OSR 45-10# (Rev 4-10-2002)

Statement of Work Cover Sheet

1. Title

Storage Tanks (U)

UNCLASSIFIED
DOES NOT CONTAIN
UNCLASSIFIED CONTROLLED
NUCLEAR INFORMATION
ADC & Reviewing Official: Joe M. Ormand CSA LEADER (Name and Title)
Date: 1/11/06

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5. Functional Classification	6. Requester Department	7. Requester Division
Production Support	Design Services	Projects, Design and Construction Services

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Name: Carlos A. Chiappetto — Date: 1/11/2006
Title: Senior Civil Engineer
Department: Design Services

9. Additional Reviewer — Joe M. Ormand, Jr.

Name: Joe M. Ormand, Jr. — Date: 1/11/2006
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Department: Project Operations

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Title: Design Authority		Project Manager	
Department: Waste Solidification Engineering		Waste Solidification	

CC 1/11/2006

OSR 45-9# (Rev 12-28-95)

Statement of Work Revision History Sheet

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4. Date	**5. Revision No.**	**6. Paragraph No.**	**7. Description of Changes**	
11/10/2005	0		Issue for Procurement	
1/11/2006	1	Numerous	Issue for Procurement	
			Extensive changes–Revision bars shown, but not itemized	

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1.0 SCOPE

1.1 General Description of the Service

1.1.1 Provide labor, materials, and services required for the design, fabrication, delivery, field construction, inspection, testing, and documentation for two (2) circular storage tanks with a total capacity of 5.8 million gallons.

1.1.1.1 Fabrication scope includes the option to produce and deliver the pre-cast / post-tensioned wall and / or pre-cast roof section components. These prefabricated concrete wall sections will include bonded circumferential tendons for post erection tensioning.

1.1.1.2 Tank foundation will be constructed on a WSRC furnished mud mat.

1.1.1.3 The scope of this work is divided into the following elements:

A. Task #1 – Tank Design

B. Task #2 – Concrete, Mortar, and Grout Mix Design

C. Task #3 – Fabrication and Shop Assembly – Pre-cast Sections (if applicable)

D. Task #4 – Tank Construction

1.1.1.4 Testing of materials for concrete mix design and production will require an Independent Inspection / Testing Laboratory.

1.2 Background

1.2.1 Savannah River Site handles and processes radioactive materials including low-level liquid waste salt solution which is mixed with a cement based grout (saltstone grout) and stored in concrete vaults in Z-Area.

1.2.2 This procurement will provide storage tanks to perform the primary containment function for the low level radioactive saltstone grout. The secondary containment will be an engineered liner which will be installed as part of a separate contract.

1.2.3 Tank installation location is in Z-Area (Saltstone Facility) at the Savannah River Site, Aiken County, South Carolina.

1.2.4 The storage tanks are the second part of a three part project which includes:

1.2.4.1 Part 1 – Site preparation including clearing and grubbing and construction of storm water control structures (by Others)

1.2.4.2 Part 2 – Design and construction of two storage tanks (scope of this Statement of Work)

1.2.4.3 Part 3 – Excavation, foundation preparation, installation of secondary containment liner, backfill to the roof line and final grading (by Others)

1.2.5 Quality requirements for design, testing, and inspections are imposed to obtain durable concrete, mortar, and grout capable of mitigating sulfate attack (present in the saltstone grout) while remaining watertight during the saltstone grout filling stage.

2.0 REFERENCES

2.1 Definitions

2.1.1 Acronyms

NRMCA	National Ready-Mixed Concrete Association
SRS	Savannah River Site
SSR	Supplier Surveillance Representative (WSRC)
WSRC	Washington Savannah River Company

2.1.2 Terms

2.1.2.1 Hold Point – A designated verification / witness activity beyond which work shall not proceed, until verification is performed and documented by a Supplier Surveillance Representative.

2.1.2.2 Saltstone Grout – A cement based grout made with liquid salt solution containing low-level radioactive waste materials.

2.2 Codes / Standards / Orders / Regulations

2.2.1 National Codes / Standards

2.2.1.1 This section is intended to identify the applicable National Codes / Standards indicating the required edition or year. For specific requirements, see applicable sections of this Specification.

2.2.1.2 Obtain WSRC acceptance for other editions and/or addenda of National Codes / Standards required by this Specification prior to use.

2.2.2 Required National Codes / Standards

2.2.2.1 American Concrete Institute (ACI)

A. 201.2R, 1/1/2001, Guide to Durable Concrete
B. 305R, 1/1/1999, Hot Weather Concreting
C. 306R, 1/1/1988, Cold Weather Concreting

2.2.2.2 American Society of Civil Engineers (ASCE)

A. 7-02, 1/1/2002, Minimum Design Loads for Buildings and Other Structures

2.2.2.3 American Society for Testing and Materials (ASTM)

A. A 36/A 36M, 03/01/2005, Standard Specification for Carbon Structural Steel
B. A 53/A 53M REV A, 10/01/2004, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
C. A 185/A 185M REV A, 6/1/2005, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
D. A 497/A 497M REV A, 6/1/2005, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
E. A 615/A 615M REV B, 10/01/2004, Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement-AASHTO No.: M 31
F. C 29/C 29 M, 7/10/1997, Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate (R 2003)
G. C 31/C 31M, 2/10/2003, Standard Practice for Making and Curing Concrete Test Specimens in the Field

H. C 33, 6/10/2003, Standard Specification for Concrete Aggregates
I. C 39/C 39M, 11/1/2004, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
J. C 40, 1/1/2004, Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
K. C 88, 3/10/1999, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
L. C 94/C 94M, 02/1/2004, Standard Specification for Ready-Mixed Concrete
M. C 109/C 109M, 7/1/2005, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-In. or [50-mm] Cube Specimens)
N. C 117, 8/1/2004, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
O. C 123, 1/10/1997, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
P. C 131, 3/10/2003, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
Q. C 136, 2/1/2005, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
R. C 138/C 138M, 3/10/2001, Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
S. C 142, 8/4/2004, Standard Test Method for Clay Lumps and Friable Particles in Aggregates (R2004)
T. C 143/C 143M, 7/10/2005, Standard Test Method for Slump of Hydraulic-Cement Concrete
U. C 150, 5/10/2005, Standard Specification for Portland Cement
V. C 172, 9/10/1999, Standard Practice for Sampling Freshly Mixed Concrete
W. C 231, 7/1/2004, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
X. C 260, 8/10/2001, Standard Specification for Air-Entraining Admixtures for Concrete
Y. C 295, 1/10/2003, Standard Guide for Petrographic Examination of Aggregates in Concrete
Z. C 311, 7/1/2004, Standard Test Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland - Cement Concrete
AA. C 441, 5/1/2005, Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
BB. C 494/C 494M, 5/1/2005, Standard Specification for Chemical Admixtures for Concrete
CC. C 535, 3/10/2003, Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
DD. C 566, 1/10/1997, Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying (R2004)

EE. C 618, 1/10/2003, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

FF. C 685/C 685M, 8/10/2001, Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

GG. C 989, 1/1/2005, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

HH. C 1012, 1/1/2004, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution

II. C 1064, 7/10/2003, Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

JJ. C 1105, 5/1/2005, Standard Test Method for Length Change of Concrete Due to Alkali-Carbonate Rock Reaction

KK. C 1157, 11/01/2003, Standard Performance Specification for Hydraulic Cement

LL. C 1202, 1/10/1997, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

MM. C 1240, 6/1/2004, Standard Specification for Silica Fume Used in Cementitious Mixtures

NN. C 1260, 5/1/2005, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

OO. C 1556, 6/1/2004, Standard Test Method for Determining the Apparent Chloride Diffusion Coefficient of Cementitious Mixtures by Bulk Diffusion

PP. E 329, 6/10/2003, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

2.2.2.4 American Welding Society (AWS)

A. D1.1/D1.1M, 1/1/2004, Structural Welding Code - Steel

2.2.2.5 American Water Works Association (AWWA)

A. D110, 6/22/1995, Wire- and Strand-Wound, Circular-Pre-stressed Concrete Water Tanks-Addendum A - June 1996; Erratum - January 2001

B. D115, 1/1/1995, Circular Pre-stressed Concrete Water Tanks with Circumferential Tendons-First Edition

2.2.2.6 US Army Corps of Engineers (COE)

A. CRD-C 163, 9/1/1992, Handbook for Concrete and Cement Test Method for Water Permeability of Concrete Using Triaxial Cell

2.2.2.7 International Code Council (ICC)

A. IBC, 1/1/2003, International Building Code

2.2.2.8 International Organization for Standardization (ISO)

A. 9001, 12/15/2000, Quality Management Systems - Requirements

2.2.2.9 National Ready-Mixed Concrete Association (NRMCA)

A. Guideline Manual for Quality Assurance/ Quality Control Section 3 (QC-3), Eighth Revision, "Plant Certification Checklist"

2.2.3 Code of Federal Regulations (CFR)

None

2.3 SRS Documents

2.3.1 Documents

None

3.0 WORK REQUIREMENTS

3.1 Task #1: Tank Design

3.1.1 Tank is required to contain the saltstone grout, without leakage, during the saltstone grout fill operation stages and after the saltstone grout has solidified. (See Attachments 5.3 through 5.8)

3.1.2 Design Parameters

3.1.2.1 Nominal Size: 150 feet inside diameter (fixed) by 22 feet high (minimum inside height at top of wall) for a total capacity of 2.9 million gallons per tank

3.1.2.2 Minimum Design Life:

A. Operating: 10 years with a water tight seal

B. Structural: 25 years

3.1.2.3 Design, construction, examination and testing in accordance with one of the following: AWWA D110 or AWWA D115.

A. Use of AWWA D110 is limited to concrete panels incorporated into structure as follows:

1. Type I, Cast-in-place concrete with vertical pre-stressed reinforcement
2. Type III, Pre-cast concrete without steel diaphragm but with vertical pre-stressed reinforcement

B. Foundation – Cast-in-place concrete

C. Walls

1. Cast-in-place or pre-cast concrete
2. Pre-stressed or post-tensioned in the circumferential direction
   a. Additional vertical tensioning is acceptable.

D. Roof – Cast-in-place or pre-cast concrete

1. Pre-stressing or post-tensioning may be used.

3.1.2.4 Special Design Conditions

A. Lateral forces will be present due to the empty tank being buried to the roof line using dynamic compaction equipment.

1. Prepare Specifications for Back Filling.

B. The tank will not be filled with water for purposes of leak testing or backfill.

1. Do not consider sloshing.
2. Do not provide drainage for the tank.
3. Do not provide a leachate collection system.

C. Filling of the tank with liquid saltstone grout will be done with incremental lifts over a period of several months. For design purposes, each incremental lift will not exceed 12 inches. Individual lifts will undergo initial curing prior to placement of the next lift.

3.1.2.5 Tank top – capable of supporting 30 pounds per square foot live load and the equipment loads in accordance with Attachment 5.7.

3.1.2.6 Design roof interior columns and any required intermediate supports with structural pipes to minimize obstruction / resistance to saltstone grout flow to perimeter walls.

3.1.2.7 Minimum thickness of concrete components:

A. Foundation Slab: 12 inches with a minimum of 3 inch cover for reinforcing steel (top / inside face)

B. Walls: 8 inches with a minimum 3 inch cover of reinforcing steel (inside face)

C. Roof: 8 inches

3.1.2.8 Design the roof assembly of each tank in accordance with Attachment 5.7 including:

A. Penetration sleeves

B. Embed plates, including supported loads

C. Penetration covers and plugs

3.1.2.9 To allow membrane installation by Others at later date:

A. Provide the tank exterior surfaces with a smooth finish (sides and top)

B. Reinforcing ribs and projections on exterior walls of the tank are not permitted

C. Post tensioning buttresses are permitted

3.1.2.10 Saltstone Grout Material Characteristics:

A. Weight of grout while fluid: 110 pounds per cubic foot

B. Temperature Range during placement (based on heat of hydration during curing): 50°F to 195°F

3.1.2.11 Soil Properties

A. Average groundwater table elevation is 225 feet mean sea level with seasonal fluctuation of ± 5 feet.

B. Wet density of the backfill is 125 pounds per cubic foot.

C. Lateral earth pressure coefficients for the backfill are:

1. Active earth pressure coefficient, Ka = 0.33
2. Passive earth pressure coefficient, Kp = 3.0
3. At-rest earth pressure coefficient, Ko = 0.5

D. Allowable soil bearing pressure: 3500 pounds per square foot at elevation 268 feet.

E. Subgrade modulus, in pci (pounds per square inch per inch of deformation)

1. 10 to 20 for a 150 foot diameter foundation
2. 100 to 130 for a 30 inch diameter plate

3.1.3 Structural Requirements:

3.1.3.1 Design for seismic loads in combination with other concurrent service and environmental loads in accordance with ICC IBC, Chapter 16, "Structural Design" and ASCE 7-02 using the following parameters:

A. S_S, 0.2 sec spectral response acceleration = 0.6g

B. S_1, 1.0 sec spectral response acceleration = 0.2g

C. Site Class for SRS (Seismic Design Category) : D

D. Importance factor I_P = 1.5

E. Service loads concurrent with seismic loads shall include operating temperature and pressure.

F. Design to prevent damage to the structure from a seismic event. The associated tank equipment (by others) does not need to function during or after the seismic event.

3.1.3.2 Design tank to withstand the full hydrostatic head of water without leaks in the unburied condition.

3.1.3.3 Construction Loads

A. Design empty tank to withstand backfill static and dynamic loads during backfilling.

B. Design components and lifting lugs for hoisting into position.

C. Design of lifting lugs to consider post-installation surface condition to allow for exterior liner installation.

3.1.4 Service Conditions

3.1.4.1 Environmental Conditions

A. Operational Environment Conditions (i.e. while Tank is being filled):

1. Pressure: Atmospheric plus hydrostatic head
2. Temperature:
   a. Minimum: 50°F (10°C)
   b. Maximum: 195°F (90°C) (at the center of the tank)
3. Relative Humidity: 20% to 100% (Condensing)

B. Ambient Outdoor Environmental Conditions

1. Temperature:
   a. Minimum: 20°F (-6°C)
   b. Maximum: 110°F (40°C)
2. Relative Humidity range: 5% to 100% (Condensing)

3.1.5 Design Submittals

3.1.5.1 Submit a Design Package including the following, as a minimum

A. Drawings Index Sheet with project title and list of drawings.

B. General Arrangement Drawing: Includes layout and dimensions including roof openings.

C. Structural Drawings: Provide drawings for tank structure (complete tank).

D. Structural Design Calculations:

1. Provide supporting calculations including any internal roof supports
2. Load cases to include:
   a. Dead loads, live loads, and seismic loads
   b. Construction loads
   c. Operating loads during the filling of tank with saltstone grout

E. Construction Specifications:
   1. Provide specifications including any fabrication of pre-cast sections on-site or off-site.
   2. Provide material, construction and testing specifications as specified by tank design.
   3. Specify fabrication and erection tolerances.
   4. Provide tensioning specifications as required by tank design.

3.1.5.2 Submit Tank Erection Drawings and Installation Instructions.

A. Include Drawings Index Sheet with project title and list of drawings.
B. Include instructions for removal of lifting lugs or attachment points and smoothing of surface to meet surface finish requirements.
C. Shop Detail Drawings for each pre-cast component including interconnections and tensioning components.
D. Include instructions for repair of surface finish damage. Surfaces are required to be smooth for installation of secondary containment liner.

3.1.5.3 Submit CSI formatted Specification for backfilling.

3.2 Task #2: Concrete, Mortar, and Grout Mix Design

3.2.1 Mix Design

3.2.1.1 Design separate mixes based on the proposed point of production for the:

A. Concrete for cast-in-place Foundation, Walls and Roof
B. Concrete for pre-cast Wall Sections
C. Concrete for pre-cast Roof Sections
D. Cement Mortar for Wall Sections
E. Cement Mortar for Roof Sections
F. Cement Grout for Wall Sections
G. Cement Grout for Roof Sections

3.2.1.2 Prepare two Mix Design sets.

A. Primary – Based on the use of Type V Portland Cement or Type HS Hydraulic Cement.
B. Secondary – Based on the use of Type II Portland Cement.

3.2.1.3 Design the mixes in accordance with ACI 201.2R for durable concrete and sulfate resistance, using Class 3 exposure for primary foundation slab, walls, and roof.

3.2.1.4 Utilize materials from the local area where the production concrete, cement mortar, and cement grout will be batched, including those placed at SRS.

3.2.1.5 Design the mixes to:

A. Enhance durability and reduce cracking
B. Produce a dense low permeable concrete/mortar/grout matrix

3.2.1.6 Design mixes are required to have a:

A. Maximum water to total cementitious material ratio of 0.38
B. Portland or Hydraulic Cement
C. Blast furnace slag: minimum 40 percent by mass of total cementitious material
D. Silica fume: 5 to 8 percent by mass of total cementitious material

Note: Addition of fly ash to mix design is permissible after slag and silica fume proportions are achieved.

E. Maximum intrinsic permeability of 9.1×10^{-20} meters^2 (permeability 1.00×10^{-12} meters per second)

F. Minimum compressive strength @ 28 days: 5,000 pounds per square inch

3.2.1.7 Submit Mix Designs for each concrete, cement mortar, and cement grout proposed for use to include:

A. Proportions of the materials which comprise the mix designs including, as a minimum:

1. Dry weight of cement
2. Dry weight of blast furnace slag
3. Dry weight of fly ash (if used)
4. Dry weight of silica fume
5. Saturated dry surface weights of fine and coarse aggregates
6. Type (including manufacturer's product identification) and quantity of admixture(s)
7. Water

B. Working ranges of the slump

C. Air content

D. Unit weight

E. Expected minimum strength at 7, 28, and 90 days

F. Unique Mix Design Identifier defined in Section 3.4.4 on documentation for technical information, retained records, submittals and when ordering from the batching and mixing facility.

3.2.2 Qualification of Mix Design

3.2.2.1 Use materials from the local area where the production concrete, cement mortar, and cement grout will be batched.

3.2.2.2 Prepare and test qualification batches of each concrete, cement mortar, and cement grout mix design using materials from the same supply sources to be used in the production batches.

3.2.2.3 Submit Qualification Material Test Reports for Design Mix Characteristics for each concrete, cement mortar, and cement grout proposed for use, to include the following tests:

A. Slump: ASTM C 143/C 143M

B. Air Content: ASTM C 231

C. Density (Unit Weight) and Yield: ASTM C 138/C 138M

D. Compressive Strength: Concrete: ASTM C 39/C 39M at 7 and 28 days

E. Compressive Strength: Cement Mortar, Cement Grout, and Non-Shrink Grout: ASTM C 109/C 109M at 7 and 28 days

3.2.2.4 Submit 90 Day Compressive Strength Material Test Reports for each concrete, cement mortar, and cement grout proposed for use.

3.2.2.5 Submit Qualification Material Test Reports for Water Permeability and Chloride Ion Penetrability and Diffusion for each concrete, cement mortar, and cement grout proposed for use, to include the following tests:

A. Intrinsic Permeability: COE CRD-C 163

B. Chloride Ion Penetrability: ASTM C 1202

1. Acceptance Criteria: Charge passed is less than 1000 coulombs (very low chloride ion penetrability in accordance with ASTM C 1202, Table 1).

C. Apparent Chloride Diffusion Coefficient: ASTM C 1556

3.2.2.6 Submit Qualification Material Test Reports for Sulfate Resistance for each cementitious material (ACI 201.2R, paragraph 2.25) and each cement blend (ACI 201.2R, paragraph 2.28) proposed for use in accordance with ASTM C 1012.

A. Measure length change at 1, 2, 3, 4, 8, 13 and 15 weeks (ASTM C 1012, Section 9.4).

3.2.2.7 Continue the sulfate resistance tests for each cementitious material and each cement blend in accordance with ASTM C 1012 and measure length change at 6, 9, 12, 15, and 18 months (ASTM C 1012, Section 9.4)

A. Submit Material Test Reports for Sulfate Resistance at 6 Months.

B. Submit Material Test Reports for Sulfate Resistance at 9 Months to include *previous test results*.

C. Submit Material Test Reports for Sulfate Resistance at 12 Months to include previous test results.

D. Submit Material Test Reports for Sulfate Resistance at 15 Months to include previous test results.

E. Submit Material Test Reports for Sulfate Resistance at 18 Months to include previous test results.

3.2.2.8 After WSRC acceptance of the concrete, cement mortar or cement grout mix designs is obtained, the products and constituents used may not be changed without prior WSRC acceptance.

3.2.2.9 Modification to the products and constituents used in a concrete, cement mortar, or cement grout mix design require submittal of the revised mix design and re-qualification testing of the mix.

3.2.2.10 Use a Supplier Deviation Disposition Request for submittal of proposed modifications to a mix design.

3.2.3 Material Requirements

3.2.3.1 Portland Cement: ASTM C 150

A. Type V cement used for Class 3 exposure in accordance with ACI 201.2R.

1. Contains no more than 0.6 percent, by weight, of alkalis calculated as Na_2O + 0.685 K_2O

2. Submit a Material Test Report for Type V Portland Cement (called Manufacturer's Certification or Mill Test Report in ASTM C 150 of the chemical composition and physical properties, showing conformance with the requirements of ASTM C 150 of the Type specified, from each source of supply.

B. Type II cement qualified for Class 3 exposure in accordance with ACI 201.2R.

1. Contains no more than 0.6 percent, by weight, of alkalis calculated as Na_2O + 0.685 K_2O.

2. Submit a Material Test Report for Type II Portland Cement (called Manufacturer's Certification or Mill Test Report in ASTM C 150) of the

chemical composition and physical properties, showing conformance with the requirements of ASTM C 150 of the Type specified, from each source of supply.

3.2.3.2 Hydraulic Cement: ASTM C 1157

A. Type HS cement used for Class 3 exposure in accordance with ACI 201.2R.

B. Contains no more than 0.6 percent, by weight, of alkalis calculated as Na_2O + 0.685 K_2O

C. Submit a Material Test Report for Hydraulic Cement (called Manufacturer's Certification in ASTM C 1157) of the chemical composition and physical properties, showing conformance with the requirements of ASTM C 1157, Type HS, from each source of supply.

3.2.3.3 Fine Aggregate:

A. Submit a Material Test Report for the Fine Aggregate, from each source of supply, including :

1. Documentation showing conformance with the requirements of ASTM C 33 for:
   a. Grading (Section 6)
   b. Deleterious Substances (Section 7 and Table 1)
   c. Organic Impurities (Section 7)
   d. Soundness (Section 8)
   e. Alkali-Silica Reaction (Section X1.3) using ASTM C 1260
   f. Alkali-Carbonate Rock Reaction (Section X1.4) using ASTM C 1105
2. A petrographic examination report in accordance with ASTM C 295

3.2.3.4 Coarse Aggregate:

A. Submit a Material Test Report for the Coarse Aggregate, from each source of supply, including :

1. Documentation showing conformance with the requirements of ASTM C 33 for:
   a. Grading (Section 10 and Table 2)
   b. Deleterious Substances (Section 11 and Table 3)
   c. Soundness (Section 8)
   d. Alkali-Silica Reaction (Section X1.3) using ASTM C 1260
   e. Alkali-Carbonate Rock Reaction (Section X1.4) using ASTM C 1105
2. A petrographic examination report in accordance with ASTM C 295

3.2.3.5 Blast Furnace Slag:

A. ASTM C 989, Grade 120

B. Submit a Material Test Report for Blast Furnace Slag showing conformance with the requirements of ASTM C 989, from each source of supply, including the following:

1. Chemical composition (Section 7 and Table 2)
2. Physical properties (Section 8 and Table 1)
3. Certification of chloride ion content (Section 12.2)

4. Manufacturer's Statement of the nature, amount and identity of any processing or other additions made to the slag (Section 13)
5. Sulfate Resistance (Section X2.4) using Test Method ASTM C 1012

C. Previous laboratory testing, field performance records, or equivalent documentation may be provided showing the relative sulfate resistance of the slag conducted in accordance with ASTM C 1012.

1. If previous laboratory testing, field performance records, or equivalent documentation is to be used for the material being proposed, the materials required to perform the testing of ASTM C 1012, Section 9 shall be provided to SRS for the first shipment of slag and each first shipment of slag from different manufacturers.

3.2.3.6 Water and Ice

A. Use water and ice which conforms to ASTM C 94/C 94M or ASTM C 685/C 685M requirements.

B. Do not use wash water for batching concrete, cement mortar, or cement grout.

3.2.3.7 Fly Ash (if used):

A. ASTM C 618, Class F

B. Submit Material Test Reports for Fly Ash showing conformance with the requirements of ASTM C 618, from each source of supply, including the following:

1. *Chemical composition (Section 6 and Table 1) with Loss on Ignition limited to* a maximum of 6 percent.
2. Physical properties (Section 7 and Table 2)
3. Supplementary optional physical requirements (Section 7 and Table 3) using Procedure B of ASTM C 311 for the determination of Effectiveness in Contributing to Sulfate Resistance.
4. Sulfate Resistance using Test Method ASTM C 1012

C. Previous laboratory testing, field performance records, or equivalent documentation may be provided showing conformance to the Effectiveness in *Contributing to Sulfate Resistance of the Supplementary Optional Physical* requirements of ASTM C 618, Table 3 for the Class F fly ash.

1. If previous laboratory testing, field performance records, or equivalent documentation is to be used for the material being proposed, the materials required to perform the testing of ASTM C 1012, Section 9 shall be provided to SRS for the first shipment of fly ash and each first shipment of fly ash from different manufacturers.

3.2.3.8 Silica Fume:

A. ASTM C 1240

B. Submit Material Test Report for Silica Fume showing conformance with the requirements of ASTM C 1240, from each source of supply, including the following:

1. Chemical composition (Section 5 and Table 1)
2. Physical requirements (Section 6 and Table 2)
3. Reactivity with cement alkalies (Section 17 and Table 3) using Test Method ASTM C 441

4. Sulfate resistance (Section 18 and Table 3) using Test Method ASTM C 1012 and acceptance criteria of very high resistance for sulfate resistance expansion

C. Previous laboratory testing, field performance records, or equivalent documentation may be provided showing conformance to the Reactivity with Cement Alkalies of the optional physical requirements of ASTM C 1240 for the silica fume.

1. If previous laboratory testing, field performance records, or equivalent documentation is to be used for the material being proposed, the materials required to perform the testing of ASTM C 441, Section 9 shall be provided to SRS for the first shipment of silica fume and each first shipment of silica fume from different manufacturers.

D. Previous laboratory testing, field performance records, or equivalent documentation may be provided showing conformance to the Sulfate Resistance Expansion of the optional physical requirements of ASTM C 1240 for the silica fume.

1. If previous laboratory testing, field performance records, or equivalent documentation is to be used, the materials required to perform the testing of ASTM C 1012, Section 9 shall be provided to SRS for the first shipment of silica fume and each first shipment of silica fume from different manufacturers.

3.2.3.9 Air-Entraining Admixture (if used):

A. ASTM C 260

B. Submit Material Test Report for Air Entraining Admixtures of the physical properties, showing conformance with the requirements of ASTM C 260, from each source of supply of each proposed admixture product, including:

1. ASTM C 260 optional uniformity requirement tests
2. Documentation showing admixture does not contain chlorides

   Exception: Chlorides in water used for admixture manufacture
3. Manufacturer's product data to include chemical composition.

3.2.3.10 Water Reducing Admixture (if used):

A. ASTM C 494/C 494M, Type A or D

B. Submit Material Test Report for Water Reducing Admixtures, showing conformance with the requirements of ASTM C 494/C 494M, for each proposed admixture product, each Type specified (i.e. A or D), and from each source of supply, including:

1. Documentation showing admixture does not contain chlorides

   Exception: Chlorides in water used for admixture manufacture

2. Manufacturer's product data to include chemical composition.

3.2.3.11 High Range Water Reducing Admixture (if used):

A. ASTM C 494/C 494M, Type F or G

B. Submit Material Test Report for High Range Water Reducing Admixtures, showing conformance with the requirements of ASTM C 494/C 494M, for each proposed admixture product, each Type specified (i.e. F or G), and from each source of supply, including:

1. Documentation showing admixture does not contain chlorides

   Exception: Chlorides in water used for admixture manufacture

2. Manufacturer's product data to include chemical composition.

3.2.3.12 Embedded Items:

A. Reinforcing Steel: ASTM A 615/A 615M REV B

B. Welded Wire Reinforcement: ASTM A 185/A 185M REV A or ASTM A 497/A 497M REV A

C. Plate or Shapes: ASTM A 36/A 36M

D. Pipe: ASTM A 53/A 53M REV A

3.2.4 Mix Design Identifier

3.2.4.1 Concrete, mortar, and grout mix identifications are required to follow SRS format.

A. Concrete Mix Design Identifiers are 9 to 12 characters as follows:

   (EXAMPLE: D5000-8-0-2-AB)

1. First five characters are for the Compressive Strength at 28 days
   a. A2000 = 2000 psi mix
   b. B3000 = 3000 psi mix
   c. C4000 = 4000 psi mix
   d. D5000 = 5000 psi mix
2. Sixth character is for the Maximum Slump in inches (whole number)
3. Seventh character is "S" indicating Mix with Slag/Silica Fume
4. Eighth character is for Aggregate Size
   a. 0 = No coarse aggregate
   b. 1 = 3/8 inch
   c. 2 = ¾ inch
   d. 3 = 1 $^{1}/_{2}$ inch
   e. 4 = Hi-Density Aggregate

5. Ninth and above characters are for Admixtures (identify all included in mix)
   a. A = Air Entrained Admixture and / or Water Reducing Admixture
   b. B = High Range Water Reducing Admixture
   c. R = Retarder Admixture
   d. S = Special Admixture
6. Utilize "X" where a digit or letter is not applicable

3.3 Task #3: Fabrication and Shop Assembly – Pre-cast Sections

3.3.1 General Requirements

3.3.1.1 Fabricate pre-cast sections in accordance with:

A. WSRC accepted Design Package and Shop Drawings

3.3.2 Welding Requirements

3.3.2.1 Welding of structural carbon steel materials: Comply with AWS D1.1/D1.1M

3.3.3 Coating of Exposed Carbon Steel Surfaces

3.3.3.1 Coating: Supplier's standard shop primer

A. Surface Preparation: In accordance with manufacturer instructions.

B. Application: In accordance with manufacturer instructions.

3.3.3.2 Submit Coating System Product Data including manufacturer's surface preparation and application instructions.

3.3.4 Batching Requirements

3.3.4.1 Use WSRC accepted concrete, cement mortar, and cement grout mix designs.

3.3.4.2 Measure and batch concrete, cement mortar, and cement grout in accordance with:

A. ASTM C 94/C 94M for a batching and mixing facility

B. ASTM C 685/C 685M for a batching and mixing facility using volumetric batching and continuous mixing (auger mixer).

3.3.4.3 Monitor and record the moisture content of the fine aggregates and the coarse aggregates in accordance with ASTM C 566.

3.3.4.4 Adjust the quantity of concrete, cement mortar, and cement grout mix water.

A. Use aggregate moistures as a determinate in adding water.

B. Do not exceed the maximum total quantity of water specified in the approved mix design.

3.3.4.5 Record on the batch tickets, water added to the concrete, cement mortar, and cement grout (two separate entries):

A. At the batching and mixing facility

B. Prior to placement (do not exceed maximum water quantity in mix design)

C. Retain batch tickets from each delivery per Section 13 of ASTM C 94/C 94M or per Section 15 of ASTM C 685/C 685M.

3.3.4.6 Provide the concrete, cement mortar, and cement grout within the temperature range specified for the approved mix design.

A. Control the temperature of the concrete, cement mortar, and cement grout in accordance with ACI 305R for hot weather concreting and ACI 306R for cold weather concreting.

B. Measure temperature at the discharge of the delivery transportation system in accordance with ASTM C 172.

C. Reject and do not use concrete, cement mortar, or cement grout if the temperature range is exceeded.

3.3.5 Material Testing

3.3.5.1 Provide testing of materials and reports in accordance with Section 4.1

3.3.6 Surface Finish

3.3.6.1 Remove surface discontinuities 1/8 inch or greater in height from surfaces of pre-cast components which are from casting, formwork mismatches, grouting or other fabrication processes.

3.3.6.2 Break sharp edges and corners.

3.3.6.3 Formwork seam lines or metal to concrete interface discontinuities are not acceptable.

3.3.6.4 *Burrs, weld splatter, and arc strikes are not acceptable.*

3.4 Task #4: Tank Construction and Testing

3.4.1 General Requirements

3.4.1.1 Use Section 3.3 Concrete Batching.

3.4.1.2 Use Section 3.3 Welding.

3.4.1.3 Use Section 3.3 Coating.

3.4.1.4 Use Section 3.3 Surface Finish.

3.4.1.5 Use Section 3.3 Material Testing.

3.4.2 Tank Construction

3.4.2.1 Construct concrete components per Task #1 WSRC accepted design documents.

3.4.2.2 Grout Level Markings

A. Provide saltstone grout level markings on the internal surface of the tank wall at three locations on each tank in accordance with Attachment 5.6

3.4.2.3 Protect and maintain existing facilities and temporary structures during construction / installation activities through final acceptance. This includes;

A. Existing structures / systems,

B. Liner buried at perimeter of the mud mat,

C. Erosion control features within the work area,

D. Passive dewatering features within the excavated area,

E. Graveled access road,

F. Surveying monuments in the vicinity of tank's site used by subcontractor to maintain elevation and horizontal controls of his work.

3.4.2.4 Prepare As-Built Documents and Drawings to update Task #1 WSRC accepted design documents and drawings which have been modified or clarified during the performance of Task #3 or Task #4 based on approved SDDRs.

A. Submit As-Built Documents and Drawings.

3.5 WSRC Furnished Material, Equipment, Services

3.5.1 Excavation and backfill of tank site, including site dewatering provisions and erosion control features.

3.5.2 Installation of compacted soil sub-base, mud mats and liner system.

3.5.3 Concrete: WSRC may elect to subcontract Task #2 and portions of Task #3 and Task #4 to "others" for the purpose of expediting the time required to formulate and test sulfate resistant concrete. Should this be the case, the successful subcontractor for Task #1 and remaining portions of Task #3 and Task #4 shall be allowed the option of requesting appropriate high range water reducing admixtures for the purposes of mix workability during pre-cast and/or cast-in-place concrete production.

3.5.3.1 WSRC acceptance of requested admixture is required prior to use.

3.5.3.2 Additional Supplier testing may be required prior to the use of a requested admixture.

3.6 Quality Requirements

3.6.1 WSRC Review

3.6.1.1 WSRC reserves the right to review aspects of the design, fabrication, inspection, examination and testing of the equipment to the extent necessary to ensure compliance to Specification and code requirements. This review includes the right to access to the Supplier's facilities, including sub-tier suppliers, vendors, and Suppliers, for the purpose of review, audit, surveillance, and witnessing of fabrication, inspection, examination, and testing activities.

3.6.2 Quality Program

3.6.2.1 Execute a Quality Program.

A. A documented quality program will be planned, implemented, and maintained.

B. The establishment of the program will include consideration of the technical aspects of the activities affecting quality.

C. The quality program shall identify the activities and items to which it applies.

D. The program shall provide control over activities affecting quality to an extent consistent with their importance.

E. The program shall include monitoring activities against acceptance criteria in a manner sufficient to provide assurance that the activities affecting quality are performed satisfactorily.

F. The program shall be established at the earliest time consistent with the schedule for accomplishing the activities.

G. The program shall provide for the planning and accomplishment of activities affecting quality under suitably controlled conditions.

H. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied.

I. The program shall provide for any special controls, processes, test equipment, tools, and skills to attain the required quality of activities and items and for verification of that quality. Control of the design process and control of materials, in both mix design qualification and production is of special interest.

J. The organization shall establish and implement processes to detect and correct quality problems.

K. The program shall provide for indoctrination, training, and qualification as necessary of personnel performing or managing activities affecting quality to ensure that suitable proficiency is achieved and maintained.

L. Management shall regularly assess the adequacy and effective implementation of the quality assurance program.

3.6.2.2 Submit a copy of the Supplier's Quality Program Manual and with the Proposal.

A. Include the Supplier's current ISO 9001 or Pre-cast/Pre-stressed Concrete Institute Plant Certification Program certification documentation with the Quality Program Manual submittal.

3.6.2.3 Invoke the technical and quality requirements of this specification on sub-tier suppliers, when the Supplier contracts others to provide for services, items, or parts.

3.6.3 Supplier Qualifications

3.6.3.1 Company specializing in fabrication, assembly, and erection of pre-cast / post tensioned concrete water storage structures.

3.6.3.2 Minimum five (5) years documented company experience and resume of key personnel performing the Work.

3.6.3.3 Submit Supplier Qualifications and Experience documentation with the Proposal.

3.6.4 Independent Inspection / Testing Laboratory Qualifications

3.6.4.1 Authorized to operate in the State in which the laboratory facilities are located.

3.6.4.2 Performs inspection and testing of concrete, mortar, and grout component materials and products.

3.6.4.3 Performs testing of the physical and chemical properties of concrete, mortar, and grout.

3.6.4.4 Maintains a full time Professional Engineer registered in the State in which the laboratory facilities are located to supervise inspections and tests performed and review results documentation.

3.6.4.5 Conforms to the requirements of ASTM E 329 and has had an inspection of the Inspection / Testing Laboratory procedures and equipment within three (3) years by a qualified national authority as defined in ASTM E 329.

3.6.4.6 Uses testing equipment calibrated at intervals with devices traceable to either the National Institute of Standards and Technology (NIST) or accepted values of natural physical constants.

A. Calibrates equipment annually under normal use or semi-annually under heavy or dynamic use.

B. Recalibrates or replaces equipment in which the standard operating range has been exceeded, damaging physical or electrical conditions have occurred, or otherwise exposed to abnormal operating conditions.

C. Displays calibration sticker or certificate on equipment.

3.6.4.7 Submit Independent Inspection / Testing Laboratory Qualifications with the Proposal including:

A. *Independent Inspection / Testing Laboratory name, address, telephone* number, and names of laboratory technicians and engineers assigned to the Project and the responsible officer. Include personnel resumes, qualifications, and certifications.

B. Documentation of inspection made by a qualified national authority during the most recent tour of inspection with memorandums of deficiencies reported during the inspection tour and the corrective actions taken to resolve the deficiencies.

C. Current accreditation document(s) received from the nationally recognized accreditation organization(s).

D. Supplier shall submit the Independent Inspection / Testing Laboratory Quality Assurance program details.

E. Supplier shall submit a Supplier Deviation Disposition Request immediately upon notification by the Independent Inspection / Testing Laboratory of out of calibration equipment used to perform inspections and testing of the equipment and material used to generate the various tank closure mixes.

F. Documentation of laboratory's authorization to operate in State in which the laboratory facilities are located.

G. Professional registration documentation of supervising engineer

H. *Current list of testing equipment and associated components with calibration* documents for the two (2) most recent calibrations

3.6.5 Concrete, Cement Mortar, Cement Grout, and Non-Shrink Grout Production Facility Certification

3.6.5.1 Batch Process Production Facilities

A. Batch process concrete, cement mortar, cement grout, and non-shrink grout production facilities are required to comply with the National Ready-Mixed Concrete Association, QC Manual, Section 3, "Certification of Ready Mixed Concrete Production Facilities" requirements.

B. Certification to be in effect during any qualification or production of concrete, cement mortar, cement grout, or non-shrink r grout at the facility.

C. If a proposed facility is not certified by NRMCA, equivalent documentation that demonstrates that the batching facility and mixer units have received independent inspection within the six (6) months prior to bid submittal is acceptable.

D. Equivalent documentation includes:

1. Certification by a governmental agency, such as the US Army Corps of Engineers, Cognizant Authority of the state (not a political subdivision of a state) where production facility is located
2. An inspection and report performed by an independent inspection agency or laboratory and certified by a Registered Professional Engineer.
3. Equivalent certification or inspection to have been received within the six (6) months prior to any qualification or production of concrete, cement mortar, cement grout, and non-shrink grout at the facility.

E. Submit a copy of the Supplier's current "NRMCA Certificate of Conformance for Concrete Production Facilities" or equivalent with the proposal.

F. Submit a copy of the complete results of the most recent NRMCA Plant Certification Inspection Check List or equivalent with the proposal for each facility proposed.

3.6.5.2 Volumetric Batching and Continuous Mixing Production Facilities

A. Volumetrically batched and continuously mixed concrete production facilities are required to comply with ASTM C 685/C 685M requirements.

B. Submit a copy of the complete results of the most recent Batching Accuracy and Mixing Efficiency Tests in accordance with ASTM C 685/C 685M with the proposal for each facility.

3.6.6 Supplier Records

3.6.6.1 Retain the following documents and other records generated in association with this Specification during the course of the subcontract.

A. Contract documents, including this Specification and associated Supplier Deviation Disposition Requests.

B. Engineering documentation submittals (Attachment 5.1).

C. Any document generated for this scope (e.g. procedures, reports, certifications, qualifications, letters, etc.) not required as a submittal. Example: "in-process" quality assurance records.

3.6.6.2 Retain records for a minimum of one (1) year beyond the closure of the subcontract.

3.6.6.3 Make retained records available to WSRC upon request during the retention period.

3.6.6.4 Dispose of retained records after the retention period in accordance with Supplier's records management program.

3.7 Site Conditions

3.7.1 See Subcontractor Field Conditions in the procurement documents.

3.8 Period of Performance / Schedule

3.8.1 Initial Schedule

3.8.1.1 Period of performance will be defined in the Procurement Documents.

3.8.1.2 Submit an Initial Schedule with the Proposal and include.

A. Design Submittals

B. Mix Design Qualification Testing

C. Construction of Pre-cast Component Forms

D. Fabrication and Shop Assembly

E. Shipment of Tank Pre-Fabricated Components

F. Pre-cast Component Production Testing Complete

G. Foundation Construction

H. Tank Erection / Construction

I. Testing

3.8.2 Detailed Activity Schedule

3.8.2.1 Submit a Detailed Activity Schedule.

A. Include or incorporate the following information in the schedule, as a minimum:

1. Description of and planned duration for each activity.
2. The sequence, restraints and interfaces between and among the Supplier's activities, as well as between the Supplier's activities and the activities of any of the Supplier's sub-suppliers or of WSRC.
3. Milestones:
   a. Design Submittals Complete
   b. Mix Design Qualification Testing Complete
   c. Construction of Pre-cast Component Forms Complete
   d. Fabrication and Shop Assembly Complete
   e. Shipment of Tank Pre-Fabricated Components
   f. Production Testing Complete
   g. Foundation Construction Complete
   h. Tank Erection / Construction Complete
   i. Roof Erection / Construction Complete
   j. Testing Complete
4. Activities of Particular Interest
   a. Design Review (including submittals)
   b. Fabrication Submittals
   c. Shipment and Delivery
   d. Erection Sequence
   e. Testing Submittals
   f. Hold Points

3.8.2.2 Maintain and update the accepted Detailed Activity Schedule reflecting the current status of Work. Transmit update monthly to procurement Representative.

3.8.3 Coordination

3.8.3.1 Coordinate activities with the WSRC to minimize interferences and delays.

3.8.3.2 Notification to WSRC:

A. Immediately upon determination that a Milestone date cannot be met.

B. Prior to changing an Engineering Document which has received a WSRC Status of 1 or 5.

3.9 Personnel Qualifications / Certifications

3.9.1 Design Certification

3.9.1.1 A Professional Engineer of the appropriate discipline registered in the State in which the Supplier is located is required to seal the Design Package document submittals.

3.9.1.2 Supplier's seal of corporate Certificate of Authorization and seal of the Professional Engineer of the appropriate discipline, signed and dated, is required to certify the information is in accordance with the requirements of this specification.

3.9.2 Independent Testing Laboratory

3.9.2.1 Sampling and testing of concrete and constituents shall be performed by:

A. A licensed independent testing laboratory.

B. Laboratory Staff to include technical engineer(s) experienced in the designated discipline with documented minimum of five (5) years experience on similar projects and under the direct supervision of a Professional Engineer.

3.9.3 Welder Qualifications

3.9.3.1 Welder Qualification and Certification Records are required to be in accordance with AWS D1.1/D1.1M

3.10 Deliverables and Submittals

3.10.1 Submittals

3.10.1.1 Reference the following information on transmittals, submittals and other correspondence:

WSRC Purchase Order No.: _____(Defined on Award)

WSRC Project Title: Salt Stone Vault no. 2

Supplier's Order Number: _____

3.10.1.2 Address transmittals, Engineering Document Requirements submittals, and Supplier Deviation Disposition Request correspondence to:

Westinghouse Savannah River Company

Document Control Center, Bldg. 704-1N

WSRC Purchase Order No.: _____(Defined on Award)

Aiken, SC 29808

Attention: _____ (Defined on Award)

3.10.1.3 Address submittals of electronic media required in Attachment 5.1, to:

Westinghouse Savannah River Company

Building: _____(Defined on Award)

Room No.: _____(Defined on Award)

Aiken, SC 29808

Attention: _____(Engineering Representative)

3.10.1.4 Address a copy of transmittal letters and other communication to:

Westinghouse Savannah River Company

Building 730-4B

Room No.: _____(Defined on Award)

WSRC Purchase Order No.: _____(Defined on Award)

Aiken, SC 29808

Attention: _____(Procurement Representative)

3.10.2 Supplier Document Formats

3.10.2.1 Use English units in drawings, calculations, procedures and reports.

3.10.2.2 Drawings

A. Prepare drawings using Intergraph Microstation version SE (or later – version J preferred) or Autocad Version 14 (or later).
   1. Where electronic media is required for design submittals, provide in Microstation or Autocad format.
   2. Confirm electronic media and files are virus free.
   3. Identify on label of electronic media – Virus application used and the date of virus definition update used.

B. Drawing and lettering shall be of such size and density that, after reduction to half scale, information is clearly legible.

C. Drawings, including reproducibles, electronic media, and prints will become the property of WSRC.

D. The Reference Drawing block on each drawing shall list drawings referenced on that sheet plus the Index Sheet drawing (at a minimum).

3.10.2.3 Calculations

A. Combine calculations in a Design Manual which includes a Table of Contents.

B. Prepare calculations in sufficient detail to ensure that allowable criteria and proper factors of safety have been followed. Provide each calculation with a statement of its problem, the codes and standards governing its design, and a conclusion. Evaluate accepted calculations and revise accordingly to reflect as-built configurations.

C. Provide sufficient detail to allow an individual competent in that discipline to understand the methodology, inputs and results without discussion with originator.

D. For any calculations performed using software, provide copies of the database and/or calculation on CD ROM or equivalent. Include source Mathcad files, if used.

3.10.2.4 Specifications

A. Provide specifications in sufficient detail for the performance of all the construction tasks for tank construction.

B. Prepare in a commercially accepted format (e.g., CSI) to provide well defined activities for the completion of all the construction tasks, unless noted otherwise.

C. Specifications should be divided in sections by types of construction activities.

D. Include construction tolerances.

3.10.3 Inspection / Testing Laboratory Reports

3.10.3.1 Develop and complete written reports, of required testing and inspections specified within this specification, and include the following, at a minimum:

A. Date issued

B. Project title and Specification number

C. Name of inspector or laboratory technician

D. Date, time and location of inspection or testing

E. Identification of product, type of activity performed and applicable code or standard used

F. Type of inspection or test
G. Serial number or distinct identification number of instrument used
H. Results of inspection or test and description of observed irregularities
I. Indicate conformance or nonconformance of test or inspection results with the specified criteria / limits evaluated against
J. Initials and date of personnel performing the activity
K. Seal, signature and date of Professional Engineer determining the validity and acceptability of the reported data

3.10.4 Documentation

3.10.4.1 Use of recycled paper with a maximum of 25 percent recycled content is acceptable for documentation.

3.10.4.2 Submit copies of each Design Package drawing as indicated in Attachment 5.1. Use black lines on white background for copies. Provide shop / assembly drawings suitable for image scanning in ANSI D size (22" x 32").

3.10.5 Engineering Document Requirements Submittal Process

3.10.5.1 Submit Engineering Documents. (Attachment 5.1)

3.10.5.2 WSRC review will result in a status as follows:

Status 1: Work may proceed.
Status 2: Submit final documentation.
Work may proceed.
Status 3: Revise and resubmit.
Work may proceed subject to resolution of indicated comments.
Status 4: Revise and resubmit.
Work may not proceed.
Status 5: Permission to proceed not required.

3.10.5.3 Results of WSRC review returned within 14 calendar days from the date of receipt.

3.10.5.4 Revise documents with a Status of 2, 3, or 4 to incorporate WSRC comments

3.10.5.5 Submit revised documents within fourteen (14) calendar days from the date of Supplier receipt.

3.10.5.6 Notify WSRC prior to changing Status 1 or Status 5 Engineering Documents.

3.10.5.7 Submit changed Engineering documents.

3.10.5.8 Assignment of Status 1 or Status 5 to the Engineering Documents by WSRC does not relieve the Supplier of any part of their obligation:

A. To satisfy the requirements defined in this Specification
B. For the correctness of Engineering Documents
C. For the adequacy and suitability of material and equipment represented

3.11 Packaging, Handling, Shipping and Storage

3.11.1 Packaging

3.11.1.1 Package components in accordance with Supplier's standard

3.11.1.2 Mark each component with date of production, weight, and final position in structure.

3.11.2 Handling

3.11.2.1 Handle pre-cast components consistent with their shape and design.

3.11.2.2 Lift and support only from Supplier defined support points.

3.11.2.3 Supplier to provide lifting or handling devices capable of supporting component in positions anticipated during manufacture, storage, transportation, and erection.

3.11.2.4 Protect members to prevent staining, chipping, or spalling of concrete.

3.11.3 Shipping

3.11.3.1 Load, Transport, and Deliver to jobsite on Savannah River Site, in accordance with directions provided at Award.

3.11.4 Storage

3.11.4.1 In accordance with Supplier's standard

3.11.4.2 WSRC Storage Level "D" (for Information Only)

3.11.5 Submit Prefabricated Component Lifting, Handling, and Storage Instructions.

3.12 Deviations

3.12.1 After award submit a Supplier Deviation Disposition Request (SDDR), Attachment 5.9, form to WSRC for each deviation to the technical or quality requirements of this procurement. Submit to WSRC Document Control Center as stated in Submittals.

NOTE: Any deviation from physical, chemical or compressive strength requirements contained in Material Test Reports which do not meet the requirements of this specification are required to be submitted on a Supplier Deviation Disposition Request at the time the test results are available. Do not wait for next scheduled submittal.

3.12.1.2 For each deviation, perform the following:

A. Identify the specification and revision number.

B. Identify the criteria that cannot be met by Item and Section number.

C. Present an explanation for the deviation.

D. Present a proposal for resolution, including technical justification.

E. Present a price adjustment for resolution of the exception.

3.12.1.3 Do not perform any work or make delivery of any item for which a Supplier Deviation Disposition Request is submitted until a written resolution is received from WSRC.

3.12.2 Nonconformance:

3.12.2.1 Identify on a Supplier Deviation Disposition Request.

3.12.2.2 Include supporting technical justification when requesting acceptance of a "Use-As-Is" or "Repair" disposition.

3.13 Administrative Requirements

3.13.1 Meetings and Trips

3.13.1.1 Design Kickoff Meeting: within one (1) week after subcontract award at Supplier's facility

3.13.1.2 Weekly Teleconference: from award to site mobilization

3.13.1.3 Fabrication Kickoff Meeting: within one (1) week after release to fabricate at Supplier's facility

3.13.1.4 Shop Visits: – During fabrication of pre-cast panels at Supplier's facility per 4.2.2.

3.13.1.5 Weekly Progress Meeting: from site mobilization to demobilization

3.13.2 Progress Reports

3.13.2.1 Provide a Weekly Progress Report to the Procurement Representative 2 days prior to the weekly meetings. Include, as a minimum in the progress report, the following:

A. A narrative report, describing actual work activities accomplished during the reporting period.

B. Actual progress of the work

C. Schedule information

D. A description of the current or potential problem areas that are affecting progress or could affect the succeeding month's work, including but not limited to, potential late delivery of materials or equipment.

4.0 ACCEPTANCE OF SERVICES AND EQUIPMENT

4.1 Examination/Testing Requirements

4.1.1 General

4.1.1.1 Instrument Calibrations

A. Calibrate instruments as required by the manufacturer's instructions and the specific testing procedures / standards being used.

B. Calibrate instruments in accordance with the National Institute of Standards and Testing (NIST) or accepted values of natural physical constants.

C. Make calibration records available to SSR for review during scheduled visits.

D. Notify the Supplier immediately of out of calibration equipment and document condition on a Supplier Deviation Disposition Request.

4.1.2 Examinations

4.1.2.1 Visual Examination

A. Comply with the requirements of AWS D1.1/D1.1M for structural carbon steel

B. Submit Visual Examination Procedure.

C. Verify dimensional configuration of prefabricated tank components are within tolerance limits in accordance with accepted Supplier drawings.

D. Visually examine 100 % of structural welds.

E. Verify dimensional configuration of tank field components are within tolerance limits in accordance with accepted Supplier drawings.

F. Verify embedded items are in proper location in accordance with accepted Supplier drawings.

G. Submit Visual Examination Reports

4.1.3 Testing

4.1.3.1 Initial Aggregate Testing

A. Perform the following tests prior to the initial use in the production of the concrete, cement mortar, cement grout, and non-shrink grout mixes for each class of fine and coarse aggregates from each production facility.

B. If a source of the aggregates changes, perform aggregate testing on the new material prior to initial use of new material in production mixes.

C. Lightweight Particles in Fine Aggregates: ASTM C 123

D. Bulk Density (Unit Weight) and Voids in Fine Aggregates: ASTM C 29/C 29 M

E. Soundness of Fine Aggregates by Use of Sodium Sulfate or Magnesium Sulfate: ASTM C 88

F. Petrographic Examination of Fine Aggregates: ASTM C 295

G. Alkali-Silica Reaction of Fine Aggregates:
   1. ASTM C 33, Appendix X1
   2. Use ASTM C 1260 test method

H. Alkali-Carbonate Rock Reaction of Fine Aggregates:
   1. ASTM C 33, Appendix X1
   2. Use ASTM C 1105 test method

I. Lightweight Particles in Coarse Aggregates: ASTM C 123

J. Bulk Density (Unit Weight) and Voids in Coarse Aggregates: ASTM C 29/C 29 M

K. Resistance to Degradation of Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine: ASTM C 131 for small-size coarse aggregate or ASTM C 535 for large-size coarse aggregate

L. Soundness of Coarse Aggregates by Use of Sodium Sulfate or Magnesium Sulfate: ASTM C 88

M. Petrographic Examination of Coarse Aggregates: ASTM C 295

N. Alkali-Silica Reaction of Coarse Aggregates:
   1. ASTM C 33, Appendix X1
   2. Use ASTM C 1260 test method

O. Alkali-Carbonate Rock Reaction of Coarse Aggregates:
   1. ASTM C 33, Appendix X1
   2. Use ASTM C 1105 test method

P. Submit Initial Aggregate Testing Report from each production facility

4.1.3.2 *Production Aggregate Testing*

A. Perform the following tests prior to the initial use in the production of the concrete, mortar, and grout mixes and at the testing frequency identified below for each class of fine and coarse aggregates from each production facility.

B. Aggregate Moisture Content:
   1. ASTM C 566
   2. Frequency:
      a. Beginning of each batching day
      b. Twice a day, *minimum*
      c. Upon moisture change during the day

C. Fine Aggregate Gradation:
   1. ASTM C 136
   2. Frequency: Weekly

D. Materials Finer than 75µm (No. 200) Sieve for Fine Aggregate:
   1. ASTM C 117
   2. Frequency: Monthly

E. Organic Impurities in Fine Aggregates:

1. ASTM C 40
2. Frequency: Monthly

F. Clay Lumps and Friable Particle in Fine Aggregates:
1. ASTM C 142
2. Frequency: Monthly

G. Coarse Aggregate Gradation: ASTM C 136
1. Frequency: Weekly

H. Materials Finer than 75µm (No. 200) Sieve for Coarse Aggregate:
1. ASTM C 117
2. Frequency: Monthly

I. Submit Production Aggregate Monthly Testing Report from each production facility.

4.1.3.3 Production Concrete, Cement Mortar, Cement Grout, and Non-Shrink Grout Testing

A. Retain batch tickets from each delivery per Section 13 of ASTM C 94/C 94M or per Section 15 of ASTM C 685/C 685M.

B. Obtain samples in accordance with ASTM C 172.

C. Sample and cast one (1) set of concrete, cement mortar, cement grout, and non-shrink grout cylinders:
1. From the first three (3) yards of mix delivered or discharged each day
2. From every one hundred (100) cubic yards, or fraction thereof, of each mix delivered in any twenty-four (24) hour period

D. Perform field tests on the fresh concrete samples for the following attributes:
1. Temperature: ASTM C 1064
2. Slump or Flow Consistency: ASTM C 143/C 143M
3. Air Content: ASTM C 231
4. Bulk Density or Unit Weight: ASTM C 138/C 138M

E. A set of cylinders is defined as seven (7) compressive strength cylinders, six (6) inches in diameter x twelve (12) inches long, in accordance with ASTM C 31/C 31M.

F. Test the cylinders for Compressive Strength in accordance with ASTM C 39/C 39M.
1. Test one (1) cylinder at seven (7) days
2. Test two (2) cylinder at twenty-eight (28) days
3. Hold two (2) cylinders for spares
4. Ship two (2) cylinders to SRS for future testing.

G. Compressive strength testing dates of the concrete, cement mortar, cement grout, and non-shrink grout cylinders which fall on a weekend or a holiday may be adjusted as contained below.
1. Seven (7) day test may be performed within -1 or +2 days of the corresponding test dates.
2. Twenty-eight (28) day test may be performed within -1 or +1 day of the corresponding test dates.

H. Material Test Reports for Concrete, Cement Mortar, Cement Grout, and Non-Shrink Grout to include:
   1. Separate report for each batch sampled which includes the field tests results, the laboratory tests results and the batch tickets.
   2. Batch ticket per Section 13 of ASTM C 94/C 94M or per Section 15 of ASTM C 685/C 685M, irregardless of whether the material was used in pre-cast fabrication or rejected and not used.
   3. Provide all the batch tickets from each delivery since the previous sample.
   4. Document the field test results.

I. Submit the Final Compressive Strength Test Reports for Concrete, Cement Mortar, Cement Grout, and Non-Shrink Grout to include 28 day compressive strength results test with a complete set of previous test results.

J. Submit the Future Testing Compressive Strength Cylinders for Concrete, Mortar, and Grout (two for each test set).

4.2 WSRC Surveillance and Audits

4.2.1 WSRC shall have access to Supplier facilities or areas, including Sub-suppliers, where the design, fabrication, installation, construction and testing of the contracted items are in process. Accessibility includes reviewing, monitoring, and auditing of contracted in-process work including associated documentation.

4.2.2 WSRC personnel will schedule visits to Supplier's facility at mutually agreeable intervals.

4.2.2.1 Minimum Visits

A. Kick-Off meeting,
B. Beginning of production,
C. At least once during production,
D. Prior to shipment.

4.2.3 The SSR will perform surveillance activities.

4.2.3.1 Verify the use of accepted shop drawings.

4.2.3.2 Verify welder qualifications and certifications.

4.2.3.3 Verify nondestructive examination and test personnel qualifications.

4.2.3.4 Verify the use of accepted inspection and examination procedures.

4.2.3.5 Verify Material Test Reports.

4.2.3.6 Verify the Visual Examinations.

4.2.3.7 Release for Shipment Review **[Hold Point]**

A. Review Attachment 5.1 documentation (Engineering Document Requirements submittals) to ensure they are WSRC Status 1 or 5.

B. Verify component markings, numbering, and tagging are in accordance with the requirements in this specification.
   1. Review Attachment 5.2 documentation (Quality Verification Document Requirements submittals) to ensure they are complete and conform to the requirements of this specification.

C. The SSR will issue a release for shipment via signature on Attachment 5.2.

4.3 Final Acceptance Method

4.3.1 Pre-Fab Panel Inspection at SRS will include the following:

4.3.1.1 Verification that no physical damage has occurred upon delivery

4.3.1.2 Verification that Receipt Inspection Documentation is included with shipment

A. Verify Quality Verification Document Requirements form, Attachment 5.2, signed / dated by SSR

B. Confirm each Quality Verification Document is included

4.3.2 Tank Acceptance

4.3.2.1 STR to verify the following;

A. Verify Quality Verification Document Requirements form, Attachment 5.2, signed / dated by SSR

B. Confirm each Quality Verification Document is included

C. Walkdown and verification that tank was fabricated and installed per this specification.

5.0 ATTACHMENTS

5.1 Engineering Document Requirements (3 Pages)

5.2 Quality Verification Document Requirements (2 Pages)

5.3 Vicinity Map (1 Page)

5.4 Location Plan (1 Page)

5.5 Before Grading Sections (1 Page)

5.6 After Grading Sections (1 Page)

5.7 Vault Penetration and Embed Plan (1 Page)

5.8 Tank Base Detail (1 Page)

5.9 Supplier Deviation and Disposition Request (SDDR) (2 Pages)

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Engineering Document Requirements

Attachment No. 5.1
Revision No. 1
Spec/Req'n No. C-SOW-Z-00001
Page 1 of 3

1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. Permission to Proceed Required		5. Submittal Schedule	6. Quantity Required		7. Kind of copies	8. Remarks
			Yes	No		Init	Final		
1.0	3.1.5.1	Design Package	Y		4 weeks After Award		2	Repro & Electronic Media	
4.1	3.1.5.2	Tank Erection Drawings and Installation Instructions	Y		8 weeks After Award		2	Repro	
4.1	3.1.5.3	CSI formatted Specification for Back Filling		N	8 Weeks After Award		2	Repro	
8.0	3.2.1.7	Mix Designs	Y		4 Weeks After Award		2	Repro	
10.1	3.2.2.3	Qualification Material Test Reports for Design Mix Characteristics	Y		10 weeks After award		2	Repro	
10.1	3.2.2.4	90 Day Compressive Strength Material Test Reports	Y		20 Weeks After Award		2	Repro	
10.1	3.2.2.5	Qualification Material Test Reports for Water Permeability and Chloride Ion Penetrability and Diffusion	Y		16 weeks After Award		2	Repro	
10.1	3.2.2.6	Qualification Material Test Reports for Sulfate Resistance	Y		20 weeks After award		2	Repro	
10.1	3.2.2.7 A.	Material Test Reports for Sulfate Resistance at 6 Months		N	Within 20 days After Completion of Test		2	Repro	
10.1	3.2.2.7 B.	Material Test Reports for Sulfate Resistance at 9 Months		N	Within 20 days After Completion of Test		2	Repro	
10.1	3.2.2.7 C.	Material Test Reports for Sulfate Resistance at 12 Months		N	Within 20 days After Completion of Test		2	Repro	
10.1	3.2.2.7 D.	Material Test Reports for Sulfate Resistance at 15 Months		N	Within 20 days After Completion of Test		2	Repro	
10.1	3.2.2.7 E.	Material Test Reports for Sulfate Resistance at 18 Months		N	Within 20 days After Completion of Test		2	Repro	
10.1	3.2.3.1 A.2.	Material Test Report for Type V Portland Cement		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.1 B.2.	Material Test Report for Type II Portland Cement		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.2 C.	Material Test Report for Hydraulic Cement		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.3 A.	Material Test Report for the Fine Aggregate		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.4 A.	Material Test Report for the Coarse Aggregate		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.5 B.	Material Test Report for Blast Furnace Slag		N	4 Weeks After Award		2	Repro	Submit MTR for each shipment during production
10.1	3.2.3.7 B.	Material Test Report for Fly Ash		N	4 Weeks After Award		2	Repro	Submit if fly ash is used in mix design

Engineering Document Requirements

Attachment No. 5.1
Revision No. 1
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1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. Permission to Proceed Required		5. Submittal Schedule	6. Quantity Required		7. Kind of copies	8. Remarks
			Yes	No		Init	Final		
10.1	3.2.3.8 B.	Material Test Report for Silica Fume		N	4 Weeks After Award		2	Repro	Submit if silica fume is used in mix design
10.1	3.2.3.9 B.	Material Test Report for Air Entraining Admixtures		N	4 Week After Award		2	Repro	
10.1	3.2.3.10 B.	Material Test Report for Water Reducing Admixtures		N	4 weeks After Award		2	Repro	Submit if Water Reducing Admixtures are used in mix design
10.1	3.2.3.11 B.	Material Test Report for High Range Water Reducing Admixtures		N	4 Weeks After Award		2	Repro	Submit if High Range Water Reducing Admixtures are used in mix design
10.2	3.3.3.2	Coating System Product Data		N	4 weeks After Award		2	Repro	
1.0	3.4.2.4 A.	As-Built Documents and Drawings	Y		Prior to Shipment		2	Repro & Electronic Media	
6.0	3.6.2.2	Quality Program Manual	Y		With Proposal		2	Repro	
28.0	3.6.3.3	Supplier Qualifications and Experience	Y		With Proposal		2	Repro	
6.0	3.6.4.7	Independent Inspection / Testing Laboratory Qualifications	Y		With Proposal		2	Repro	
6.0	3.6.5.1 E.	NRMCA Certificate of Conformance for Concrete Production Facilities	Y		With Proposal		2	Repro	
6.0	3.6.5.1 F.	NRMCA Plant Certification Inspection Check List	Y		With Proposal		2	Repro	
6.0	3.6.5.2 B.	Batching Accuracy and Mixing Efficiency Tests		N	With Proposal		2	Repro	Not required if a continuous mixing facility is not proposed.
5.0	3.8.1.2	Initial Schedule		N	With Proposal		2	Repro	
5.0	3.8.2.1	Detailed Activity Schedule		N	2 weeks After Award		2	Repro	Update Monthly. Submit to Procurement Representative.
4.1	3.11.5	Prefabricated Component Lifting, Handling, and Storage Instructions		N	8 weeks After Award		2	Repro	
25.0	4.1.2.1 B.	Visual Examination Procedure	Y		4 Weeks After Award		2	Repro	
8.0	4.1.3.1 P.	Initial Aggregate Testing Report		N	Prior to Production		2	Repro	Change of source of material requires new testing and submittal
10.1	4.1.3.2 I.	Production Aggregate Monthly Testing Report		N	Monthly		2	Repro	Submit all reports by last working day of month
26.0	4.1.3.3 J.	Future Testing Compressive Strength Cylinders for Concrete, Mortar, and Grout		N	Within 14 days After Last Cylinder Break		2	Repro	

Engineering Document Requirements Form Instructions

Purpose The Engineering Document Requirements (EDR) form is prepared by the originator, establishes a basis for actions required of a Supplier and provides the schedule for the submittal of engineering documents by the Supplier.

Legend Entry No. **Information Required**

1 Document category number – see below.
2 Applicable Specification number and appropriate paragraph.
3 Description corresponding to document category number.
4 Permission to proceed with fabrication or other specific processes is marked yes, if required.
5 List a milestone after award i.e., prior to fabrication, prior to test, prior to shipment, or with shipment that the listed document is to be submitted by Supplier.
6 Number of copies required for submittal.
7 Reproducible, Mylar, Vellum, etc.
8 Enter remarks when appropriate.

Document Category Number and Descriptions

1.0 Drawings
- 1.1 Outline Dimensions, Services, Foundations and Mounting Details – Drawings providing external envelope, including lugs, centerline(s), location and size for electrical cable, conduit, fluid, and other service connections, isometrics and details related to foundations and mountings.
- 1.2 Assembly Drawings – Detailed drawings indicating sufficient information to facilitate assembly of the component parts of an equipment item.
- 1.3 Shop Detail Drawings – Drawings which provide sufficient detail to facilitate fabrication, manufacture, or installation. This includes pipe spool drawings, internal piping and wiring details, cross-section details and structural and architectural details.
- 1.4 Wiring Diagrams – Drawings which show schematic diagram equipment, internal wiring diagrams, and interconnection wiring diagram for electrical items.
- 1.5 Control Logic Diagrams – Drawings which show paths which input signals must follow to accomplish the required responses.
- 1.6 Piping and Instrumentation Diagrams – Drawings which show piping system scheme and control elements.

2.0 Parts Lists and Costs – Sectional view with identified parts and recommended spare parts for one year's operation and specified with unit cost.

3.0 Complete WSRC Data Sheets – Information provided by Supplier on data sheets furnished by WSRC.

4.0 Instructions
- 4.1 Erection/Installation – Detailed written procedures, instructions, and drawings required to erect or install material or equipment.
- 4.2 Operations – Detailed written instructions describing how an item or system should be operated.
- 4.3 Maintenance – Detailed written instructions required to disassemble, reassemble and maintain items or systems in an operating condition.
- 4.4 Site Storage and Handling – Detailed written instructions, requirements and time period for lubrication, rotation, heating, lifting or other handling requirements to prevent damage or deterioration during storage and handling at jobsite. This includes shipping instruction for return.

5.0 Schedules: Engineering and Fabrication/Erection – Bar charts or critical path method diagram which detail the chronological sequence of activities, i.e., Engineering submittals, fabrication and shipment.

6.0 Quality Assurance Manual/Procedures – The document(s) which describe(s) the planned and systematic measures that are used to assure that structures, systems, and components will meet the requirements of the procurement documents.

7.0 Seismic Data Reports – The analytical or test report which provides information and demonstrates suitability of material, component or system in relation to the conditions imposed by the stated seismic criteria.

8.0 Analysis and Design Reports – The analytical data (stress, electrical loading, fluid dynamics, design verification reports, etc.) which demonstrate that an item satisfies specified requirements.

9.0 Acoustic Data Reports – The noise, sound and other acoustic vibration data required by the procurement documents.

10.0 Samples
- 10.1 Typical Quality Verification Documents – A representative data package which will be submitted for the items furnished as required in the procurement documents.
- 10.2 Typical Material Used – a representative example of the material to be used.

11.0 Material Descriptions – The technical data describing a material which a Supplier proposes to use. This usually applies to architectural items, e.g., metal siding, decking, doors, paints, coatings.

12.0 Welding Procedures and Qualifications – The welding procedure, Specification and supporting qualification records required for welding, hard facing, overlaying, brazing and soldering.

13.0 Material Control Procedures – The procedures for controlling issuance, handling, storage and traceability of materials such as weld rod.

14.0 Repair Procedures – The procedures for controlling materials removal and replacement by welding, brazing, etc., subsequent thermal treatments, and final acceptance inspection.

15.0 Cleaning and Coating Procedures – The procedures for removal of dirt, grease or other surface contamination, and preparation and application of protective coatings.

16.0 Heat Treatment Procedures – The procedures for controlling temperatures and time at temperature as a function of thickness, furnace atmosphere, cooling rate and methods, etc.

19.0 UT – Ultrasonic Examination Procedures – Procedures for detecting discontinuities and inclusions in materials by the use of high frequency acoustic energy.

20.0 RT – Radiographic Examination Procedures – Procedures for detecting discontinuities and inclusions in materials by x-ray or gamma ray expose of photographic film.

21.0 MT – Magnetic Particle Examination Procedures – Procedures for detecting surface or near surface discontinuities in magnetic materials by the distortion of an applied magnetic field.

22.0 PT – Liquid Penetrant Examination Procedures – Procedures for detecting discontinuities in materials by the application of a penetrating liquid in conjunction with suitable developing materials.

23.0 Eddy Current Examination Procedures – Procedures for detecting discontinuities in materials by distortion of an applied electromagnetic field.

24.0 Pressure Test – Hydro, Air, Leak, Bubble or Vacuum Test Procedures – Procedures for performing hydrostatic or pneumatic structural integrity and leakage tests.

25.0 Inspection Procedures – Organized process followed for the purpose of determining that specified requirements (dimensions, properties, performance results, etc.) are met.

26.0 Performance Test Procedures – Test performed to demonstrate that functional design and operational parameters are met.
- 26.1 Mechanical Tests – e.g., pump performance, data, valve stroking, load, temperature rise, calibration, environmental, etc.
- 26.2 Electrical Test – e.g., impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.

27.0 Prototype Test Reports – Reports of a test which is performed on a standard or typical examination of equipment or item, and which is not required for each item produced in order to substantiate the acceptability of equal items. This may include tests which result in damage to the item(s) tested.

28.0 Personnel Qualification Procedures – Procedures for qualifying welders, inspectors and other special process personnel.

29.0 Supplier Shipping Preparation Procedures – Procedures used by a Supplier to prepare finished materials or equipment for shipment from its facility to the jobsite.

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Quality Verification Document Requirements

Attachment No. 5.2
Revision No. 1
Spec/Req'n No. C-SOW-Z-00001
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1. Document Category Number	2. Specification Paragraph Reference	3. Document Description	4. SSR Release	5. WSRC Receipt Inspection Check-In	6. Remarks	7. DOC Supplier Page Count
25.0	4.1.2.1 G.	Visual Examination Reports				
17.1	4.1.3.3 I.	Final Compressive Strength Test Reports for Concrete, Cement Mortar, Cement Grout, and Non-Shrink Grout				

8. Supplier's Order No.	9. Supplier's Part	10. Supplier's Part Name	11. Quantity
12. PO No.	13. WSRC Line/Equip Tag or Code No.	14. WSRC Part Name	

15. Supplier's Conformance Statement

We certify that the work and required documents meet the requirements of the procuring documents.

Authorized Supplier Signature | Title | Date

16. Source Surveillance Representative at Supplier's Facility

Work was released based on satisfactory completion of quality surveillance and review of documentation.

☐ With Authorized Deviations Noted in Column 6
☐ No Deviations

Signature of SSR | Date

17. Receiving Inspection at SRS

This form and the quality verification documents referenced hereon have been received and their relationship to the hardware verified.

Signature of WSRC Inspector | Date

Quality Verification Document Requirements Form Instructions

Purpose The Quality Verification document Requirements (QVDR) is initiated by SRS and completed by the Supplier when providing quality verification documents. The QVDR is a multipurpose form to
Transmit quality verification documents from the Supplier,
Provide evidence of SSR release of documentation and /or work, and
Provide evidence of an SRS inspection check of documentation received at SRS.

WSRC Entries

Entry No.	Information Required
1	Enter Document Category Number – see below.
2	Enter Specification Number and Paragraph Reference.
3	Enter Description corresponding to the Document Category Number.
4	SSR to initial upon item release.
6	Enter "Remarks: as appropriate.
16	SSR and dates release.

Field Entries

Entry No.	Information Required
5	SRS inspector at the jobsite to complete check-in.
17	The SRS inspector will review the quality verification documentation package. If found satisfactory, he signs and dates the check-in statement.

Supplier Entries

Entry No.	Information Required
7	Enter number of pages of quality verification document being submitted.
8	Enter information required.
9	Enter information required.
10	Enter information required.
11	Enter the quantity of units covered by the documents submitted. For each item on Entry No. 12 being released, provide a separate copy of this completed form and the supporting quality verification documents.
12	Enter information required.
13	Enter information required.
14	Enter information required.
15	Supplier – Signature of an employee authorized to sign such documents.

Document Category Numbers and Descriptions

12.0 Welding Verification Reports – Reports of welding performed to include weld identification, and certification that qualified welding procedures and welders were used.

13.0 Material Verification Reports – Reports relative to material which confirm, substantiate or assure that an activity or condition has been implemented in conformance with code and material specifications imposed by the procurement documents.

14.0 Major Repair Verification Reports – Reports may include weld repair locations (maps), material test reports for filler metal, pre- and post-weld heat treatment records, NDE records, etc. The resolution of whether a repair is major or not is an SRS responsibility.

15.0 Cleaning and Coating Verification Reports – Reports include a certification of visual examination for surface preparation, surface profile, materials, etc.; and also humidity data, temperature data and coating thickness data as required by the procurement documents.

16.0 Heat Treat Reports – Reports normally include furnace charts and similar records which identify and certify the item(s) treated, the procedure used, furnace atmosphere, time at temperature, cooling rate, etc.

17.0 Material Property Reports
- 17.1 MTR (Material Test Reports) – These reports include all chemical, physical, mechanical, and electrical property test data required by the material specification and applicable codes. These are applicable to cement, concrete, metals, cable jacket materials, rebar, rebar splices, etc.
- 17.2 Impact Test Data – Reports of Charpy or drop weight tests including specimen configuration, test temperature and fracture data.
- 17.3 Ferrite Data – Reports of the ferrite percentage for stainless steel materials used, including castings and welding filler metals as deposited.
- 17.4 Materials Certificate of Conformance – Documents which certify conformance to the requirements of the applicable material specification.
- 17.5 Electrical Property Reports – Reports of electrical characteristics, e.g., dielectric, impedance, resistance, flame tests, corona, etc.

18.0 Code Compliance – Verifying documents (such as data Forms U-1, M-2, State, etc.), which are prepared by the manufacturer or installer and certified by the Authorized Code Inspector.

19.0 UT – Ultrasonic Examination and Verification Reports – Examination results of certain characteristics of discontinuities and inclusions in material by the use of high frequency acoustic energy.

20.0 RT – Radiographic Examination and Verification Reports – Examination results of certain characteristics of discontinuities and inclusions in materials by x-ray or gamma ray exposure of photographic film, including film itself.

21.0 MT – Magnetic Particle Examination and Verification Reports – Examination results of surface (or near surface) discontinuities in magnetic materials by distortion of an applied magnetic field.

22.0 PT – Liquid Penetrant Examination and Verification Reports – Examination results of surface discontinuities in materials by application of a penetrating liquid in conjunction with suitable developing techniques.

23.0 Eddy Current Examination and Verification Reports – Examination results of discontinuities in material by distortion of an applied electromagnetic field.

24.0 Pressure Test – Hydro, Air, Leak, Bubble or Vacuum Test and Verification Reports – Results of hydrostatic or pneumatic structural integrity and leakage tests.

25.0 Inspection and Verification Reports – Documented findings resulting from an inspection.

26.0 Performance Test and Verification Reports – Reports of Test Results
- 26.1 Mechanical Test, e.g., pump, performance data, valve stroking, load, temperature rise, calibration, environment, etc.
- 26.2 Electrical Tests, e.g., load, impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.

27.0 Prototype Test Report – Report of the test which is performed on a standard or typical example of equipment, material or item, and which is not required for each item produced in order to substantiate the acceptability of equal items. This normally includes tests which may, or could be expected to, result in damage to the item(s) tested.

28.0 Certificate of Conformance – A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements.

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Stores: 26-19104.00
Page 1 of 2

Supplier Deviation Disposition Request

Attachment No. 5.9
Spec C-SOW-Z-00001
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Page 1 of 2

Note

1. Completion instructions attached.
2. Items 1-19 below to be completed by Supplier.
3. *Items WSRC entries only.
4. Attach additional information whenever necessary.
5. WSRC must be notified within 5 days after detection of deviation.
6. A copy of the completed SDDR form shall be included by the Supplier in the Quality Verification Data Package for each item to which this SDDR applies.

Supplier Completed

For Supplier Use		For WSRC Use		
Supplier SDDR No.	Date Submitted	WSRC SDDR No.	Project No.	Date Received

1. Supplier Name	Address	City/State	Zip	2. Supplier's Order No.

2.1 WSRC Document	3. Supplier's Part No.	4. Suppliers Part Name	5. Deviation Detected (Date)	Method

6. All Previous SDDRS (No./Date)	7. WSRC PO No./Change Notice No.	8. WSRC Buyer	9. WSRC Part No.

10. WSRC Part Name	11. WSRC SSR Notified (Date)	Method	12. WSRC Eng Notified (Date)	Method

13. Deviation Description (Attach extra sheets, photographs, sketches, etc., as necessary, and identify quantity and serial No.'s, as applicable.)

14. Suppliers Proposed Disposition ☐ Use-As-Is ☐ Repair ☐ Modify WSRC Requirement

15. Cost Impact	16. Schedule Impact

17. Proposed Disposition and Technical (plus cost/schedule if applicable) Justification (Attach extra sheets, sketches, etc., as necessary.)

18. Associated Supplier Document Change(s)

19. Suppliers Authorized Representative (Name)	Date

Signature	Title

WSRC

*20. SRS Eng Action
☐ Accepted ☐ Drawing Change (☐ WSRC ☐ Supplier)
☐ Rejected ☐ Specification/Requisition Change
☐ Other Suppliers Affected ☐ Follow-Up
☐ Baseline Change ☐ Other _____

Item Description _____
End Use _____
Responsible Division _____
Functional Class _____

*21. USQ Document No.

*22. WSRC Disposition Statement Including Justification (Attach extra sheets, sketches, etc., as necessary)

Incorporation Required ☐ Yes ☐ No	Document No.(s)	WSRC Action Required ☐ Yes ☐ No

*23. WSRC Acceptance/Printed Name/Signature

CTF/Disposition Originator	Date	CQF	Date
VER/CHK	Date	P&MMD	Date
MGR	Date	Other	Date

Instructions

(Use Black Ink or Typewriter)
(Always include Instruction Sheet with Page 1)

This form is to be used after Purchase Order Award by a supplier or subtier supplier to

a) Notify WSRC when manufactured product or service does not meet established contract requirements and to document the supplier's proposed disposition, with their technical proposed disposition, with their technical (and where appropriate, Cost/ Schedule) justification.
b) Notify WSRC when the supplier wants to propose changes to the contract documents unanticipated at time of award.
c) Record WSRC disposition of the SDDR.

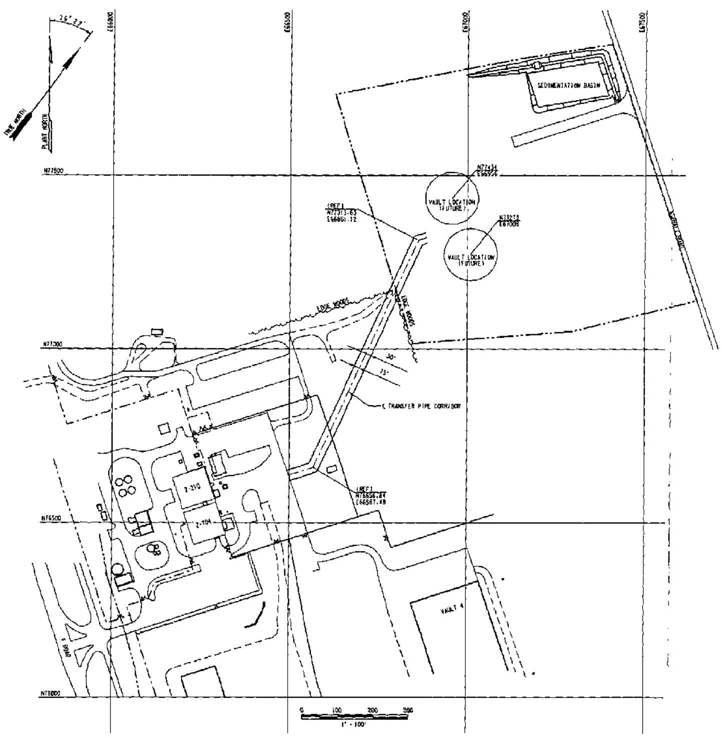
A deviation is any departure from the requirements of the procuring documents, which the supplier has incorporated or proposes to incorporate in the completed item or service provided. Deviation disposition can be classified as Use-As-Is or Repair.

Repair is defined as the process of restoring a nonconforming characteristic to a condition such that the capability of an item to function reliably and safety is unimpaired, even though that item still may not conform to the original requirement. Repair includes alternations to the properties to the material through heat-treating, welding, metal deposition, chemical processing, etc. The SDDR form is not required for cases where WSRC has previously provided authorization to proceed, using an accepted repair method for a specific type of repair. Records must be maintained for each specific repair.

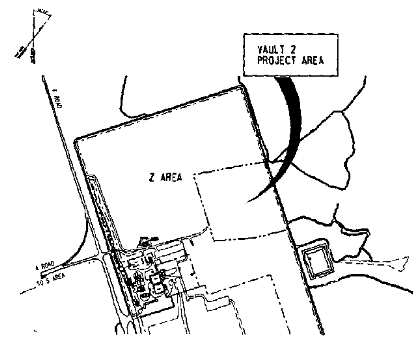
An WSRC Engineering action and disposition statement does not relieve the supplier from responsibility for the accuracy, adequacy, or suitability of the item or service being provided as defined in the procurement documents, nor does it constitute waiver of the right to renegotiate the terms of the procurement documents.

Block No. **Entry Information**

1. Supplier's name and address — city, state, and zip code. List same information for subtier suppliers if applicable.
2. Supplier's order number if one has been assigned.
2.1 WSRC specification or drawing number against which a deviation is being proposed.
3. Supplier's Part Number as applicable from the drawings, catalog, internal specification, etc.
4. Supplier's Part Name.
5. Date deviation detected and method used to detect deviation (NDE, dimensional, check, visual, etc.)
6. List all previous SDDRs and their dates that have been submitted for similar deviations requested on this purchase order.
7. WSRC Purchase Order Number and Revision Number.
8. WSRC Buyer Name.
9. WSRC Purchase Requisition (item, part, tag or code) Number(s).
10. WSRC Part Name, if one has been assigned.
11. Date and method (Fax, letter, etc.) used to notify the WSRC Supplier Surveillance Representative (SSR) whenever WSRC Quality Surveillance is applicable. If the Purchase Requisition identified no requirements for Supplier Surveillance, enter "Not Required."
12. Date and method (Fax, letter, etc.) used to notify WSRC Engineering.
13. Describe the deviating characteristics and define the extent of the out-of specification condition for each identified piece affected. Identify the location of the deviation characteristic by print coordinates or specific location, as applicable. Attach reproducible quality extra sheets, sketches, photographs, etc., as necessary. When proposing a change in either supplier or WSRC documents; describe the change; identify the documents completely including title or subject, date and revision; and where appropriate, attach a copy of areas in question.
14. State proposed disposition.
15. Enter cost impact that would result from proposed changes and which will be reflected in appropriate Procurement documents.
16. Enter delivery schedule impact that would result from proposed changes.
17. Describe the proposed disposition and provide technical (and where appropriate cost/schedule) justification for WSRC evaluation. Attach reproducible quality copies whenever required. If the deviation is correctable by repair, submit a detailed repair procedure or reference the procedure previously submitted and approved by WSRC for use in similar situations. Provide supplier control number and procedure title. For documents, provide suggested corrective wording, procedures, documents, etc. Provide a copy of each SDDR attachment to the WSRC SSR at the supplier's location.
18. Identify the nature of changes that may be needed on associated supplier documents (drawings, specifications, procedures, installation instructions, etc.).
19. Enter the name (typed or printed) and title of the supplier's representative authorizing the disposition request and have appropriate signature and date signed.
*20. Check SRS Engineering disposition accepted or rejected. Check additional boxes to define the action required by WSRC Engineering and include the appropriate item description, end use, responsible division and functional classification. Refer to baseline change procedures for baseline changes.
21. USQ Document No. "Repair", Modify WSRC Requirements" and "Use-as-is" disposition for nuclear and nuclear support facilities, enter the applicable USQ Document Number (e.g. Unreviewed Safety Question Screening, (USQS) and/or Unreviewed Safety Question Evaluation, (USQE), Categorical Exclusion document number) utilized to document the review performed by a USQ - Qualified Person in accordance with 11Q. If the item is not to be used in a nuclear or nuclear support facility application, then enter "N/A" in Block 21.
*22. Provide appropriate justification for the WSRC action(s) indicated in Block 20. When changes to drawings, specifications, requisitions, or other WSRC documents are involved, each document should be identified and the associated change briefly described. If other suppliers are affected, indicate who they are and the documents that initiated resolution of that involvement. "Other" follow-up action (e.g., the need for additional WSRC calculations, additional drawings or sketches, inspection by WSRC Engineering representative, etc.) should also be identified here. If WSRC action is required, so indicate.
*23. Originator — Signature of Responsible Engineer.
Verifier/Checker — Signature of the Verifier/Checker Reviewing the Engineering action and the date signed.
MGR — Signature of the WSRC Department Manager and the date signed.
CQF — Signature of the Cognizant Quality Function Representative and the date signed.
P&MMD — Signature of the WSRC Procurement and Materials Management Department representative acknowledging the SDDR and the date signed.



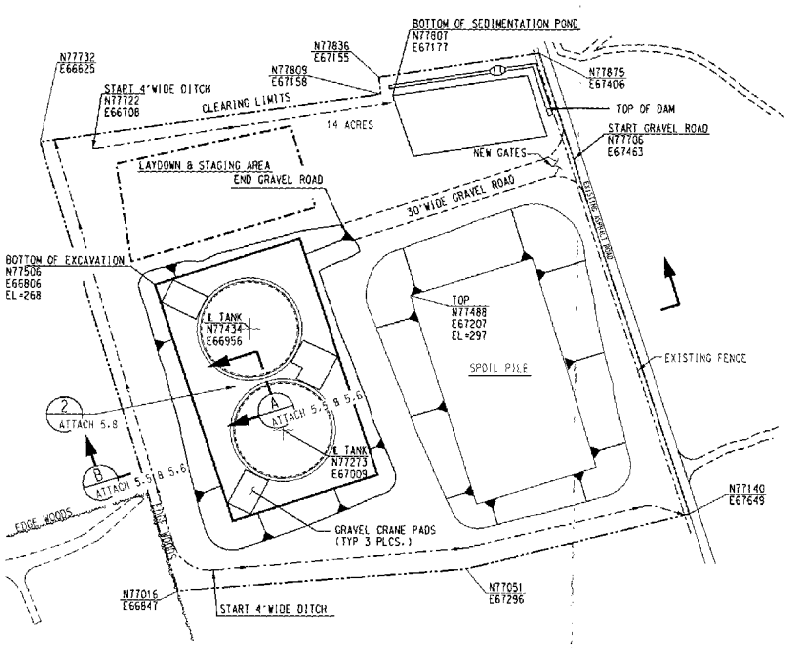
VICINITY MAP



KEY PLAN

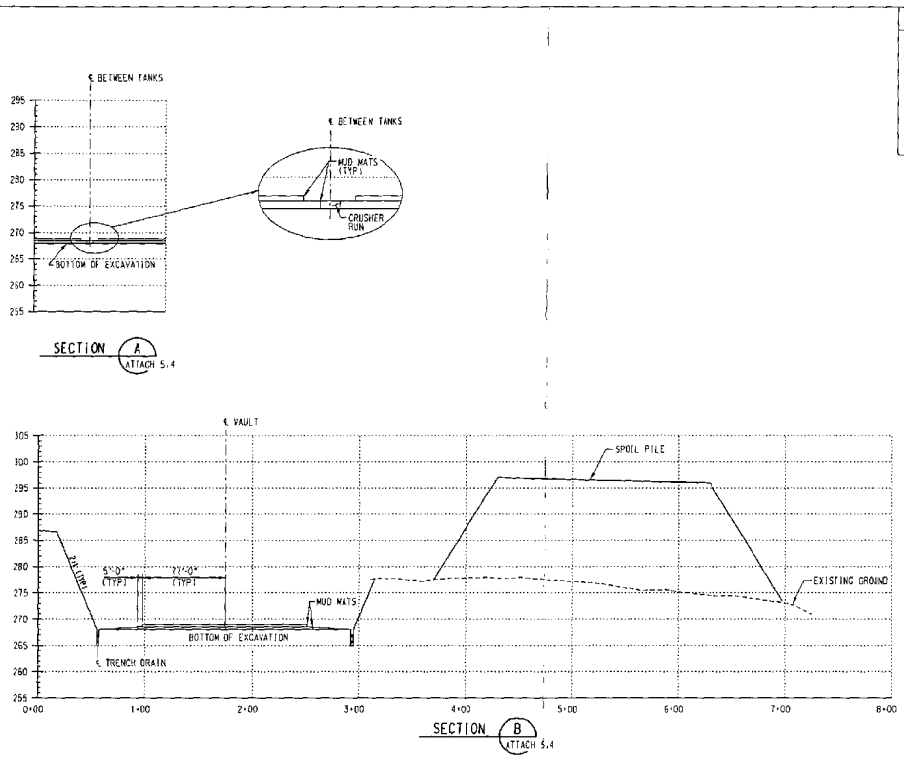
SALTSTONE VAULT No. 2, BLDG. 451-002Z
VICINITY MAP

C-SOW-Z-00001 REV. 1
ATTACHMENT 5.3
PAGE 1 OF 1



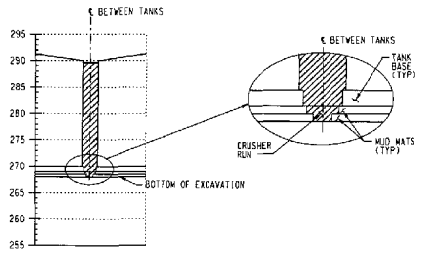
SALTSTONE VAULT No. 2, BLDG. 451-002Z
LOCATION PLAN

C-SOW-Z-00001 REV. 1
ATTACHMENT 5.4
PAGE 1 OF 1

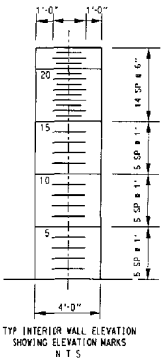


SALTSTONE VAULT No. 2, BLDG. 451-002Z
BEFORE GRADING SECTIONS

C-SOW-Z-00001 REV. 1
ATTACHMENT 5.5
PAGE 1 OF 1



SECTION A (ATTACH 5.4)

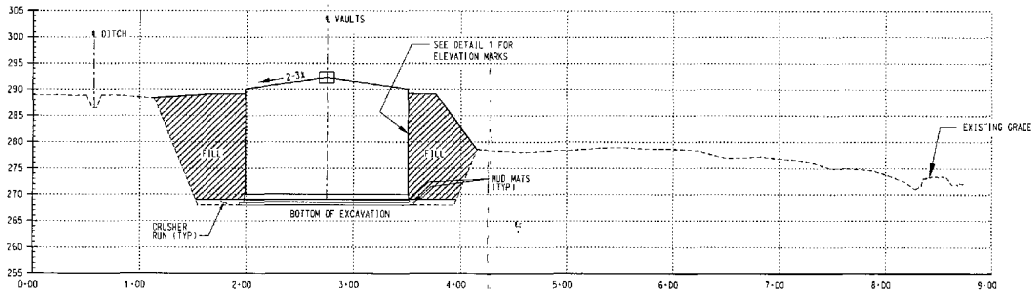


DETAIL 1

TYP INTERIOR WALL ELEVATION SHOWING ELEVATION MARKS
N T S

NOTES:

1. PAINT SCALE DIRECTLY ON INTERIOR WALL OF CONCRETE PANEL USING NON-REFLECTIVE PAINT. THE BACKGROUND SHALL BE WHITE PER DIMENSIONS GIVEN. ELEVATION NUMBERS AND LINES SHALL BE BLACK.
2. PROVIDE ELEVATION NUMBERS AT 5' INTERVALS AS SHOWN. NUMBERS SHALL BE 4" HIGH.
3. ELEVATION LINES SHALL BE 1" THICK BY 2'LONG AND PLACED AT 1' INTERVALS UP TO 15' AND AT 6" INTERVALS THEREAFTER AS SHOWN.

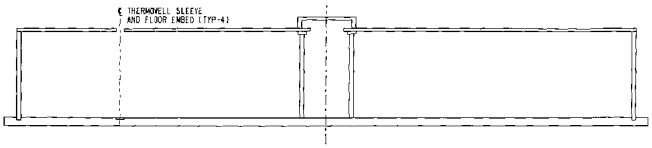


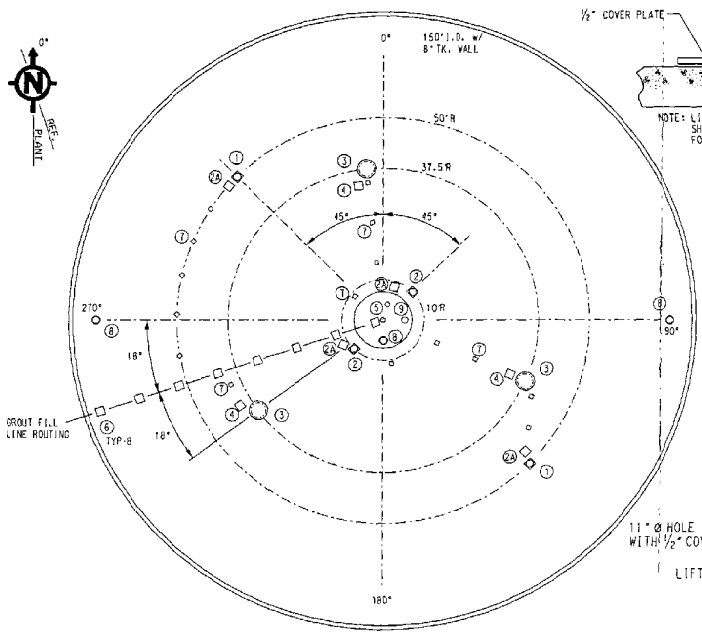
SECTION B (ATTACH 5.4)

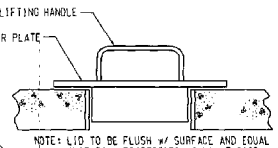
SALTSTONE VAULT No. 2, BLDG. 451-0022
AFTER GRADING SECTIONS

C-SOW-Z-00001 REV. 1
ATTACHMENT 5.6
PAGE 1 OF 1

VAULT PENETRATION AND EMBED DRAWING

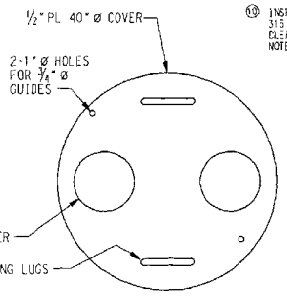






NOTE: LID TO BE FLUSH w/ SURFACE AND EQUAL SHIELDING PROPERTIES AS VAULT ROOF FOR SAMPLE AND INSPECTION PORTS

DETAIL 1
PORT PLUG



DETAIL 2
CAMERA PORT

LEGEND

① THERMOWELL TREE LOCATION: ON 50'-0" (± 2") R: (TYP-2 PLCS. 180° APART): ONE 12" ± 12" X ½" EMBED REQUIRED FOR EACH: FLOOR (MAX. LOADS: 150 lbs. LATERAL; 250 lbs. VERTICAL) AND PROVIDE A 6" DIA. OPENING w/ PLUG FOR CONDUIT ON LINE WITH TW EMBED FLOOR PLATE. SEE DETAIL 1.

② THERMOWELL TREE LOCATION: ON 10'-0" (MAX.) R: (TYP-2 PLCS. 180° APART): ONE 12" X 12" X ½" EMBED REQUIRED FOR EACH: FLOOR (MAX. LOADS: 150 LBS. LATERAL; 250 LBS. VERTICAL) AND PROVIDE A 6" DIA. OPENING w/ PLUG FOR CONDUIT ON LINE WITH TW EMBED FLOOR PLATE: (MAX. LOADS: 100 lbs. LATERAL & VERTICAL). SEE DETAIL 1.

②A TW JUNCTION BOX: PROVIDE ONE 15" X 15" X ½" EMBED PLATE WITH-IN 2'-0" OF EACH THERMOWELL. LOADS: 100 lbs VERTICAL.

③ CAMERA PORT: ON 37'-6" R (±2"), (TYP-3 PLCS): 120° APART; 3'-0" DIA. ACCESS OPENING w/ COVER PLATE; MAX. LOADING: 500 lbs.; SEE DETAIL 2.

④ CAMERA JUNCTION BOX: PROVIDE ONE (1) 2'-0" x 2'-0" x ½" EMBED PLATE FOR EACH CAMERA PORT; MAX. LOADING: 250 lbs.,

⑤ GROUT FILL PORT: PROVIDE ONE 3" DIA. VICTALLIC (GROOVED PIPE) NOZZLE w/ BLIND FLANGE; NOZZLE TO EXTEND 12" ABOVE TOP OF TANK AND 6" BELOW TANK INTERIOR SURFACE.

⑥ GROUT FIL. LINE SUPPORTS: PROVIDE 2'-0" x 2'-0" x ¾" EMBED PLATES w/ 10'-0" C/C SPACING FOR THE GROUT FILL LINE SUPPORTS; MAX. LOADING: 250 lbs VERTICAL, 200 lbs. LATERAL; INITIAL SUPPORT TO BE MAXIMUM OF 4'-0" FROM OUTER EDGE OF TANK.

⑦ CONDUIT SUPPORT EMBEDS: PROVIDE 12" x 12" x ½" EMBED PLATES FOR ROUTING OF CONDUIT. MAX. SPACING TO BE 10'-0" C to C; MAX. LOADING: 50 lbs. LATERAL, 100 lbs. VERTICAL.
NOTE: ALL CONDUIT WILL EXIT THE TANK TOP VIA THE GROUT FILL LINE ROUTING. THEREFORE THE TANK VENDOR MAY RELOCATE THE CONDUIT SUPPORT EMBEDS FROM PENET.'s: 1, 2 & 4 BASED ON THEIR TANK DESIGN.

⑧ VENTILATION PORT: PROVIDE THREE (3) 12" DIA.-150 CLASS FLANGED NOZZLES w/ BLANKS FOR THE ATTACHMENT OF PASSIVE VENTILATION FILTERS. ONE LOCATED NEAR THE HIGH POINT OF THE TANK AND TWO NEAR THE LOW POINT, 180° APART.

⑨ SAMPLE PORT: PROVIDE ONE (1) 8" DIA. SAMPLE PORT WITH PLUG FOR THE COLLECTION OF GROUT SAMPLES. SEE DETAIL 1.

⑩ INSPECTION PORT: PROVIDE A 3" Ø PORT w/ PLUG FOR EVERY 315 SQUARE FOOT AREA (APPROX. 6# TOTAL. FOR MONITORING CLOSURE / CLEAN CAP INSTALLATION. SEE DETAIL 1.
NOTE: NOT SHOWN ON PLAN, VENDOR TO LOCATE

SALTSTONE VAULT No. 2; BLDG.: 451-0022
VAULT PENETRATION AND EMBED PLAN

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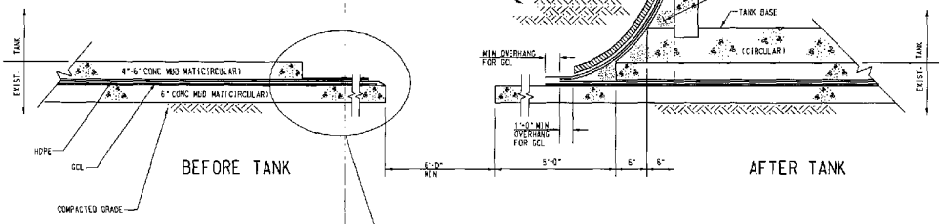
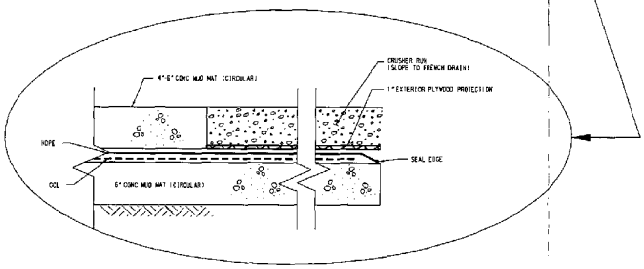


TYPICAL TANK BASE DETAIL

DETAIL (2) NO SCALE



DETAIL (3) NO SCALE

SALTSTONE VAULT No. 2, BLDG. 451-002Z
TANK BASE DETAIL

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ATTACHMENT 5.8
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