilized with long term antioxidants.

c. Submit Certificates of Compliance for the materials provided and results of conformance testing. Submit an affidavit certifying raw and roll material test results submitted are accurate and that the reinforcement meets the requirements of the project specifications. The affidavit shall be signed by an official authorized to certify on behalf of the manufacturer. If the affidavit is dated after award of the contract and/or is not specific to the project, the supplier shall attach a statement certifying that the affidavit addressed to the wholesale company is representative of the material supplied. The documents shall include a statement confirming that all purchased resin used to produce reinforcement is virgin resin. Provide affidavit a minimum of 7 days prior to delivery of geogrid to the site.

2.1.1 Geogrid Reinforcement Properties

The reinforcement shown on the contract drawings shall meet the property requirements listed in Table 1. Reinforcement strength requirements represent minimum average roll values in the machine direction.

TABLE 1

PROPERTY	REQUIREMENT	TEST DESIGNATION
Allowable Design Strength (Ta)	7500 lb/ft	GSI GRI GG4a
UV Resistance	70 percent after 500 hours	ASTM D 4355

TABLE 1

PROPERTY	REQUIREMENT	TEST DESIGNATION
Coefficient of Interaction* for Pullout	0.85	ASTM D 6706
Interface Friction at Peak Degrees	26	ASTM D 5321

*Submit the coefficient of interaction for pull-out resistance of the proposed geogrid in a soil of similar gradation and texture to the material that will be used for fill in the reinforced zone. Establish the coefficient of interaction in accordance with ASTM D 6706. Provide certified test results a minimum of 7 days prior to delivery of geogrid to the site.

2.1.1.1 Allowable Strength

Submit Geogrid allowable strength calculated in accordance with GSI GRI GG4a or GSI GRI GG4b. The calculations shall itemize each reduction factor. Provide calculations a minimum of 7 days prior to delivery of geogrid to the site. Allowable strength is based on reduction factors for installation damage, durability, and creep that are applicable to site specific conditions. Determine reduction factors in accordance with the test procedures documented in GSI GRI GG4a or GSI GRI GG4b. The minimum reduction factor for durability shall be 1.1 for polyethylene and polypropylene geogrids and 1.15 for coated polyester geogrids. The minimum reduction factor for installation damage shall be 1.1 for all polymers. The reduction factor for creep shall be based on testing performed in accordance with ASTM D 5262 at 5% strain. The geogrids are required to maintain a tensile strength equal to Ta for a limited duration, about two months; therefore, the creepreduction factor should be less that that typically accounted for in 120 years. Include such consideratiosn when calculating the required Ta of 7,500 lb/ft with all appropriate safety factors.

2.1.1.2 Interface Friction Testing

Submit certified laboratory interface friction test results including description of equipment and test method, a minimum of 7 days prior to delivery of geogrid to the site. Conduct laboratory interface friction tests on the following interfaces: select fill, base course aggregate, and new levee embankment fill. The frequency of testing for each interface shall be at a rate of 1 per project. Conduct tests in accordance with ASTM D 5321. Use normal stresses of 10, 20, and 30 psi along with a displacement rate of 0.2 inches per minute. Orient geosynthetics such that the shear force is parallel to the down slope orientation of these components in the field.

2.2 SPLICES

Splices shall not be allowed.

PART 3 EXECUTION

3.1 INSTALLATION

Submit Geogrid layout plan along with anchorage and joint details, sequencing and construction procedures, a minimum of 15 days prior to

geogrid placement.

3.1.1 Subgrade Preparation

Immediately prior to placement of the geogrid, the surface on which the geogrid will be placed shall be free of rock and other material that could damage the geogrid or the underlying geosynthetics, including the embankment foundation temporary access road.

3.1.2 Placement

Install the geogrid in accordance with the Manufacturer's recommendations. Unroll the geogrid in the direction of reinforcement. After a layer of geogrid has been placed, use suitable means, that do not damage the underlying geosynthetics, to hold the geogrid flat and in place until cover soil can be placed. Geogrid damaged during placement and covering shall be removed and replaced at no additional cost to the Government.

3.1.3 Overlaps and Fasteners

Adjacent rolls of geogrid shall be positioned edge-to-edge and loosely fastened to maintain alignment during fill placement. Overlap is not necessary. Use fastener type and spacing as recommended by the manufacturer and approved by the Contracting Officer. Metallic fasteners shall not be allowed.

3.1.4 Penetrations

For small penetrations through geogrids, only transverse members of the geogrid shall be cut. The load-carrying longitudinal (machine direction) members shall be spread around the penetration. For larger penetrations, additional geogrid shall be placed on each side of the penetration and spliced to the adjacent geogrid to compensate for any longitudinal tensile members that must be cut.

3.2 COVER SOIL PLACEMENT

Cover geogrid with soil within 5 calendar days of acceptance. Keep the geogrid smooth and taut during placement of cover materials. Cover soil shall not be dropped onto the geogrid from a height greater than 3 feet. The cover materials shall be pushed out over the geogrid in an upward tumbling motion. Place cover materials from the bottom of the slope upward. The initial loose cover materials lift thickness shall be 12 inches. Use equipment with ground pressures less than 7 psi to place the first lift over the geogrid. A minimum of 24 inches of cover materials shall be maintained between construction equipment with ground pressures greater than 7 psi and the geogrid, Layer 1. Twelve inches of material cover shall be required for geogrid Layer 2 where present. Equipment placing cover materials shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph. Additional cover material and placement requirements are described in Section 31 00 00 EARTHWORK and Section 32 11 23 Aggregate Base Course.

3.3 OVERSIGHT

Keep a QA Representative present at all times during geogrid installation and cover material layer.

3.4 CONFORMANCE TESTING

Submit results of conformance testing. Conformance testing expenses are the responsibility of the Contractor. Perform testing using a commercial testing laboratory selected by the Contractor and approved by the Contracting Officer. The laboratory shall be accredited via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP) for the tests the laboratory will be required to perform. The Contracting Officer reserves the right to direct the location and select the material for samples. Conformance test results shall equal or exceed results reported on the Manufacturer's certified roll material test reports.

TABLE 5. CONFORMANCE TESTING

PROPERTY	TEST DESIGNATION	FREQUENCY
Single or Multi-Rib Tensile Strength	ASTM D 6637	5000 LF

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SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 GENERAL

This specification is for aggregate base course for the construction of temporary haul roads. The aggregate base course shall be removed from the temporary haul roads in Year 2 construction and placed on top of the lowered Ebey Slough levee section and excavated material from the breach placed adjacent to this levee section to serve as erosion control.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	(2007) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2007a) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C131	(2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4318	(2010) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 5821	(2001; R 2006) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D 6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates
ASTM E 11	(2010a) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve are expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SYSTEM DESCRIPTION

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Provide adequate equipment having the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools
Waybills and Delivery Tickets

SD-06 Test Reports

Sampling and Testing; G
Field Density Tests; G

SD-07 Certificates

Testing; G

Qualifications of the USACE validated commercial testing laboratory.

1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor and performed by a testing laboratory approved in accordance with Section 01 45 00 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements; perform testing at the specified frequency. The Contracting Officer may specify the time and location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

1.5.1 Sampling

Take samples for laboratory testing in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

Perform the following tests in conformance with the applicable standards listed.

1.5.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C117 and ASTM C136. Sieves shall conform to ASTM E 11.

1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D 4318.

1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content

in accordance with AASHTO T 180, Method D and corrected with AASHTO T 224.

1.5.2.4 Field Density Tests

Measure field density in accordance with ASTM D 1556 or ASTM D 6938. For the method presented in ASTM D 6938 check the calibration curves and adjust them, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 6938 result in a wet unit weight of soil, and ASTM D 6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 6938. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 6938, on each different type of material being tested at the beginning of a job and at intervals as directed.

a. Submit certified copies of test results for approval not less than 30 days before material is required for the work.

b. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

c. Submit copies of field test results within 24 hours after the tests are performed.

1.5.2.5 Wear Test

Perform wear tests on ABC course material in conformance with ASTM C131.

1.5.3 Testing Frequency

1.5.3.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis including the No. 635 sieve.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

1.5.3.2 In Place Tests

Perform each of the following tests on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 250 square yards , or portion thereof, of completed area.

b. Perform sieve analysis including the No. 635 sieve on every lift of material placed and at a frequency of one sieve analysis for every 500

square yards , or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the total thickness of the base course at intervals, in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.5.4 Approval of Material

Select the source of the material 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.6 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 AGGREGATES

Provide ABC consisting of clean, sound, durable particles of crushed stone angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine aggregate.

2.1.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D 5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured

faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

Gradation requirements specified in TABLE I shall apply to the completed aggregate base course. Gradation shall be in compliance with Washington State requirements for Ballast, Section 9-03.9(1). It is the responsibility of the Contractor to obtain materials that shall meet the gradation requirements after mixing, placing, compacting, and other operations. Ballast shall have Los Angeles Wear, 500 revolutions of 40 percent maximum and degradation factor of 15 minimum. TABLE I shows permissible gradings for granular material used in aggregate surface roads. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION FOR AGGREGATE SURFACE COURSES

Sieve Designation	Percent Passing
2 1/2 in.	99-100
2 in.	65-100
1 in.	50-85
No. 4	26-44
No. 40	16 Maximum
No. 200	9.0 Maximum
Dust Ratio	2/3 Maximum
Sand equivalent	35 Minimum

NOTE 1: Particles having diameters less than No. 635 shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C127 and ASTM C128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, clean the previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area. Provide line and grade stakes as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile all materials, including approved material available from excavation and

grading, in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

Mix the coarse and fine aggregates in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. Make adjustments in mixing procedures or in equipment, as directed, to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification.

3.5.2 Placing

Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, place the material in a single layer. When a compacted layer in excess of 6 inches is required, place the material in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades,

and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Additionally, place approved fill material along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Continue compaction until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Construct the compacted thickness of the base course as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

. Completed portions of the base course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

3.7 MAINTENANCE

Maintain the base course in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of in waste disposal areas indicated.

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SECTION 32 15 00

CRUSHED AGGREGATE SURFACE COURSE (CASC)

PART 1 GENERAL

This specification is for the minimum requirements for crushed aggregate surface course for the new levee roadway and resurfacing of used haul roads that shall remain in place.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	(2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4318	(2010) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates
ASTM E 11	(2010a) Wire Cloth and Sieves for Testing Purposes

Washington State Department of Transportation (WDSOT)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Road Grade

Develop plan view showing final grades along with cross sections every 50 feet of the top of aggregate base course along the new levee alignment and tops of haul roads that shall remain in place before the placement of the CASC. Provide survey information, cross sections, and plan view maps of the survey for Government approval. The Contractor shall include gradation band curves for the aggregate surface course.

SD-03 Product Data

Equipment

List of proposed equipment to be used in performance of construction work including descriptive data.

SD-06 Test Reports

Sampling and Testing; G
Density Test
Smoothness Test; G
Thickness Test; G
Wear Test

SD-07 Certificates

Testing; G

Qualifications of the USACE validated commercial testing laboratory.

1.3 QUALITY ASSURANCE

Sampling and testing is the responsibility of the Contractor. Submit calibration curves and related test results prior to using the device or equipment being calibrated. Submit copies of field test results within 24 hours after the tests are performed. Test results from samples, not less than 30 days before material is required for the work. Results of laboratory tests for quality control purposes, for approval, prior to using the material. Sampling and testing shall be performed by an approved commercial testing laboratory

1.3.1 Sampling

Take samples for material gradation, liquid limit, and plastic limit tests in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.3.2 Testing

1.3.2.1 Gradation

Make aggregate gradation in conformance with ASTM C117, ASTM C136, and ASTM D 422. Sieves shall conform to ASTM E 11.

1.3.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D 4318.

1.3.3 Approval of Materials

Select the source of the material to be used for producing aggregates a minimum of 30 days prior to the time the material shall be required in the work. Approval of sources not already approved by the Corps of Engineers shall be based on an inspection by the Contracting Officer. Tentative approval of materials shall be based on appropriate test results on the aggregate source. Final approval of the materials shall be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted surface course. All approved materials must be from a single source. Mixing of materials from multiple sources shall not be allowed. All material testing shall be performed at the Contractor's expense by an USACE certified and validated materials testing laboratory.

1.3.4 Equipment

Submit a list of proposed equipment to be used in performance of construction work including descriptive data. All plant, equipment, and tools used in the performance of the work covered by this section will be subject to approval by the Contracting Officer before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, and meeting the grade controls, thickness controls, and smoothness requirements set forth herein.

1.4 ENVIRONMENTAL REQUIREMENTS

Aggregate surface courses shall not be constructed when the ambient temperatures is below 35 degrees F and on subgrades that are frozen or contain frost. It is the responsibility of the Contractor to protect, by approved method or methods, all areas of surfacing that have not been accepted by the Contracting Officer. Surfaces damaged by freeze, rainfall, or other weather conditions shall be brought to a satisfactory condition by the Contractor before placement of CASC may occur. .

PART 2 PRODUCTS

2.1 AGGREGATES

Provide aggregates consisting of clean, sound, durable particles of natural gravel, crushed gravel, crushed stone, sand, slag, soil, or other approved materials processed and blended or naturally combined. Provide aggregates free from lumps and balls of clay, organic matter, objectionable coatings, and other foreign materials. The Contractor is responsible for obtaining materials that meet the specification and can be used to meet the grade and smoothness requirements specified herein after all compaction and proof

rolling operations have been completed.

2.1.1 Coarse Aggregates

The material retained on the No. 4 sieve shall be known as coarse aggregate. Coarse aggregates shall be reasonably uniform in density and quality. The coarse aggregate shall have a percentage of wear not to exceed 50 percent after 500 revolutions as determined by ASTM C131. The amount of flat and/or elongated particles shall not exceed 20 percent. A flat particle is one having a ratio of width to thickness greater than three; an elongated particle is one having a ratio of length to width greater than three.

2.1.2 Fine Aggregates

The material passing the No. 4 sieve shall be known as fine aggregate. Fine aggregate shall consist of screenings, sand, soil, or other finely divided mineral matter that is processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

Gradation requirements specified in TABLE I shall apply to the completed aggregate surface. Gradation shall be in compliance with Washington State Department of Transportation (WSDOT)requirements 2012 Standard Specifications M-41-10, Paragraph 9-03.9(3) Crushed Surfacing. It is the responsibility of the Contractor to obtain materials that shall meet the gradation requirements after mixing, placing, compacting, and other operations. TABLE I shows permissible gradings for granular material used in aggregate surface roads. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION FOR AGGREGATE SURFACE COURSES

Sieve Designation	Percent Passing
1 1/4 in.	100
3/8 in.	--
1/2 in.	80-100
No. 4	46-66
No. 40	8-24
No. 200	10.0 max
% Fracture	75 min.
Sand equivalent	40 min.

All percentages are by weight.

The fracture requirements shall be at least one fractured face and shall apply to the combined aggregate retained on the No. 4 sieve in accordance with AASHTO TP 61.

2.2 LIQUID LIMIT AND PLASTICITY INDEX REQUIREMENTS

The portion of the completed aggregate surface course passing the No. 40 sieve shall have a maximum liquid limit of 35 and a plasticity index of 4 to 9.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Perform clearing, stripping, and excavating. Operate the aggregate sources to produce the quantity and quality of materials meeting these specification requirements in the specified time limit. Upon completion of the work, the aggregate sources on Government property shall be finalized to drain readily and be left in a satisfactory condition. Finalize aggregate sources on private lands in agreement with local laws or authorities.

3.2 STOCKPILING MATERIALS

Prior to stockpiling the material, clear and level the storage sites. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Stockpile aggregates in such a manner that will prevent segregation. Aggregates and binders obtained from different sources shall be stockpiled separately.

3.3 COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated herein as present laboratory maximum density. Compact each layer of the aggregate surface course with approved compaction equipment, as required in the following paragraphs. The water content during the compaction procedure shall be maintained at optimum or at the percentage specified by the Contracting Officer. In locations not accessible to the rollers, the mixture shall be compacted with mechanical tampers. Compaction shall continue until each layer through the full depth is compacted to at least 100 percent of laboratory maximum density. Remove any materials that are found to be unsatisfactory and replace them with satisfactory material or rework them to produce a satisfactory material.

3.4 PREPARATION OF UNDERLYING COURSE SUBGRADE

Clean of all foreign substances the underlying course, including shoulders. At the time of surface course construction, the underlying course shall contain no frozen material. Ruts or soft yielding spots in the underlying course areas having inadequate compaction and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade and recompacting to density requirements specified in Section 32 11 16.16 SUBBASE COURSES. The completed underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the surface course is placed.

3.5 GRADE CONTROL

During construction, the lines and grades including crown and cross slope indicated for the aggregate surface course shall be maintained by means of line and grade stakes placed by the Contractor in accordance with the SPECIAL CONTRACT REQUIREMENTS.

3.6 MIXING AND PLACING MATERIALS

The materials shall be mixed and placed to obtain uniformity of the material and a uniform optimum water content for compaction. Make adjustments in mixing, placing procedures, or in equipment to obtain the true grades, to minimize segregation and degradation, to obtain the desired water content, and to ensure a satisfactory surface course.

3.7 LAYER THICKNESS

Place the aggregate material on the underlying course in layers of uniform thickness. When a compacted layer of 6 inches or less is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

3.8 PROOF ROLLING

Proof rolling of the areas designated shall be in addition to compaction specified above and shall consist of application of 30 coverages with a heavy rubber-tired roller having four tires abreast with each tire loaded to 30,000 pounds and tires inflated to 150 psi. In the areas designated, proof rolling shall be applied to the top lift of layer on which surface course is laid and to each layer of the base course. Water content of the lift of the layer on which the surface course is placed and each layer of the aggregate surface course shall be maintained at optimum or at the percentage directed from the start of compaction to the completion of a proof rolling. Materials in the aggregate surface course or underlying materials indicated unacceptable by the proof rolling shall be removed and replaced, as directed, with acceptable materials.

3.9 EDGES OF AGGREGATE-SURFACED ROAD

Approved material shall be placed along the edges of the aggregate surface course in such quantity as to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, at least 1 foot of shoulder width shall be rolled and compacted simultaneously with the rolling and compacting of each layer of the surface course.

3.10 SMOOTHNESS TEST

The surface of each layer shall not show any deviations in excess of 3/8 inch when tested with a 10 foot straightedge applied both parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding this amount shall be corrected by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.11 THICKNESS CONTROL

The completed thickness of the aggregate surface course shall be within 1/2 inch, plus or minus, of the thickness indicated on plans. The thickness of the aggregate surface course shall be measured at intervals in such manner that there will be a thickness measurement for at least each 500 square yards of the aggregate surface course. The thickness measurement shall be made by test holes at least 3 inches in diameter through the aggregate surface course. When the measured thickness of the aggregate surface course is more than 1/2 inch deficient in thickness, correct such areas by

scarifying, adding mixture of proper gradation, reblading, and recompacting, as directed,at no additional expense to the Government. Where the measured thickness of the aggregate surface course is more than 1/2 inch thicker than that indicated, it shall be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements determined as specified above, but shall be within 1/4 inch of the thickness indicated. When the average job thickness fails to meet this criterion, make corrections by scarifying, adding or removing mixture of proper gradation, and reblading and recompacting, as directed, at no additional expense to the Government.

3.12 DENSITY TESTS

Measure density in the field in accordance with ASTM D 1556 ASTM D 6938. For the method presented in ASTM D 1556 use the base plate as shown in the drawing. For the method presented in ASTM D 6938 the calibration curves shall be checked and adjusted, if necessary, using only the sand cone method as described in paragraph Calibration of the ASTM publication. Tests performed in accordance with ASTM D 6938 result in a wet unit weight of soil and ASTM D 6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 6938. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 6938, on each different type of material being tested at the beginning of a job and at intervals, as directed.

3.13 WEAR TEST

Perform wear tests in conformance with ASTM C131.

3.14 MAINTENANCE

Maintain the aggregate surface course in a condition that will meet all specification requirements until accepted.

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SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Stand of Turf

95 percent ground cover of the established species.

1.2 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood cellulose fiber mulch

Fertilizer

Include physical characteristics, and recommendations.

SD-06 Test Reports

Topsoil composition tests (reports and recommendations).

SD-07 Certificates

State certification and approval for seed

SD-08 Manufacturer's Instructions

Erosion Control Materials

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

1.4.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.4.1.2 Fertilizer Delivery

Fertilizer shall not be applied unless specified for an individual project.

If necessary, dolomitic lime shall be applied prior to hydroseeding and shall be the type specified for lawns and landscaped areas.

1.4.2 Storage

1.4.2.1 Seed, Fertilizer Storage

Store in cool, dry locations away from contaminants.

1.4.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.4.2.3 Handling

Do not drop or dump materials from vehicles.

1.5 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.5.1 Restrictions

Seeding shall not be done during windy weather or when the ground is frozen, excessively wet, or otherwise untillable. When in the opinion of the Corps, environmental conditions are not conducive to satisfactory result from seeding operations, suspend the work and resume it only when desirable results are likely to be obtained. Unfavorable environmental conditions include wind strong enough to carry the seed/slurry mix away, cold soil temperatures, and rain that will wash seed from slopes. Do not plant outside the designated planting times.

1.6 TIME LIMITATIONS

1.6.1 Seed

Apply seed within twenty four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Classification

Seed shall be clean, delivered in original unopened packages and bearing an analysis of the contents, and guaranteed 95 percent pure with minimum germination rate of 85 percent. Grass and legume seed shall conform to the standards for "Certified" grade seed or better as outlined by the State of Washington Department of Agriculture "Rules for Seed Certification", latest edition.

a. Common name of seed
b. Lot number.
c. Net weight.
d. Percentage of purity.

d. Percentage of germination (in case of legumes percentage of germination to include hard seed).
e. Percentage of weed seed content and inert material clearly marked for each kind of seed in accordance with applicable state and federal laws.

Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mix is performed on site in the presence of the Contracting Officer Representative .

2.1.2 Planting Dates

No hydroseeding or plantings will occur after October 15 or before April 15 unless specified by individual project

2.1.3 Seed Purity

Guaranteed 95 percent pure with minimum germination rate of 85 percent

2.1.4 Seed Mixture by Weight

2.1.4.1 Wetlands - Wet Native Seed

All wet native seed shall be "non-endophyte enhanced." Seed of the following composition and proportion shall be applied at a rate of 80 pounds per acre on all areas requiring wet native seeding within the project.

Kind & Variety of Seed	Pounds of seed per acre
Western manna grass (Glyceria occidentalis)	48.0
Rice cutgrass (Leersia oryzoides)	8.0
Canada reed (Calamagrostis canadensis)	8.0
Spike bentgrass (Agrostis exarata)	12.0
Wool-grass (Scirpus cyperinus)	4.0
TOTAL	80.0

2.1.4.2 Upland - Dry Native Seed

All dry native seed shall be "non-endophyte enhanced". Seed of the following composition and proportion shall be applied at a rate of 120 pounds per acre on all areas requiring dry native seeding within the project.

Kind & Variety of Seed	Pounds of seed per acre
Sterile Wheat Grass	60.0

Kind & Variety of Seed	Pounds of seed per acre
Blue wildrye (Elymus glaucus))	36.0
Red fescue (Festuca rubra ssp. rubra)	12.0
Meadow barley (Hordeum brachyantherum)	7.0
Canada reed (Calamagrostis canadensis)	2.0
Tufted hairgrass (Dechampsia cespitosa)	3.0
TOTAL	120.0

2.2 TOPSOIL

2.2.1 Sponsor Provided Topsoil

Select levee fill used for the construction of the levee embankments will also be used as topsoil on the project..

2.3 SOIL CONDITIONERS

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.3.1 Lime

If necessary, dolomitic lime shall be applied prior to hydroseeding and shall be the type specified for lawns and landscaped areas.

2.3.2 Composted Derivatives

Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:

2.3.2.1 Particle Size

Minimum percent by weight passing:

No. 4 mesh screen	95
No. 8 mesh screen	80

2.3.2.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.4 MULCH

Mulch shall be free from noxious weeds, mold, and other deleterious materialsMulch shall be packaged in wet-strength craft or plastic bags containing 100 pounds maximum weight. The package shall contain current labels, the manufacturer's name, and net weight.

2.4.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.

2.4.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.

2.4.3 Wood Fiber Mulch

Wood fiber mulch for hydroseeding shall be derived from fresh wood chips, defibrated into fibers and fiber bundles, as manufactured under the trade name Silva Fiber, or approved equal, and shall contain no germination or growth inhibiting factor. Mulch shall hydrate quickly in water to form a homogenous slurry together with seed and tackifier and shall be dyed a suitable color to facilitate observation of the placement of the material. When hydraulically sprayed on the ground, the material shall allow the absorption and percolating of water.

2.5 WATER

Source of water shall be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

2.6 EROSION CONTROL MATERIALS

Erosion control material shall conform to the following:

2.6.1 Erosion Control Net

Soil erosion netting shall be Saxolin-X Erosion netting, or approved equivalent cellulose bio-degradeable netting (12 feet wide).

2.6.1.1 Tackifier

The tackifier shall consist of a blend of at least three different but complimentary hydrocolloids from natural plant sources, two of these shall be Plantago ovata (psyllium) and Cyamopsis tetragonolobus (guar), which shall make up 65 percent of the total formulation, as manufactured under the trade name J-tac; Silva-Fiber as manufactured by Weyerhaeuser Company, Tacoma, WA; Hydro Mulch Fiber as manufactured by Conwed Corporation, St. Paul, MN; or approved equal, and shall have no growth or germination inhibiting factors

2.6.2 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations. Prior to hydroseeding operations, and after surface has been shaped, graded, and compacted to undisturbed natural ground, scarify surface to a minimum depth of one inch.

3.1.1.1 Topsoil

Provide 4 inches of tribe supplied topsoil to meet indicated finish grade. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.1.2 Fertilizer Application Rates

Apply dolomitic lime prior to hydroseeding according to manufacturer's instructions.

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore soil to proper grade. Seeding shall not be done during windy weather or when the ground is frozen, excessively wet, or otherwise untillable. When, in the opinion of the Corps, environmental conditions are not conducive to satisfactory result from seeding operations, suspend the work and resume it only when desirable results are likely to be obtained. Unfavorable environmental conditions include wind strong enough to carry the seed/slurry mix away, cold soil temperatures, and rain that will wash seed from slopes. Apply seed within twenty four hours after seedbed preparation. Apply seed within twenty four hours after seedbed preparation. In order to minimize soil erosion, disturbed areas shall be hydroseeded as soon as possible, within the guidelines and conditions specified, so as to maximize growing time prior to the onset of winter rains. No hydroseeding will occur after October 15, or before April 15, unless specified by individual project.

3.2.2 Seed Application Method

Seed and mulch shall be applied together by a hydroseeder that uses water as the carrying agent and maintains continuous agitation through paddle blades. The seeder shall have an operating capacity sufficient to agitate, suspend, and mix into a homogeneous slurry, the specified amount of seed, mulch, fertilizer, and water. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic discharge spray nozzles which will provide a uniform distribution of the slurry. The seed and mulch shall be placed in the hydroseeder tank no more than 30 minutes prior to application. .

3.2.2.1 Hydroseeding

First, mix water and fiber. Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. Fiber shall be added at 1,000 pounds, dry weight, per acre. Then add and mix seed and fertilizer to produce a homogeneous slurry. When hydraulically sprayed on the ground, material shall form a blotter like cover impregnated uniformly with grass seed. Spread with one application with no second application of mulch.

Seed mix	120 pounds per acre
Mulch	1,000 pounds per acre
Tackifier:	
Slopes 2 hor. to 1 vert. and flatter	40 pounds per acre
Slopes steeper than 2 hor. to 1 vert.	80 pounds per acre
Raveling or highly erosive steep slopes	120 pounds per acre

After seeding, irrigate the area every three days, or as approved by the Corps, until the grass is established.

3.2.3 Mulching

3.2.3.1 Hay or Straw Mulch

Wood fiber mulch for hydroseeding shall be derived from fresh wood chips, defibrated into fibers and fiber bundles, as manufactured under the trade name Silva Fiber, or approved equal, and shall contain no germination or growth inhibiting factor. Mulch shall hydrate quickly in water to form a homogeneous slurry together with seed and tackifier and shall be dyed a suitable color to facilitate observation of the placement of the material. When hydraulically sprayed on the ground, the material shall allow the absorption and percolating of water.
The tackifier shall consist of a blend of at least three different but complimentary hydrocolloids from natural plant sources, two of these shall be Plantago ovata (psyllium) and Cyamopsis tetragonolobus (guar), which shall make up 65 percent of the total formulation, as manufactured under the trade name J-tac; Silva-Fiber as manufactured by Weyerhaeuser Company, Tacoma, WA; Hydro Mulch Fiber as manufactured by Conwed Corporation, St. Paul, MN; or approved equal, and shall have no growth or germination inhibiting factors.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.

3.2.5 Erosion Control Material

Soil erosion netting shall be Saxolin-X Erosion netting or approved equivalent cellulose bio-degradable netting 12 feet wide. Install in accordance with manufacturer's instructions, where indicated or as directed by the Contracting Officer. If conditions are not suitable for seed germination to occur within one week of planting, erosion control materials must be suitable to control erosion until such time as the ground is suitable for planting seeds (e.g. plant in spring for a late fall finishing project).

3.2.6 Watering

After seeding, irrigate the area every three days, or as approved by the Corps, until the grass is established.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

A satisfactory stand of turf for permanent hydroseeding is defined as grass that has 95 percent ground cover of the established species.

-- End of Section --

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SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 190	(2004; R 2008) Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 198	(2010) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A760/A760M	(2010) Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A798/A798M	(2007) Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM A807/A807M	(2002; R 2008) Standard Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A929/A929M	(2001; R 2007) Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM C1433	(2010) Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D1171	(1999; R 2007) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
ASTM D1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe

SD-04 Samples

Pipe for Culverts and Storm Drains

SD-07 Certificates

Pipeline Testing
Determination of Density
Frame and Cover for Gratings

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use

shall be discarded when the recommended pot life is exceeded.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Corrugated Steel Pipe

ASTM A760/A760M, zinc or aluminum (Type 2) coated pipe of either:

a. Type I pipe with annular or helical 2-2/3 by 1/2 inch corrugations.

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A929/A929M.

2.2.2 Precast Reinforced Concrete Box

Manufactured in accordance with and conforming to ASTM C1433.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete under Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C231/C231M. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground. Expansion-joint filler material shall conform to ASTM D1751, or ASTM D1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.

2.3.2 Joints

2.3.2.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C443. Factory-fabricated

resilient joint materials shall conform to ASTM C425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

2.3.2.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C877.

2.3.2.3 Flexible Watertight, Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches wide and approximately 3/8 inch thick, meeting the requirements of ASTM D1056, Type 2 A1 or B3, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D1171. Rubber O-ring gaskets shall be 13/16 inch in diameter for pipe diameters of 36 inches or smaller and 7/8 inch in diameter for larger pipe having 1/2 inch deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches in diameter for pipe having 1 inch deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

b. Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.3.3 Flap Gates

Flap Gates shall be heavy-duty with circular opening and double-hinged. Top pivot points shall be adjustable. The seat shall be one-piece cast iron with a raised section around the perimeter of the waterway opening to provide the seating face. The seating face of the seat shall be bronze. The cover shall be one-piece cast iron with necessary reinforcing rib, lifting eye for manual operation, and bosses to provide a pivot point connection with the links. The seating face of the cover shall be bronze. Links or hinge arms shall be cast or ductile iron. Holes of pivot points shall be bronze bushed. All fasteners shall be either galvanized steel, bronze or stainless steel.

2.4 STEEL LADDER

Steel ladder shall be provided where the depth of the storm drainage structure exceeds 12 feet. These ladders shall be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2-1/2 inches wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A123/A123M.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A48/A48M, Class 30B or 35B. Shape and size shall be as indicated.

2.6 RESILIENT CONNECTORS

Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C923.

2.7 EROSION CONTROL RIPRAP

Provide nonerodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of as indicated.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Section 31 00 00 EARTHWORK and the requirements specified below.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 36 inches to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing, where required, shall be placed within the trench width as specified, without any overexcavation. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Section 31 00 00 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Corrugated Metal Pipe

Bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A798/A798M. It is not required to shape the bedding to the pipe geometry. Bedding for corrugated structural plate pipe shall meet requirements of ASTM A807/A807M.

3.3 PLACING PIPE

Submit printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5

Note post installation requirements of paragraph 'Deflection Testing' in PART 3 of this specification for all pipe products including deflection testing requirements for flexible pipe.

3.3.1 Corrugated Metal Pipe and Pipe Arch

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Part paved pipe shall be installed so that the centerline of bituminous pavement in the pipe, indicated by suitable markings on the top at each end of the pipe sections, coincides with the specified alignment of pipe. Fully paved steel pipe or pipe arch shall have a painted or otherwise applied label inside the pipe or pipe arch indicating sheet thickness of pipe or pipe arch. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M 190 or AASHTO M 243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to exterior or interior coatings. During transportation and installation, pipe or pipe arch and coupling bands shall be handled with care to preclude damage to the coating, paving or lining. Damaged coatings, pavings and linings shall

be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which coating, paving or lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced. Vertical elongation, where indicated, shall be accomplished by factory elongation. Suitable markings or properly placed lifting lugs shall be provided to ensure placement of factory elongated pipe in a vertical plane.

3.3.2 Structural-Plate Steel

Structural plate shall be installed in accordance with ASTM A807/A807M. Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are tightened to meet the torque requirements of 200 foot-pounds plus or minus 50 foot-pounds. Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for amount of torque produced. Power wrenches shall be checked and adjusted frequently as needed, according to type or condition, to ensure proper adjustment to supply the required torque.

3.3.3 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 3 feet apart, whichever is less.

3.4 JOINTING

3.4.1 Corrugated Metal Pipe

3.4.1.1 Field Joints

Transverse field joints shall be designed so that the successive connection of pipe sections will form a continuous line free of appreciable irregularities in the flow line. In addition, the joints shall meet the general performance requirements described in ASTM A798/A798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. [The annular space between abutting sections of part paved, and fully paved pipe and pipe arch, in sizes 30 inches or larger, shall be filled with a bituminous material after jointing.] Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts shall be as indicated or where not indicated, shall be as specified in the applicable standards or specifications for the pipe.

3.4.1.2 Flexible Watertight, Gasketed Joints

Installation shall be as recommended by the gasket manufacturer for use of

lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations. Watertight joints shall remain uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated. Pipe connections to concrete manholes and inlets shall be made with flexible, watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation equal to the midpoint (spring line) of RCP or has reached an elevation of at least 12 inches above the top of the pipe for flexible pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 8 inches. Tests for density shall be made as necessary to ensure conformance to the

compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 8 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 8 inches. Use levee fill material for this entire region of backfill for flexible pipe installations.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing is the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D1557 except that

mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D2167 or ASTM D6938. When ASTM D6938 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D6938 results in a wet unit weight of soil and ASTM D6938 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D6938. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

3.8 PIPELINE TESTING

3.8.1 Leakage Tests

Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C828 or ASTM C924, after consultation with the pipe manufacturer. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C1103. Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by the exfiltration test shall not exceed [250 gallons per inch in diameter per mile of pipeline per day] [0.2 gallons per inch in diameter per 100 feet of pipeline per hour]. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.

3.8.2 Deflection Testing

No sooner than 30 days after completion of installation and final backfill, an initial post installation inspection shall be accomplished. Clean or flush all lines prior to inspection. Perform a deflection test on entire length of installed flexible pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads shall not exceed limits in paragraph PLACING PIPE above as percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a laser profiler or mandrel.

a. Laser Profiler Inspection: If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained,

remove pipe which has excessive deflection, and replace with new pipe. Initial post installation inspections of the pipe interior with laser profiling equipment shall utilize low barrel distortion video equipment for pipe sizes 48 inches or less. Use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally and be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll static or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe. For initial post installation inspections for pipe sizes larger than 48 inches, visual inspection shall be completed of the pipe interior.

b. Pull-Through Device Inspection: Pass the pull-through device through each run of pipe by pulling it by hand. If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show excess allowable deflections of the average inside diameter of pipe, remove pipe which has excessive deflection, replace with new pipe, and completely retest in same manner and under same conditions. Pull-through device: The mandrel shall be rigid, nonadjustable having a minimum of 9 fins, including pulling rings at each end, engraved with the nominal pipe size and mandrel outside diameter. The mandrel shall be 5 percent less than the certified-actual pipe diameter for Plastic Pipe, 5 percent less than the certified-actual pipe diameter for Corrugated Steel and Aluminum Alloy, 3 percent less than the certified-actual pipe diameter for Concrete-Lined Corrugated Steel and Ductile Iron Culvert provided by manufacturer. When mandrels are utilized to verify deflection of flexible pipe products, the Government will verify the mandrel OD through the use of proving rings that are manufactured with an opening that is certified to be as shown above.

c. Deflection measuring device: Shall be approved by the Contracting Officer prior to use.

d. Warranty period test: Pipe found to have a deflection of greater than allowable deflection in paragraph PLACING PIPE above, just prior to end of one-year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection. Inspect 100 percent of all pipe systems under the travel lanes, including curb and gutter. Random inspections of the remaining pipe system outside of the travel lanes shall represent at least 10 percent of the total pipe footage of each pipe size. Inspections shall be made, depending on the pipe size, with video camera or visual observations. In addition, for flexible pipe installations, perform deflection testing on 100 percent of all pipes under the travel lanes, including curb and gutter, with either a laser profiler or 9-fin mandrel. For flexible pipe, random deflection inspections of the pipe system outside of the travel lanes shall represent at least 10 percent of the total pipe footage of each pipe size. When mandrels are utilized to verify deflection of flexible pipe products during the final post installation inspection, the Government will verify the mandrel OD through the use of proving rings.

3.8.3 Post-Installation Inspection

One hundred percent of all flexible pipes (HDPE, PVC, CMP) shall be checked for rips, tears, joint separations, soil migration through the joint, cracks, localized bucking, bulges, settlement and alignment.

a. Repair or replace any pipe with crack exhibiting displacement across the crack, exhibiting bulges, creases, tears, spalls, or delamination.

b. Reports: The deflection results and final post installation inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe systems, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

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SECTION 35 31 19

STONE SLOPE PROTECTION FOR STRUCTURES
01/08

PART 1 GENERAL

This SECTION shall apply to the type and placement of the new riprap and quarry spalls for stone slope protection on the riverward and landward faces of the new levee embankment.

1.1 UNIT PRICES

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 127	(2007) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 295	(2008) Petrographic Examination of Aggregates for Concrete
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM D 3740	(2010) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4791	(2010) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4992	(2007) Evaluation of Rock to be Used for Erosion Control
ASTM D 5312	(2004) Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
ASTM D 5313	(2004) Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions
ASTM D 5519	(2007) Particle Size Analysis of Natural and Man-Made Riprap Materials

ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 148	(1969) Method of Testing Stone for Expansive Breakdown on Soaking in Ethylene Glycol
EM 1110-2-1601	(1991; 1994 Change 1) Engineering and Design -- Hydraulic Design of Flood Control Channels
EM 1110-2-2302	(1990) Construction with Large Stone

1.3 DEFINITIONS

1.3.1 Stone Protection

Stone slope protection is defined as a system which includes a layer of quarry spalls beneath a layer or layers of riprap and a layer of quarry spalls amended with topsoil.

1.3.2 Riprap

Riprap is defined as a material having a gradation band similar to those specified in EM 1110-2-1601, Chapter 3, uniform graded material or as noted in this specification. Riprap is normally produced by mechanical methods, with a jaw crusher and grizzly after the stone has been mined by blasting in a quarry. Riprap gradations have a maximum top size of 3.5 tons.

1.3.4 Stone

Stone for this specification shall refer to riprap and quarry spalls.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Placement Plan; G

SD-03 Product Data

Riprap; G
Quarry Spalls; G

The source for materials used in riprap and quarry spalls.

SD-04 Samples

Stone; G

Suitable stone samples prior to delivery of any such material to

the work site.

SD-06 Test Reports

Evaluation Testing of Stone; G

A copy of the laboratory inspection report along with actions taken to correct deficiencies and a copy of the test reports, prior to delivery of such material to the work site; since quality test on the stone in accordance with PART 2 paragraph EVALUATION TESTING OF STONE is the responsibility of the Contractor.

Bedding Material; G

Test reports attesting that the quarry spalls meets specified requirements.

Bulk Specific Gravity

At least 120 calendar days in advance of shipment of stone to the work site, a copy of bulk specific gravity test results for each gradation range of stone proposed to be furnished. The information shall be furnished prior to preparation of pre-production demonstration stockpiles.

Gradation Test at Quarry; G

Drop test record; G

Quarry Inspection Report; G

Complete report from licensed geologist or engineer of the quarry inspection.

SD-07 Certificates

Stone; G
Bedding Material; G

Certificates of compliance attesting that the materials meet specification requirements.

Laboratory; G

A copy of the documents, provided by the Materials Testing Center (MTC) at CEWES, that validates that the laboratory can perform the required tests. The individual tests shall be listed for which the validation covers along with the date of the inspection.

Weigh Scale Certification

Certified Weight Scale Ticket

1.5 QUALITY ASSURANCE

1.5.1 Stone

1.5.1.1 General

All stone shall be durable material as approved by the Contracting Officer and as required by EM 1110-2-2302. The Contractor shall show that an adequate quantity of material is available and provide quality test data in accordance with this specification, EM 1110-2-2302, and all other relevant standards and requirements. All stone shall be of a suitable quality to ensure permanence in the structure and in the climate in which it is to be used. The stone shall be hard, durable, angular, and free from cracks, blast fractures, bedding, seams, vugs, veins, and other defects or discontinuities that would tend to increase its deterioration from natural causes. Inspections for cracks, fractures, seams and defects shall be made by visual examination. If, by visual examination, it is determined that 10 percent or more of the stone produced contains hairline cracks, or other defects, then all stone produced by the means and measures which caused the fractures shall be rejected. A hairline crack that is defined as being detrimental shall have a minimum width of 4 mil (0.004 inch)and shall be continuous for one-third the dimension of at least two sides of the stone. The stone shall be clean and free from all foreign matter for inspection. Any foreign material adhering to or combined with the stone as a result of stockpiling shall be removed prior to placement. The selected stone shall match as close as possible the color of the existing riprap on the upstream face of the embankment that shall be left in place adjacent to the work area when tested dry and wet.

1.5.1.2 Sources

The Contractor shall furnish the stone from the source to the Contracting Officer, subject to the conditions herein stated. The Government shall conduct a quarry investigation and evaluate the quality test data provided by the Contractor to determine whether acceptable stone can be produced from the proposed source after the Contractor has completed the Quarry Inspection and report as required in Paragraph Evaluation Testing of Stone - Investigation and Testing. The Contractor shall be responsible for arranging the quarry inspection site visit and shall provide the Contracting Officer a minimum of 10 days notice of the time and location of the visit.

Satisfactory service records of the stone at other work shall be provided to the Contracting Officer. In order for stone to be acceptable on the basis of service records, stone of a similar size, and from similar formation or ledge, must have been placed in a similar thickness and exposed to weathering under similar conditions as are anticipated for this contract, and must have satisfactorily withstood such weathering for a minimum of 20 years. In addition to an acceptable 20 year service record, the Contracting Officer has the option to elect to have representative samples taken and tested.

a. Selection of Source. The Contractor shall designate in writing only one source for stone. The Contractor shall notify the Contracting Officer at least 60 workdays before the stone leaves the quarry. It is the Contractor's responsibility to determine that the stone source selected is capable of providing the quality, quantities and gradation needed and at the rate needed to maintain the scheduled progress of the work. Samples for acceptance testing shall be provided in accordance

with this specification. If a source for stone so designated by the Contractor is not accepted for use by the Contracting Officer, the Contractor shall be required to find another source.

b. Acceptance of Materials. Acceptance of a source of stone is not to be construed as acceptance of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, ledges, or channels, when such materials are unsuitable for stone as determined by the Contracting Officer. The Contracting Officer also reserves the right to reject individual units of produced specified materials in stockpiles at the quarry, all transfer points, and at the project construction site, when such materials are determined to be unsuitable.

During the course of the work, the stone may be tested by the Government, if the Contracting Officer determines that testing is necessary. If such tests are determined necessary, the testing will be done in commercial laboratory selected by the Government. Materials produced from a source shall meet all the requirements herein. The cost of testing will be at the Contractor's expense. During the contract period, both prior to and after materials are delivered to the job site, visual inspections and measurements of the stone materials may be performed by the Contracting Officer. If the Contracting Officer, during the inspections, finds that the stone quality, gradation, or weights of stone being furnished are not as specified or are questionable, re-sampling and re-testing by the Contractor shall be required. Sampling of the delivered stone for testing and the manner in which the testing is to be performed shall be as directed by the Contracting Officer. This additional sampling and testing shall be performed at the Contractor's expense. When test results indicate that materials meet specified requirements, an equitable adjustment in the contract price will be made for the sampling and testing. Rejected material shall be removed from the Project site at no cost to the Government.

1.5.1.3 Evaluation Testing of Stone Source

The tests to which the stone may be subjected will include petrographic analysis, specific gravity, unit weight, absorption, wetting and drying, freezing and thawing, and such other tests as may be considered necessary to demonstrate that the stone is of a satisfactory quality.

a. Unit Weight, Bulk Specific Gravity, saturated surface dry (SSD) and Absorption.

Stone shall weigh more than 155 pounds per cubic foot shall have a bulk specific gravity, saturated surface dry, (SSD), greater than 2.65. The stone shall have an absorption less than 2 percent. The method of test for unit weight bulk specific gravity (SSD) and absorption will be ASTM C 127, except the unit weight will be calculated in accordance with Note No. 5 using bulk specific gravity, saturated surface dry.

b. Samples. Samples of stone from a source shall be taken by a representative of the quarry to the approved laboratory under the supervision of the Contracting Officer for testing and acceptance prior to delivery of any stone from this source to the site of the work. The Contractor shall be responsible for arranging sampling and transport and shall notify the Contracting Officer a minimum of 10 days before the activity.

Samples shall consist of at least three pieces of stone, roughly cubical in shape and weighing not less than 150 pounds each from each unit that will be used in the production of the required stone. If the source is an undeveloped quarry, or if the operation has been dormant for more than one year, such that fresh samples are not available, the Contractor shall expose fresh rock for 20 feet horizontally and for the full height of the face proposed for production, prior to the field evaluation. The Contracting Officer may also require documentation of subsurface exploration of an undeveloped quarry in order to determine whether or not sufficient reserves are available.

1.5.1.4 Random Sampling

The stone produced by each source may be sampled by the Government for Quality Assurance testing on the basis of a minimum once each year or once during the production of each 25,000 tons of stone produced each year for the Government. The samples will be evaluated based upon petrographic analysis, specific gravity, unit weight, bulk specific gravity (SSD), and absorption. All random sampling and testing costs shall be borne by the Contractor. Random sampling shall comply with Paragraph Evaluation Testing of Stone.

1.5.1.5 Drop Test

A drop test provides an immediate evaluation of the durability of very large stone during handling of the stone including placement into a structure. For comparability, the test stones shall be dropped from a bucket or by other means from a height of not less than half the average diameter of the stone onto a clean, rigid, nondeflecting surface or second stone of comparable size set on a nonyieldinig surface. Dumping from a truck is not acceptable.

The stone shall be examined carefully before as well as after the completion of the test. Failure criteria is the development of new cracks, opening of old cracks, and the loss of piece from the surface of the stone. Each stone shall be dropped a total of five times for evaluation purposes with examination after each drop. The Contractor shall provide all necessary equipment and operating personnel to perform the testing.

The drop test shall be performed in the presence of the Contracting Officer or representative and USACE Seattle District Geotechnical and Geological personnel at the stone production site. The Contractor shall arrange all testing and shall provide the Contracting Officer a minimum of 10 days notice before the tests are to be performed.

The testing shall require the selection of five suitable stones from each weight size listed for quarry spalls and riprap by the Contractor and the USACE. Selected stones shall be approved by the USACE before testing. All stones shall be clean of dust, dirt, debris, or other material that may hinder inspection. Material shall be representative of the stone that shall be used for the work.

The Contractor shall record the results of each test and photograph the stone before the test and the resulting impact of each drop test on each stone. The Contractor shall provide this Drop test record to the Contracting Officer within 5 days of the completion of the tests.

Random drop tests of stone selected by the USACE shall be performed during construction. If the stone fails, the placed material shall be closely

inspected. All material displaying hairline cracks shall be removed at no cost to the Government. An additional drop testing program shall be conducted at the stone production site and the quarry stone source shall be inspected for quality. All costs of this additional testing shall be borne by the Contractor at no additional expense to the Government. All material that is rejected and requires removal at the work site shall be taken off the Project site and disposed of at no cost to the Government. The Contractor shall provide suitable replacement stone to replace the rejected material at no cost to the Government.

1.6 CONSTRUCTION TOLERANCES

The finished surface and stone layer thickness shall not deviate from the lines and grades shown by more than the tolerances listed below. Tolerances are measured perpendicular to the indicated neatlines. Extreme limits of the tolerances given shall not be continuous in any direction for more than five times the nominal stone dimension nor for an area greater than 100 square feet of the structure surface.

NEATLINE TOLERANCES		
MATERIAL	ABOVE NEATLINE (inches)	BELOW NEATLINE (inches)
Quarry Spalls	3	3
Riprap	6	6

The intention is that the work shall be built generally to the required elevations, slope and grade, and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Contracting Officer. Payment shall not be made for excess material, which the Contracting Officer permits to remain in place.

PART 2 PRODUCTS

Products shall be as specified below. Materials shall not be amended at the quarry or other location with sand, silt, cuttings, or other quarry cleaning or material products to meet a desired weight for hauling. All materials shall be washed to removed fine particles and allow inspection. Loads arriving at the work site that have been amended with excess fines to meet weight or have not been washed shall be reject and returned to the source at no expense to the Government.

2.1 QUARRY SPALLS

2.1.1 General

Quarry spalls shall consist of a washed crushed stone.

2.1.2 Material

Quarry spalls shall be composed of tough, hard, angular, durable particles, adequately free from thin, flat and elongated pieces, and shall contain no organic matter nor soft, friable particles. The aggregates shall meet the

quality requirements of ASTM C 33/C 33M. Quarry spalls shall conform to Washington State Department of Transportation (WSDOT0 2012 Standard Specification M 41-10 9-13.6 Quarry Spalls.Gradation shall conform to the following requirements:

Sieve Size	Percent Passing
BEDDING MATERIAL	
8 inch	100
3 inch	40 maximum
3/4 inch	10 maximum

Provide quarry spalls well-graded between the limits shown. Perform at least one test on each 100 tons to be delivered to the project site for each specified gradation in accordance with ASTM C 136. A representative sample weighing not less than 100 pounds shall be removed from the bedding layer placed at locations directed by the Contracting Officer. All points on individual grading curves obtained from representative samples of quarry spalls shall lie between the boundary limits as defined by smooth curves drawn through the tabulated gradation limits plotted on ENG FORM 2087 or similar form. The individual gradation curves within these limits shall not exhibit abrupt changes in slope denoting either gap grading or scalping of certain sizes or other irregularities, which would be detrimental to the proper functioning of the bedding layers.

2.2 STONE

2.2.1 General

2.2.1.1 Evaluation Testing of Stone Investigation and Tests

The Contractor shall have evaluation tests performed on stone samples collected from the proposed source. The quarry investigation shall be performed by a registered geologist or registered engineer in Washington State. The investigation shall be performed in the presence of the Contracting Officer or representative and USACE Seattle District Geotechnical and Geological personnel. The Quarry Inspection Report shall follow the following outline at a minimum, all other Federal, State, and local requirements for quarry inspections and reports, and the information outline in ASTM D 4992.

1. Executive Summary
2. Introduction
3. Test Quarry Design and Objectives
   a. Discussion of objectives

b. Overview of site selection criteria
c. Thorough presentation of design including layout and slope stability
4. Geological Conditions in the Test Quarry
5. Description of Each Test Blast
a. Rock type and condition
b. Hole pattern
c. Delay pattern
d. Hole depths and loading design
e. Explosives, detonators, and delays
f. Blasted rock mass description
g. Quarry-run gradation
h. Laboratory test results
i. Conclusions
6. Drilling, Loading, and Hauling Equipment and Procedures
7. Description of the Results of Each Presplit Slope Blast
a. Rock type and condition
b. Presplit hole and explosive charge configuration
c. Presplit slope condition
d. Rock joint analysis and slope stability
e. Conclusions
8. Rock Processing Results
a. Description of processing objectives
b. Description of rock processing equipment
c. Results of processing each rock type and condition
d. Gradations and particle shapes
e. Degradation during each stage of processing
f. Laboratory test results
9. Conclusions and Recommendations
a. Conclusions including lessons learned
b. Recommendations

APPENDICES -- Laboratory Test Sheets, Boring Logs, Field Gradation Test Results, Description of Rock Processing Equipment, Photographic Documentation, Etc.

The tests to which the stone shall be subjected include petrographic examination (ASTM C 295), bulk specific gravity (SSD),unit weight, absorption (ASTM C 127), resistance of stone to freezing and thawing (ASTM D 5312), and if argillaceous limestone and sandstone are used, resistance to wetting and drying (ASTM D 5313). The laboratory to perform the required testing shall be validated based on relevant paragraphs of ASTM D 3740, and certified USACE testing laboratory, and no work requiring testing shall be permitted until the laboratory has been inspected and validated. The first inspection of the facilities shall be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor.

a. Bulk Specific Gravity Range. All stone shall have a minimum bulk specific gravity, saturated surface dry (SSD), of 2.65 based upon water having a unit weight of 62.4 pounds per cubic foot. The method of test for bulk specific gravity (SSD) shall be ASTM C 127.

b. Unit Weight and Absorption. Stone shall weigh more than 155 pounds per cubic foot shall have a bulk specific gravity, saturated surface dry, greater than or equal to 2.65. The stone shall have an absorption less than 2 percent. The method of test for unit weight and absorption shall be ASTM C 127, except the unit weight shall be calculated in accordance with Note No. 5 using bulk specific gravity, saturated surface dry.

c. Petrographic Examination. Stone shall be evaluated in accordance with ASTM C 295, which shall include information required by ASTM D 4992, paragraph 10. COE CRD-C 148 shall be used to perform Ethylene glycol tests required on rocks containing smectite as specified in ASTM D 4992 and on samples identified to contain swelling clays.

d. Resistance to Freezing and Thawing. Stone shall have a maximum loss of 5 percent after the number of cycles specified in ASTM D 5312, Figure 1, when determining the durability of stone when subjected to freezing and thawing in accordance with ASTM D 5312, except the surface area of one side of the sample shall be between 144 and 2,304 square inches.

e. Resistance of Rock to Wetting and Drying. Stone shall have a maximum loss of 2 percent when determining the durability of stone when subject to wetting and drying in accordance with ASTM D 5313, except the surface area of one side of the sample shall be between 144 and 2,304 square inches.

f. Samples. Samples of stone from the designated source shall be taken by a representative of the Quarry under the supervision of the Contractor, Contracting Officer or representative, and USACE Seattle District Geotechnical and Geological personnel, for testing and acceptance prior to delivery of any stone from the source to the site of the work. Information provided with the samples shall include the location within the quarry from which the sample was taken along with a field examination of the quarry. The field examination shall include the information outline in ASTM D 4992, paragraph 7. Samples shall consist of at least three pieces of stone, roughly cubical in shape and weighing not less than 150 pounds each from each unit that shall be used in the production of the required stone. If the source is an undeveloped quarry, or if the operation has been dormant for more than one year such that fresh samples are not available, the Contractor shall expose fresh rock for 20 feet horizontally and for the full height of the face proposed for production, prior to the field evaluation. The Contracting Officer may also require documentation of subsurface exploration of an undeveloped quarry in order to determine whether or not sufficient reserves are available. The samples shall be shipped at the Contractor's expense to a laboratory validated by the USACE to perform the required tests.

   The Contractor shall be responsible for arranging the stone sampling and field inspection and shall provide the Contracting Officer with a minimum of 10 days of notice before the activity. All costs of sampling and shipment shall be borne by the Contractor. Loss, damage of, or rejection of the samples during handling and transport to the laboratory shall result in an additional stone sample selection site visit and shipping of the suitable selected stone to the laboratory at no additional cost to the Government.

g. Tests. Conduct the tests in accordance with applicable ASTM and Corps of Engineers methods of tests, given in the Handbook for Concrete and Cement, in a laboratory validated by the USACE. All costs of testing shall be borne by the Contractor.

2.2.1.2 Quarry Operations

Conduct quarry operations in a manner to produce stone conforming to the requirements specified, this may involve selective quarrying, handling,

processing, blending, and loading as necessary, all of which shall be as specified in the Contractor's Quality Control Plan per Section 01 45 00 CONTRACTOR QUALITY CONTROL. Control blasting and handling of rock to produce rock of the size ranges and quality specified. Techniques such as the use of proper hole diameter, hole depth, hole angle, burden and spacing distances, types and distribution of explosives delay intervals and sequence, removal of muck piles between each shot, and special handling techniques are required as necessary to produce the specified materials. All aspects of blasting operations shall be specifically designed so that the end product is not damaged from the blasting technique and that the stone is suitable for the intended purpose.

The Contractor shall provide a qualified geologist and material specialist familiar with quarry operations and production of large stone to be stationed at the production quarry during stone production and loading for transport. The personnel shall continually inspect the stone and operations to ensure suitable stone is produced and loaded for transport to the work site. Daily quality control reports of quarry operations shall be provided within 24 hours to the Contracting Officer or representative. The Contractor quarry personnel shall immediately contact the Contractor superintendent and the Contracting Officer or representative of any operation or condition that may impact stone quality and shall reject unsuitable stone at the quarry.

a. Curing Stone

Conduct curing operations on freshly quarried stone to allow it to release stored energy and moisture and to allow the stone to demonstrate that it will not fracture during the energy release and drying-out phase. Stones of sizes which are individually picked by the Contractor along with the Contracting Officer and USACE Seattle District Geotechnical and Geological personnel, shall be temporarily stockpiled at the quarry site a minimum of 30 calendar days before being shipped to the project site. Stockpile site shall be clean and free of debris, soil, mud, water, and away from active face production areas. A minimum of ten stones shall be selected.

b. Stone Quarrying Exclusion Period

Stone quarried between the 15 of September and the 15 of April shall not be approved for use in the project. If the stone is not affected by freeze-thaw cycles, and the durability history of the stone demonstrates that quarrying during the exclusion period has not adverse effect on the durability of the stone, and the Contracting Officer approves the use of stone quarried during the exclusion period, the stone quarrying period exclusion may be waived by the Contracting Officer. Stone quarried before the the exclusion period at a time which shall not permit sufficient curing time before being subjected to freezing conditions, and which is subject to fracturing as a result of freeze-thaw cycles, shall not be approved for use.

c. Temporary Storage at Quarry

Storage of stone materials subsequent to shipment from the quarry and prior to permanent placement in the required work shall be subject to approval of the Contracting Officer. Underwater storage of stone materials is prohibited. All stone must be quarried and ready for shipment before excavation work may begin. Stone may only be stockpiled at the production quarry.

2.2.1.3 Gradation Test at Quarry

The Contractor shall perform a gradation test or tests on the riprap at the quarry in accordance with paragraph GRADATION TEST METHOD FOR RIPRAP. Take the sample in the presence of the Contracting Officer. Notify the Contracting Officer not less than 3 days in advance of each test. One gradation test(s) shall be performed per 2,000 tons of each size of riprap placed. The gradation tests shall be reported using the forms ENG FORM 2087 GRADATION TEST, ENG FORM 4055 RIPRAP Gradation Curves, and ENG FORM 4794-RIPRAP Gradation Curves (LRA), attached at end of this section. Designate on the test form that portion in tons of the lot tested, which is applicable to this contract. Any deviation from the reported tonnage shall be corrected and recorded on a revised appropriate gradation forms. The sample shall consist of not less than 50 tons of riprap and shall be collected in a random manner which shall provide a sample which accurately reflects the actual gradation arriving at the jobsite.

Failure of the test on the initial sample and on an additional sample will be considered cause for rejection of the quarry and/or quarry process, and all riprap represented by the failed tests shall be set aside and not incorporated into the work. Any additional tests required because of the failure of an initial test sample shall not be considered as one of the other required tests. If collected by the truckload, each truckload shall be representative of the gradation requirements. The Contracting Officer may direct additional testing of the riprap at the project site if the riprap appears, by visual inspection, to be out of gradation. All additional testing cost shall be borne by the Contractor with no additional cost to the Government.

The additional tests shall be performed on in-place materials at the locations directed, or on random loads selected by the Contracting Officer. In-place test areas shall be not less than 12 by 12 feet and shall include the full thickness of the placed riprap layer, without disturbing or including the underlying material and shall meet the minimum sample size specified above. Each pit excavated for an in-place test sample shall be refilled and reworked to provide a surface void of signs of disturbance. One in-place gradation shall be performed on each 2,000 tons or portion thereof placed. If the gradation test fails, additional gradation tests will be required at the Contractor's expense to delineate the limits of unacceptable stone. The additional gradation tests shall not count as part of the minimum number of gradation tests required. The unacceptable stone shall be removed from the project site at no additional cost to the Government. The Contracting Officer may direct this testing under the Contract Clause INSPECTION OF CONSTRUCTION. Provide all necessary screens, scales and other equipment, and operating personnel, to grade the sample. Certification and test results shall represent riprap shipped from the quarry. Certification and tests results must be received by the Contracting Officer at the jobsite before the riprap is used in the work.

2.2.1.4 Proportional Dimension Limitations

The maximum aspect ratio (greatest dimension:least dimension) of any piece of stone for size ranges shall be not greater than 3:1 when measured across mutually perpendicular axis. Not more than 25 percent (25%) of the stones within a gradation range shall have an aspect ratio greater than 2.5:1. A maximum of 10 percent flat and elongated pieces by weight shall be acceptable. A flat and elongated piece of riprap is defined as having a

ratio of width to thickness or length to width greater than 3:1. ASTM D 4791 shall be used as a guide to perform the test. Stone not meeting this requirement shall be rejected and removed from the Project site at no cost to the Government.

2.2.1.5 Riprap Stockpile

Storage of riprap at the worksite is not to be confused with off-site stockpiling of riprap. If the Contractor elects to provide off-site stockpiling areas, the Contracting Officer shall be notified of all such areas. The Contractor's stockpile shall be a maximum of 12 feet high and formed by a series of layers of truckload dumps, where the rock essentially remains where it is placed. Subsequent layers shall be started 10 feet from the edge of the previous layer so that the rock will not roll down the edges of the previous layers. The first layer shall be a maximum of 6 feet high. After being stockpiled, any riprap which has become contaminated with soil or refuse shall not be put into the work unless the contaminating material has been removed from the riprap prior to placement.

b. Off-site Stockpile. Off-site stockpiling of stone shall only be allowed at the quarry. All stone shall be placed on crushed stone or gravel and shall not be placed on the quarry floor or soil. Stockpile area shall be well drained. Stone stockpiled on soil or in water or that becomes contaminated with quarry fines or other material beside the specified stone shall be rejected.

2.2.2 Riprap

Only quarried stone shall be used. Riprap quality shall be in accordance with Washington State Department of Transportation (WSDOT) 2012 Standard Specifications M 41-10 9-13.1(2) Light Loose Riprap and shall conform to Table 1 Riprap Gradation below.

TABLE 1 - RIPRAP GRADATION	
PERCENT	LIMITS OF STONE WEIGHT, LB.
20-90	2000-300
15-80	1000-50
10-20	50

PART 3 EXECUTION

3.1 DEMONSTRATION SECTION

Prior to placement of stone, construct a section of stone protection consisting of riprap and quarry spalls and a section of quarry spalls amended with topsoil to demonstrate the proposed operations for production placement. The section shall demonstrate procedures and capability of grading, placing toe stone and bank protection within the tolerances specified. The demonstration section shall be 100 feet in length and shall conform to all applicable specifications.

3.1.1 Methods and Equipment

Methods and equipment employed for placement shall demonstrate the adequacy

for use in placement of riprap and shall conform with the requirements specified. The quantities of all materials placed within the section shall be accurately tabulated and provided immediately to the Contracting Officer for comparison with computed quantities.

3.1.2 Demonstration Section Evaluation

Do not proceed with placing stone protection prior to the approval of the demonstration section. Within a period of 7 days after completion of the section, the Contracting Officer shall determine the adequacy of the section to function as part of the permanent construction. The Contractor shall be notified as to the acceptability of the section and may be directed to modify methods of construction and remove the section if necessary.

3.1.3 Removal of Demonstration Section

If removal of the demonstration section is required, it shall be conducted in such a manner as to maintain the integrity of the underlying subgrade. The Contractor shall remove the material and transport to the disposal area.

3.2 BASE PREPARATION

Areas on which stone protection are to be placed shall be graded and/or dressed to conform to cross sections and grading plan shown on the contract drawings. The prepared base shall be approved by the Contracting Officer. Where such areas are below the allowable minus tolerance limit they shall be brought to grade by fill with gravel fill and then compacted to a density equal to the adjacent in place material. Immediately prior to placing the stone protection, the prepared base shall be inspected by the Contracting Officer and no material shall be placed thereon until that area has been approved.

3.3 PLACEMENT OF Quarry Spalls

3.3.1 General

A 12-inch layer of quarry spalls shall be placed on the prepared surface of the new levee base as described below and in accordance with the details shown on the contract drawings. A tolerance from the slope lines and grades shown on the contract drawings shall be allowed in the finished surface of the material, except that the extreme of this tolerance shall not be continuous over an area greater than 200 square feet.
The quarry spalls shall be placed from the toes of the new levee berms to the top of the new levee in a single layer to full depth. Minimal horizontal displacement of the quarry spalls by grading equipment shall be allowed to reduce potential segregation of the material particles. The quarry spalls shall be compacted by three passes of a bulldozer with transverses perpendicular to the contours of the slopes.
A four inch layer of topsoil shall be placed on the quarry spalls. The top soil shall be pushed laterally as needed for coverage and to fill as much of the voids in the underlying quarry spalls as possible. A tolerance from the slope lines and grades shown on the contract drawings shall be allowed in the finished surface of the material, except that the extreme of this tolerance shall not be continuous over an area greater than 200 square feet. The topsoil shall be compacted by three passes of a bulldozer with transverses perpendicular to the contours of the slopes. Growzer plate

impressions shall be left in places in the topsoil to aid in retention of hydroseed.

3.4 PLACEMENT OF RIPRAP

Within 30 day of notice to proceed, submit a detailed placement plan clearly discussing all methods and procedures of placement of the new riprap backfill including detailed discussions of protection of and placement of the new riprap adjacent to the existing concrete retaining walls, bridge piers, and piezometers during placement work. The Contractor shall include gradation band curves for the riprap, and quarry spalls.

3.4.1 General

Riprap shall be placed on the quarry spalls specified in paragraph(s) QUARRY SPALLS if required.

3.4.2 Placement

Underwater placement shall not be required.

3.4.2.1 Above Water

Riprap shall be placed in a manner which will produce a well-graded, tightly interlocked mass of rock with the minimum practicable percentage of voids, and shall be constructed, within the specified tolerances, to the lines and grades shown on the contract drawings. A tolerance from the slope lines and grades shown on the contract drawings shall be allowed in the finished surface of the riprap, except that the extreme of this tolerance shall not be continuous over an area greater than 200 square feet. The average tolerance of the entire job shall have no more than 20 percent of the tolerances specified above.

Riprap shall be placed by means of crane operated skip-pan (box), dragline bucket, clamshell, rock-bucket, hydraulic excavator , trackhoe, or other approved equipment. Riprap shall not be placed by dumping from haul trucks.

Riprap shall be placed to its full course thickness in one operation and in such manner as to avoid displacing the quarry spalls. The large stones shall be well distributed and the entire mass of stones in their final position shall be graded to conform to the gradation specified in paragraph RIPRAP. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Placing riprap in layers shall not be permitted. Placing riprap by dumping it into chutes, or by similar methods likely to cause segregation of the various sizes, shall not be permitted. Placing riprap by dumping it at the top of the slope and pushing it down the slope shall not be permitted. Riprap shall not be dropped from a height of greater than two feet during placement or when dumping from transport trucks. Riprap shall not be dumped onto hard and rigid surfaces when unloaded from transport trucks. Dumping riprap onto gravel mats is permitted for unloading. No equipment shall be operated directly on completed portions of the stone protection system at any time. The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads

during final placing; or by other methods of placement which shall produce the specified results. Each truckload shall be representative of the gradation requirements. Equipment shall be able to push rock placed on the slope if required to reduce void spaces between rock clasts.

All dump trucks used in placing the riprap shall be equipped with bottom hinged tailgates or high lift rock gates. The gate releasing mechanism shall be arranged so that it may be operated only from, at, or near the front of the truck.

Rearranging of individual stones shall be required to the extent necessary to obtain a well-graded distribution of stone sizes as specified above. Maintain the stone protection until accepted by the Contracting Officer; any material displaced prior to acceptance due to the Contractor's negligence shall be replaced with no additional payment and to the lines and grades shown on the contract drawings.

Placement of riprap by hand shall be required around the concrete retaining walls, top of slopes, around piezometers, and to in fill areas that are difficult to reach by placement equipment.

3.5 TESTS AND INSPECTIONS

3.5.1 Pre-Production

3.5.1.1 Bulk Specific Gravity

Quantity determinations are contingent upon the range of bulk specific gravity (saturated surface dry (SSD) basis) of stone to be supplied. Therefore, during the process of selecting a source of stone for the project, make an investigation to determine the lowest and highest bulk specific gravity (SSD) of stone available at the source proposed to be utilized for each gradation range of stone. Tests shall be performed at a Government approved testing laboratory. The testing results shall be submitted in accordance with paragraph SUBMITTALS. Test results which display an extraordinarily wide range of values may necessitate additional testing to determine whether the source contains stratas with stones of an acceptable range of bulk specific gravity. The Contractor shall submit a copy of the certification from the regulation agency attesting to the scale's accuracy, and a copy of each certified weight scale ticket 1 working day(s) after weighing.

3.5.1.2 Material Quality

Before selecting a source for preparation of a demonstration stockpile, the Contractor shall be reasonably certain that the source is capable of meeting the quality and source requirements specified in paragraphs SOURCES and EVALUATION TESTING OF STONE, including their respective subparagraphs.

3.5.1.3 Borderline Material Quality

If the COR's evaluation of a demonstration stockpile results in not being able to determine by visual examination whether the material is acceptable or unacceptable, the COR will select at least one but not more than three representative stones from the demonstration stockpile to be prepared for shipment to the testing laboratory for testing in accordance with paragraph

EVALUATION TESTING OF STONE. Where specified sizes are in excess of 2,000 pounds, cut or break a representative piece, weighing approximately 2,000 pounds each, off of the selected stones. For specified stone sizes of less than 2,000 pounds but more than 500 pounds, individual samples shall be the size of the largest stone specified for the size range. Samples of stone groupings with a maximum size less than 500 pounds shall contain at least two (2) stones representative of the higher limit of the stone weights specified. In addition, the sample shall be representative of the gradation specified and the minimum weight of the total sample shall be not less than 500 pounds. The sampling and testing procedures shall be repeated for each strata being quarried. Ship the samples to the laboratory as specified in paragraph EVALUATION TESTING OF STONE. If the laboratory testing reveals the materials are unacceptable, submit a replacement source for approval and proceed with the demonstration stockpile procedures anew. All selection and testing of the new source shall be borne by the Contractor at no expense to the Government.

3.5.1.4 Demonstration Stockpile at Source

Following submittal of the Contractor's Quality Control (CQC) Plan and selection of a source, but prior to the Government's approval of a source and the CQC Plan, make arrangements to provide a pre-production demonstration stockpile for each of the stone size ranges for the project. The stockpiles shall be located at the source of the stone and be shaped in windrow fashion. The stones with a size range greater than 3 tons shall be placed in a single layer with 1 foot of clear space around each stone. Stones under 3 tons in weight shall not be stacked higher than 4 feet. The stones placed in the demonstration stockpiles shall be representative of the overall quality of materials in the source and shall not consist of the best specimens unless it is reasonable to determine that the source will provide the required amount of stone of the applicable size range with a degree of quality no less than that existent in the demonstration stockpile. The quantity of stone in each demonstration stockpile shall be dependent upon the gradation size range to be produced for the project. The stones placed in the stockpile shall have been preselected by the Contractor's Quality Control Plan (CQCP) inspector or supervisor and acceptable stones over 500 pounds in size shall have been marked with spray paint on three mutually perpendicular sides with a coded mark to denote acceptability for a certain size range. A stockpile of representative reject stones marked with a red "X" shall also be maintained at the site as examples of unacceptable materials or shapes.

3.5.1.5 Evaluation of Demonstration Stockpile at Source

Notify the Contracting Officer when stockpiles are ready for evaluation. The Contractor's approved Quality Control Plan (QCP) supervisor and all QCP inspectors shall accompany the Contracting Officer's Representative (COR) during the Government's evaluation of the demonstration stockpiles. Arrange to have individual stones turned as necessary to accommodate the COR's evaluation. The COR will mark rejected stones with a red "X" and such stones shall be removed to the reject stockpile or to a crusher if one is available. If more than 2 unacceptable stones are found within a stockpile, the entire stockpile will be rejected by the Government and a replacement stockpile will be created for re-evaluation. If the replacement stockpile is rejected, revise and resubmit its Quality Control Plan (QCP) and create another replacement demonstration stockpile for evaluation. If the third demonstration stockpile for a particular size range at a single source is found unacceptable, the source will be disapproved for such size rang and a new source shall be submitted for

approval. In addition, submit the name and qualifications for a person to replace the QCP supervisor. The Contractor may choose a replacement source at the time a first or second demonstration stockpile is found unacceptable. The replacement of demonstration stockpiles or stone sources shall be at no additional cost to the Government and with no change in the time of completion.

3.5.1.6 Approval of Demonstration Stockpile at Source

At the time the COR finds the contents of a demonstration stockpile to be acceptable, either through visual examination and through laboratory testing, the Contractor shall be notified in writing that the source, the QCP plan and QCP staff are approved, whereupon the Contractor may proceed with production of materials for the project provided they are consistent with demonstration stockpiles.

3.5.1.7 Duration of Demonstration Stockpile at Source

Other than for being shipped as the final quantities of materials to be placed in the work, each demonstration stockpile shall remain unchanged at the source until all other required material of the size range represented by the stockpile has been shipped from the source.

3.5.2 Placement Control

3.5.2.1 Quality Control Measures

Establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. Maintain records of the quality control tests, inspections and corrective actions. Quality control measures shall cover all construction operations including, but not limited to, the placement of all materials to the slope and grade lines shown and in accordance with this section.

3.5.2.2 Check Surveys

Surveys made by the Contractor are required on each material placed for determining that the materials are acceptably placed in the work. Make checks as the work progresses to verify lines, grades and thicknesses established for completed work. At least one (1) check survey as specified below shall be made for each twenty-five (25) foot section as shown as practicable after completion. Following placement of each type of material, the cross section of each step of the work shall be approved by the Contracting Officer before proceeding with the next step of the work. Approval of cross sections based upon check surveys shall not constitute final acceptance of the work. Cross sections shall be taken on lines 25 feet apart, measured along the structure reference line, with readings at 5-foot intervals and at beaks along the lines. However, other cross section spacing and reading intervals may be used if determined appropriate by the Contracting Officer. Additional elevations shall be taken as the Contracting Officer may deem necessary or advisable. The surveys shall be conducted in the presence of an authorized representative of the Contracting Officer.

c. Stockpiled Riprap. If the Contractor elects to stockpile riprap offsite, the riprap shall be weighed immediately before placement by the method described above.

(1) Determination of Excess Stone. All stone outside the limits and

tolerances of the cross sections of the structure, except variations so minor as not to be measurable, shall be deducted from the quantity of new stone for which payment is to be made. Weight of excess stone shall be determined from the cross sections obtained by the method provided for in paragraph FINAL SURVEYS, on the basis that the cubic feet of volume (including voids) for each type of stone, is equal to one ton or 2,000 pounds for the bulk specific gravity and percentage of voids shown. Should any excess stone be disclosed above the tolerance line as defined in paragraph TOLERANCES, its volume will be computed by the average end area method, based upon the cross section in the following manner. The average end area of excess stone above the tolerance line for two (2) successive cross sections, multiplied by the distance between the cross sections will be accepted as the volume. In addition to the above, stone, which has been delivered to the site and has been lost or wasted or otherwise not properly incorporated into the final required work, shall be deducted from the quantity for which payment is to be made.

(2) Final Surveys. Survey work and measurements required for determination of excess volume computations for stone materials shall be performed in the presence of the Contracting Officer. Notify the Contracting Officer not less than 3 days in advance of each survey. Cross section surveys shall be taken perpendicular to the axis of the structures. Elevations shall be taken on lines 25 feet apart measuring along the structure reference line, with the readings at 5-foot intervals and at breaks in the grade along the line. Other survey intervals and readings may be used if deemed appropriate or advisable by the Government's on-site representative. Additional cross sections, elevations, may be taken if determined necessary by the Government's on-site representative. Determination of quantities will be made by the Government's on-site representative and having once been made, will not reopen, except on evidence of collusion, fraud or obvious error. Prior to performing any work under this Section, coordinate all operations with the Government's on-site representative so that excess volume surveys will be made at the appropriate time. The surveys made under paragraph CHECK SURVERYS may be used when deemed appropriate by the Government's on-site representative, as part of the surveys required herein. Stone quantity computations shall be based entirely upon weights of new stone as determined from carrier displacement or certified scale weight tickets.

a. Above Water: The elevation of stone above the water surface shall be determined by the use of a leveling instrument and a rod having a base 12 inches in diameter. If approved by the Contracting Officer other means may also be used.

3.5.3 Quarry Spalls Gradation

3.5.3.1 General

The Contractor shall perform gradation tests to assure compliance with contract requirements and shall maintain detailed records. The quarry spalls shall be sampled in accordance with ASTM D 75/D 75M and tested in accordance with ASTM C 136. Perform the tests before and after surveys of each layer of stone protection material placed.

3.5.3.2 Reporting

Reporting shall be in accordance with paragraph GRADATION TEST.

3.23.9 Riprap

Establish and maintain quality control for slope protection riprap to assure compliance with contract requirements, and maintain records of his quality control for all construction operations, including but not limited to the following:

a. Dressing the slope to eliminate any irregularities, including irregularities in the gravel blanket placed by others, due to rain or wave wash or operations of the Contractor's equipment.

b. Grading and dressing necessary to secure a suitable connection with the riprap paving in place.

d. Above-water connection between riprap paving and concrete structures and instruments.

e. Connection between riprap and paving.

3.5.4 Gradation Tests for Stone

3.5.4.1 Gradation Test Method for Riprap

Gradation tests shall be performed in accordance with ASTM D 5519, Test Method A.

3.5.4.2 Standard Test Method for Gradation of Riprap

a. Select a representative sample (Note No. 1), weigh and dump on hard stand.

b. Select specific sizes (see example) on which to run "individual weight larger than" test. (See Note No. 2). Procedure is similar to the standard aggregate gradation test for "individual weight retained".

c. Determine the largest size stone in the sample. (100 percent size)

d. Separate by "size larger than" the selected weights, starting with the larger sizes. Use reference stones, with identified weights, for visual comparison in separating the obviously "larger than" stones. Stones that appear close to the specific weight must be individually weighed to determine size grouping. Weigh each size group, either individually or cumulatively.

e. Paragraph d above will result in "individual weight retained" figures. Calculate individual percent retained (heavier than), cumulative percent retained, and cumulative percent passing (lighter than). Plot percent passing, along with the specification curve on ENG Form 4794-R.

NOTE NO. 1: Sample Selection: The most important part of the test and the least precise is the selection of a representative sample. No "standard" can be devised; larger quarry run stone is best sampled at the shot or stockpile by given direction to the

loader; small graded stone is best sampled by random selection from the transporting vehicles. If possible, all parties should take part in the sample selection and agree before the sample is run that the sample is representative.

NOTE NO. 2: Selection of Size for Separation: It is quite possible and accurate to run a gradation using any convenient sizes for the separation, without reference to the specifications. After the test is plotted on a curve, then the gradation limits may be plotted. Overlapping gradations with this method are no problem. However, it is usually more convenient to select points from the gradation limits, such as the minimum 50 percent size, the minimum 15 percent size, and one or two others, as separation points.For these types of stone gradations the separation points need to be selected as the smallest size stone at each break in the gradation specified.

F O R

E X A M P L E

O N L Y

EXAMPLE GRADATION SPECIFICATIONS	
PERCENT LIGHTER BY WEIGHT	STONE WEIGHT IN LBS
100	400 - 160
50	160 - 80
15	80-30

EXAMPLE WORKSHEET				
STONE SIZE LBS	INDIVIDUAL WT. RETAINED	INDIVIDUAL PERCENT RETAINED	CUMULATIVE RETAINED	PERCENT PASSING
400	0	0	0	100
160	9600	30	30	70
80	11,200	35	65	35
30	8000	25	90	10
<30	3200	10	100	-
TOTAL	32,000 pounds			

EXAMPLE WORKSHEET				
STONE SIZE LBS	INDIVIDUAL WT. RETAINED	INDIVIDUAL PERCENT RETAINED	CUMULATIVE RETAINED	PERCENT PASSING
NOTE: Largest stone 251 pounds				

G R A D A T I O N T E S T D A T A S H E E T

Quarry _____ Type of Stone Tested _____

Date of Test _____ Testing Rate _____

T E S T R E P R E S E N T S		
Contract No.	District	Tons
	TOTAL	

G R A D A T I O N					
			Cumulative		
Stone Size (lbs)	Weight Retained	Individual % Retained	% Retained	% Passing	Specification % Finer by Wt
Total Weight					
Max Size Stone					

Remarks:

I certify that the above stone sample is representative of the total tonnage covered by this test report.

Contractor Representative _____
Government Representative _____

STONE SOURCES		
LATITUDE/LONGITUDE	QUARRY LOCATION, ADDRESS, & TELEPHONE	MAIN OFFICE ADDRESS & TELEPHONE NUMBER
STATE		
STATE		

-- End of Section --

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35 41 00

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LEVEE CONSTRUCTION

PART 1 GENERAL

This specification provides the minimum requirements for the construction of the north, middle, and south portions of the new levee and upgrades to the Ebey Slough Levee between the south end of the new levee and the existing Marysville sewage lagoon levee. Site soils consist of very soft to soft silt and silt with sand that are seasonally saturated and have low bearing strength. Levee construction shall consist of the placement of the levee and surcharge in Year 1 and removal of surcharge and placement of levee berms in Year 2.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2216	(2010) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2010) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 422	(1963; R 2007) Particle-Size Analysis of Soils
ASTM D 4253	(2000; R 2006) Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	(2000; R 2006e1) Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4318	(2010) Liquid Limit, Plastic Limit, and

	Plasticity Index of Soils
ASTM D 4643	(2008) Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
ASTM D 5195	(2008) Density of Soil and Rock In-Place at Depths Below the Surface by Nuclear Methods
ASTM D 6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011) Safety and Health Requirements Manual

1.2 DEFINITIONS

1.2.1 Clearing

Clearing consists of the removal and satisfactory disposal of all above ground and below ground trees, downed timber, snags, slash, brush, garbage, trash, debris, fencing, and other items occurring in the designated areas to be cleared.

1.2.2 Grubbing

Grubbing consists of the removal and satisfactory disposal of stumps, roots larger than 2 inches in diameter, and matted roots from the designated grubbing areas. Grubbing also includes filling of holes from the grubbing operation.

1.2.3 Stripping

Stripping consists of the removal and satisfactory disposal of crops, weeds, grass, and other vegetative materials to the ground surface and topsoil to a depth of 12 inches.

1.2.4 Satisfactory Materials

Satisfactory materials consists of materials classified in accordance with ASTM D 2487 as CL, CL-ML, ML, SC, SM, SW-SM free from: roots and other organic matter; contamination from hazardous, toxic or radiological substances; trash, debris; and frozen materials. Not all satisfactory materials can be used in levee. Only the satisfactory materials stated above, meeting the additional or modified requirements of paragraph TYPES OF FILL MATERIALS, can be used for levee construction.

1.2.5 Unsatisfactory Materials

Unsatisfactory materials shall not be used in any levee or other required fill. Unsatisfactory materials includes all other materials that are not defined above as satisfactory materials. Vegetation, cleared and grubbed material, stripped material, and levee and breach excavation material shall not be used for levee embankment or levee foundation construction.

1.2.6 Embankment

The terms "levee" or "embankment" as used in these specifications are defined as the earth and rock fill portions of the levee structure or other fills related to the levee structure, including and includes all types of earth fill for the levee and all other fills within the limits of the levee, excepting those stone and filter materials used for slope protection, which are described in paragraph 2.2.2 Riprap.

1.2.7 Backfill

Backfill as used in this section is defined as that fill material which cannot be placed around or adjacent to a structure until the structure is completed or until a specified time interval has elapsed after completion.

1.2.8 Excavation

Excavation consists of removal of material to the lines and grades shown on the Drawings and as described in paragraph EXCAVATION in PART 3 EXECUTION.

1.2.9 Classification of Soils

Materials used to construct the new levee embankment and for the select fill in the new levee excavation shall be classified in accordance with ASTM D 2487 (Unified Soil Classification System). 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, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

1.2.10 Degree of Compaction

1.2.10.1 Cohesive Material

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, abbreviated hereinafter as percent laboratory maximum density.

1.2.10.2 Cohesionless Material

Degree of compaction is expressed as a percentage of the relative density in accordance with ASTM D 4253 and ASTM D 4254.

1.3 SYSTEM DESCRIPTION

The work covered by this section consists of furnishing all equipment, labor, materials, and incidentals, and performing all operations necessary for the clearing, grubbing, and stripping of the areas specified herein or indicated on the drawings, and for the removal and disposal of cleared, grubbed, and stripped materials, removal or plugging of existing drainage structures, and refilling of holes resulting from grubbing; excavation of

borrow areas and existing levees, and for all other excavations incidental to the construction of levees, channels , ditches , and ponding areas as specified and shown; foundation preparation and the construction of levee embankments, including new levee, enlargement of existing levee, backfill of inspection trenches, cutoff trenches, berms, road crossings, backfill at drainage structures, and other incidental earthwork as may be necessary to complete the levee as specified herein and as shown on the drawings. All work under this section shall comply with the requirements of EM 385-1-1.

1.3.1 Embankment and Backfill Materials

At least 30 days prior to delivery of any Contractor-furnished material to the site of the work, submit soil classification test results, moisture-density curves, gradation curves, and laboratory results of the required tests of the proposed material. Materials for embankment and backfill construction will be obtained from the Tulalip Tribe borrow sources. The Tulalip Tribe shall screen the borrow for oversized particles and organic material, and transport such borrow material to the Project site soil stockpile at no cost to the Contractor or Government. Materials obtained from required excavation shall not be utilized for construction of the new levee embankment or as backfill. All roots, limbs, and wood fragments shall be removed from embankment materials. Materials containing sod, other organic or perishable material, trash, debris, and frozen materials shall not be used in the embankment. Submit to the Contracting Officer the source or sources intended to provide materials for embankment construction in the Borrow Source Plan. If a source is selected other than a commercial quarry or other commercial entity from which earth or rock material will be directly purchased and where the Contractor or his subcontractor shall perform the borrow excavation, a written statement will be provided to the Contracting Officer indicating permission to utilize the area in the Contractor Selected Borrow Site Plan. It is the Contractor's responsibility to obtain Federal, State, and local permits which may be required for excavation and reclamation of the borrow area. A copy of the plan and procedures to be utilized for reclamation shall be furnished to the Contracting Officer as required in Section 3.9 EXCAVATION, paragraph 3.9.7.2 Contractor-Furnished. The Contracting Officer will require material samples from any proposed borrow source to be submitted as indicated in paragraph Quality Control.

1.3.2 Haul Roads

Haul roads shall be located and constructed as shown on the drawings and within the project boundaries shown on the drawings. Prior to the commencement of construction, submit for approval a Haul Road Site Plan detailing the location of all haul roads within the project limits. Haul roads between the soil stockpile sites and the levee embankment shall be located within the limits shown on the drawings . The limits of the borrow haul road shall be clearly marked in the field using survey stakes as noted in paragraph SURVEYING. Areas on each side of the borrow haul road corridor shall not be disturbed. Haul roads shall be constructed to maintain the intended traffic, be free draining, and be maintained in good condition throughout the contract period. Any haul road which crosses any creek or drainage channel shall be constructed, and maintained so as to not flood either upstream areas by restricting stream flows or flood downstream areas by the release of any stored water in the event that the crossing fails for any cause. Haul roads constructed during the contract duration shall be removed after work is completed and the impacted area restored to its preconstruction conditions. All haul roads within the right-of-way that will remain as public thoroughfares after construction shall be

cleaned daily and maintained in the preconstruction condition.

1.3.3 Ramps and Crossings

Ramps and crossings shall be constructed at the locations shown on the drawings by placement of a fill as specified in paragraph 1.4.1. Ramps and crossings shall be constructed only by adding material to the levee crown and slopes. Ramps shall have a 20 feet minimum crown width, a grade not to exceed 10 percent, and 1V on 2H side slopes.

1.3.4 Runways

Where material is hauled over an existing levee for construction, the Contractor shall be permitted to construct temporary runways over the levee by the addition of material to the levee cross section. For the construction of runways the minimum width of haul road shall be 20 feet for one-way traffic, and 60 feet for two-way traffic and 1V on 2H side slopes.

1.3.5 Stockpiling

Any on-site stockpiling of embankment materials shall be in accordance with paragraph Stockpiles.

1.3.6 Slides and Foundation Failures

When sliding occurs in any part of the embankment and backfills prescribed in this section after they have been placed, but prior to final acceptance of all work under the contract, repair the slide as directed in writing by the Contracting Officer and approved by the Designers. When the slide is caused through the fault of the Contractor, the repair shall be made at no cost to the Government. When the slide is not the fault of the Contractor, an equitable adjustment in the contract price shall be made pursuant to the Contract Clause CHANGES to cover the cost of the repairs.

1.3.7 Drainage Requirements

Submit written evidence consisting of an authenticated copy of the easement under which the Contractor acquired the property rights and access thereto, prepared and executed in accordance with applicable State and local requirements in the Property Rights and Access Plan. Do not block or restrict the flow in a natural drain, existing culvert, ditch or channel at any time without obtaining prior written approval from the Contracting Officer. This approval will not relieve the Contractor from responsibility for any damage caused by the operation. Monitor the river stream flow and provide sufficient free discharge areas so that conditions are not worsened upstream or downstream by possible floods during construction. Surface water shall be directed away from excavations and construction sites so as to prevent erosion and undermining of foundations. Diversion ditches, dikes, and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained. If private property is to be used for drainage, submit written evidence that the right has been obtained from the property owner for drainage on his property in a Property Owner Drainage Right-of-Way Agreement.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Haul Road Site Plan; G DO
Property Owner Drainage Right-of-Way Agreement; G DO
Borrow Source Plan; G DO
Contractor Selected Borrow Site Plan; G DO
Property Rights and Access Plan; G DO
Shoring, Sheeting, and Bracing Plan; G DO
Excavation Plan; G DO
Backfill Plan; G DO
Surcharge Lift Placement Plan; G DO

SD-02 Shop Drawings

Drainage Requirements

SD-03 Product Data

Shoring, Sheeting, and Bracing; G DO
Excavation; G DO
Borrow Areas; G DO
Plan of Operations; G DO
Embankment and Backfill Materials; G DO

Nuclear Density; G

SD-06 Test Reports

Measurement of Fill Material; G DO
Materials Testing; G DO

SD-07 Certificates

Testing; G DO

Qualifications of the USACE validated commercial testing laboratory.

1.5 REGULATORY REQUIREMENTS

The state statutory and regulatory requirements listed below form a part of this specification to the extent referenced.

1.6 PERMITS

In accordance with Contract Clause PERMITS AND RESPONSIBILITIES, obtain all necessary permits required for the required work and pay all fees associated with permitting and compliance. In addition, the Government has obtained permits for storm water discharge,as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. Comply with the terms of these

permits and with the requirements of Sections 01 57 20 ENVIRONMENTAL PROTECTION, Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL, and this section.

1.7 PROJECT SITE CONDITIONS

1.7.1 Protection of Cultural and Natural Resources

All work and operations shall comply with the requirements of Section 01 57 20 ENVIRONMENTAL PROTECTION and with the requirements of this section.

1.7.2 Protection of Man-Made Facilities and Natural Features

Trees within the clearing area shall be felled in such a manner as to avoid damage to trees left standing and trees outside the clearing area, existing buildings, man-made facilities and natural features, with due regard to the safety of employees and others, and in compliance with EM 385-1-1. Clearing shall occur between September 15 - February 28, unless otherwise approved by the Government. The clearing area shall extend 15 feet riverward and landward from the toes of the final levee and berm sections and as noted below. Excavation shall follow the same requirements specified above for felling trees and shall be in compliance with EM 385-1-1. Existing utility lines that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation and that are to be retained shall be protected from damage during excavation. When utility lines that are to be removed are encountered within the area of operations, notify the applicable utility companies in sufficient time for measures to be taken to prevent interruption of the services.

1.7.3 Historical, Archeological, and Cultural Resources

Historical, archeological, and cultural resources within the Contractor's work limits may exist. If, during construction activities, the Contractor observes items that may have historical or archeological value, such observations shall be reported immediately to the Contracting Officer so that appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in the destruction of these resources and prevent the workers from trespassing on or otherwise damaging such resources.

1.7.4 Subsurface Data

Subsurface soil boring logs along the levee alignment are shown on the drawings and boring logs for all relevant site exploration is attached to these specifications. These data represent subsurface information at the boring locations; however, variations may exist in the subsurface between boring locations. Groundwater levels indicated on the soil boring logs were levels found at the time of exploration. The groundwater table can vary significantly depending on time of year, variation from normal precipitation, and river stage or tide level. Groundwater is reported to be 5 feet below surface in the summer and at surface or one to two feet above surface in the winter.

1.8 SEQUENCING

1.8.1 Clearing and Grubbing

All clearing and grubbing work shall be completed at least 300 feet in

advance of embankment construction. In locations where work on drainage structures is performed prior to embankment construction, all clearing and grubbing shall be completed for the structure at least 30 feet perpendicular to the structure along its entire length and 50 feet below the ends of the structure. If regrowth of vegetation or trees occurs after clearing and grubbing and before placement of embankment, the Contractor shall be required to clear and grub again prior to embankment construction. Clearing and grubbing shall extend 15 feet riverward and landward of the toes of the north new levee and the upgraded section of the Ebey Slough levee and from the toes of the levee berms of the middle and south new levees.

1.8.2 Stripping

After inspection and acceptance of cleared and grubbed areas, stripping may proceed. All stripping work shall be completed not more than 300 feet in advance of embankment construction.

1.8.2.1 Levee Excavation

1. Construct temporary haul roads.
2. Install Temporary Erosion and Sediment Control (TESC) measures.
3. Excavate new levee foundation to lines and grades shown on drawings. Place excavated material adjacent and east of levee excavation for use by the tribe as berm material. Use smooth mold bar on excavator bucket to minimize disturbance to bottom of excavation.
4. New levee foundation excavation shall extend no more than 200 feet ahead of constructed ballast excavation roadway.
5. Dewater new levee excavation as required: Geotextile, geogrid, ballast, and select fill shall not be placed in water.
6. Install settlement plates, inclinometers, and vibrating wire piezometers. Protective casings shall be installed.
7. Place geotextile.
8. Place geogrid transversely across levee excavation in full lengths; overlap not necessary.
9. Construct excavation roadway. Roadway ballast shall be placed in lifts not to exceed one foot. Select fill shall also be placed along foundation in lifts not to exceed 8 inches (compacted to 6 inches).
10. Geogrid separation layers, including ballast and fill, are 1 foot. See drawings for number of layers based upon stationing. Compact each layer with 5 passes of ___ ton smooth steel roller. Vibrating rollers shall not be used. Compact materials to at least 90% maximum dry density.

1.8.2.2 Surcharge Construction (Year 1)

1. Maximum fill lift height shall not exceed five feet.
2. Lifts to be composed of 8" maximum lifts of soil compacted to at least 95% maximum dry density.
3. Lifts must extend the length of the levee. Submit surcharge lift placement plan for approval 30 days prior to material placement.
4. All fill lifts (five feet maximum) shall be allowed to rest for a minimum of seven (7) days before placement of overlying fill lift to allow settlement and dissipation of excess pore water pressure.
5. Cover surface of new levee with approved temporary erosion protection at end of surcharge construction.

1.8.2.3 Final Levee Construction (Year 2)

1. Construct levee berm excavation. Remove excavated material to disposal

area or allow tribe to use material on wave berms.
2. Remove surcharge to elevation 14.5 feet, and use surcharge material to construct levee stability berms.
3. Import additional soil from soil stockpile (if necessary) to construct levee stability berms to lines and grades shown on drawings.
4. Place soil in levee stability berms in eight-inch maximum lifts and compact to at least 90% maximum dry density. Do not place soil in water: dewater levee stability berm excavation, as necessary.
5. Place soil protection/armor.
6. Construct new levee roadway.
7. Hydroseed levee slopes and berms.

PART 2 PRODUCTS

2.1 HAUL ROAD MATERIALS

Haul road routes are shown on the Drawings. Temporary haul roads shall be constructed on the existing ground surface for access to the construction areas of the new levee and the Ebey Slough levee breach. A haul road shall exist on the existing Ebey Slough levee and on the exiting road directly east of the sewage lagoon levee. These roads shall be resurfaced at the end of construction and shall not be removed except at locations noted on the Drawings at the Ebey Slough levee breach. Temporary haul roads shall be constructed across the existing land surface with minimal disturbance of the vegetative mat cover. Depressions and channels may be filled as required along the road alignment. A geotextile as specified in Section 31 05 19 shall be placed on the existing ground surface along the temporary haul road alignment. The base course shall be a minimum of 12 inches thick and placed in accordance with Section 32 11 23. Crushed surface course shall be placed on the base course and shall be 2 inches thick. The geotextile shall extend 2 feet beyond the edges of the aggregate base course and crushed aggregate surface course. The top width of the road shall be 15 feet. Edges of the aggregate shall slope at the angle of repose from the geotextile. The grade of the road shall be shall be maintained a minimum of 14 inches above the existing ground surface and shall be free of depressions, dips, or humps along the alignment. The road shall slope at two percent to one side to allow drainage of runoff. The roads shall be maintained during construction work to remove ruts, depressions, ridges, areas of poor drainage, and obstructions that may impact site access.

2.2 TYPES OF FILL MATERIALS

2.2.1 Select Fill

Select fill for the embankment material shall be obtained from the borrow site provided by the Tulalip Tribe . The select fill material shall consist of satisfactory materials classified in accordance with ASTM D 2487 as CL, GM, GC, SM, or SW-SM. The select fill shall be screeneed and transported to the soil stockpile at the Project site by the Tulalip Tribe at no cost to the Contractor or Government.

2.2.2 Riprap

Riprap embankment protection shall meet the requirements of Light Loose Riprap as per WSDOT 9-13.1(2().

2.3 SETTLEMENT GAGES

Settlement gages shall be constructed and placed as shown in the Drawings. The settlement gage plates shall be manufactured before being brought to the site. The base of the settlement gage plate shall be placed one foot below the bottom of the new levee excavation. The soil for the settlement plate excavation shall be removed by hand and the base of this excavation shall be disturbed as little as possible, shall not be compacted, and shall be horizontal and free or any loose soil or debris. The settlement gauge shall be attached to the settlement plate and the instrument placed gently in the settlement plate excavation. The gage pipe shall be vertical and constructed to height of three feet above the final elevation of the maximum fill lift as shown on the drawings.

2.6 VIBRATING WIRE PIEZOMETERS

Vibrating wire piezometers shall be placed as shown in the Drawings. The vibrating wire piezometers shall be <type_____> conforming to _____. The vibrating wire piezometers shall be installed in bore hole placed below the settlement gage plates or as recommended by the Manufacturer. The monitoring wire shall be run through the interior of the settlement gage stand pipe to allow ease in access for readings.

2.6 INCLINOMETERS

Inclinometers shall be placed as shown in the Drawings. The inclinometers shall be <type_____> and shall be installed in accordance with _____. The inclinometers shall be placed at the toes of the Year 1 constructed new levee in bore holes. The inclinometers shall be extended to 40 feet below ground surface and shall extend three feet above the ground surface. All inclinometers shall be protected by steel protective casing with a lockable lid.

PART 3 EXECUTION

3.1 CONSTRUCTION

3.1.1 Lines and Grades

The new levee embankment and new levee excavation select fill shall be constructed to the lines, grades, and cross sections indicated on the drawings. The Government reserves the right to increase or decrease the foundation widths and embankment slopes or to make such other changes in the embankment or backfill sections as may be deemed necessary to produce a safe structure. Changes in quantities resulting from such revisions will not constitute justification for change in contract unit prices, except as provided for in the Variations in Estimated Quantities Clause. The end slopes and side slopes of partial fill sections shall not be steeper than one vertical on 3 horizontal , for the middle and south new levees, unless otherwise shown on the drawings. The end slopes and side slopes of partial fill sections shall not be steeper than one vertical on two horizontal on the riverward side and one vertical on 2.5 horizontal on the landward side of the north new levee, unless otherwise shown on the drawings.

3.1.2 Conduct of the Work

Maintain and protect the embankment and backfill in a satisfactory condition at all times until final completion and acceptance of all work

under the Contract. If, in the opinion of the Contracting Officer, the hauling equipment causes horizontal shear planes or slicken sides, rutting, quaking, heaving, cracking, or excessive deformation of the embankment or backfill, limit the type, load, or travel speed of the hauling equipment on the embankment or backfill. The Contractor may be required to remove, at no additional payment, any embankment material placed outside of prescribed slope lines. Any approved embankment or backfill material which is lost in transit or rendered unsuitable after being placed in the embankment or backfill and before final acceptance of the work shall be replaced in a satisfactory manner and no additional payment will be made. Excavate and remove from the embankment or backfill any material which is unsatisfactory, dispose of such material, and refill the excavated area as directed, all at no cost to the Government.

3.2 CLEARING

Clearing shall be accomplished within the limits of existing ground to receive embankment and structures, together with strips 5 feet wide, beyond and contiguous thereto, existing levees to be degraded, ponding areas, ditches, structures, traverses, channels, riprap, revetment, borrow areas and ramps. Clearing shall occur between September 15 - February 28, unless otherwise approved by the Government. Trees, downed timber, snags, slash, brush, garbage, trash, debris, fencing and other items shall be cleared flush with the existing ground surface. Trees and vegetation designated to be left standing or to remain shall be protected from damage from construction operations. Clearing of borrow areas shall be limited to the minimum area required for construction operations.

3.3 GRUBBING

Grubbing shall be accomplished within the limits of existing ground to receive embankment and structures, together with strips 5 feet wide, beyond and contiguous thereto, existing levees to be degraded, ponding areas, ditches, structures, traverses, channels, riprap, revetment, borrow areas and ramps. Grubbing shall be accomplished to a depth of at least 3 three feet below the existing ground surface. All holes caused by grubbing operations and removal of pipes and drains, excluding holes in borrow areas, channels and ditches above required grade, shall be filled with satisfactory material as specified in paragraph 2.2.1 Select Fill. This material shall be placed in 8 inch layers to the elevation of the adjacent ground surface and each layer compacted to a density at least equal to that of the adjoining undisturbed material.

3.4 STRIPPING

The entire area within the limits of existing ground to receive embankment and structures, together with strips 5 feet wide, beyond and contiguous thereto, existing levees to be degraded, ponding areas, and ditches shown on the drawing shall be stripped to remove crops, weeds, grass, and other vegetative materials to the ground surface and topsoil to a depth of 12 inches, or as indicated on the drawings.

3.5 DISPOSITION OF CLEARED, GRUBBED, AND STRIPPED MATERIAL

Except as otherwise specified or indicated on the drawings, all materials resulting from clearing and grubbing operations shall be stockpiled on-site in the riverward portion of the project at least 100 feet from the riverward toe of the new levee. Cleared and grubbed material shall be sorted to separate neatly stacked piles of trees with diameters greater

than 4 inches, trees less than 4 inches in diameter and brush, and tree roots with stumps. The trees, brush, and root with stumps may be distributed in the restoration area by the Tulalip Tribe. Any debris, trash, or metal shall be separated from the cleared and grubbed material and shall be disposed of off site. In no case shall any material resulting from clearing and grubbing operations be buried or permanently placed within the new levee foundation, embankment, or any structural foundation. The topsoil material resulting from the stripping operations shall be temporarily stockpiled in a staging area at the disposal area noted on the Drawings.

3.5.1 Burning

Burning of cleared and grubbed material on-site shall not be allowed.

3.5.2 Burying

Burying of cleared and grubbed material on-site shall not be allowed.

3.5.3 Chipping

All branches, and brush may be chipped. The chips shall be hauled either to stockpiles indicated on the Drawings, or shall be disposed of at the locations shown on the Drawings by thin spreading of the chips on the existing ground surface.

3.5.4 Removal from Site of Work

The Contractor may elect to remove all or part of the cleared and grubbed materials from the site of the work in accordance with Section 01 57 20 ENVIRONMENTAL PROTECTION. The Government is not responsible for the protection and safekeeping of any materials retained by the Contractor. Such materials shall be removed from the site of the work before the date of completion of the work.

3.6 REMOVAL OR PLUGGING OF ABANDONED PIPE AND CONDUITS

Abandoned pipes and conduits shall be removed to the limits shown on the D rawings or plugged by complete filling with concrete. Prior to plugging and filling with concrete, clean the interior of the pipe to be plugged and place the concrete in such a manner as to insure a dense, well bonded plug and fill. Concrete shall be light weight and suitable for use in saline environments.

3.7 SHORING, SHEETING, AND BRACING

Submit a detailed Shoring, Sheeting, and Bracing Plan 30 days prior to the beginning of any excavation so supported. The plan for shoring, sheeting and bracing shall be prepared and certified by licensed Professional E ngineer. Include in the plan Drawings and design computations of the proposed shoring, sheeting, and bracing, and documentation, showing details of the coordination and approval of shoring, sheeting, and bracing by the applicable parties. Approval of the detailed plan shall be obtained from the Contracting Officer prior to starting the work. If necessary, modify the plan as required to meet field conditions, and the modifications shall be approved prior to use.Shoring, sheeting, and bracing shall be installed where required for the protection of existing natural features and man-made facilities, for the safety of workers and the public, in compliance with EM 385-1-1, and to insure the integrity of the embankment. Shoring,

sheeting and bracing shall not be used in lieu of the required excavation slopes. Shoring, sheeting, and bracing shall be adequately designed and properly installed to withstand anticipated loads. Shoring, sheeting and bracing shall be planned and designed by a registered professional engineer. All shoring, sheeting and bracing shall be removed as embankment and backfill operations progress.

3.8 DEWATERING AND DIVERSION

Surface and groundwater control shall be accomplished in coordination with the required excavation and embankment construction. Surface and/or groundwater control may necessitate the use of temporary diversion ditches, cofferdams and/or dewatering by the use of pumping. Methods for care of surface water and for controlling the surface and groundwater levels shall be subject to approval of the Contracting Officer. Turbid water shall be treated before disposal to the stream or river systems. The new levee excavations shall be dewatered as required. No levee material or backfill shall be placed in water.

3.9 EXCAVATION

Excavation shall consist of removal of material in preparing the foundations to the lines and grades shown on the Drawings, removal of material from ditches and channels to the lines and grades shown on the D rawings, removal of objectionable materials and obtaining required fill materials from the borrow areas. Blasting will not be permitted or required. Over-excavation shall be backfilled to grade with similar over excavated material or satisfactory material and compacted to a density of at least that of the surrounding material. Submit a written Excavation Plan 30 days prior to the beginning of any excavation. Approval of the detailed plan shall be obtained from the Contracting Officer prior to starting the work. If necessary, modify the plan as required to meet field conditions, and the modifications shall be approved prior to use. At a minimum, the plan shall contain the following:

a. Proposed methods for preventing interference with, or damage to, existing underground or overhead utility lines, trees designated to remain and other man-made facilities or natural features designated to remain within or adjacent to the construction rights-of-way.

b. Provision for coordinating the work with other Contractors working in the construction rights-of-way or on facilities crossing or adjacent to this work.

c. The proposed methods for controlling surface and ground water in the borrow areas and required excavations.

d. Stockpiling plan for embankment material before it is transported to the project site showing locations, stockpile heights, slopes, limits, and drainage around the stockpile areas.

e. A complete listing of equipment used to excavate and transport the excavated material.

f. The proposed sequence of work for excavating the borrow areas with plan and cross sectional views showing starting and final work locations and clearing, grubbing and stripping limits.

g. The proposals for conserving arable land and for making optimum use

of available borrow, including the Contractor's proposed methods for grading the bottom of the borrow areas after completing use of the borrow areas.

h. The proposed road pattern, and plan for implementing dust control measures.

3.9.1 Over Excavation

3.9.1.1 Outside Limits of Levee Foundations or Structures

Over excavation outside the limits of the foundations of levees or structures shall be backfilled to grade with satisfactory material and compacted to a density of at least that of the surrounding material.

3.9.1.2 Within Limits of Levee Foundations or Structures

Over excavation within the limits of the foundations of levees or structures shall be backfilled to grade in accordance with paragraph PREPARATION OF FOUNDATION, PARTIAL FILL SURFACES AND ABUTMENTS.

3.9.2 Inspection Trench

An inspection trench shall be excavated and maintained free of standing water. The trench shall be excavated at least 20 feet in advance of, but not more than 320 feet in advance of, construction. The trench shall be constructed along the centerline of the new levee and shall be two feet deep and four feet wide.

3.9.3 Structures

Excavations for structures shall conform to the dimensions and elevations indicated for each structure and footing, except as specified hereinafter, and shall include trenching for utility and foundation drainage systems to a point five feet beyond each structure and all work incidental thereto. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms. Satisfactory material removed below the depths indicated without specific direction of the Contracting Officer shall be replaced at no additional cost to the Government and filled in accordance with paragraph OVER EXCAVATION above. Over excavation below required invert elevations or bottoms of footings shall be backfilled with lean concrete. No footings shall be constructed on unsatisfactory material as determined by the Contracting Officer. Excessively wet and/or soft material in subgrades resulting from water ponding in footing excavations shall be removed and replaced with lean concrete.

3.9.4 Channels

Channels shall be excavated at the locations and to the lines and grades shown on the drawings and in accordance with paragraph TOLERANCES.

3.9.5 Ditches

Drainage ditches shall be excavated at the locations and to the lines and grades shown on the drawings and in accordance with paragraph TOLERANCES.

3.9.6 Slopes and Surcharges

Temporary excavation slopes for any channel, structure excavation, or other

required excavation shall not be steeper than the specified finished slope or the specified construction slope, as applicable, and subject to the approval of the Contracting Officer. This may be accomplished by benching the temporary slope so that the average slope is not steeper than the specified slope. In addition, no temporary, permanent, or construction slope shall be surcharged with excavated or stockpiled material or with heavy construction equipment which would have the same effect as the surcharge material. The toe of stockpiled material shall be maintained a minimum distance back from the top of the finished excavation equal to the depth of the excavation. Determine the maximum height of such stockpile without causing instability of the excavation slope. Any slide or other adverse conditions caused by failure of the Contractor to maintain these conditions shall be considered the responsibility of the Contractor and remedial measures shall be at the Contractor's expense.

3.9.7 Borrow Areas

Submit a written statement to the Government not later than 30 days after receipt of Notice to Proceed indicating the Contractor's intention to use the specified Government-furnished borrow area(s), Contractor-furnished borrow area(s), or a combination of these borrow areas.

3.9.7.1 Government-Furnished

Borrow areas shall be excavated to the extent necessary to obtain satisfactory material within the lines and grades as shown on the drawings. When the material necessary for the construction of the embankment and berms cannot be obtained from adjacent borrow areas, it shall be obtained from other Government-furnished borrow areas. Any excavation below the depths and slopes specified herein or shown on the drawings shall be backfilled by the Contractor, at the Contractor's expense, to the specified permissible excavation line, with satisfactory material(s), as specified by the Contracting Officer to a density of at least that of the surrounding material. Borrow areas shall be drained and kept dry during excavation. Where possible, unsatisfactory materials in borrow areas shall not be removed.

3.9.7.2 Contractor-Furnished

Proposed borrow areas shall be subject to approval by the Contracting Officer. Any borrow sources proposed, accepted and approved by the Contracting Officer shall meet all applicable Federal, State and local requirements. Proposed sources located within 200 feet landward and 200 feet riverward of the levee shall not be permitted.

3.9.8 Toe Drains

Toe drains shall be excavated to the dimensions and the locations indicated on the drawings.

3.9.9 Utilities

Excavations for pipe beds shall be shaped to fit the contour of the pipe over a width of not less than 0.6 of the pipe diameter, or as shown on the drawings.

3.9.10 Rock

Rock excavation shall not be required.

3.9.11 Riprap and Bedding

Riprap shall be provided from a source approved by the Government and in accordance with Paragraph 2.2.2.

3.10 TOLERANCES

A tolerance of two inches above or below the prescribed grade will be allowed in the excavation for channels, ditches, inspection trenches, cutoff trenches, excavations for riprap and bedding, and mandatory borrow areas.

All embankments and backfills shall be constructed to the grades, lines, and cross-sections shown on the Drawings. At all points a tolerance of two inches above or below the prescribed grade will be permitted in the final dressing, provided that any excess material is so distributed that the crown of the levee drains and that there are no abrupt humps or depressions in any surfaces.

3.11 SLIDES

In case sliding occurs in any part of the excavations prescribed in this section after they have been excavated, but prior to final acceptance of all work under the contract, repair the slide as directed by the Contracting Officer. In case the slide is caused through the fault of the Contractor, it shall be repaired at no cost to the Government. In case the slide is due to no fault of the Contractor, an equitable adjustment in the contract price will be made for the repairs in accordance with the Contract Clause CHANGES.

3.12 STOCKPILES

Provisions of paragraph SLOPES AND SURCHARGES are applicable to all stockpiled materials. Upon completion of construction operations, all remaining stockpiled material shall be removed and disposed of by the disposal methods specified in paragraph DISPOSITION OF EXCAVATED MATERIALS.

3.13 SURFACE DRAINAGE OF COMPLETED AREAS

The surface shall be free from sharp ridges, gullies, potholes, sinkholes, and any other surface irregularities. A tolerance of two inches above or below the prescribed grade will be allowed provided that the surface drains in the direction as indicated on the Drawings.

3.14 MAINTENANCE OF WORK

3.14.1 Debris Removal

Maintain all ditch and channel excavations free from leaves, brush, sticks, trash, and other debris until final acceptance of all work under the contract at no additional cost to the Government.

3.14.2 Sediment Removal

Prior to final acceptance of all work under this contract, the removal of sediments from ditch or channel excavations shall be required to restore design grade and section at no additional cost to the Government.

3.15 DISPOSITION OF EXCAVATED MATERIALS

3.15.1 Unsatisfactory Materials

Unsatisfactory materials shall be as defined in paragraph DEFINITIONS, subparagraph UNSATISFACTORY MATERIALS. Unsatisfactory materials from the excavations prescribed in this section shall be permanently disposed of by placing in the disposal area shown on the drawings . The material shall be shaped so that its surface is free from abrupt changes in grade and shall be sloped to drain.

3.16 PREPARATION OF FOUNDATION, PARTIAL FILL SURFACES AND ABUTMENTS

3.16.1 Earth

After excavation (as described in paragraph EXCAVATION) or stripping (as described in paragraph CLEARING, GRUBBING AND STRIPPING) of the embankment foundation to the extent indicated or otherwise required, the sides of stump holes, test pits, and other similar cavities or depressions shall be broken down so as to flatten out the slopes, and the sides of the cut or hole shall be scarified to provide bond between the foundation material and the fill. Unless otherwise directed, each depression shall be filled with the same material type that is to be placed immediately above the foundation. The fill shall be placed in layers, moistened, and compacted in accordance with the applicable provisions of paragraphs PLACEMENT, MOISTURE CONTROL, and COMPACTION for the specific material type. Materials which cannot be compacted by roller equipment because of inadequate clearances shall be compacted with power tampers in accordance with the paragraph COMPACTION for the specific material type. After filling of depressions and immediately prior to placement of compacted fill in any section of the embankment, the foundation of such section shall be loosened thoroughly by scarifying, plowing, discing or harrowing to a minimum depth of four inches, and the moisture content shall be adjusted to the amount specified in paragraph MOISTURE CONTROL for the appropriate type of material. The bottom of the new levee foundation excavation shall be disturbed as little as possible before the placement of backfill. Immediately prior to placement of compacted fill on or against the surfaces of any partial fill section, all soft or loose material, all material containing cracks or gullies, and all material that does not conform with the specified zoning of the embankment shall be removed. The remaining surface of the partial fill shall be loosened by scarifying, plowing, discing or harrowing to a minimum depth of four inches, and the moisture content shall be adjusted as specified in paragraph MOISTURE CONTROL for the appropriate type of material. The surface of the partial fill section upon which fill is to be placed shall then be compacted as hereinafter specified for the appropriate type of fill.

3.16.2 Benching

Benching into existing levee embankment and abutments is required in order to place and compact the material in horizontal layers. The vertical face cut into the existing embankment or abutment resulting from the benching operation shall be a minimum of 12 inches in height but shall not exceed34 inches in height or as shown on the Drawings.

3.16.3 Settlement of Foundation

The Contractor shall furnish and install settlement gages , at the settlement measurement locations shown on the plans, for determination of

settlement of the foundation during construction within the settlement measurement ranges shown on the drawings. Each settlement measurement location shall be located on the prepared foundation at a point directly under the crown of the planned levee section prior to placing of fill material. The gages shall be maintained and extended, if necessary, during the construction. The type and arrangement of the gages shall be as shown on the drawings. Make such measurements and determine such elevations on the gages prior to the placing of fill material and again within 24 hours after final cross sections have been taken over the completed embankment at the locations of the gages. Perform a cross section at the settlement measurement location prior to the placing of fill material to establish the elevation of the foundation/embankment interface. Within 24] hours after final cross sections have been taken over the completed embankment at the settlement measurement location perform the core boring to determine foundation settlement. Settlement measurements shall be subject to verification by the Contracting Officer.

3.17 PLACEMENT AND SPREADING

3.17.1 General

Prior to beginning embankment placement on the levee foundation, notify the Government that the foundation is ready to receive fill. No fill shall be placed on any part of the embankment foundation until such areas have been inspected and given final approval by the Contracting Officer.

3.17.1.1 Gradation and Distribution

The gradation and distribution of materials throughout each zone of the levee shall be such that the embankment shall be free from lenses, pockets, streaks, and layers of material differing substantially in texture or gradation from surrounding material of the same class. If lenses, pockets, or layers of materials differing substantially in texture or gradation from surrounding material occur in the spread material, the layer shall be mixed by harrowing or any other approved method to blend the materials. During the placing and spreading process, maintain at all times a force of workers adequate to remove all roots, debris, and oversize stone from all embankment materials. All stones and rock fragments larger than 3 inches in any dimension shall be removed from the fill. No fill shall be placed upon a frozen surface, nor shall snow, ice, or frozen earth be incorporated in the embankment.

3.17.1.2 Foundations and Partial Embankment Fills

The foundations and all partial embankment receiving fills shall be kept thoroughly drained. Placing operations will be such as to avoid mixing of materials from adjacent sections as much as practicable.

3.17.1.3 Equipment Traffic

Equipment traffic on any embankment zone shall be routed to distribute the compactive effort as much as practicable. 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 from the succeeding layer is placed.

3.17.2 Placement on Surfaces Containing Frozen Materials

Embankment shall not be placed on a foundation which contains frozen material, or which has been subjected to freeze-thaw action. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades (whether in an excavation or on an embankment, and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to nights, holidays, weekends, or winter shutdowns of earthwork operations, shall be removed to a depth that is acceptable to the Contracting Officer and replaced with new material. Alternatively, the material shall be thawed, dried, reworked and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill shall cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for the determination. Levee embankment material shall not contain frozen clumps of soil, snow or ice.

3.17.3 Placement of Embankment and Backfill Against Structures

No embankment or backfill shall be placed on or against concrete less than 7 days after placement or 70 percent of the design strength, without prior approval of the Contracting Officer. Crawler-type tractors, vibratory equipment and other similar compaction equipment shall not be used within 4 feet of any completed or partially completed structure. Compaction within 4 feet of completed or partially completed structures shall be accomplished by the use of mechanical hand tampers, vibrating plates, or other approved methods and equipment. Ensure that compaction operations do not damage any existing utilities. Any damage caused by the Contractor's operation shall be repaired at the Contractor's expense.

3.17.4 Select Fill

Select fill material shall be placed and spread in layers not more than 8 inches in uncompacted thickness, except that within 4 feet of structures, the uncompacted layer thickness shall be reduced to 6 inches. Layers should be started full out to the slope stakes and shall be carried substantially horizontal and parallel to the levee centerline with sufficient crown or slope to provide satisfactory drainage during construction.

3.18 MOISTURE CONTROL

3.18.1 General

The materials in each layer of the fill shall contain the amount of moisture, within the limits specified below or as directed by the Contracting Officer, necessary to obtain the required compaction. Material that is not within the specified moisture content limits after compaction shall be reworked to obtain the specified moisture content, regardless of density.

3.18.1.1 Insufficient Moisture for Suitable Bond

If the top or contact surfaces of a partial fill section become too dry to permit suitable bond between these surfaces and the additional fill to be placed thereon, loosen the dried materials by scarifying or discing to such

depths as may be directed by the Contracting Officer, shall dampen the loosened material to an acceptable moisture content, and shall compact this layer in accordance with the applicable requirements of paragraph COMPACTION.

3.18.1.2 Excessive Moisture for Suitable Bond

If the top or contact surfaces of a partial fill section become too wet to permit suitable bond between these surfaces and the additional fill to be placed thereon, the wet material shall be scarified and permitted to dry, assisted by discing or harrowing, if necessary, to such depths as may be directed by the contracting officer. The material shall be dried to an acceptable moisture content, and shall be compacted in accordance with the applicable requirements of paragraph COMPACTION.

3.18.1.3 Drying Wet Material

Material that is too wet shall be spread on the embankment and permitted to dry, be assisted by discing or harrowing, if necessary, until the moisture content is reduced to an amount within the specified limits.

3.18.1.4 Increasing Moisture in Dry Material

The moisture content of material that is too dry, will be adjusted on the levee embankment . Add water to the fill material and by harrowing, or other approved methods, work the moisture into the material until a uniform distribution of moisture within the specified limits is obtained. Water applied on a layer of fill on the levee embankment shall be accurately controlled in amount so that free water will not appear on the surface during or subsequent to rolling. Should too much water be added to any part of the embankment, the rolling on that section of the embankment shall be delayed until the moisture content of the materials is reduced to an amount within the specified limits. If it is impracticable to obtain the specified moisture content by wetting or drying the material on the fill, the Contractor may be required to pre-wet or dry back the material at the source of excavation or in the borrow area.

3.18.2 Select Fill

The moisture content after compaction shall be within the limits of two percentage points above optimum to two percentage point below optimum moisture content as determined by ASTM D 698.

3.19 COMPACTION

3.19.1 Compaction Equipment

Compaction equipment shall conform to the following requirements and shall be used as prescribed in subsequent paragraphs.

3.19.1.1 Tamping Rollers

Tamping rollers shall be as follows:

a. Towed -Tamping rollers shall consist of a heavy duty double drum unit, with a drum diameter not less than 60 inches, and an individual drum length of not less than 60 inches. The drums shall be capable of being ballasted with water or a combination of sand and water. Each drum shall have staggered feet uniformly spaced over the cylindrical surface

such as to provide approximately three tamping feet for each 2 square feet of drum surface. The tamping feet shall be 7 to 9 inches in clear projection from the cylindrical surface of the roller and shall have a face area of not less than 5 square inches nor more than 7 square inches. The roller shall be equipped with cleaning fingers, so designed and attached as to prevent the accumulation of material between the tamping feet, and these cleaning fingers shall be maintained at their full length throughout the periods of use of the roller. The weight of the roller shall not be less than 3500 psf of linear drum length weighted, and shall not be more than 2000 psf of drum length empty. The two drums comprising one roller unit shall be yoked such that they will oscillate when traversing uneven surfaces. The design and operation of the tamping roller shall be subject to the approval of the Contracting Officer who shall have the right at any time during the prosecution of the work to direct such repairs to the tamping feet, minor alterations in the roller and variations in the weight as may be found necessary to secure optimum compaction of the earth fill materials. The Contractor may be required to add ballast to the roller to the maximum capacity specified by the manufacturer of the roller. The roller shall be drawn by a crawler-type or a rubber-tired tractor at a speed not to exceed 3.5 miles per hour. The use of the rubber-tired tractor shall be discontinued if the tires leave ruts that prevent uniform compaction by the tamping roller. If tamping rollers are used in tandem, not more than two rollers in tandem will be permitted and in such case, one trip of the tandem rollers over any surface will be considered as two passes. When tamping rollers are used in tandem, the tamper foot spacing shall be offset so that the circumferential rows on the rear drums are in line with the mid-point of the circumferential rows on the forward drums.

b. Self-propelled - Conditioned upon satisfactory performance, self-propelled tamping rollers may be used in lieu of tractor-drawn tamping rollers. Self-propelled rollers exceeding the empty weight requirement may be used provided that by the substitution of tamping feet, having a face area not exceeding 14 square inches, the nominal foot pressure on the tamping feet of the self-propelled roller can be adjusted to approximate the nominal foot pressure of the towed roller for the particular working condition required for the towed rollers. The tamping feet shall be 7 to 9 inches in clear projection from the cylindrical surface of the roller. For self-propelled rollers, in which steering is accomplished through use of rubber-tired wheels, the tire pressure shall not exceed 40 psi. Self-propelled rollers shall be operated at a speed not to exceed 3.5 miles per hour. Self-propelled tamping rollers may be used in lieu of tractor drawn tamping rollers provided the foot pressure on the tamping feet of the self-propelled roller are approximately the same as the foot pressure on the towed roller. For self-propelled rollers steered with rubber-tired wheels, the tire pressure shall not exceed 40 psi. Self-propelled rollers shall be operated at speeds not exceeding 3.5 miles per hour. The Contracting Officer has the authority to limit or eliminate the use of self-propelled rollers if they are found to cause shearing or laminations of the compacted fill.

3.19.1.2 Vibratory Rollers

Vibratory rollers for compacting rock fills, pervious sand and gravel fills, or filter and transition drainage layers shall be equipped with a smooth steel compaction drum and shall be operated at a frequency of vibration during compaction operations between 1100 and 1500 vpm.

Vibratory rollers may be either towed or self-propelled and shall have an unsprung drum weight that is a minimum of 60 percent of the rollers' static weight. Towed rollers shall have at least 90 percent of their weight transmitted to the ground through the compaction drum when the roller is standing in a level position hitched to the towing vehicle. Rollers for compacting rockfill, sand and gravel fills, or filter and drainage layers shall have a minimum static weight of 20,000 pounds, a minimum dynamic force of 40,000 pounds when operating at 1400 vpm, and an applied force not less than 9,000 pounds per foot of compaction drum length. Rollers for compacting sand and gravel fills or filter and drainage layers shall have a minimum static weight of 8,000 pounds, a minimum dynamic force of 16,000 pounds when operating at 1400 vpm, and an applied force not less than 5,000 pounds nor greater than 9,000 pounds per foot of compaction drum length. The level of amplitude and vibration frequency during compaction will be maintained uniform throughout the embankment zone within which it is operating. Rollers shall be operated at speeds not to exceed 1.5 mph. The equipment manufacturer shall furnish sufficient data, drawings, and computation for verification of the above specifications, and the character and efficiency of this equipment shall be subject to approval. Vibrating rollers shall not be used until the new levee embankment is constructed to four feet above the ground surface and only if the use of such equipment does not cause pumping or excessive deformation of the select fill, increased settlement or later disablement of the embankment, or generation of excessive pore water pressures.

3.19.1.3 Hand Operated Compactors

Compaction of material, in areas where it is impracticable to use a roller or tractor compaction shall be performed by the use of approved hand operated power compactors.

a. Power Tampers: Power tampers shall be hand operated equipment capable of compacting material in confined areas. The compactors shall be either an internal combustion or pneumatic activated tamper. Tampers shall have sufficient weight and striking power to produce the specified compaction. The character and efficiency of this equipment shall be subject to the approval of the Contracting Officer.

b. Vibratory Plate Compactor: Vibratory compactors operated by hand in confined areas shall utilize the oscillating cam principal and shall deliver an impact of not less than 2000 lbf at a rate of approximately 2000 impulses per minute. The character and efficiency of this equipment shall be subject to the approval of the Contracting Officer.

3.19.1.4 Crawler-type Tractors

Crawler-type tractors used for spreading or compaction shall weigh not less than 20,000 pounds, shall exert a unit tread pressure of not less than 6 psi, and shall be operated at a speed not to exceed 3.5 miles per hour.

3.19.1.5 Sprinkling Equipment

Sprinkling equipment shall consist of tank trucks, pressure distributors or other equipment designed to apply water uniformly and in controlled quantities to variable width of surface.

3.19.1.6 Miscellaneous Equipment

Scarifiers, disks, spring-tooth or spike-tooth harrows, spreaders, and

other equipment shall be suitable for use in embankment construction and approved by the Contracting Officer. Equipment used for blending fill material shall be capable of penetrating the full loose lift thickness of the specific material type.

3.19.2 Compaction of Select Fill

After a layer of material has been dumped and spread, it shall be harrowed to break up and blend the fill materials and to obtain uniform moisture distribution. Harrowing shall be performed with a heavy disk plow, or other approved harrow, to the full depth of the layer. If one pass of the harrow does not accomplish the breaking up and blending of the materials, additional passes of the harrow shall be required, but in no case will more than three passes of the harrow on any one layer be required for this purpose. When the moisture content and the condition of the layer are satisfactory, the lift shall be compacted to a minimum of 95 percent of the maximum dry density as determined by the Contractor in accordance with ASTM D 698 . In areas which are not accessible by roller, the fill shall be placed in layers not more than 4 inches in uncompacted depth and compacted with an approved hand operated compactor to a density equal to that obtained in other areas which are accessible to rollers. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously. Compaction equipment shall be operated such that the strip being traversed by the roller shall overlap the rolled adjacent strip by not less than 3 feet.

3.19.3 Compaction Adjacent to Structures and Utilities

Heavy equipment for spreading and compacting fill shall not be operated within 4 feet of structures or utilities, except as otherwise specified herein. Material within 4 feet shall be compacted using appropriate hand operated compactors specified herein.

3.19.4 Additional Rolling for Compaction

If the Contracting Officer determines that the desired compaction of any portion of the embankment is not achieved by the number of coverages specified, additional complete coverages shall be made over the surface area as directed by the Contracting Officer.

3.20 FIELD QUALITY CONTROL

3.20.1 Clearing, Grubbing, and Stripping

Establish and maintain quality control for clearing, grubbing, and stripping operations to assure compliance with contract requirements, and maintain records of the quality control for all construction operations including but not limited to the items indicated below. Furnish these records, as well as the records of corrective actions taken, to the Government in accordance with Section 01 45 00 CONTRACTOR QUALITY CONTROL.

3.20.1.1 Clearing

Station to station limits, transverse clearing limits from applicable centerline; percentage of area complete; types of materials cleared.

3.20.1.2 Grubbing

Station to station limits, transverse grubbing limits from applicable centerline; percentage of area complete; type of material; filling of grubbed holes.

3.20.1.3 Stripping

Station to station limits, transverse stripping limits from applicable centerline; percentage of area complete; type of material; depth of stripping.

3.20.2 Excavation

Establish and maintain quality control for excavation operations to assure compliance with contract requirements, and maintain records of the Contractor's quality control for all construction operations including but not limited to the following:

a. Lines, grades and tolerances,

b. Segregation of materials,

c. Disposal and/or stockpiling of materials,

d. Unsatisfactory materials,

e. Conditions that may induce seepage or weaken the foundation or embankment,

f. Stability of excavations.

Furnish records of inspections and tests, as well as the records of corrective actions taken, to the Government in accordance with Section 01 45 00 CONTRACTOR QUALITY CONTROL.

3.20.3 Embankment

3.20.3.1 General

As a part of the Contractor Quality Control (CQC) system required by SECTION 01 45 00 CONTRACTOR QUALITY CONTROL, establish and maintain field quality control for foundation preparation, embankment and backfill operations to assure compliance with contract requirements and maintain detailed records of field quality control for all operations including but not limited to the following:

a. Earthwork Equipment

Type, size, number of units and suitability for construction of the prescribed work.

b. Foundation Preparation

Methods of preparing the foundations in advance of embankment and backfill construction and methods for providing drainage of the foundation and partially completed fills.

3.20.3.2 Materials Testing

Perform sufficient testing to insure that the fill is being constructed as specified. The testing program specified below shall be considered the minimum acceptable frequency of testing. This does not relieve the Contractor from the responsibility of performing additional testing, if required to ensure compliance with these specifications.

a. Soil Classification Tests

Soil classification tests shall be performed in accordance with ASTM D 2487. One initial classification test shall be required for each different classification of material to be utilized as embankment fill or backfill. As prescribed in ASTM D 2487, grain size analyses in accordance with ASTM D 422 and Atterberg limits in accordance with ASTM D 4318 shall be performed on each different classification. Submit additional tests for every 3000 cubic yards of embankment or backfill material. Soil classification tests shall be performed on foundation material as required to determine the acceptability of the in-situ soils. Additional tests will be required if noticeable changes in the material occur.

b. Cohesive Material Testing

(1) Moisture Density Relationships. The moisture-density relations for each different classification of cohesive material utilized shall be determined in accordance with ASTM D 1557. Prior to placing any fill material containing cohesive material, a minimum of (5) five-point compaction test shall be performed on representative samples of the material to be used as fill. During fill placement a minimum of one additional moisture-density test shall be performed for every 5000 cubic yard placed. Additional tests will be required each time a new material is encountered. The moisture-density curves will be compiled to form a family of curves which will be utilized to estimate optimum properties (maximum dry density and optimum moisture content) to be used with field density test.

(2) Water (Moisture) Content Tests. Determination of water content shall be performed in accordance with ASTM D 2216. ASTM D 4643 may be used when rapid moisture content results are needed. All rapid results obtained by ASTM D 4643 shall be confirmed by a test on a duplicate sample performed in accordance with ASTM D 2216. In the event of disagreement between the results, ASTM D 2216 shall govern. One water content test will be performed for each 5000 cubic yards of material placed or each lift of material whichever is less. These test will be in addition to the water content tests performed in conjunction with in-place density tests. Backfill and fills not meeting the required specifications for water content shall be retested after corrective measures have been applied.

(3) In-place Density Testing for Cohesive Materials. The in-place density of the cohesive materials shall be determined in accordance with ASTM D 1556, ASTM D 2167, ASTM D 6938, ASTM D 2937, or ASTM D 5195. At least one (1) in-place density test shall be performed on each lift of material or every 3000 cubic yards of completed fill whichever is more frequent with the horizontal locations randomly staggered in the fill. At each field density

test location, soil samples shall be obtained and one one-point compaction test, one moisture content, one grain size analysis, shall be performed on the sample. The results of the one-point compaction test and the moisture content test will be utilized to obtain the optimum properties to compare to the results of the in-place density test. Fill not meeting the required specifications for in-place density shall be retested after additional compaction has been completed. When nuclear method is used for in-place density testing according to ASTM D 6938, the first test and every tenth test thereafter for each material type shall include a sand cone correlation test in accordance with ASTM D 1556. The sand cone test shall be performed adjacent to the location of the nuclear test, shall include a nominal 6 inch diameter sand cone, and shall include a minimum wet soil weight of 6 pounds extracted from the hole. Nuclear density testing equipment shall not be used during rain. The density correlations shall be submitted with test results. Each transmittal including density test data shall include a summary of all density correlations for the job neatly prepared on a summary sheet including at a minimum:

(a) Meter serial number and operators initials.
(b) Standard count for each test.
(c) Material type.
(d) Probe depth.
(e) Moisture content by each test method and the deviation.
(f) Wet density by each test method and the deviation.

c. Cohesionless Material Testing

(1) Compaction Tests. Run not less than one relative density test for every 3,900 cubic yards of cohesionless fill in accordance with ASTM D 4253 and ASTM D 4254.

(2) In-Place Density Tests. The in-place density of the cohesionless materials shall be determined in accordance with ASTM D 1556, ASTM D 2167, ASTM D 6938, ASTM D 2937, orASTM D 5195. Run not less than one (1) field in-place density test on each lift of material or every 3000 cubic yards of completed embankment fill or backfill whichever is less. Horizontal locations shall be randomly staggered in the fill. When nuclear method is used for in-place density testing according to ASTM D 6938, the first test and every tenth test thereafter for each material type shall include a sand cone correlation test in accordance with ASTM D 1556. The sand cone test shall be performed adjacent to the location of the nuclear test, and shall include a nominal 6 inch diameter sand cone, and shall include a minimum wet soil weight of 6 pounds extracted from the hole. The density correlations shall be submitted with test results. Each transmittal including density test data shall include a summary of all density correlations for the job neatly prepared on a summary sheet including at a minimum:

(a) Meter serial number and operators initials.
(b) Standard count for each test.
(c) Material type.
(d) Probe depth.
(e) Moisture content by each test method and the deviation.
(f) Wet density by each test method and the deviation.

(3) Water (Moisture) Content Tests. Determination of water content shall be performed in accordance with ASTM D 2216. ASTM D 4643 may be used when rapid moisture content results are needed. All rapid results obtained by ASTM D 4643 shall be confirmed by a test on a duplicate sample performed in accordance with ASTM D 2216. In the event of disagreement between the results, ASTM D 2216 shall govern. One water content test will be performed for each 5000 cubic yards of material placed or each lift of material whichever is less. These test will be in addition to the water content tests performed in conjunction with in-place density tests. Backfill and fills not meeting the required specifications for water content shall be retested after corrective measures have been applied.

d. Additional Testing

The Contracting Officer may request additional tests if there is reason to doubt the adequacy of the compaction, or special compaction procedures are being used, or materials change or if the Contracting Officer determines that the Contractor's testing is inadequate or the Contractor is concentrating backfill and fill operations in a relatively small area.

3.20.3.3 Materials

Suitability of materials for use in embankment and backfill.

3.20.3.4 Fill Placement

Layout, maintaining existing drainage, moisture control, thickness of layers, removal of oversized material, spreading and compaction for embankment and backfill.

3.20.3.5 Grade and Cross Section

Surveys to verify that the dimensions, slopes, lines and grades conform to those shown on the drawings. Surveys to monitor settlement gages to measure foundation settlement. Surveys to locate core boring locations and elevations to determine foundation settlement.

3.20.3.6 Reporting

On a daily basis, furnish the inspection records and all material testing results, the quantity of fill placed, as well as the records of corrective action taken, in accordance with Section 01 45 00 CONTRACTOR QUALITY CONTROL.

3.20.3.6.1 SURVEYS

Surveys shall be performed to determine pre and post construction site conditions and during daily placement of materials. The Contractor shall submit a Survey Plan no later than 30 days after Notice to Proceed that shall fully describe the means, methods, locations, equipment, and personnel at a minimum that shall be used to complete the survey work. All surveys shall be performed under the direction of a licensed Professional Surveyor in the State of Washington who has at least 10 years minimum of experience in survey methods and data reduction. The Contractor shall fully detail means and methods and safety requirements for the site condition surveys in the Survey Plan. Results of the Pre and Post Site

Conditions Surveys shall be submitted to the Contracting Officer within 7 days after completion. Placement of materials shall not begin until the preconstruction site condition survey is approved by the Government.

3.20.3.6.1.1 Survey Control

The Contractor shall ensure a surveying accuracy within the following tolerances:

1.	Slope stakes	±0.1 foot
2.	Roadway restoration vertical alignment (as compared to existing grades)	±0.01 foot
3.	Embankment top elevations	±0.1 foot variation from plan grades
4.	Structural component and pipeline elevations	±0.02 foot variation from plan grades

3.22.4.2 Survey Requirements

a. Existing site conditions the work site, staging areas, and disposal site showing all above ground and underground features including setting three permanent survey monuments at the work site. This survey shall be completed a minimum of 30 days prior to the start of excavation work and shall be used to define final grades for roadways in the construction limits in accordance with Section 32 15 00 AGGREGATE SURFACE COURSE;

b. Bottom of excavation showing all above ground and underground features;

c. As-built survey of work site, staging areas, and disposal site.

Also survey work shall be required for Emergency Demobilization, Emergency Rock Placement, and other options listed in BID SCHEDULE. All surveys shall extend 50 feet outside the limits of the defined work, staging, and disposal sites and have a minimal contour interval of 1-foot.

Datum: The horizontal mapping datum will be in NAD 27, Washington Coordinate System, North Zone and the vertical datum will be NGVD 1929. All measurements will be in English units.

Planimetric Data Collection: Contractor shall provide size, type, and location all physical features within the work area. Physical features include, but are not limited to, buildings, foundations, monitoring wells, debris piles, riprap, roads, curbs, railroads, bridge abutments, walks, driveways, aprons, fences, culverts and other drainage structures.

Topographic Data Collection: Contractor shall collect adequate topographic data to allow generation of 1-foot contours at a finished map scale of 1" = 40 feet.

Geotechnical Data Collection: Contractor shall locate and tie all geotechnical and hydrologic instrumentation and tunnel ventilation features in the survey area. For piezometers, collect ground elevation and top of casing. For weirs collect ground elevation, top of weir, and top of weir

crest.

Settlement plate, inclinometer, and vibrating wire piezometer measurements.

Utility Data Collection: Contractor shall arrange to have underground utilities which lie in or pass through the project footprint located and their locations marked on the ground for follow-on survey ties. Utility locate specialist shall verify that markings placed by others (local utility companies and/or facility personnel) are accurate and complete. If markings are incomplete or inaccurate, utility locate contractor shall correct these markings before surveyors record their locations. Contractor shall tie all utility paint marks and tie locations and collect detailed information for the following:

a. Water. Locate all valves, stand pipes, regulators, etc. Locate all fire hydrants. Provide an elevation on top of valve case and top of valve. Provide size of pipe and distance above ground for standpipes. Finished CADD file shall depict water valve location, as well as location, size and material (if available) of water lines. Note: City of Tacoma water main runs under the access road and shall be located and tied.

b. Sanitary Sewer/Septic System. Locate all manholes and provide top of rim elevation along with an invert elevation of all pipes connected to the manhole. Identify type, size and direction of each pipe. Contractor shall also tie the next nearest manhole(s), including inverts and pipe sizes, outside the work area. Contractor shall locate septic system and location of drainfield. Finished CADD files shall depict manhole information, location, size and flow direction of sanitary sewer lines.

c. Storm Drainage. Locate culverts along length of access road within work limits, identifying type, size, direction and invert elevation for all culverts. Locate manholes and all other storm drainage structures such as headwalls, catch basins, oil/water separators and clean outs. Provide top of manhole or top of catch basin elevation along with an invert elevation of all pipes connected to a manhole ore catch basin and type and bottom elevation. Contractor shall also tie the next nearest drainage structure(s), including inverts and pipe sizes, outside the work area. Finished CADD file shall depict manhole information, location, size, flow direction and material of storm sewer lines.

d. Electrical. Locate all power and light poles, guy wires, vaults, manholes, meters, transformers, electrical boxes and substations. Obtain type and height of poles, number and size of transformers, number of cross arms, number of wires (electrical and communication), direction and low wire elevation at each pole, and depict this on finished CADD file. Provide top of rim or top of vault elevation, top of wire or conduit elevation, number and location of empty ducts in walls of manholes and vaults, direction of conduit into and out of vault, and bottom elevation of manholes and vaults. Provide size for all electrical vaults and boxes. Finished CADD file shall also show location of underground electrical lines, as marked on ground by utility locator personnel, and connection to manholes, vaults and transformers. If transformers are pad mounted, obtain number on transformer.

e. Gas. Locate all valves, meters and gas line markers. Provide

elevation on top of valve case and on top of valve. Finished CADD file shall depict location, size and material of gas lines.

f. Telephone/Communication. Locate all poles, manholes, above ground pedestals, telephone booths, radio towers, etc. Obtain type and height of poles, number of cross arms, number of wires, direction, and low wire elevation at each pole, and annotate this on finished CADD file. Provide top of rim elevation of communication manholes/vaults, open manholes to determine top of wire or conduit elevation, cable types, sizes, counts, composition, splice cases, terminal numbers; conduit type, size, contents and bottom elevation of manholes/vaults, and annotate on CADD drawing. Provide size for all telephone vaults and boxes. CADD file shall also show location of underground lines as marked on ground by utility locator personnel, and connections to manholes and vaults.

g. Cable Television. Locate all cable routes (both overhead and underground). Locate all poles, manholes, hand holes, pedestals, underground ductbanks and direct buried cable. Finished CADD file shall depict both overhead and underground location of lines.

Real Estate Data Collection: Not required.

3.20.3.6.1.2 Calibration of Survey Equipment

a. Gage Board: Install a gage board at the Project on the the riverward and landward sides of the new levee at the locations shown on the Drawings and as approved by the Contracting Officer. The gage boards shall be checked prior to any survey and the water elevation recorded. The gage boards shall be suitable for use in seawater. The board shall extend to 5 feet above the 100 yeaer flood elevation and shall have an accuracy of 0.01 foot.

The Contractor shall submit a Gage Board Plan no later than 30 days after Notice to Proceed that shall fully describe the means, methods, location, materials, mounting equipment, and personnel at a minimum that shall be used to manufacture and install the gage board. Diagrams and drawing of the proposed gage board and mounts shall be included in the plan.

(1) All survey equipment shall be calibrated and adjusted for the gage board, with check bar, at least six (6) times within a normal eight (8) hour work day.

(2) Normal calibration times shall be at the beginning of the work day, mid-morning, close of morning's work, start of afternoon's work, mid-afternoon, and the end of the day.

(3) Further calibrations shall be performed whenever there is any malfunction within the survey equipment or support equipment, which might affect the measurements.

(4) The check bar shall be set at approximately the deepest area to be measured.

(5) All survey equipment shall be calibrated to read the datum used for the work in accordance with the drawings.

(6) When checking the calibration at mid-morning, end of morning,

mid-afternoon and end of work, the same setting used for the previous calibration shall be used.

(7) If the calibration check does not agree with the previous calibration, the survey equipment being used shall be calibrated to the proper setting.

(8) Under no circumstances shall the setting of the survey equipment being used changed between calibrations.

b. Tagline Method of Horizontal Location Along Station: If a tagline is used with a depth recorder, the soundings shall be marked with a fix every 5 feet.

c. Checking Gage Board: The gage board shall be checked prior to each calibration and recorded on the sounding charts and in the field notes.

3.22.4.4 Site Condition Surveys

Surveys shall be performed to determine pre and post construction site conditions. The site condition surveys shall extend 20 feet upstream and downstream of the construction limits. Each site condition survey shall be characterized by combining the physical measurements from the sounding and dive surveys and the multibeam data from the bathymetric survey in a single x.y.z data file. .

3.22.4.5 Field Notebook Standards:

a. The Contractor shall deliver electronic copies of survey field books notes to the Government in PDF format.

b. Field books shall be neat, legible and sequential. They will also show names of crew members and date, temperature and weather conditions at the beginning of each day, equipment used for the survey..

c. Each field book shall have an index. The serial number and type of instruments used will be shown on this page.

d. There shall be no more than one (1) horizontal set-up per page.

e. Field notebooks shall be Rite-in-the-Rain, Level No. 311.

f. Field note books shall be marked as follows:

Qwuloolt _____
Contract No. _____FY2011(Date dd/mm/yr)
File No. C-2-4-321
Bk (1 of _)

3.22.4.6 Government-furnished Material

The following items are provided for incorporation into the final product and are to be returned to the Contracting Officer upon completion of work:

a. Various CADD, PDF and ArcGIS files of the project area.

b. AEC CADD Standards, Release 3.0 shall be supplied upon request from the contractor.

Deliverables. Final deliverables shall consist of:

a. Scale Map. A 1" = 40' scale map in AutoCAD or MicroStation V8 format depicting planimetric, topographic and utility data collected. Completed MicroStation files shall conform to AEC CADD Standards, Release 3.0

b. Records. Original field books, calculation sheets, and sketches and copies of these records in Adobe PDF format.

c. Metadata Files. The Contractor shall generate and deliver metadata files compliant with the FGDC Standard "Content Standard for Digital Geospatial Metadata", FGDC-STP-001-1998.

Schedule. The contractor shall furnish sufficient technical and supervision and administration personnel to ensure the execution of the work.

Delays. The Contractor shall keep the Government advised at all times about delays or difficulties that may prohibit the completion of any or the whole of their project on schedule.

-- End of Section --

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