

1
2
3
4
5
6
7
8

**RENEWAL APPLICATION
APPENDIX I1G**

TECHNICAL SPECIFICATIONS

**PANEL CLOSURE SYSTEM
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO**

**RENEWAL APPLICATION
APPENDIX I1G**

TECHNICAL SPECIFICATIONS

**PANEL CLOSURE SYSTEM
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO**

TABLE OF CONTENTS

1
2
3
4
5
6
7
8
9
10
11
12 List of Figures I1G-vi
13 DIVISION 1 - GENERAL REQUIREMENTS I1G-1
14 Section 01010 - Summary of Work I1G-3
15 Part 1 - General I1G-3
16 1.1 Scope I1G-3
17 1.2 Scope of Work I1G-3
18 1.3 Definitions and Abbreviations I1G-4
19 1.4 List of Drawings I1G-6
20 1.5 Work by Others I1G-6
21 1.6 Contractor’s Use of Site I1G-6
22 1.7 Contractor’s Use of Facilities I1G-7
23 1.8 Work Sequence I1G-7
24 1.9 Work Plan I1G-7
25 1.10 Submittals I1G-8
26 Part 2 - Products I1G-8
27 Part 3 - Execution I1G-8
28 Section 01090 - Reference Standards I1G-9
29 Part 1 - General I1G-9
30 1.1 Scope I1G-9
31 1.2 Quality Assurance I1G-9
32 1.3 Schedule of References I1G-9
33 Section 01400 - Contractor Quality Control I1G-13
34 Part 1 - General I1G-13
35 1.1 Scope I1G-13
36 1.2 Related Sections I1G-13
37 1.3 Contractor Quality Control Plan I1G-13
38 1.4 References and Standards I1G-13
39 1.5 Quality Assurance I1G-14
40 1.6 Tolerances I1G-14

1	1.7	Testing Services	I1G-14
2	1.8	Inspection Services	I1G-15
3	1.9	Submittals	I1G-15
4	Part 2 - Products.....		I1G-15
5	Part 3 - Execution.....		I1G-15
6	3.1	General.....	I1G-15
7	3.2	Quality Control Plan	I1G-16
8	3.2.1	General.....	I1G-16
9	3.2.2	Content of the CQC Plan	I1G-16
10	3.2.3	Acceptance of Plan	I1G-17
11	3.2.4	Notification of Changes	I1G-17
12	3.3	Quality Control Organization	I1G-17
13	3.3.1	General.....	I1G-17
14	3.3.2	CQC System Manager	I1G-17
15	3.3.3	CQC Personnel.....	I1G-17
16	3.3.4	Organizational Changes	I1G-18
17	3.4	Tests.....	I1G-18
18	3.4.1	Testing Procedure	I1G-18
19	3.5	Testing Laboratory.....	I1G-18
20	3.6	Inspection Services	I1G-19
21	3.7	Completion Inspection	I1G-19
22	3.7.1	Pre-Final Inspection.....	I1G-19
23	3.7.2	Final Acceptance Inspection.....	I1G-20
24	3.8	Documentation.....	I1G-20
25	3.9	Notification of Noncompliance.....	I1G-21
26	Section 01600 - Material and Equipment		I1G-22
27	Part 1 - General.....		I1G-22
28	1.1	Scope.....	I1G-22
29	1.2	Related Sections.....	I1G-22
30	1.3	Equipment.....	I1G-22
31	1.4	Products.....	I1G-22
32	1.5	Transportation and Handling	I1G-22
33	1.6	Storage and Protection	I1G-23
34	1.7	Substitutions.....	I1G-23
35	1.7.1	Equipment Substitutions	I1G-23
36	1.7.2	Product Substitutions	I1G-23
37	Part 2 - Products.....		I1G-23
38	Part 3 - Execution.....		I1G-24
39	DIVISION 2 - SITE WORK.....		I1G-25

1	Section 02010 - Mobilization and Demobilization.....	I1G-27
2	Part 1 - General.....	I1G-27
3	1.1 Scope.....	I1G-27
4	1.2 Related Sections.....	I1G-27
5	Part 2 - Products.....	I1G-27
6	Part 3 - Execution.....	I1G-27
7	3.1 Mobilization of Equipment and Facilities to Site	I1G-27
8	3.2 Use of Site.....	I1G-27
9	3.3 Use of Existing Facilities	I1G-28
10	3.4 Demobilization of Equipment and Facilities	I1G-28
11	3.5 Site Cleanup.....	I1G-28
12	Section 02222 - Excavation	I1G-29
13	Part 1 - General.....	I1G-29
14	1.1 Scope.....	I1G-29
15	1.2 Related Sections.....	I1G-29
16	1.3 Reference Documents	I1G-29
17	1.4 Field Measurements and Survey	I1G-29
18	Part 2 - Products.....	I1G-29
19	Part 3 - Execution.....	I1G-29
20	3.1 Excavating for Concrete Barrier	I1G-29
21	3.2 Excavating for Surface Preparation and Leveling of Base Areas	
22	for Isolation Walls	I1G-30
23	3.3 Disposition of Excavated Materials	I1G-30
24	3.4 Field Measurements and Survey	I1G-30
25	Section 02722 - Grouting.....	I1G-31
26	Part 1 - General.....	I1G-31
27	1.1 Scope.....	I1G-31
28	1.2 Related Sections.....	I1G-31
29	1.3 References.....	I1G-31
30	1.4 Submittals for Review and Approval.....	I1G-31
31	1.5 Submittals for Construction	I1G-31
32	Part 2 - Products.....	I1G-32
33	2.1 Grout Materials	I1G-32
34	2.2 Product Data.....	I1G-32
35	Part 3 - Execution.....	I1G-33
36	3.1 General.....	I1G-33
37	3.2 Interface Grouting of Concrete Barrier.....	I1G-33

1	3.3	Contact Grouting.....	I1G-34
2	3.3.1	Drilling.....	I1G-34
3	3.3.2	Materials for Contact Grouting.....	I1G-35
4	3.3.3	Grouting Procedures.....	I1G-35
5	3.4	Cleanup.....	I1G-36
6	3.5	Quality Control.....	I1G-36
7		DIVISION 3 – CONCRETE.....	I1G-37
8		Section 03100 - Concrete Formwork.....	I1G-39
9		Part 1 - General.....	I1G-39
10	1.1	Scope.....	I1G-39
11	1.2	Related Sections.....	I1G-39
12	1.3	References.....	I1G-39
13	1.4	Submittals.....	I1G-40
14	1.5	Quality Assurance.....	I1G-40
15		Part 2 - Products.....	I1G-40
16	2.1	Form Materials.....	I1G-40
17		Part 3 - Execution.....	I1G-41
18	3.1	General.....	I1G-41
19	3.2	Shop Drawings.....	I1G-41
20	3.3	Fabrication.....	I1G-41
21	3.4	Installation.....	I1G-42
22	3.4.1	Grout Pipes.....	I1G-42
23	3.4.2	Formwork.....	I1G-42
24	3.5	Quality Control.....	I1G-42
25	3.6	Handling, Shipping, Storage.....	I1G-43
26		Section 03300 - Cast-in-Place Concrete.....	I1G-44
27		Part 1 - General.....	I1G-44
28	1.1	Scope.....	I1G-44
29	1.2	Related Sections.....	I1G-44
30	1.3	References.....	I1G-44
31	1.4	Submittals for Review/Approval.....	I1G-45
32	1.5	Submittals at Completion.....	I1G-46
33	1.6	Quality Assurance.....	I1G-46
34		Part 2 - Products.....	I1G-46
35	2.1	Cement.....	I1G-46
36	2.2	Aggregates.....	I1G-46
37	2.3	Water.....	I1G-46
38	2.4	Admixtures.....	I1G-47
39	2.5	Concrete Mix Properties.....	I1G-47
40	2.6	Salado Mass Concrete.....	I1G-48
41		Part 3 - Execution.....	I1G-48

1	3.1	General.....	I1G-48
2	3.2	Pumping Concrete.....	I1G-49
3	3.3	Coordination of Work.....	I1G-50
4	3.4	Clean-Up.....	I1G-50
5	3.5	Quality Control	I1G-50
6		DIVISION 4 – MASONRY	I1G-53
7		Section 04100 - Mortar	I1G-55
8		Part 1 - General	I1G-55
9	1.1	Scope.....	I1G-55
10	1.2	Related Sections.....	I1G-55
11	1.3	References.....	I1G-55
12	1.4	Submittals for Review and Approval.....	I1G-55
13	1.5	Submittals at Completion.....	I1G-56
14	1.6	Quality Assurance.....	I1G-56
15	1.7	Delivery Storage Handling	I1G-56
16		Part 2 - Products.....	I1G-56
17	2.1	Mortar Mix.....	I1G-56
18		Part 3 - Execution.....	I1G-56
19	3.1	General.....	I1G-56
20	3.2	Mortar Mixing.....	I1G-56
21	3.3	Installation.....	I1G-57
22	3.4	Field Quality Control	I1G-57
23		Section 04300 - Unit Masonry System	I1G-58
24		Part 1 - General	I1G-58
25	1.1	Scope.....	I1G-58
26	1.2	Related Sections.....	I1G-58
27	1.3	References.....	I1G-58
28	1.4	Submittals for Revision and Approval.....	I1G-58
29	1.5	Quality Assurance.....	I1G-58
30		Part 2 - Products.....	I1G-58
31	2.1	Concrete Masonry Units	I1G-58
32	2.2	Mortar	I1G-59
33		Part 3 - Execution.....	I1G-59
34	3.1	General.....	I1G-59
35	3.2	Installation.....	I1G-59
36	3.3	Field Quality Control	I1G-59
37			

List of Figures

1
2
3
4
5
6
7

Figure

Title

I1G-1 Plan Variations
I1G-2 Waste Handling Shaft Cage Dimensions
I1G-3 Waste Shaft Collar and Airlock Arrangement

1

DIVISION 1 - GENERAL REQUIREMENTS

1

(This page intentionally blank)

- 1 • Mobilize to site
- 2 • Coordinate construction with operations
- 3 • Perform the following for the air intake entry and the air exhaust entry.
 - 4 – Excavate the surface preparation for the explosion isolation wall
 - 5 – Construct the explosion isolation wall
 - 6 – Excavate the DRZ
 - 7 – Install the form work for the concrete barrier
 - 8 – Place concrete for the concrete barrier
 - 9 – Grout the interface of concrete barrier/back wall
 - 10 – Provide contact grouting along the contact surface (if required by the engineer)
- 11
- 12 • Clean up construction areas in underground and above ground
- 13 • Submit all required record documents
- 14 • Demobilize from site

15 1.3 Definitions and Abbreviations

16 **Definitions**

17

18 Contact-handled waste—Contact-handled defense transuranic (**TRU**) waste with a surface dose
19 rate not to exceed 200 millirem per hour.

20

21 Concrete barrier—A barrier placed in the access drifts of a panel to restrict the mass flow rate of
22 volatile organic compounds (**VOC**).

23

24 Concrete block—Concrete used for construction of either an explosion-isolation wall or a
25 construction-isolation wall.

26

27 Construction-isolation wall—A wall immediately adjacent to the panel waste-emplacement area
28 that is made of concrete block, with mortar or steel frame to isolate construction personnel from
29 coming into contact with the waste.

30

31 Creep—Plastic deformation of salt under deviatoric stress.

32

33 Design migration limit—A mass flow rate that is at least 1 order of magnitude below the health-
34 based levels for VOCs during the Waste Isolation Pilot Plant (**WIPP**) operational period.

35

36 Disturbed rock zone (~~DRZ~~)—A zone surrounding underground excavations where stress
37 redistribution occurs with attendant dilation and fracturing.

38

1 Explosion-isolation wall—A concrete-block wall adjacent to the panel waste-emplacement area
2 with mortar that can sustain the pressure and temperature transients of a methane explosion.
3

4 Health-based concentration level—The concentration level for a VOC in air that must not be
5 exceeded at the point of compliance during the WIPP operational period.

6 Health-based migration limit—The mass flow rate of a VOC from all closed panels that results
7 in the health-based concentration level at the point of compliance.
8

9 Hydration temperature—The temperature developed by a cementitious material due to the
10 hydration of the cement.
11

12 Interface grouting—Grouting performed through grout boxes and pipe lines to fill the void at the
13 concrete barrier/back-wall interface.
14

15 Methane explosion—A postulated deflagration caused by the buildup of methane gas to
16 explosive levels.
17

18 Partial closure—The process of rendering a part of the underground repository inactive and
19 closed according to approved facility closure plans. The partial-closure process is considered
20 complete after partial-closure activities are performed in accordance with approved Resource
21 Conservation and Recovery Act (**RCRA**) partial closure plans.
22

23 Point of compliance—The operating point of compliance for VOC levels at the WIPP, which is
24 the 16-section land withdrawal boundary.
25

26 Remote-handled waste—Any of the various forms of high beta-gamma defense TRU waste
27 requiring remote-handling and with a surface dose rate exceeding 200 millirem per hour.
28

29 Standard barrier—A concrete barrier emplaced into the panel-access drifts without major
30 excavation of the surrounding rock.
31

32 Volatile Organic Compound (~~VOC~~)—Any VOC comprising the land-disposal-restricted
33 indicator VOC constituents in the WIPP waste inventory.
34

35 **Abbreviations/Acronyms**

36		
37	ACI	American Concrete Institute
38	AISC	American Institute for Steel Construction
39	ANSI	American National Standards Institute
40	ASTM	American Society for Testing and Materials
41	AWS	American Welding Society
42	CFR	Code of Federal Regulations
43	DOE	U.S. Department of Energy
44	DRZ	Disturbed rock zone
45	EPA	U.S. Environmental Protection Agency
46	MB 139	Marker Bed 139

1	MSHA	U.S. Mine Safety and Health Administration
2	NMAC	New Mexico Administrative Code
3	NMED	New Mexico Environment Department
4	MOC	Management and Operating Contractor (Permit Condition I.D.3)
5	RCRA	Resource Conservation and Recovery Act
6	SMC	Salado Mass Concrete
7	USACE	U.S. Army Corps of Engineers
8	WIPP	Waste Isolation Pilot Plant

10 1.4 List of Drawings

11 The following drawings are made apart of this specification:

13	762447-E1	Panel closure system, air intake and exhaust drifts, title sheet
14	762447-E2	Panel closure system, underground waste-emplacement panel plan
15	762447-E3	Panel closure system, air intake drift, construction details
16	762447-E4	Panel closure system, air exhaust drift, construction details
17	762447-E5	Panel closure system, construction and explosion walls, construction details
18	762447-E6	Panel closure system, air intake and exhaust drifts, grouting and miscellaneous
19		details

21 1.5 Work by Others

22 Survey

24 All survey work to locate the barriers and walls, control and confirm excavation, and complete
25 the work will be supplied by the Permittees. All survey measurements for record purposes will
26 also be performed/supplied by the Permittees. The Contractor shall be responsible for verifying
27 the excavation dimensions to develop the form work to fit the excavation.

29 Excavation

31 The Permittees may elect to perform certain portions of the work, notably the excavation. The
32 work performed by the Permittees will be defined prior to the contract.

34 1.6 Contractor's Use of Site

35 Site Conditions

37 The site is located near Carlsbad, New Mexico, as shown on the site location maps and the title
38 sheet drawing. The underground arrangements and location of the WIPP waste-emplacement
39 panels are shown on the plan view drawing. The work described above is to construct the
40 concrete barriers in the air intake and exhaust drifts of one of the panels upon completion of the
41 disposal phase of that panel. The waste-emplacement panels are located approximately 2,150
42 feet below the ground surface. The Contractor shall visit the site and become familiar with the
43 site and site conditions prior to preparing his bid proposal.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

Contractor's Use of Site

Areas at the ground surface will be designated for the Contractor's use in assembling and storing his equipment and materials. The Contractor shall utilize only those areas designated.

Limited space within the underground area will be designated for the Contractor's use for storage of material and setup of equipment.

Coordination of Contractor's Work

The Contractor is advised that on-going waste emplacement and excavation operations are being conducted throughout the period of construction of the panel barrier system. The Contractor shall coordinate his construction operations with that of the waste emplacement and mining operations. All coordination shall be through the Engineer.

1.7 Contractor's Use of Facilities

Existing facilities at the site which are available for use by the Contractor are:

- WIPP roadheader
- Waste shaft conveyance
- Salt skip hoist
- (1) 20 ton forklift
- (1) 40 ton forklift
- 460 volt AC, 3 phase power
- Water (underground, at waste shaft only) (above ground, at location designated by Engineer)

Additional information on these facilities is presented in Section 02010.

1.8 Work Sequence

Work Sequence shall be as shown on the drawings and directed by the Engineer.

1.9 Work Plan

The Contractor shall prepare and submit for approval by the Engineer a Work Plan fully describing his proposed construction operation. The work plan shall define all proposed equipment. The work plan shall also include the method of excavation, grouting, and pumping

1 concrete. The work plan shall also contain such items as control of surface dust emissions. No
2 work shall be performed prior to approval of the Work Plan.

3
4 1.10 Submittals

5 Submittals to the Permittees shall be in accordance with the Permittees' Submittal Procedures
6 and as required by the individual specifications. Approval by the Permittees shall not constitute
7 approval by NMED. Any submittals that propose a change to the panel closure requirements of
8 ~~this Permit~~ (e.g., changes in grout composition, detailed design, etc.) shall be submitted to
9 NMED as required by 20.4.1.900 NMAC (incorporating 40 CFR §270.42).

10

11 **Part 2 - Products**

12

13

Not used.

14

15

16 **Part 3 - Execution**

17

18

Not Used.

19

20

End of Section

AISC	American Institute of Steel Construction One E. Wacker Dr., Suite 3100 Chicago, IL 60601-2001 Ph: 312-670-2400 Fax: 312-670-5403
ANSI	American National Standards Institute 11 West 42nd St. New York NY 10036 Ph: 212-642-4900 Fax: 212-302-1286
API	American Petroleum Institute 1220 L. St., NW Washington, DC 20005 Ph: 202-682-8375 Fax: 202-962-4776
ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103 Ph: 215-299-5585 Fax: 215-977-9679
AWS	American Welding Society 550 LeJeune Road Miami, FL 33135 Ph: 800-443-9353 Fax: 305-443-7559
CFR	Code of Federal Regulations Government Printing Office Washington, DC 20402 Ph: 202-783-3238 Fax: 202-223-7703
EPA	Environmental Protection Agency Public Information Center 401 M St., SW Washington, DC 20460 Ph: 202-260-2080

FTM-STO Federal Test Method Standards
Standardization Documents Order Desk
Bldg. 4D
700 Robbins Ave.
Philadelphia, PA 19111-5094
Ph: 215-697-2179
Fax: 215-697-2978

NRMCA National Ready-Mixed Concrete Association
900 Spring St.
Silver Spring, MD 20910
Ph: 301-587-1400
Fax: 301-585-4219

NTIS National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
(703) 487-4650

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

USACE U.S. Army Corps of Engineers
U.S. Army Engineer Waterway Experiment Station
ATTN: Technical Report Distribution Section, Services Branch, TIC
3909 Halls Ferry Rd.
Vicksburg, MS 39180-6199
Ph: 601-634-2355
Fax: 601-634-2506

MOC Washington TRU Solutions LLC
Carlsbad, New Mexico 88221

1
2
3

End of Section

(This page intentionally blank)

1 **Section 01400 - Contractor Quality Control**
2 **Part 1 - General**
3

4 1.1 Scope

5 This section includes:

- 6
- 7 • Contractor Quality Control Plan ~~(CQCP)~~
 - 8 • Reference Standards
 - 9 • Quality Assurance
 - 10 • Tolerances
 - 11 • Testing Services
 - 12 • Inspection Services
 - 13 • Submittals
- 14

15 1.2 Related Sections

- 16 • 01090 - Reference Standards
 - 17 • 01600 - Material and Equipment
 - 18 • 02222 - Excavation
 - 19 • 02722 - Grouting
 - 20 • 03100 - Concrete Formwork
 - 21 • 03300 - Cast-in-Place Concrete
 - 22 • 04100 - Mortar
 - 23 • 04300 - Unit Masonry System
- 24

25 1.3 Contractor Quality Control Plan

26 The Contractor shall prepare and submit for approval by the Engineer, a Quality Control Plan, as
27 described in Section 3.2. No work shall be performed prior to approval of the Contractor's
28 Quality Control Plan.

29
30 1.4 References and Standards

31 Refer to individual specification sections for standards referenced therein, and to Section 01090 -
32 Reference Standards for general listing.

33
34 Standards referenced in this section are as follows:
35

- | | |
|------------|---|
| ASTM C1077 | Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation |
| ASTM C1093 | Practice for Accreditation of Testing Agencies for Unit Masonry |
| ASTM E329 | Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction |

ASTM E543 Practice for Determining the Qualification of Nondestructive Testing Agencies

ASTM E548 Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies

1 1.5 Quality Assurance

- 2 • Monitor quality control over suppliers, manufacturers, products, services, site conditions,
3 and workmanship, to produce work of specified quality
- 4 • Comply with specified standards as minimum quality for the work except where more
5 stringent tolerances, codes, or specified requirements indicate higher standards or more
6 precise workmanship
- 7 • Perform work by persons qualified to produce required and specified quality
- 8 • Verify that field measurements are as indicated on shop drawings
- 9 • Secure products in place with positive anchorage devices designed and sized to withstand
10 stresses, vibration, physical distortion, or disfigurement.

11 1.6 Tolerances

12 Monitor excavation fabrication and installation tolerance control of work and products to
13 produce acceptable work. Do not permit tolerances to accumulate.

14
15 Adjust products to appropriate dimensions; position before securing products in place.

16
17 1.7 Testing Services

18 Unless otherwise indicated by the Engineer, the Contractor shall employ an independent firm to
19 perform the testing services and other services specified in the individual specification sections,
20 and as required by the Engineer. Testing and source quality control may occur on or off the
21 project site.

22
23 The testing laboratory shall comply with applicable sections of the reference standards and shall
24 be authorized to operate in the state in which the project is located.

25
26 Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy
27 traceable to either the National Bureau of Standards or accepted values of natural physical
28 constants.

29

1 1.8 Inspection Services

2 The Contractor shall employ an independent firm to perform inspection services as a supplement
3 to the Contractor's quality control as specified in the individual specification sections, and as
4 required by the Engineer. Inspection may occur on or off the project site.
5

6 The inspection firm shall comply with applicable sections of the reference standards.
7

8 1.9 Submittals

9 The Contractor shall submit a Contractors' Quality Control Plan as described herein.
10

11 Prior to start of work, the Contractor shall submit for approval, the testing laboratory name,
12 address, telephone number and name of responsible officer of the firm. He shall also submit a
13 copy of the testing laboratory compliance with the reference ASTM standards, and a copy of
14 report of laboratory facilities inspection made by Materials Reference Laboratory of National
15 Bureau of Standards with memorandum of remedies of any deficiencies reported by the
16 inspection.
17

18 Prior to start of work, the Contractor shall submit for approval the inspection firm name, address,
19 telephone number and name of responsible officer of the firm. He shall also submit the
20 personnel proposed to perform the required inspection, along with their individual qualifications
21 and certifications (Example: Certified AWS Welding Inspector.)
22
23

24 **Part 2 - Products**

25
26 Not used.
27
28

29 **Part 3 - Execution**

30
31 3.1 General

32 The Contractor is responsible for quality control and shall establish and maintain an effective
33 quality control system. The quality control system shall consist of plans, procedures, and
34 organization necessary to produce an end product which complies with the contract
35 requirements. The system shall cover all construction operations, both on site and off site, and
36 shall be keyed to the proposed construction sequence. The project superintendent will be held
37 responsible for the quality of work on the job. The project superintendent in this context shall
38 mean the individual with the responsibility for the overall management of the project including
39 quality and production.
40

1 3.2 Quality Control Plan

2 3.2.1 General

3 The Contractor shall furnish for review and approval by the Engineer, not later than 30 days after
4 receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement
5 the requirements of the Contract. The plan shall identify personnel, procedures, control,
6 instructions, test, records, and forms to be used. Construction will be permitted to begin only
7 after acceptance of the CQC Plan.
8

9 3.2.2 Content of the CQC Plan

10 The CQC Plan shall include, as a minimum, the following to cover all construction operations,
11 both on site and off site, including work by subcontractors, fabricators, suppliers, and purchasing
12 agents:
13

- 14 • A description of the quality control organization, including a chart showing lines of
15 authority and acknowledgment that the CQC staff shall implement the control system for
16 all aspects of the work specified. The staff shall include a CQC System Manager who
17 shall report to the project superintendent.
- 18 • The name, qualifications (in resume format), duties, responsibilities, and authorities of
19 each person assigned a CQC function.
- 20 • Description of the CQC System Manager's responsibilities and delegation of authority to
21 adequately perform the functions of the CQC System Manager, including authority to
22 stop work which is not in compliance with the contract. The CQC System Manager shall
23 issue letters of direction to all other various quality control representatives outlining
24 duties, authorities, and responsibilities.
- 25 • Procedures for scheduling, reviewing, certifying, and managing submittals, including
26 those of subcontractors, off site fabricators, suppliers, and purchasing agents. These
27 procedures shall be in accordance with the Permittees' Submittal Procedures.
- 28 • Control, verification, and acceptance testing procedures for each specific test to include
29 the test name, specification paragraph requiring test, feature of work to be tested, test
30 frequency, and person responsible for each test. (Laboratory facilities will be subject to
31 approval by the Engineer.)
- 32 • Procedures for tracking construction deficiencies from identification through acceptable
33 corrective action. These procedures will establish verification that identified deficiencies
34 have been corrected.
- 35 • Reporting procedures, including proposed reporting formats.

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

3.2.3 Acceptance of Plan

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

3.2.4 Notification of Changes

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

3.3 Quality Control Organization

3.3.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel supplemented by independent testing and inspection firms as required by the specifications, to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Engineer.

3.3.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, with a minimum of five years construction experience on construction similar to this contract. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager.

3.3.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel or third party inspectors to assist the CQC

1 System Manager. These individuals shall be employed by the prime Contractor; be responsible
2 to the CQC System Manager; be physically present at the construction site during work on their
3 areas of responsibility; have the necessary education and/or experience. These individuals shall
4 have no other duties other than quality control.

5 6 3.3.4 Organizational Changes

7 The Contractor shall maintain his CQC staff at full strength at all times. When it is necessary to
8 make changes to the CQC staff the Contractor shall revise the CQC Plan to reflect the changes
9 and submit the changes to the Engineer for acceptance at the Contractors' expense.

10 11 3.4 Tests

12 3.4.1 Testing Procedure

13 The Contractor shall perform specified or required tests to verify that control measures are
14 adequate to provide a product which conforms to contract requirements. Upon request, the
15 Contractor shall furnish to the Engineer duplicate samples of test specimens for possible testing
16 by the Engineer. Testing includes operation and/or acceptance tests when specified. The
17 Contractor shall procure the services of an approved testing laboratory. The Contractor shall
18 perform the following activities and record and provide the following data:

- 19 • Verify that testing procedures comply with contract requirements.
- 21 • Verify that facilities and testing equipment are available and comply with testing
22 standards.
- 23 • Check test instrument calibration data against certified standards.
- 24 • Verify that recording forms and test identification control number system, including all of
25 the test documentation requirements, have been prepared.
- 26 • Results of all tests taken, both passing and failing tests, will be recorded on the CQC
27 report for the date taken. Specification paragraph reference, location where tests were
28 taken, and the sequential control number identifying the test will be given. If approved
29 by the Engineer, actual test reports may be submitted later with a reference to the test
30 number and date taken. An information copy of tests performed by an off site or
31 commercial test facility will be provided directly to the Engineer. Failure to submit
32 timely test reports as stated may result in nonpayment for related work performed and
33 disapproval of the test facility for this contract.

34 3.5 Testing Laboratory

35 The testing laboratory shall provide qualified personnel to perform specified sampling and
36 testing of products in accordance with specified standards, and ascertain compliance of materials
37 and mixes with requirements of Contract Documents. The testing laboratory shall promptly

1 notify the Engineer and Contractor of any observed irregularities or non-conformance of Work
2 or Products.

3
4 Reports indicating results of tests, and compliance (or noncompliance) with the contract
5 documents will be submitted in accordance with the Permittees' submittal procedures.

6
7 The Contractor shall cooperate with the independent testing firm, furnish samples, storage, safe
8 access, and assistance by incidental labor as required. Testing by the independent firm does not
9 relieve the contractor of the responsibility to perform the work to the contract requirements.

10
11 The laboratory may not:

- 12
- 13 • Release, revoke, alter, or enlarge on requirements of the contract
- 14 • Approve or accept any portion of the work
- 15 • Assume any duties of the Contractor.
- 16

17 The laboratory has no authority to stop the work.

18 19 3.6 Inspection Services

20 The inspection firm shall provide qualified personnel at site to supplement the Contractor's
21 Quality Control Program to perform specified inspection of Products in accordance with
22 specified standards. He shall ascertain compliance of materials and mixes with requirements of
23 Contract Documents, and promptly notify the CQC System Manager, the Engineer and the
24 Contractor of observed irregularities or non-conformance of Work or Products. The inspector
25 does not have the authority to stop the work. The inspector shall refer such cases to the CQC
26 System Manager who has the authority to stop work (see Section 3.2.2).

27
28 Reports indicating results of the inspection and compliance (or noncompliance) with the contract
29 documents will be submitted in accordance with the Permittees' submittal procedures.

30
31 The Contractor shall cooperate with the independent inspection firm, furnish samples, storage,
32 safe access and assistance by incidental labor, as requested.

33
34 Inspection by the independent firm does not relieve the Contractor of the responsibility to
35 perform the work to the contract requirements.

36 37 3.7 Completion Inspection

38 3.7.1 Pre-Final Inspection

39 At the completion of all work the CQC System Manager shall conduct an inspection of the work
40 and develop a "punch list" of items which do not conform to the approved drawings and
41 specifications. Once this is accomplished the Contractor shall notify the Engineer that the
42 facility is complete and is ready for the "Prefinal" inspection. The Engineer will perform this
43 inspection to verify that the facility is complete. A "Final Punch List" will be developed as a

1 result of this inspection. The Contractor's CQC System Manager shall ensure that all items on
2 this list have been corrected and notify the Engineer so that a "Final" inspection can be
3 scheduled. Any items noted on the "Final" inspection shall be corrected in a timely manner.
4 These inspections and any deficiency corrections required by this paragraph will be
5 accomplished within the time slated for completion of the entire work.
6

7 3.7.2 Final Acceptance Inspection

8 The final acceptance inspection will be formally scheduled by the Engineer based upon notice
9 from the Contractor. This notice will be given to the Engineer at least 14 days prior to the final
10 acceptance inspection and must include the Contractor's assurance that all specific items
11 previously identified to the Contractor as being unacceptable, along with all remaining work
12 performed under the contract, will be complete and acceptable by the date scheduled for the final
13 acceptance inspection.
14

15 3.8 Documentation

16 The Contractor shall maintain current records providing factual evidence that required quality
17 control activities and/or tests have been performed. These records shall include the work of
18 subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the
19 following information:
20

- 21 • Contractor/subcontractor and their area of responsibility.
- 22 • Operating plant/equipment with hours worked, idle, or down for repair.
- 23 • Work performed each day, giving location, description, and by whom.
- 24 • Test and/or quality control activities performed with results and references to
25 specifications/drawings requirements. List deficiencies noted along with corrective
26 action.
- 27 • Quantity of materials received at the site with statement as to acceptability, storage, and
28 reference to specifications/drawings requirements.
- 29 • Submittals reviewed, with contract reference, by whom, and action taken.
- 30 • Off-site surveillance activities, including actions taken.
- 31 • Instructions given/received and conflicts in plans and/or specifications.
- 32 • Contractor's verification statement.

33 These records shall indicate a description of trades working on the project; the number of
34 personnel working; weather conditions encountered; and any delays encountered. These records
35 shall cover both conforming and deficient features and shall include a statement that equipment

1 and materials incorporated in the work and workmanship comply with the contract. The original
2 and one copy of these records in report form shall be furnished to the Engineer daily. Reports
3 shall be signed and dated by the CQC System Manager. The report from the CQC System
4 Manager shall include copies of test reports and copies of reports prepared by all subordinate
5 quality control personnel.
6

7 3.9 Notification of Noncompliance

8 The Engineer will notify the Contractor of any detected noncompliance with the foregoing
9 requirements. The Contractor shall take immediate corrective action after receipt of such notice.
10 Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the
11 purpose of notification. If the Contractor fails or refuses to comply promptly, the Engineer may
12 issue an order stopping all or part of the work until satisfactory corrective action has been taken.
13 No part of the time lost due to such stop orders shall be made the subject of claim for extension
14 of time or for excess costs or damages by the Contractor.
15

16 End of section.

Section 01600 - Material and Equipment
Part 1 - General

1
2
3

4 1.1 Scope

5 This section includes:

6

- 7 • Equipment
- 8 • Products
- 9 • Transportation and handling
- 10 • Storage and protection
- 11 • Substitutions

12

13 1.2 Related Sections

- 14 • 01010 - Summary of Work
- 15 • 01400 - Contractor Quality Control
- 16 • 02010 - Mobilization and Demobilization
- 17 • 02222 - Excavation
- 18 • 02722 - Grouting
- 19 • 03100 - Concrete Formwork
- 20 • 03300 - Cast-in-Place Concrete
- 21 • 04100 - Mortar
- 22 • 04300 - Unit Masonry System

23

24 1.3 Equipment

25 The Contractor shall specify his proposed equipment in the Work Plan. Power equipment for use
26 underground shall be either electrical or diesel engine driven. All diesel engine equipment shall
27 be certified for use underground.

28

29 1.4 Products

30 The Contractor shall specify in the Work Plan, or in subsequently required submittals the
31 proposed products including, but not limited to the grout mix and its components, concrete mix
32 and its components, mortar mix and its components, formwork, and masonry. The proposed
33 products shall be supported by laboratory test results as required by the specifications. All
34 products shall be subject to approval by the Engineer.

35

36 1.5 Transportation and Handling

- 37 • Transport and handle products in accordance with manufacturer's instructions.
- 38 • Promptly inspect shipments to ensure that products comply with requirements, quantities
39 are correct, and products are undamaged.

1
2
3
4
5

Part 3 - Execution

Not used.

End of section.

1

DIVISION 2 - SITE WORK

1

(This page intentionally blank)

1 **Section 02010 - Mobilization and Demobilization**
2 **Part 1 - General**

3
4 1.1 Scope

5 This section includes:

- 6
7 • Mobilization of equipment and facilities to site
8 • Contractor use of site
9 • Use of existing facilities
10 • Demobilization of equipment and facilities
11 • Site cleanup

12 1.2 Related Sections

- 13 • 01010 - Summary of Work
14 • 01600 - Material and Equipment

15 **Part 2 - Products**

16
17 Not used.

18 **Part 3 - Execution**

19
20
21 3.1 Mobilization of Equipment and Facilities to Site

22 Upon authorization to proceed, the Contractor shall mobilize his equipment and facilities to the
23 jobsite. Equipment and facilities shall be as specified, and as defined in the Contractor's Work
24 Plan. The Contractor shall erect the batch plant and assemble his equipment and materials in the
25 areas designated by the Engineer. Facilities shall be located as near as practical to the existing
26 utilities.

27 The Permittees will provide utilities (460 volt AC, 3 phase, and water) at designated locations.
28 The Contractor shall be responsible for all hookups and tie-ins required for his operations.

29 The Contractor shall be responsible for providing his own office, storage, and sanitary facilities.

30 Areas will be designated for the Contractor's use in the underground area in the vicinity of the
31 panel closure system installation. These areas are limited.

32 3.2 Use of Site

33 The Contractor shall use only those areas specifically designated for his use by the Engineer.
34 The Contractor shall limit his on-site travel to the specific routes required for performance of his
35 work, and designated by the Engineer.

1 3.3 Use of Existing Facilities

2 Existing facilities at the site which are available for use by the Contractor are:

- 3 • WIPP roadheader
4 • Waste shaft conveyance
5 • Salt skip hoist
6 • (1) 20 ton forklift
7 • (1) 40-ton forklift
8 • 460 Volt AC, 3 phase power
9 • Water (in mine, at waste shaft only-above ground at location designated by the Engineer).

10 The Contractor shall arrange for use of the facilities with the Engineer and coordinate his
11 actions/requirements with that of the ongoing operations.
12

13 Use of water in the underground will be restricted. No washout or cleanup will be permitted in
14 the underground. Above ground washout/cleanup or equipment will be allowed in the areas
15 designated by the Engineer.
16

17 The Contractor is cautioned to be aware of the physical dimensions of the waste conveyance and
18 the air lock (see Figures I1G-2 and I1G-3, attached).
19

20 The Contractor shall be responsible for any damage incurred by the existing site facilities as a
21 result of his operations. Any damage shall be reported immediately to the Engineer and repaired
22 at the Contractor's cost.
23

24 3.4 Demobilization of Equipment and Facilities

25 At completion of this work, the Contractor shall demobilize his equipment and facilities from the
26 job site. The batch plant shall be disassembled and removed along with any unused material.
27 All Contractor's equipment and materials shall be removed from the mine and all disturbed areas
28 restored. Utilities shall be removed to their connection points unless otherwise directed by the
29 Engineer.
30

31 3.5 Site Cleanup

32 At conclusion of the work, the Contractor shall remove all trash, waste, debris, excess
33 construction materials, and restore the affected areas to its prior condition, to the satisfaction of
34 the Engineer. A final inspection of the areas will be conducted by the Engineer and the
35 Contractor before final payment is approved.
36

37
38

End of section.

1 mining machine may also be available for use. The Contractor is to determine availability and
2 coordinate proposed use of the roadheader with the Engineer. The existing roadheader is capable
3 of excavating the back and the portions of the ribs above the floor level. However, it is not
4 capable of excavating the portion below floor level.

5
6 The tolerances for the concrete barrier excavation shall be +6 inches, to 0 inch. In addition, the
7 Contractor is to remove all loose or spalling rock from the excavation surface to provide a sound
8 surface abutting the concrete barrier. The Contractor shall provide and install roof bolts for
9 support as required for personnel protection and approved ground control plans.

10
11 3.2 Excavating for Surface Preparation and Leveling of Base Areas for Isolation Walls

12 The Contractor shall excavate a 6-inch surface preparation around the entire perimeter of the
13 isolation walls. The surface preparation in the floor shall be made level to produce a surface for
14 placing the first course of block in the isolation walls. Tolerances for the leveled portion of the
15 surface preparation are ± 1 inch. Excavation may be performed by either mechanical or manual
16 means. Use of explosives is prohibited.

17
18 3.3 Disposition of Excavated Materials

19 The Contractor shall remove all excavated materials from the panel-access drift where they are
20 excavated. Excavated materials shall be removed from the mine via the salt skip to the surface,
21 where they will be disposed on site at a location as directed by the Engineer.

22
23 3.4 Field Measurements and Survey

24 All survey required for performance of the work will be provided by the Permittees. The
25 Contractor shall protect all survey control points, bench marks, etc., from damage by his
26 operations. MOC will verify by survey that the Contractor has excavated to the required lines
27 and grades. The Contractor shall be responsible for verifying the excavation dimensions to
28 develop concrete formwork to fit the excavation. No form work or block work is to be erected
29 until this survey is completed. The Contractor is to coordinate the survey work with his
30 operations to assure against lost time. The Contractor shall notify the Engineer at least 24 hours
31 prior to the time surveying is required

32
33
34 End of section.

1 **Section 02722 - Grouting**
2 **Part 1 - General**
3

4 1.1 Scope

5 This section includes:

- 6
7 • Grouting of concrete barrier.
8

9 1.2 Related Sections

- 10 • 01010 - Summary of Work
11 • 01400 - Contractor Quality Control
12 • 01600 - Material and Equipment
13 • 03100 - Concrete Form Work
14 • 03300 - Cast-in-Place Concrete
15

16 1.3 References

17 ASTM C1107 Standard Specification for Nonshrink Grout
18

19 ASTM C109 Test Method for Compressive Strength of Hydraulic Cement Mortars
20

21 1.4 Submittals for Review and Approval

22 Thirty days prior to the initiation of grouting, the Contractor shall submit to the Engineer for
23 review and approval, the following:
24

- 25 • Type of grout proposed
26
27 • Product data:
28 – Manufacturer's specification and certified laboratory tests for the manufactured grout,
29 if proposed
30 – Certified laboratory tests for the salt-saturated grout, if proposed, using project-
31 specific materials
32 • Proposed grouting method, including equipment and materials and construction sequence
in Work Plan.

33 1.5 Submittals for Construction

34 Daily grouting report indicating the day, date, time of mixing and delivery, quantity of grout
35 placed, water used, pressure required, problems encountered, action taken, quality control data,
36 testing results, etc., no later than 24 hours following construction.

Part 2 - Products

2.1 Grout Materials

Grout used for grouting in connection with fresh water/plain cement concrete shall be nonshrink, cement-based grout, Five Star 110 as manufactured by Five Star Products Inc., 425 Stillson Road, Fairfield, Connecticut 06430 or approved equal. Mixing and installation shall be in accordance with the manufacturer's recommendations.

As an alternate to the above grout, in connection with the Salado Mass concrete mix, the Contractor shall use, subject to the approval of the Engineer, a salt saturated grout. The following formulation is suggested to the Contractor as an initiation point for selection of the grout mix. Salt saturated grout strength shall be 4500 psi at 28 days.

Salt-Saturated Grout (BCT-1F)

Component	Percent of total Mass (wt.)
Class H Cement	48.3
Class C Fly Ash	16.2
Cal Seal (Plaster - from Halliburton)	5.7
Sodium chloride	7.9
Dispersant	0.78
Defoamer	0.02
Water	21.1

Water for mixing shall be of potable quality, free from injurious amounts of oil, acid, alkali, salt, or organic matter, sediments, or other deleterious substances, as specified for concrete, Section 03300-2.3.

2.2 Product Data

If the Contractor proposes to utilize a manufactured nonshrink cement-based grout, he shall submit complete manufacturer's specifications for the product, along with certified laboratory test results of the material.

If the Contractor proposes to utilize the salt-saturated grout in connection with the Salado Mass concrete mix, he shall submit manufacturer's/supplier's specifications for the component materials, and certified laboratory test results for the resultant mix.

1 **Part 3 - Execution**
2

3 3.1 General

4 The Contractor shall furnish all labor material, equipment, and tools to perform all operations in
5 connection with the grouting.
6

7 Grout delivery and return lines for interface grouting shall be installed in the form work or in the
8 area to be grouted to provide uniform distribution of the grout as shown on the drawings. The
9 exact location of the boxes and lines shall be determined in the field. Additional grout delivery
10 and return lines and boxes may be required by the Engineer.
11

12 Pumps shall be positive displacement piston type pump designed for grouting service capable of
13 operating at a discharge pressure of 100 psi. The Contractor shall supply a standby pump to be
14 utilized in the event of a breakdown of the primary unit.
15

16 Mixers shall be high velocity “colloidal” type with a rotary speed of 1,200 to 1,500 rpm. Grout
17 shall be mixed to a pumpable mix as per the manufacturer’s recommendations.
18

19 Mixing water shall be accurately metered to control the consistency of the grout.
20

21 The Contractor shall provide all necessary valves, gages, and pressure hoses.
22

23 Water for mixing is available at the waste shaft. The Contractor is cautioned that no free water
24 discharges or spills are permitted in the mine. All cleanup and washout operations shall be
25 performed at the ground surface.
26

27 Potential spill areas in the underground shall be identified by the Contractor in the work plan.
28 The Contractor shall provide adequate containment for potential spills. Isolation measures shall
29 include, but are not limited to, lining with a membrane material (PVC, hypalon, HDPE), draped
30 curtains (polyethylene, PVC, etc.), corrugated sheet metal protective walls or a combination of
31 these and other measures.
32

33 If salt-saturated grout is selected for use, the Contractor shall make provisions to accurately
34 proportion the components. Proportioning shall be by weighing. Sufficient quantities of dry
35 components shall be developed prior to initiation of the grouting to perform the work so as not to
36 incur delays during the mixing/placing sequence.
37

38 3.2 Interface Grouting of Concrete Barrier

39 After each cell of the concrete barrier has been allowed to cure for a period of seven days, or as
40 directed by the Engineer, the Contractor shall interface grout the remaining space between the
41 back wall and the top surface of the concrete barrier.
42

1 Each cell of the concrete barrier shall be grouted before the next adjacent cell is formed and
2 concrete placed. Grout delivery and return lines shall be installed with the form work as shown
3 and called for on the drawings, or as directed by the Engineer.
4

5 The placing of grout, unless otherwise directed by the Engineer shall be continuous until
6 completed. Grouting shall progress from lower to higher grout pipes. Grouting shall proceed
7 through a single delivery line until grout escapes from the adjacent return line. The Contractor
8 shall then secure these lines and move to the next adjacent set of delivery and return lines.
9 Pressure shall be adjusted to adequately deliver the grout to the forms, as witnessed by grout in
10 the return line.
11

12 The grouting operation shall be conducted in a manner such that it does not affect the stability of
13 the concrete barrier structure.
14

15 3.3 Contact Grouting

16 After completion of interface grouting if directed by the Engineer, the Contractor shall contact
17 grout to fill any remaining voids at the concrete barrier/back wall interface. Contact grouting
18 includes all operations to drill, clean, and grout holes installed in the concrete barrier.
19

20 The Contractor shall drill and grout the interface zone to the main concrete barrier as directed by
21 the Engineer.
22

23 The location, direction, and depth of each grout hole shall be as directed by the Engineer. The
24 order in which the holes are drilled and the manner in which each hole is drilled and grouted, the
25 proportions of the water used in the grout, the time of grouting, the pressures used in grouting,
26 and all other details of the grouting operations shall be as directed by the Engineer.
27

28 Wherever required, contact grouting will entail drilling the hole to a limited depth, installing a
29 packer, and performing grouting.
30

31 3.3.1 Drilling

32 The holes shall be drilled with rotary-type drills. Drilling grout holes with percussion-type drills
33 will not be permitted except as approved by the Engineer.
34

35 The requirements as to location, depth, spacing, and direction of the holes shall be as directed by
36 the Engineer.
37

38 The minimum diameter shall be approximately $4\frac{1}{2}$ **1.5** inches.
39

40 When the drilling of each hole or stage of has been completed, compressed air will be used to
41 flush out drill cuttings. The hole shall then be temporarily capped or otherwise suitably
42 protected to prevent the hole from becoming clogged or obstructed until it is grouted.
43

1 3.3.2 Materials for Contact Grouting

2 Standard weight black steel pipe conforming to ASTM A-53 shall be set in the concrete in the
3 locations as directed by the Engineer. All pipe and fittings shall be furnished by the Contractor.
4

5 The size of the grout pipe for each hole and the depth of the holes for setting pipe for grouting
6 shall be as directed by the Engineer. Care shall be taken to avoid clogging or obstructing the
7 pipes before being grouted, and any pipe that becomes clogged or obstructed from any cause
8 shall be cleaned satisfactorily or replaced.
9

10 The packers shall be furnished by the Contractor and shall consist of expansible tubes or rings of
11 rubber, leather, or other suitable material attached to the end of the grout supply pipe. The
12 packers shall be designed so that they can be expanded to seal the drill hole at the specified
13 locations and when expanded shall be capable of withstanding without leakage, for a period of 5
14 minutes, air pressure equal to the maximum grout pressures to be used.
15

16 3.3.3 Grouting Procedures

17 Different grouting pressures will be required for grouting different sections of the grout holes.
18 Pressures as high as necessary to deliver the grout but which, as determined by trial, are safe
19 against concrete displacement shall be used in the grouting.
20

21 If, during the grouting of any hole, grout is found to flow from adjacent grout holes or con-
22 nections in sufficient quantity to interfere seriously with the grouting operation or to cause
23 appreciable loss of grout, such grout holes and connections shall be capped temporarily. Where
24 such capping is not essential, inaugurated holes shall be left open to facilitate the escape of air as
25 the grout is forced into other holes. Before the grout has set, the grout pump shall be connected
26 to adjacent capped holes and to other holes from which grout flow was observed, and grouting of
27 all holes shall be completed. If during the grouting of any hole, grout is found to flow from
28 points in the barrier, any parts of the concrete structure, or other locations, such flows or leaks
29 shall be plugged or caulked by the Contractor as directed by the Engineer.
30

31 As a safeguard against concrete displacement, excessive grout travel, or while grout leaks are
32 being caulked, the Engineer may require the reduction of the pumping pressure, intermittent
33 pumping, or the discontinuance of pumping.
34

35 The consistency of the grout mix shall be varied, as directed by the Engineer, depending on the
36 conditions encountered. Where the grout hole or connection continues to take a large amount of
37 grout after the mix has been thickened, the Engineer may require that pumping be done intermit-
38 tently, waiting up to 8 hours between pumping periods to allow grout in the barrier to set. After
39 the grouting is complete, the pressure shall be maintained by means of stopcocks, or other
40 suitable valve that it will be retained in the holes or connections being grouted.
41

1 3.4 Cleanup

2 No clean-up or washing of equipment with water is allowed in the underground. No free water
3 spills are permitted. All clean out or wash out requiring water will be performed above ground at
4 the location approved by the Engineer. See note above regarding potential spill areas in
5 Section 3.1 - General.

6
7 3.5 Quality Control

8 The Contractor shall provide a third-party quality control inspector at the site throughout the
9 grout placement operations. The inspector shall determine that the grout mix is properly
10 proportioned and properly mixed to the approved consistency. The inspector shall sample and
11 make one set of grout cubes for compression testing for every 50 cubic feet of grout placed, or
12 fraction thereof, for each day of grout placement.

13
14
15

End of section.

1

DIVISION 3 – CONCRETE

1

(This page intentionally blank)

1 1.4 Submittals

2 The Contractor shall submit the following 30 days prior to initiation of work at site.

3
4 Shop detail drawings with appropriate calculations to support the adequacy of the formwork.

5
6 Mill test certification of materials utilized in construction of the forms.

7 Details of installation contained in the Contractor's Work Plan.

8

9 1.5 Quality Assurance

10 Design and detail the formwork under direct supervision of a professional structural Engineer
11 experienced in design of this work and licensed in the state of New Mexico.

12

13 Perform work in accordance with ACI 301, 318, and 347, AISC and AWS standards. Maintain
14 one copy of all standards at site.

15

16 Perform all fabrication in accordance with AISC manual of steel construction.

17

18 Perform all welding in accordance with AWS D1.1 structural welding code.

19

20 Perform all bolting in accordance with AISC specification for structural joints using
21 ASTM A325 or A490 bolts.

22

23

24 **Part 2 - Products**

25

26 2.1 Form Materials

27 Forms for the concrete barrier shall be constructed of ASTM A-36 steel.

28

29 Pipe inserts shall be ASTM A-53 black standard weight pipe.

30

31 Form spacers shall be ASTM A-36 round stock.

32

33 Bolts shall be ASTM A325 high strength structural bolts.

34

35 Grout pipes shall be ASTM A-53 standard weight pipe or flex conduit as shown on the drawings.

36

37 Rock anchors shall develop strength equal to or greater than ASTM A-36 round stock.

38

39 Welding electrodes shall conform to AWS A5.1.

40

1 **Part 3 - Execution**

2
3 3.1 General

4 The Contractor shall furnish all labor material equipment and tools to perform all operations in
5 connection with the design, detail, fabrication and erection of the formwork and the fabrication
6 and installation of grout pipes for the main concrete barrier.
7

8 The Contractor may, at his option submit an alternate design or modify the design shown on the
9 drawings, subject to the approval of the Engineer. All designs must be supported by design
10 calculations stamped and sealed by a registered professional engineer.
11

12 The Contractor shall furnish, fabricate and install all grout pipes and grout boxes for both the
13 concrete barrier and the isolation walls.
14

15 3.2 Shop Drawings

16 The Contractor shall design and detail all formwork for the concrete barrier, complete with any
17 required bracing and shoring for the concrete barrier as shown on the drawings, in accordance
18 with ACI 318 and 347 and the AISC manual of steel construction.
19

20 The details shall incorporate provision for adjusting and modifying the formwork to suit the
21 excavation. Excavation tolerances are given in Section 02222 Excavation.
22

23 The Contractor shall be responsible for verifying the excavation dimensions to develop the
24 concrete formwork to fit the excavation.
25

26 Prior to fabrication, the Contractor shall submit shop drawings complete with supporting
27 calculations for review/approval by the Engineer 30 days prior to initiating work. The contractor
28 shall incorporate all Engineer's comments, revisions, resolve all questions, and resubmit
29 drawings for final approval prior to proceeding with fabrication.
30

31 3.3 Fabrication

32 The Contractor shall fabricate all formwork and ancillary items in accordance with the latest
33 edition of the AISC Manual of Steel Construction and the approved detail drawings.
34

35 Formwork shall contain all inserts for grouting and pumping concrete. Sufficient valving shall
36 be provided on inserts to allow shut off of concrete and grout to prevent back flow through the
37 form work.
38

39 All welding shall be in accordance with AWS D1.1 structural welding code including operator
40 and procedure certifications. Elements shall be welded using E-7018 low hydrogen electrodes.
41 Panels shall be piece marked to correspond to the erection drawing(s) and sequence at
42 fabrication.
43

1 3.4 Installation

2 3.4.1 Grout Pipes

3 The Contractor shall furnish, fabricate, and install all grout pipes and boxes as approved by the
4 Engineer. Grout pipes and boxes shall be attached to the back surface using masonry anchors as
5 shown on the drawings or other approved methods. Grout pipes shall be connected to the inserts
6 installed in the permanent forms and securely fastened to the formwork. All grout pipes will be
7 blown out with compressed air after installation and prior to closure of the formwork to assure
8 they are clean and free from debris or obstructions. Grout pipes shall then be temporarily capped
9 to prevent entry of foreign matter until ready for grouting. The Contractor shall apply masking
10 tape to the grout box openings to prevent concrete infiltration during concrete placement.
11

12 3.4.2 Formwork

13 The steel formwork for the concrete barrier is to remain in place at completion of each segment
14 of the barrier; therefore, all formwork shall be free from oil, grease, rust, dirt, mud, or other
15 material that would prevent bonding by the concrete. Forms will not be oiled or receive
16 application of release agent.
17

18 The Contractor shall install formwork at the locations shown on the drawings to the lines and
19 grades shown. Forms are to be mortar tight. The Contractor shall adjust the formwork to suit the
20 contour of the excavation. Rock may be trimmed or chipped to suit where interferences are
21 encountered. Where overexcavation has occurred in excess of the designed-in adjustability of
22 the formwork, modifications shall be proposed to the Engineer for his approval prior to
23 installation. Installation of the formwork shall be reviewed and approved by the Engineer prior
24 to proceeding with concrete installation.
25

26 The Contractor shall provide a sealant or gasket material on mating surfaces to provide
27 mortar-tite joints.
28

29 3.5 Quality Control

30 The Contractor shall arrange for and contract with an approved third party inspector to provide
31 inspection/testing services for the fabrication and installation of the formwork and ancillary
32 items, as required by the QA/QC plan.
33

34 The Contractor shall furnish certified mill test reports for all materials utilized in the fabrication.
35

36 All welding shall be in accordance with AWS D1.1 structural welding code. The Contractor
37 shall furnish welding operator and procedure certifications for all operators and procedures
38 utilized.
39

40 Fabricated components shall be inspected for dimension and overall quality. Welds shall be
41 inspected by an AWS certified welding inspector.
42

1 The inspector shall visually inspect the installation for fit-up and dimensionally for location.
2

3 3.6 Handling, Shipping, Storage

4 The Contractor shall handle, ship, and store fabricated components with care to avoid damage.
5 Stored components shall be placed on timbers or pallets off the ground to keep the units clean.
6 Components shall be tarped while in outdoor storage. Components that become spattered or
7 contaminated with mud will be thoroughly cleaned before delivering to the mine for installation.
8 Damaged components will be rejected by the inspector and replaced by the contractor at his cost.
9

10

11

End of section.

Section 03300 - Cast-in-Place Concrete
Part 1 - General

1.1 Scope

This section includes:

- Cast-in-place concrete for concrete barrier
- Concrete mix design.

1.2 Related Sections

- 01010 - Summary of Work
- 01400 - Contractor Quality Control
- 01600 - Material and Equipment
- 02222 - Excavation
- 02722 - Grouting
- 03100 - Concrete Formwork

1.3 References

ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete
ACI 318.1	Building Code Requirements for Structural Plain Concrete
ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 94	Standard Specification for Ready-Mixed Concrete
ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	Standard Specification for Slump of Portland Cement Concrete
ASTM C 150	Standard Specification for Portland Cement
ASTM C 186	Standard Test Method for Heat of Hydration of Hydraulic Cement
ASTM C 403	Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

1		
2	ASTM C 618	Flyash and Raw or Calcined Natural Pozzolan for Use as an Admixture in
3		Portland Cement Concrete
4		
5	ASTM D 2216	Standard Test Method for Laboratory Determination of Water (moisture)
6		Content of Soil and Rock
7		
8	USACE CRD-C 36	Method of Test for Thermal Diffusivity of Concrete
9		
10	USACE CRD-C 48	Standard Test Method for Water Permeability of Concrete
11		
12	API 10	Cements
13		
14	NRMCA	Check List for Certification of Ready Mixed Concrete Production
15		Facilities
16		
17	NRMCA	Concrete Plant Standards
18		
19	MOC Standards	
20	WIPP-DOE-71	Design Criteria Waste Isolation Pilot Plant, Revised Mission Concept --
21		IIA (DOE, 1984)
22		
23	WP 03-1	WIPP Startup and Acceptance Test Program (Westinghouse, 1993b)
24		
25	WP 09-010	Design Development Testing (Westinghouse, 1991)
26		
27	WP 09-CN3021	Component Numbering (Westinghouse, 1994a)
28		
29	WP 09-024	Configuration Management Board/Engineering Change Proposal (ECP)
30		(Westinghouse, 1994b)
31		
32	1.4	<u>Submittals for Review/Approval</u>

33 The Contractor shall submit the following for approval 30 days prior to initiating any work at the
34 site.

35
36 Specific sources of supply and detailed product information for each component of the concrete
37 mix is specified in Section 2.6 below.

38
39 Product Data - Laboratory test data and trial mix data for the proposed concrete to be utilized for
40 the concrete barrier.

41
42 Proposed method of installation, including equipment and materials in work plan.

43
44

1 1.5 Submittals at Completion

2 Laboratory test data developed during the installation of the concrete barrier.
3

4 1.6 Quality Assurance

5 Perform work in accordance with the Contractor's Quality Control Plan and referenced ACI and
6 ASTM standards.

7
8 Acquire cement, aggregate and component materials from the same source throughout the work.
9

10 **Part 2 - Products**

11
12 2.1 Cement

13 Portland cement shall conform to API 10 Class H oil well cements. The source of the cement to
14 be used shall be indicated and manufacturer's certification that the cement complies to the
15 applicable standard shall be provided with each shipment.
16

17 2.2 Aggregates

18 Aggregates shall be quartz aggregates conforming to the requirements of ASTM C33.
19

20 Fine aggregate shall meet the requirements of ASTM C33 having a fineness modulus in the
21 range of 2.80 to 3.00.
22

23 Coarse aggregate maximum size shall be 1 ½ inches and shall be clean, cubical, angular, 100
24 percent crushed aggregate without flat or elongated particles.
25

26 The source of the aggregate is to be indicated and test reports certifying that the aggregate
27 complies with the applicable standard are to be submitted for approval with the trial mix data.
28

29 2.3 Water

30 Water used in mixing concrete shall be of potable quality, free of injurious amounts of oil, acid,
31 alkali, organic matter, or other deleterious substances.
32

33 Water shall conform to the provisions in ASTM C94, and in addition, shall conform to the
34 following:
35

- 36 • pH not less 6.0 or greater than 8.0
- 37 • Carbonates and/or bicarbonates of sodium and potassium: 1000 ppm maximum
- 38 • Chloride ions (Cl): 250 ppm maximum
- 39 • Sulfate ions (SO₄): 1000 ppm maximum
- 40 • Iron content: 0.3 ppm maximum
- 41 • Total solids: 2000 ppm maximum

1
 2 When ice is used in concrete mix, the water used for making ice shall meet all of the above
 3 requirements.
 4

5 The source of water is to be indicated and certified copies of test data from an approved
 6 laboratory confirming that the water to be used meets the above requirements shall be submitted
 7 for approval with the trial mix data.
 8

9 2.4 Admixtures

10 Pozzolan shall conform to ASTM C618. Sampling and testing of pozzolans shall conform to
 11 ASTM C311. Approximately 5 percent by weight of pozzolan may be used to replace cement in
 12 the mixes when approved.
 13

14 The source of any admixtures proposed are to be indicated and certified copies of test data from
 15 an approved laboratory shall be submitted for approval with the trial mix.
 16

17 2.5 Concrete Mix Properties

18 The Contractor shall develop and proportion a Salado Mass Concrete mix for use in constructing
 19 the concrete barrier. Cement utilized in the mix shall be Class H. The Contractor shall
 20 demonstrate by trial mix that the proposed concrete meets the following properties:
 21

Target properties for Barrier Concrete

Property	Comment
4-hr working time	Indicated by 8-inch slump (ASTM C 142) after 3-hr intermittent mixing. Max 10-inch slump at mixing.
Nonsegregating	Aggregates do not readily separated from cement paste during handling
Less than 25 °F heat rise prior to placement	Difference between initial condition and temperature after 4 hr.
4,500 psi compressive strength (f'_c)	At 28 days after casting (ASTM C39)
Volume stability	Length change between +0.05 percent and - 0.02 percent (ASTM C 490)
Minimal entrained air	2 percent to 3 percent air

22
 23 The Contractor shall provide certified copies of test data from an approved laboratory
 24 demonstrating compliance with the above target properties.
 25

1 In addition to the target properties the Contractor shall provide certified test data for the trial mix
2 for the following properties:

- 3
- 4 • Heat of hydration ASTM C-186
- 5 • Concrete Set ASTM C-403
- 6 • Thermal Diffusivity USACE CRD-C36
- 7 • Water Permeability USACE CRD-C43
- 8

9 2.6 Salado Mass Concrete

10 The Contractor shall utilize the Salado Mass concrete. The Contractor shall demonstrate that the
11 Salado Mass concrete meets the target properties shown above. Recommended initial
12 proportioning of the Salado Mass concrete is as follows:

Component	Percent of Total Mass
Class H Cement	4.93
Chem Comp III	2.85
Class F fly ash	6.82
Fine aggregate	33.58
Coarse aggregate	43.02
Sodium chloride	2.18
Defoaming agent	0.15
Sodium citrate	0.09
Water	6.38

13
14 The Contractor shall prepare a trial mix and provide certified test data from an approved testing
15 laboratory for slump, compressive strength, heat rise, heat of hydration, concrete set time,
16 thermal diffusivity, and water permeability as indicated above for the plain concrete mix.

17
18 **Part 3 - Execution**

19
20 3.1 General

21 The Contractor shall provide all labor material, equipment and tools necessary to develop,
22 supply, mix, transport and place mass concrete in the forms as shown on the drawings and called
23 for in these specifications

24
25 The Contractor will be required to provide and erect on the site a batch plant, suitable to store,
26 handle, weight and deliver the proposed concrete mix. The batch plant shall be certified to

1 NRMCA standards. The batch plant shall be erected on site in the location as directed by the
2 Engineer.

3
4 The Contractor shall batch, mix, and deliver to the underground, sufficient quantity of concrete
5 to complete placement of concrete within one form section, as shown on the drawings. Once
6 begun, placement of concrete in a section shall be continuous until completed. The time for
7 concreting one section will not exceed ten hours.

8
9 It is expected that addition of water to the dry materials and mixing of the concrete will occur at
10 the ground surface with transport of wet concrete to a pump at the underground level where it
11 will be pumped into the forms.

12
13 The Contractor is to provide all transport vehicles or means to transfer the wet concrete from the
14 mixer truck to the pump. It is expected that the Contractor will use the waste conveyance hoist
15 to transfer from the ground surface to the mine level. The Contractor is to familiarize himself
16 with the dimensions of the waste conveyance and the airlock in order to provide suitable
17 transport vehicles. The Contractor is also to familiarize himself with the capacity and speed of
18 the conveyance to allow transfer of sufficient concrete to sustain the continuing placement of
19 concrete. (See Figures I1G-2 and I1G-3, attached).

20
21 The Contractor shall determine the horizontal distance to the entry where placement of the
22 concrete barrier is to occur, and develop a route, with the approval of the Engineer for traffic
23 flow within the underground.

24
25 Details of the logistics for handling the concrete shall be included in the Contractors' Work Plan,
26 and submitted to the Engineer for approval prior to start of work at the site.

27
28 Potential spill areas in the underground shall be identified by the Contractor in the Work Plan.
29 The Contractor shall provide measures to contain and isolate any water from contact with the
30 halite in these areas. Suitable containment isolation measures shall include but are not limited to,
31 lining with a membrane material (PVC, hypalon, HDPE), draped curtains (polyethylene, PVC,
32 etc.), corrugated sheet metal protective walls or a combination of these and other measures.

33 34 3.2 Pumping Concrete

35 The Contractor shall provide pumping equipment suitable for placing the concrete into the forms.
36 The Contractor at a minimum, shall provide an operating and a spare pump, to be used in the
37 event of breakdown of the primary unit. After transporting and prior to pumping the concrete
38 shall be remixed to compensate for segregation of aggregate during transport. The Contractor
39 shall indicate the equipment proposed for pumping (manufacturer, model, type, capacity,
40 pressure and remixing at the point of delivery in the Work Plan).

1 Each batch of concrete shall be checked at the surface at the time of mixing and again at the
2 point of transfer to the pump for slump and temperature, and shall conform to the following:
3

- 4 • Maximum slump at mixing - 10 inches
 - 5 • Maximum slump at delivery to pump - 8 inches
 - 6 • Maximum mix temperature at placement = 70°F
- 7

8 Note: No water is to be added to the mix after the initial mixing and slump are determined.
9

10 The Contractor shall connect to the pipe ports fabricated into the forms for delivery of the
11 concrete, beginning with the lowest ports first. Pumping shall continue until concrete is seen in
12 the adjacent port at which time the delivery hose will be transferred to that port and the first port
13 capped.
14

15 Pumping shall continue moving laterally then upward until the entire form is filled and the pour
16 is completed.
17

18 3.3 Coordination of Work

19 The Contractor is to coordinate his work mixing, transporting, and placing the mass concrete
20 with the on-going operations in the underground. Coordination of use of the facilities and
21 existing equipment shall be through the Engineer.
22

23 3.4 Clean-Up

24 No clean up or washing of equipment with water will be allowed in the underground. No free
25 water spills are permitted in the underground. All clean-out or wash-out requiring water will be
26 performed above ground at the location approved by the Engineer.
27

28 3.5 Quality Control

29 The Contractor shall provide a third-party quality control inspector at the site throughout the
30 concrete placement. The inspector shall be responsible for determining that the batch plant is
31 proportioning the mix according to the approved proportions. The batch plant shall provide a
32 print out of batch quantities for each truck delivered to the mine. The inspector shall also
33 determine the slump for each batch as it is mixed and allow additional water to be added until the
34 initial slump is achieved. No additional water is to be added after this time. Temperature will
35 also be recorded at this time.
36

37 The inspector shall also determine the slump and temperature following the remixing when
38 concrete is transferred to the pump. Concrete not meeting or exceeding the specification is to be
39 rejected and removed from the underground.
40

41 Concrete test cylinders to determine unconfined compression strength shall be taken by the
42 inspection at the delivery from mixer to the pump in the underground. Four (4) cylinders shall
43 be made for each 50 cubic yards of concrete placed. Cylinders shall be sealed with polyethylene

1 and taped and field cured at ambient temperatures in the mine adjacent to the concrete barrier
2 area. Two (2) samples shall be tested at 7 days and the remaining two (2) at 28 days.

3
4
5

End of section.

(This page intentionally blank)

1

DIVISION 4 – MASONRY

1

(This page intentionally blank)

Section 04100 - Mortar
Part 1 - General

1.1 Scope

This section includes:

- Mortar for Isolation Wall Construction.

1.2 Related Sections

- 01010 - Summary of Work
- 01400 - Contractor Quality Control
- 01600 - Material and Equipment
- 04300 - Unit Masonry System

1.3 References

ASTM C91	Standard Specification for Masonry Cement
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C207	Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C270	Standard Specification for Mortar for Unit Masonry
ASTM C7805	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C1142	Ready-Mixed Mortar for Unit Masonry
ASTM E447	Test Methods for Compressive Strength of Masonry Prisms

1.4 Submittals for Review and Approval

The Contractor shall submit for approval the following 30 days prior to the initiation of work at the site:

Design mix.

Certified laboratory tests for the proposed design mix, indicating conformance of mortar to property requirements of ASTM C270, and test and evaluation reports to ASTM C780.

1 1.5 Submittals at Completion

2 Certified laboratory test results for the construction testing of mortar mix.
3

4 1.6 Quality Assurance

5 Perform work in accordance with the Contractor's Quality Control Plan and referenced ASTM
6 standards. Acquire cement, aggregate, and component materials from the same source
7 throughout the work.
8

9 1.7 Delivery Storage Handling

10 Maintain packaged materials clean, dry and protected against dampness, freezing and foreign
11 matter.
12

13 **Part 2 - Products**

14
15 2.1 Mortar Mix

16 The Contractor shall provide mortar for Isolation Walls, which shall be in conformance with
17 ASTM C270 type M, using the property specification (3,000 psi at 28 days).
18

19 Sand for mortar shall conform to ASTM C144.
20

21 Water used for mixing mortar shall be of potable quality, free of injurious amounts of oil, acid
22 alkali, organic matter, sediments, or other deleterious substances, as specified for Concrete,
23 Section 03300 2.3.
24

25 The supply of materials as defined in the design mix shall remain the same throughout the job.
26
27

28 **Part 3 - Execution**

29
30 3.1 General

31 The Contractor shall furnish all labor material equipment and tools to perform all operations in
32 connection with supplying and mixing mortar for constructing the isolation walls.
33

34 The Contractor shall fully describe his proposed mortar mixing operation, including proposed
35 equipment and materials in the Work Plan.
36

37 3.2 Mortar Mixing

38 Mortar shall be machine-mixed with sufficient water to achieve satisfactory workability.
39 Maintain sand uniformly damp immediately before the mixing process. If water is lost by
40 evaporation, retemper only within one and one half hours of mixing. Use mortar within two
41 hours of mixing at ambient temperature of 85° in the mine.

1
2
3
4
5
6
7
8
9
10
11
12
13
14

3.3 Installation

The Contractor shall install mortar to the requirements of Section 04300 Unit Masonry System.

3.4 Field Quality Control

The Contractor shall provide a third party Quality Control Inspector to perform all sampling and testing to confirm that the mortar mix conforms to the proposed mix properties developed in the design mix.

Construction testing of mortar mix shall be in accordance with ASTM C780 for compression strength. Four (4) prism specimens shall be taken for each 50 cu. ft. of mortar or fraction thereof placed each day.

End of Section.

Section 04300 - Unit Masonry System
Part 1 - General

1.1 Scope

This section includes:

- Concrete Masonry Units

1.2 Related Sections

- 01010 Summary of Work
- 01400 Contractor Quality Control
- 01600 Material and Equipment
- 02722 Grouting
- 03100 Concrete Formwork
- 04100 Mortar

1.3 References

ASTM C55 Standard Specification for Concrete Building Brick

ASTM C140 Standard Method of Sampling and Testing Concrete Masonry Units

1.4 Submittals for Revision and Approval

The Contractor shall submit for approval the following 30 days prior to initiation of the work at the site.

Certified laboratory test results for the proposed solid masonry units.

1.5 Quality Assurance

Perform the work in accordance with the Contractor's Quality Control Plan.

Part 2 - Products

2.1 Concrete Masonry Units

Concrete masonry units shall be solid (no cavities or cores), load bearing high-strength units having a minimum compressive strength of 3500 psi. Concrete masonry units shall be tested in accordance with ASTM C140. All other aspects of the concrete masonry units shall comply with ASTM C55, Type I Moisture Controlled.

Nominal modular size shall be 8 x 8 x 16 inches, or as otherwise approved by the Engineer.

1
2 Concrete brick shall comply with ASTM C55, Grade N, Type I (moisture controlled) having a
3 minimum compressive strength of 3500 psi (Avg. 3 units) or 3000 psi for individual unit.
4

5 2.2 Mortar

6 Mortar shall be as specified in Section 04100 Mortar.
7

8 **Part 3 - Execution**
9

10 3.1 General

11 The Contractor shall furnish all labor, material, equipment and tools to perform all operations of
12 installing Unit Masonry Isolation Walls to the lines and grades shown on the drawings.
13

14 The Contractor shall examine the excavation of the entry to affirm that the keys have been
15 properly leveled and cut to the appropriate depths, at the proper locations prior to any to any
16 work.
17

18 3.2 Installation

19 The Contractor shall install the isolation walls using concrete masonry units as specified above.
20 Masonry units shall be installed with 3/8-inch mortar joints with full mortar bedding and full
21 head joints. Masonry units shall be installed in running bond with headers every third course.
22 Masonry units shall be mortared tight to the ribs and the back wall to provide a seal all around
23 the isolation wall.
24

25 Concrete brick may be used as required for fit-up around grout pipes, or minimizing the
26 dimensional fit-up at the top or sides of the isolation walls as approved by the Engineer. The
27 interface between the top of the isolation wall and the back wall shall be completely mortared to
28 provide full contact between the back and the block wall.
29

30 3.3 Field Quality Control

31 The Contractor shall provide a third-party Quality Control Inspector to inspect the installation of
32 the Concrete Masonry Unit Isolation Walls. Inspection and testing of the mortar shall be in
33 accordance with Section 04100 Mortar.
34
35

36 End of Section

1

(This page intentionally blank)

1

FIGURES

1

(This page intentionally blank)

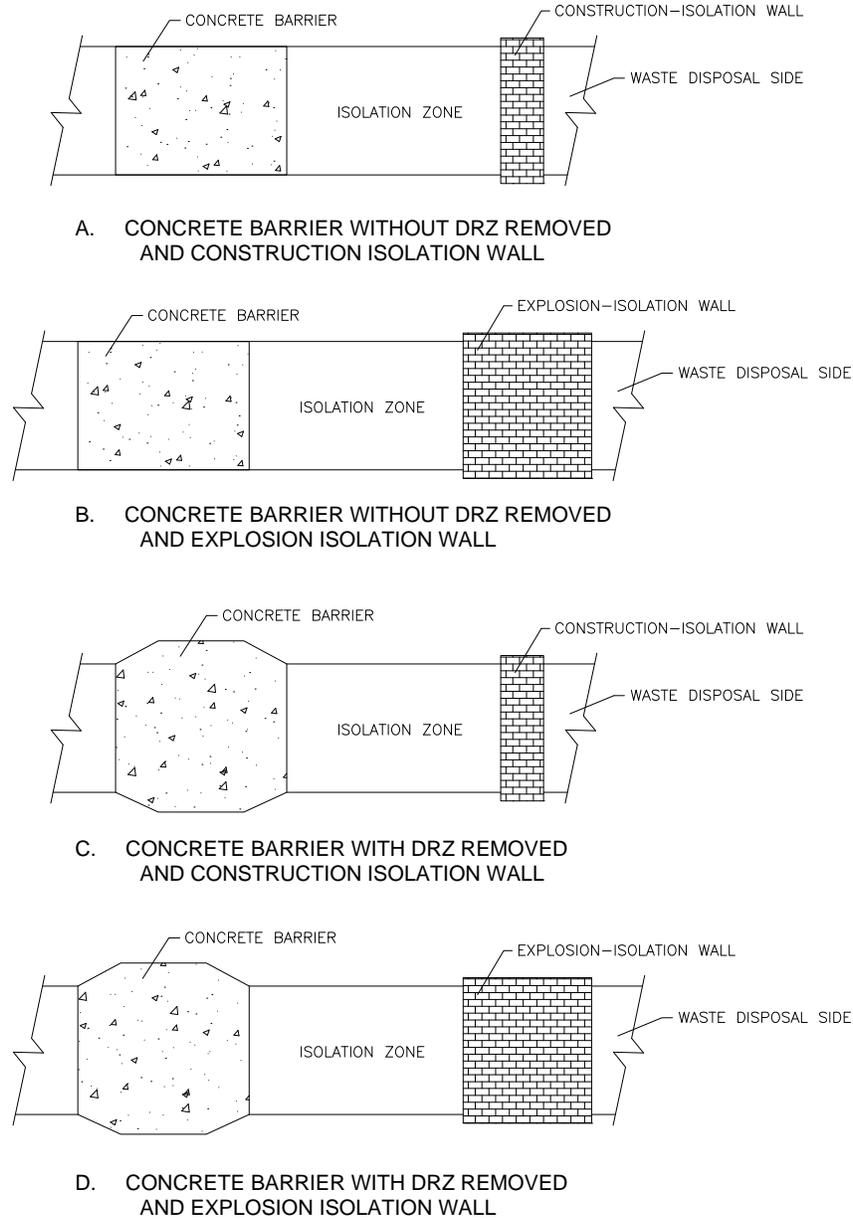
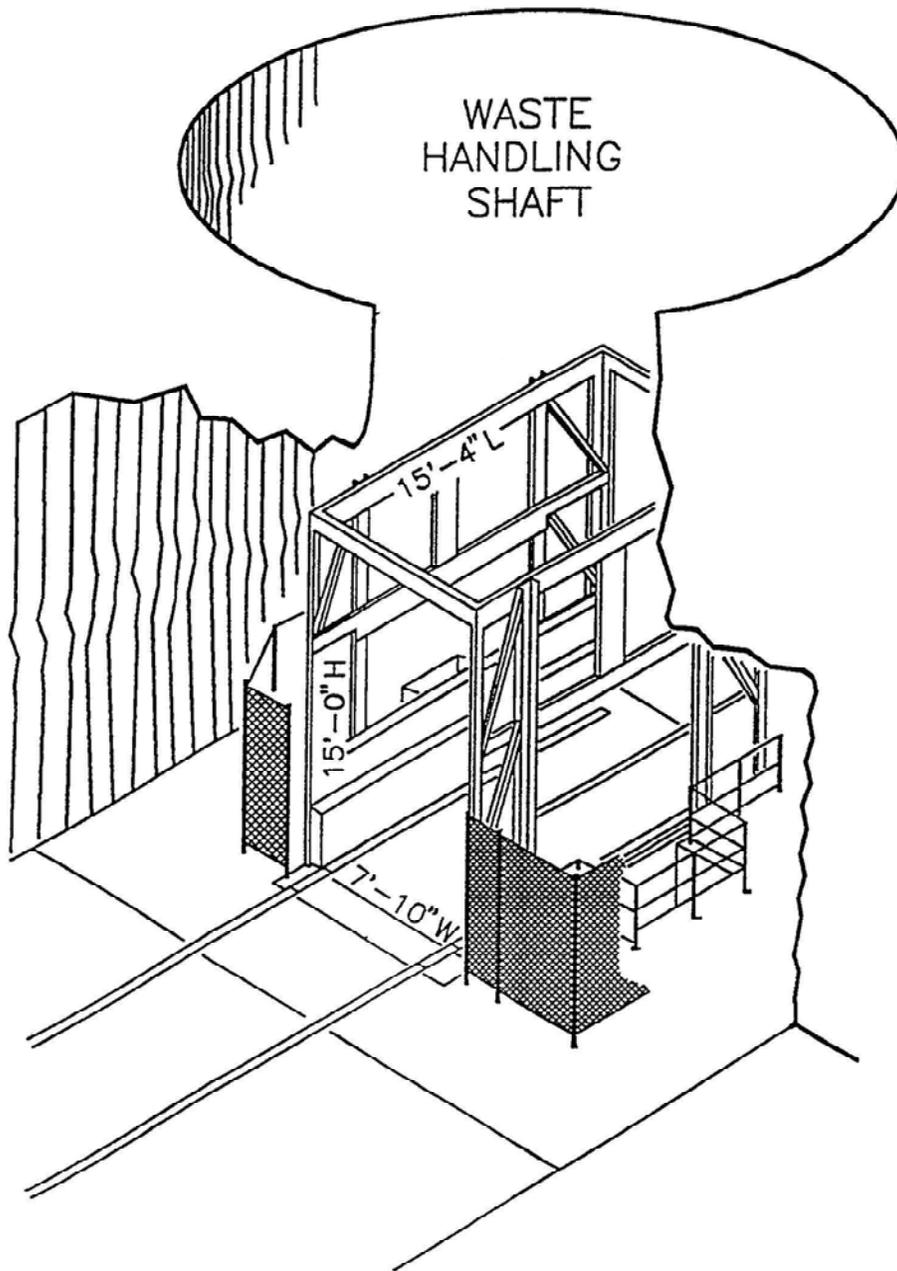


Figure I1G-1
Plan Variations



NOTES

- (1) CAGE DIMENSIONS SHOWN ARE INSIDE.
- (2) WASTE HOIST DESIGN CAPACITY IS 80,000 LBS.

Figure IIG-2
Waste Handling Shaft Cage Dimensions

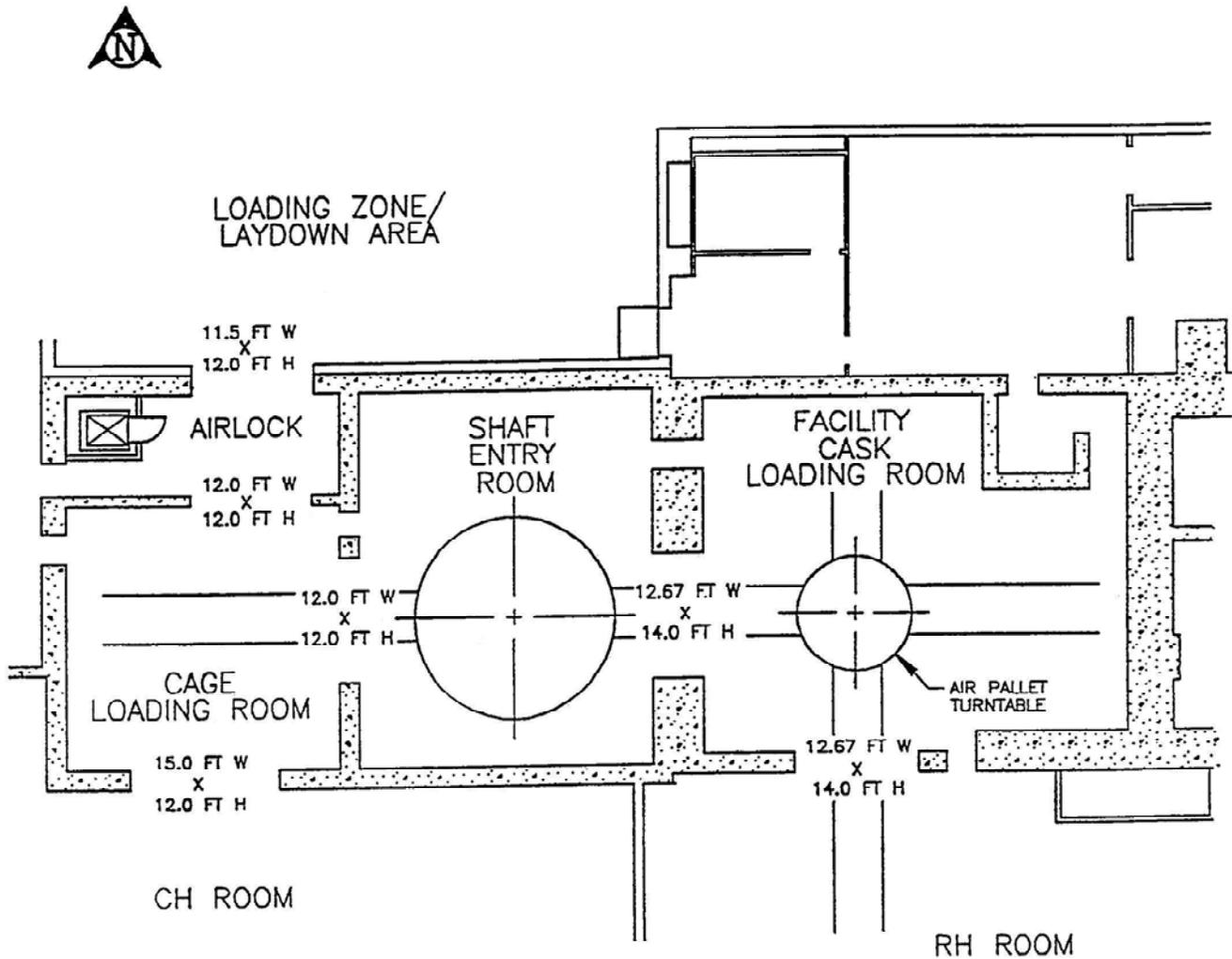


Figure IIG-3
Waste Shaft Collar and Airlock Arrangement