

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATIONS: THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATIONS, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURES, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

APPLICATION		REVISION HISTORY					
NEXT ASSY	USED ON	PART NO.	ZONE	REV	DESCRIPTION	DATE	APPROVAL

**NASA KSC Export Control Office (ECO)
Export/SBU Determination Record**

EDDR# _____

TITLE OF DOCUMENT:				
SENSITIVE BUT UNCLASSIFIED (SBU) INSTRUCTIONS: This item must be reviewed under the requirements for "Sensitive But Unclassified Information" as described in NPR 1600.1, Chapter 5.24 http://nodis3.gsfc.nasa.gov/main_lib.html				
	Yes	No	SBU Reviewer's Signature	Date
Document contains SBU?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Ernest T. Camacho</i>	4/5/10
EXPORT CONTROL (EC) INSTRUCTIONS: If the document includes export-controlled data, contact your directorate Export Control Representative or the KSC ECO Help Desk (867-9209) for a determination of the proper export category. http://exportcontrol.ksc.nasa.gov/index.cfm				
ECO Reviewer's Name and Organization		ECO Reviewer's Signature		Date
<i>Ernesto T. Camacho, TA-B3B</i>		<i>Ernest T. Camacho</i>		4/5/10
	EXPORT DETERMINATION (<input checked="" type="checkbox"/> one box only)			
EAR 99 NLR	<input checked="" type="checkbox"/>	The information contained in the document is technical in content, but is not technical data as defined by the ITAR or the EAR, and therefore is EAR 99 NLR (no export license required). [General Prohibition Six (Embargo) applies to all items subject to the EAR, i.e. items on the CCL and within EAR 99 NLR. You may not make an export or re-export contrary to the provisions of part 746 (Embargos and Other Special Controls) of the EAR and 22 CFR part 126.1 of the ITAR.]		
EAR Controlled	<input type="checkbox"/>	This document is within the purview of the Export Administration Regulations (EAR), 15 CFR 730-774, and is export controlled. It may not be transferred to foreign nationals in the U.S. or abroad without specific approval of a knowledgeable NASA export control official, and/or unless an export license or license exemption is obtained/available from the Bureau of Industry and Security, United States Department of Commerce. <i>Violations of these regulations are punishable by fine, imprisonment, or both.</i>		
ITAR Controlled	<input type="checkbox"/>	This document contains information which falls under the purview of the U.S. Munitions List (USML), as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120-130, and is export controlled. It shall not be transferred to foreign nationals, in the U.S. or abroad, without specific approval of a knowledgeable NASA export control official, and/or unless an export license or license exemption is obtained/available from the United States Department of State. <i>Violations of these regulations are punishable by fine, imprisonment, or both.</i>		

(Stamp Revision: (05-19-2009))

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED ONLY BY THE DESIGN ACTIVITY.	ORIGINAL DATE OF DRAWING (YY/MM/DD)		JOHN F. KENNEDY SPACE CENTER, NASA KENNEDY SPACE CENTER, FLORIDA			
	DRAFTSMAN	CHECKER	Repair KSC Center Wide Fire Monitoring System - Phase 2 of 2			
SOFTWARE	ENGINEER	CHECKER	PCN 98574.1			
FILENAME	ENGINEER	STRESS	Date: March 31, 2010			
MATERIAL	ENGINEER		AEI Project No. 08411-01			
HEAT TREATMENT	ENGINEER		100% CD Final Specifications			
FINAL PROTECTIVE FINISH	ENGINEER		SIZE	GAGE CODE	DWG NO	REV
	APPROVED		A		79K38767	
	<i>Ernesto T. Camacho</i>		SCALE	UNIT WEIGHT	SHEET	OF
					1	154

PCN 98574.1	DOCUMENT RELEASE AUTHORIZATION KENNEDY SPACE CENTER, NASA	PAGE 1	OF 6
ESR		REV/DATE	
DIR	DRA NO. A-CS000000- 1129	SIGNATURE 	
EFF	TITLE Repair KSC Center Wide Fire Monitoring System (Phase 2 of 2)	VEN CODE	
EQ. LOC. SEE TECHNICAL REMARKS		CONTRACT	
SDL 79K11153			

DOCUMENTS

I #	PREF	DOCUMENT NUMBER	ISSUE	SIZE	SHTS	B/L NO.	SS	MODEL NUMBER	WUC
1	DR	79K38766	New	F	137	Note 1	Note 1	Note 1	Note 1
2	SP	79K38767 1, 1A, 2-154	New	A	155	Note 1	Note 1	Note 1	Note 1
3	DM	KSC-TA-11210 cover, 1-638	New	A	639	Note 1	Note 1	Note 1	Note 1
4	SW	79K38766 (CD No. 1)	New	M	1	Note 1	Note 1	Note 1	Note 1
5	SW	79K38767 (CD No. 1)	New	M	"	Note 1	Note 1	Note 1	Note 1
6	SW	KSC-TA-11210 (CD No. 2)	New	M	1	Note 1	Note 1	Note 1	Note 1

TECHNICAL REMARKS

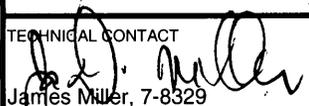
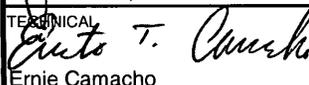
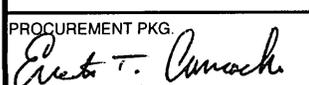
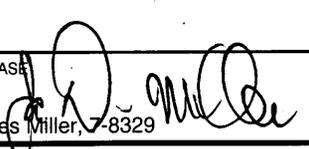
- Note 1: Reference Sheets 2 Through 5.
 Note 2: One CD contains the AutoCad Drawing files, drawing .pdf files, and specification files.
 Note 3: One CD contains the data manual (.pdf files).

NON-MAINTAINED

Connection of various facilities to the Central Radio Monitoring System (CRMS) with installation at H4-1840, J5-1197, J8-1503B, J6-1924, J6-2465, J7-132A, J7-243B, J7-432, J7-1339, J8-1614A, J8-1753, J8-1708, K6-494, K6-696, K6-794, K8-848, K8-894, K6-895, K6-900, K6-947, K6-1091, K6-1094, K6-1096, K6-1193, K6-1249, K6-1547, K6-1696, K6-1847, K6-1996H, K6-2045, K7-140, K7-558, K7-506, K7-618, K7-1205F, K7-1207, MLP-1, MLP-2, MLP-3, Constellation Mobile Launcher (ML). Simplex 2120 Removal at K6-900, K6-1193, and M6-138.

Documents released on this DRA are accessible by using WWW browsers (i.e. Mosaic, Netscape, etc) via a hyperlink on the DE home page or by typing the URL location: [HTTP://WWW-DE.KSC.NASA.GOV/KEDS/KEDS.HTM](http://WWW-DE.KSC.NASA.GOV/KEDS/KEDS.HTM)

APPROVALS

TECHNICAL CONTACT	MAIL CODE	DATE	R&QA	MAIL CODE	DATE
 James Miller, 7-8329	TA-B3-B	4/5/10			
 Ernie Camacho	TA-B3-B	4/5/10	OTHER		
SPACE AND WEIGHT			JOINT RELEASE		
PROCUREMENT PKG.  Ernie T. Camacho	TA-B3-B	4/5/10	RELEASE  James Miller, 7-8329	TA-B3-B	4/5/10

4/6/10

DOCUMENT RELEASE AUTHORIZATION CONTINUATION
KENNEDY SPACE CENTER, NASA

1. DRA No. A-CS000000- 1129

DOCUMENTS

3. I #	4. PREF	5. DOCUMENT NUMBER	6. ISSUE	7. SIZE	8. SHTS	9. B/L NO.	10. SS	11. MODEL NUMBER	12. WUC
		See Sheet 1 For Document List							
		H4-1840	NEW			355.00	CY	K62-4765	CYFFA00000
		J5-1197				355.00	EN	K61-8244	ENFFA00000
		J8-1503B				355.00	OA	K61-6036	OAFFA00000
		J6-1924				355.00	K1	K61-4120	K1FFA00000
		J6-2465				355.00	Y6	K61-4977	Y6FFAZR000
		J7-0132A				355.00	OD	K61-6043	ODFFA10000
		J7-0243B				355.00	OE	K61-6050	OEFFA00000
		J7-0432				355.00	RF	K61-1605	RFFFA00000
		J7-1339				355.00	MQ	K61-2412	MQFFA60000
		J8-1614A				355.00	OB	K61-6030	OBFFA00000
		J8-1753				355.00	RA	K61-0621	RAFFAAS000
		J8-1708				355.00	PT	K61-0620	PTFFAAS000
		K6-0494				355.00	BD	K61-0817	BDFFAK0000
		K6-0696				355.00	GD	K61-1614	GDFFAAS000
		K6-0794				355.00	ZW	K61-2091	ZWFFA00000
		K6-0848				355.00	20	K60-0519-01	20FFAVES00
		K6-0894				355.00	19	K61-0627	19FFAAS000
		K6-0895				355.00	ZO	K61-3472	ZOFFA00000
		K6-0900				355.00	28	U72-1194	28FFAAS000
		K6-0900				355.00	LC	K61-0628	LCFFAAS000
		K6-0900				355.00	LC	K61-2901	LCFFACP000
		K6-0947				355.00	UA	K61-0772	UAFFAV0000
		K6-1091				355.00	CT	K61-0629	EVFFAAS000
		K6-1094				355.00	M3	K61-3263	M3FFA60000
		K6-1096				355.00	M1	K61-2637	M1FFA60000
		K6-1193				355.00	TE	K61-0633	TEFFAAS000
		K6-1193				355.00	TE	K61-2902	TEFFACP000
		K6-1249				355.00	FI	K61-5115	FIFFA62000
		K6-1547				355.00	CK	K61-0167	CKFFAR0000

**DOCUMENT RELEASE AUTHORIZATION CONTINUATION
KENNEDY SPACE CENTER, NASA**

1. DRA No. A-CS000000- 1129

DOCUMENTS

3. I #	4. PREF	5. DOCUMENT NUMBER	6. ISSUE	7. SIZE	8. SHTS	9. B/L NO.	10. SS	11. MODEL NUMBER	12. WUC
		See Sheet 1 For Document List							
		K6-1696	NEW			355.00	Y4	K61-3650	Y4FFA60000
		K6-1847				355.00	B9	K61-3606	B9FFA00000
		K6-1996H				355.00	OP	K61-3241	OPFFA00000
		K6-2045				355.00	K2	K61-3228	K2FFA00000
		K7-0140				355.00	8V	K61-4096	8VFFA9B000
		K7-0558				355.00	GB	K61-0643	GBFFAAS000
		K7-0506				355.00	OM	K61-0641	OMFFAAS000
		K7-0618				355.00	SC	K61-2774	SCFFA60000
		K7-1205F				355.00	XE	K61-0646	XEFFAAS000
		K7-1207				355.00	9Z	K61-3901	9ZFFA90000
		M6-0138				355.00	CT	K61-2900	CTFFACP000
		MLP-3				355.00	LU	K61-0704	LUFFAAS000
		MLP-2				355.00	LV	K61-0703	LVFFAAS000
		MLP-1				355.00	LW	K61-0696	LWFFAAS000

DOCUMENT RELEASE AUTHORIZATION CONTINUATION
KENNEDY SPACE CENTER, NASA

1. DRA No.

A-CS000000- 1129

DOCUMENTS

3. I #	4. PREF	5. DOCUMENT NUMBER	6. ISSUE	7. SIZE	8. SHTS	9. B/L NO.	10. SS	11. MODEL NUMBER	12. WUC
		See Sheet 1 For Document List							
		H4-1840	NEW			359.25	CY	K62-4983-0078	CYFCSFA000
		J5-1197				359.25	EN	K62-4983-0079	ENFCSFA000
		J8-1503B				359.25	OA	K62-4983-0086	OAFCSFA000
		J6-1924				359.25	KI	K62-4983-0080	K1FCSFA000
		J6-2465				359.25	Y6	K62-4983-0081	Y6FCSFA100
		J7-0132A				359.25	OD	K62-4983-0082	ODFCSFA000
		J7-0243B				359.25	OE	K62-4983-0083	OEFCFSFA000
		J7-0432				359.25	RF	K62-4983-0084	RFFCSFA000
		J7-1339				359.25	MQ	K62-4983-0085	MQFCSFA000
		J8-1614A				359.25	OB	K62-4983-0087	OBFCSFA000
		J8-1753				359.25	RA	K62-4983-0088	RAFCSFA000
		J8-1708				359.25	PT	K62-4983-0115	PTFCSFA000
		K6-0494				359.25	BD	K62-4983-0089	BDFCSFA000
		K6-0696				359.25	GD	K62-4983-0090	GDFCSFA000
		K6-0794				359.25	ZW	K62-4983-0091	ZWFCSFA000
		K6-0848				359.25	20	K62-4983-0092	20FCSFA000
		K6-0894				359.25	19	K62-4983-0093	19FCSFA000
		K6-0895				359.25	ZO	K62-4983-0094	ZOFCSFA000
		K6-0900				359.25	LC	K62-4983-0095	LCFCSFA000
		K6-0947				359.25	UA	K62-4983-0096	UAFCSFA000
		K6-1091				359.25	EV	K62-4983-0097	EVFCSFA000
		K6-1094				359.25	M3	K62-4983-0098	M3FCSFA000
		K6-1096				359.25	M1	K62-4983-0099	M1FCSFA000
		K6-1193				359.25	TE	K62-4983-0101	TEFCSFA200
		K6-1193				359.25	TE	K62-4983-0100	TEFCSFA000
		K6-1193				359.25	TE	K62-4983-0102	TEFCSFA300
		K6-1249				359.25	FI	K62-4983-0103	FIFCSFA000
		K6-1547				359.25	CK	K62-4983-0069	CKFCSFA000

**DOCUMENT RELEASE AUTHORIZATION CONTINUATION
KENNEDY SPACE CENTER, NASA**

2. Page 5 of 6

1. DRA No. A-CS000000- 1129

DOCUMENTS

3. I #	4. PREF	5. DOCUMENT NUMBER	6. ISSUE	7. SIZE	8. SHTS	9. B/L NO.	10. SS	11. MODEL NUMBER	12. WUC
		See Sheet 1 For Document List							
		K6-1696	NEW			359.25	Y4	K62-4983-0104	Y4FCSFA000
		K6-1847				359.25	B9	K62-4983-0105	B9FCSFA000
		K6-1996H				359.25	OP	K62-4983-0106	OPFCSFA000
		K6-2045				359.25	K2	K62-4983-0107	K2FCSFA000
		K7-0140				359.25	8V	K62-4983-0108	8VFCSFA100
		K7-0558				359.25	GB	K62-4983-0126	GBFCSFA000
		K7-0506				359.25	OM	K62-4983-0125	OMFCSFA000
		K7-0618				359.25	SC	K62-4983-0109	SCFCSFA100
		K7-1205F				359.25	XE	K62-4983-0110	XEFCSFA000
		K7-1207				359.25	9Z	K62-4983-0111	9ZFCSFA000
		M6-0138				359.25	CT	K62-4983-0033	CTFCSFA000
		MLP-3				359.25	LU	K62-4983-0114	LUFCSFA000
		MLP-2				359.25	LV	K62-4983-0113	LVFCSFA000
		MLP-1				359.25	LW	K62-4983-0112	LWFCSFA000

QUANTITY	MAIL CODE	NAME	QUANTITY	MAIL CODE	NAME
DRA	IHA-022	M. Caukin	DRA	ISC-4300	G. Hegde
1B	IHA-022	J. Sherwood	DRA	ISC-1300	J. Wilt
1B	IHA-200	M. Ramsey	1B	OP-CS	S. Gassaway
DRA	SA-B1	H. Myers	1B	OP-CS	K. Griffin
1B	SA-E3-MSRS	J. LeBlanc	DRA	PH-I2	A. Knutson
1B	SA-E3-MEI	N. Parks	DRA	PH-I2	P. Suffern
DRA	SA-E2	J. Bobersky	DRA	PH-I2	N. Peters
1B	SA-E3	A. Torres	DRA	USK-119	B. Clemons
DRA	SA-E3	C. Miller	DRA	USK-708	J. Schick
DRA	ISC-4250	W. Buchawiecki	DRA	USK-354	J. Hampton
DRA	ISC-4250	A. Tisthammer	DRA	NE-M	R. Blackwelder
DRA	ISC-4210	S. Murray	DRA	NE-M9	P. Becker
DRA	ISC-4230	R. Headley	1B	IT-F	D. Thomas
2F / 3P	ISC-4210	T. Quinn	1B	NE-E1	P. Aragona
DRA	ISC-4011	J. Pratten	1B	IT-D1	D. Crawford
1B	ISC-4300	C. Ramer	DRA	IT-D1	S. Schindler
1B	ISC-4300	G. Rottler	1B	DNPS	A. Jendroch
DRA	ISC-4027	M. Dixon	1B	DNPS	H. Row
1B	ISC-4000	D. Nero			
DRA	ISC-8640	R. Clautice			
DRA	ISC-4250	K. Nickerson	1B	J. Wozniak	Affiliated Engineers
DRA	ISC-8600	L. Cardine-Sardella			5802 Research Park Blvd.
1B	ISC-8600	C. Flores			Madison, WI 53719
1B	ISC-8400	M. Charlton			
1B	SGS-322	E. Levison			
1B	SGS-349	C. Norman			
DRA	ISC-4013	C. Pobjecky			
DRA	ISC-2120	E. Byczek			
1B	ISC-2120	A. Studt			
1P	ISC-2120	J. Lesky			
1P	ISC-2120	P. Smith			
1B	ISC-2120	W. Bray			
1B	TA-B3-D	D. Slayman			
DRA	TA-B3-D	R. Boyles			
DRA	TA-B3-B	E. Camacho			
1B	TA-B3-B	N. Colvin			
1B	TA-B3-B	J. Miller			
DRA	TA-B4-B	G. Diaz			
1B	TA-B4-B	B. Glover			
DRA	TA-A3	R. Poinik			
DRA	TA-A2	M. Stevens			
1B	TA-A2	J. Dudley			

REPRODUCTION AND DISTRIBUTION INSTRUCTIONS

DRA = DRA only

B = B-size Drawings & A-Size sheets

F = Full Size & A-Size sheets

P = Half size Drawings & A-Size sheets

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01 11 00.00 98 SUMMARY OF WORK
01 33 00 SUBMITTAL PROCEDURES
01 42 00 SOURCES FOR REFERENCE PUBLICATIONS
01 57 20.00 10 ENVIRONMENTAL PROTECTION
01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01 78 00 CLOSEOUT SUBMITTALS

DIVISION 02 - EXISTING CONDITIONS

02 41 00 SELECTIVE DEMOLITION
02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
02 82 13.00 98 ASBESTOS HAZARD CONTROL ACTIVITIES

DIVISION 26 - ELECTRICAL

26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 05 26.00 40 GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY
28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY)
28 31 33.00 10 FIRE ALARM REPORTING SYSTEM, RADIO TYPE

-- End of Project Table of Contents --

SECTION 01 11 00.00 98

SUMMARY OF WORK
10/07

PART 1 GENERAL

1.1 SUMMARY

The work to be performed under this project consists of providing the labor, equipment, and materials to replace existing facility reporting to the existing KSC Central Radio Monitoring System (CRMS). The project includes modifications to fire alarm systems at numerous KSC facilities to connect to the radio based head-end control equipment installed by other during Phase 1 of this project. The project includes fire alarm control panel hardware/software, fire alarm data communications network, electrical power, electrical construction, asbestos avoidance, and hazardous material handling (painted materials) elements. The project also includes removal of the existing Simplex 2120 and Information Management System (IMS) reporting system after all facilities have been switched over to the new CRMS system.

Reference the solicitation/request for proposal for bid Options and Alternates that apply to this project.

1.2 DESCRIPTION

The work consists of:

a. Transfer of existing facility fire alarm control panel reporting to the new KSC CRMS system. Facility fire alarm work includes fire alarm control panel hardware/software modifications and the installation of radio transceiver equipment. All monitoring points and graphics associated with these transferred systems shall be programmed on the CRMS system by the Government. Full end-to-end validation testing for all monitored alarms shall be performed as well as NFPA 72 required facility fire alarm reacceptance tests. All facility fire alarm control panel work will require a pre-scheduled system outage and temporary turnover of the existing system to the Contractor for modification and testing. Installation at each facility shall be sequenced as follows:

i.) Government shall verify radio subscriber unit antenna location and inform Contractor of any adjustment required.

ii.) Radio subscriber unit equipment shall be installed, but not powered up.

iii.) Contractor shall request Government support to program radio subscriber unit at the facility site with the Contractor present. Once programmed, the radio shall be powered-up, and communications verified back to all head-end equipment.

iv.) All CRMS head-end (central fire monitoring file server and workstation equipment databases) programming shall be completed for the facility by the Government. Radio transceiver zones to be wired to facility FACP relay contacts shall be end-to-end tested to the head-end equipment.

v.) All other fire alarm related modifications shall be completed to the furthest extent possible without taking an extended outage on the facility FACP.

vi.) Facility fire alarm outage shall be taken to complete hardware modifications, software modifications, CRMS reporting testing, and facility fire alarm system re-acceptance testing.

b. Removal of existing obsolete Simplex 2120 and Information Management System (IMS) central station equipment after transfer of facilities to the CRMS head end is complete. This includes work at K6-900 (LCC), M6-138 (CD&SC), and K6-1193 (VABR).

c. Environmental and safety work including worker protection, asbestos avoidance, waste segregation, and waste disposal.

1.3 CONTRACT DRAWINGS/PUBLICATIONS

The following drawings accompany this specification and are a part thereof.

Drawing No. 79K38766
Sheets 1 through 137

The publications of the issues of referenced documents in effect on the date of issuance of invitation for bids form a part of this specification and, where referred to herein by basic designation only, are applicable to the extent indicated by the references thereto. In the event of difference between this specification or its accompanying drawings and the referenced

document, this specification and its accompanying drawings must govern to the extent of such difference.

1.4 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered recycled materials. These items, when incorporated into the work under this contract, must contain at least the specified percentage of recycled or recovered material.

1.5 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files (scaled plans, i.e. Floor Plans and Site Plans) for contract and existing system configuration drawings will only be made available to the Contractor for use in preparation of shop submittal and record drawings and data related to the referenced contract subject to the following terms and conditions.

Data contained on these electronic files shall not be used for any purpose other than the preparation of construction drawings and data for the referenced project. Contractor shall field verify all drawings as required.

Existing fire alarm system drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. In the event that a conflict arises between the signed construction documents prepared by the Government and the furnished CADD files, the signed construction documents shall govern. The Contractor is responsible for determining if any conflict exists. Use of these CADD files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

If the Contractor uses, duplicates and/or modifies electronic CADD files for use in producing construction drawings or data related to this contract, all previous indications of ownership (seals, logos, signatures, initials and dates) shall be removed.

1.6 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 days after contract award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use e-mail to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple e-mail addresses will not be allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this e-mail address.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FIRE ALARM SYSTEM ACCEPTANCE TEST COORDINATION

The Contractor shall schedule, coordinate, and provide all necessary facility system support required for integrated fire alarm system testing per 28 31 00.01 98 FIRE DETECTION AND ALARM where such systems are installed as part of this Contract. The Contractor shall coordinate and schedule outages on the systems as required.

All Contractor technical support personnel shall be fully qualified to safely and correctly operate all required equipment on their assigned system. All such support personnel shall be present at both the preliminary and final fire alarm tests (a minimum of two separate occurrences on different dates).

Scaffolding or High Crew Support - To access fire alarm devices or wiring installed at heights and locations not safely accessible with ladders. All such support to be provided by the Contractor.

Contractor shall walk down existing fire alarm system test procedures prior to execution and inform the COTR and Construction Inspector in writing of all KSC provided support required for operation of existing systems. Written request for such support shall be provided within 14 days of the proposed test date. Provide written request for support including but not limited to:

- a. Sprinkler Systems - To operate control valves and inspector test stations.

- b. Compressed Air Systems - To verify operation of low air pressure supervisory switches.

- c. Fire Pump Support - To verify monitoring of the required fire pump controller signals.

- d. Chemical Suppression Systems - To test interfaces to control panels and discharge detection pressure switches.

- e. Heating, Ventilation, and Air Conditioning (HVAC) Systems - To operate systems for duct smoke detector tests, to restart AHU units after duct smoke detector shutdown tests, and to verify correct operation of fire dampers.

- f. Elevator Systems - To safely access fire detectors in the elevator shaft and pit. To reset elevators after recall sequences are initiated.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES
01/08

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

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

SD-01 Preconstruction Submittals

Submittals which are required prior to a notice to proceed.

SD-02 Shop Drawings

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

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

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

All shop drawings shall be produced using Bentley Microstation or AutoCAD (.DXF or .DWG format). Final record shop drawing submittals shall include digital media for all shop drawings.

SD-03 Product Data

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

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

SD-05 Design Data

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

SD-06 Test Reports

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Final acceptance test and operational test procedure.

SD-07 Certificates

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

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

SD-08 Manufacturer's Instructions

Pre-printed material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

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

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

SD-11 Closeout Submittals

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

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

1.1.2 Approving Authority

Office or designated person authorized to approve submittal; Contracting Officer (CO) or when designated the Contracting Officer's Technical Representative (COTR).

1.1.3 Work

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

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following submittals prior to construction.

SD-01 Preconstruction Submittals

- Submittal register; G
- Certificates of insurance; G
- Surety bonds; G
- List of proposed subcontractors; G
- Construction Progress Schedule; G
- Schedule of prices; G
- Health and safety plan; G
- Work plan; G
- Quality control (QC) plan; G
- Environmental protection plan; G
- Contractor's State Certification; G

1.3 PREPARATION

1.3.1 Transmittal Form

Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals"

1.3.2 Identifying Submittals

When submittals are provided by a lower tier contractor the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for Government approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location.
- b. Construction contract number.
- c. Date of the drawings and revisions.
- d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.
- e. Section number of the specification section by which submittal is required.
- f. Submittal description (SD) number of each component of submittal.
- g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.
- h. Product identification and location in project.

1.3.3 Format for SD-02 Shop Drawings

- a. Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background. Cover sheet of all drawings shall include a "Sensitive But Unclassified" review block as appears on the cover sheet of the design drawings.

- b. Present A-size 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.
- c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."
- d. Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.
- e. Reserve a blank space, no smaller than 4 inches on the right hand side of each sheet for the Government disposition stamp.
- f. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

1.3.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

- a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.
- b. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references.
- c. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
- d. Submit manufacturer's instructions prior to installation.

1.3.5 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.3.6 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

1.3.7 Format of SD-10 Operation and Maintenance Data (O&M)

Provide operation and maintenance data on 8 1/2 by 11 inches paper or manufacturer's standard bounded manuals. Organize all material in a 3-ring binder with title sheet and table of contents. Provide tabbed and labeled dividers between each section identified in the table of contents.

Final record submittal of approved data manual shall include .pdf file on digital media.

1.4 QUANTITY OF SUBMITTALS

Submit twelve (12) copies of all submittals requiring review and approval. Four (4) sets marked with review notations by the Contracting Officer, will be returned to the Contractor.

All submittals shall be approved prior to the start of work detailed by the submittals.

1.5 GOVERNMENT'S REVIEW

1.5.1 Review Notations

Contracting Officer review will be completed within 21 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted", resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "return for correction," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.6 DISAPPROVED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice is to be given to the Contracting Officer.

Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

07/06

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018-2187
Ph: 847-699-2929
Fax: 847-768-3434
E-mail: customerservice@asse.org
Internet: <http://www.asse.org>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <http://www.astm.org>

COMPRESSED GAS ASSOCIATION (CGA)
4221 Walney Road, 5th Floor
Chantilly, VA 20151-2923
Ph: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com
Internet: <http://www.cganet.com>

FLORIDA ADMINISTRATIVE CODE (FAC)
Darby Printing Co.
6215 Purdue Drive
Atlanta, GA 30336
Ph: 1-800-241-5292
Fax: 404-346-3332

FLORIDA STATUTES (FL-STAT)
Law Book Distribution Office
Room LL14, The Capitol
Tallahassee, FL 32399-1400
Ph: 904-488-2323

FM GLOBAL (FM)
1301 Atwood Avenue
P.O. Box 7500
Johnston, RI 02919
Ph: 401-275-3000
Fax: 401-275-3029
E-mail: information@fmglobal.com
Internet: <http://www.fmglobal.com>

JOHN F. KENNEDY SPACE CENTER (KSC)
National Aeronautics and Space Administration
KSC Doc Library - D
Kennedy Space Center, FL 32899
Ph: 321-867-3613

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane
Piscataway, NJ 08855-1331
Ph: 732-981-0060
Fax: 732-981-1712
E-mail: customer-services@ieee.org
Internet: <http://www.ieee.org>

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)
703 Waterford Way (NW 62nd Avenue), Suite 600
Miami, FL 33126
Ph: 305-264-7772
Fax: 305-264-8088
Internet: <http://www.iata.org>

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-5900
E-mail: webmaster@nema.org
Internet: <http://www.nema.org/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: <http://www.nfpa.org>

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES
(NICET)
1420 King Street
Alexandria, VA 22314-2794
Ph: 888-476-4238
E-mail: tech@nicet.org
Internet: <http://www.nicet.org>

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
Mail Stop C-13
4676 Columbia Parkway
Cincinnati, OH 45226-1998
Ph: 800-356-4674
Fax: 513-533-8573
E-mail: pubstaff@cdc.gov
Internet: <http://www.cdc.gov/niosh/homepage.html>

UNDERWRITERS LABORATORIES (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096
Ph: 847-272-8800
Fax: 847-272-8129
E-mail: customerexperiencecenter@us.ul.com
Internet: <http://www.ul.com/>

U.S. DEPARTMENT OF DEFENSE (DOD)
Directorate for Public Inquiry and Analysis
Office of the Secretary of Defense (Public Affairs)
Room 3A750 -- The Pentagon
1400 Defense Pentagon
Washington, DC 20301-1400
Ph: 703-428-0711
E-mail: pia@hq.afis.asd.mil
Internet: <http://www.dod.gov>
Order DOD Documents from:
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Ph: 703-605-6585
FAX: 703-605-6900
E-mail: info@ntis.gov
Internet: <http://www.ntis.gov>
Order Military Specifications, Standards and Related Publications
from:
Department of Defense Single Stock Point for (DODSSP)
Defense Automation and Production Service (DAPS)
Building 4D
700 Robbins Avenue
Philadelphia, PA 19111-5098
Ph: 215-697-2179
Fax: 215-697-1462
Internet: <http://www.dodssp.daps.mil>
www.daps.dla.mil

----- Detail Series Documents -----

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1800 F Street, NW
Washington, DC 20405
Ph: 202-501-1021
Internet: www.GSA.gov
Order from:
General Services Administration
Federal Supply Service Bureau
1941 Jefferson Davis Highway
Arlington, VA 22202
Ph: 703-605-5400
Internet: <http://apps.fss.gsa.gov/pub/fedspecs/index.cfm>

----- Commercial Item Description Documents -----

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road

College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
Internet: <http://www.archives.gov>
Order documents from:
Superintendent of Documents
U.S. Government Printing Office (GPO)
732 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: <http://www.gpoaccess.gov>

-- End of Section --

SECTION 01 57 20.00 10

ENVIRONMENTAL PROTECTION
08/08

PART 1 GENERAL

1.1 REFERENCES

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

JOHN F. KENNEDY SPACE CENTER (KSC)

KNPR 8500.1 Rev A-1	(2007) Environmental Requirements
Article J-C-24	Hazardous Wastes
Article J-C-20	Spills
Article J-A-4	Material Safety Data Sheets (MSDS) Submittal/Chemical Inventory Reporting and Management
Article J-C-18	PCB Management
Article J-C-27	Disposal and Salvage of Materials
Article J-C-17	Landfill Operations/Solid Waste Removal

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

40 CFR 260	Hazardous Waste Management System: General
------------	--

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 267	Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.3 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G

1.6 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.6.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.6.2 Contents

Include in the Environmental Protection Plan, but not limit it to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.
- f. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the environmental contract clause Article J-C-20, Spills. Include in this plan, as a minimum:
 - 1) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify 911 or by cell phone 867-7911, then notify the Contracting Officer and the Environmental Assurance Branch. The Permitting and Compliance Office of the Environmental Assurance Branch will be responsible for notifying the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.
 - 2) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.
 - 3) Training requirements for Contractor's personnel and methods of accomplishing the training.

- 4) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
 - 5) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.
 - 6) The methods and procedures to be used for expeditious contaminant cleanup.
- g. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.
- 1) Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.
 - 2) Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).
 - 3) Indicate in the report the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.
 - 4) A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.
- h. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.
- i. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the

intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with environmental contract clause Article J-A-4, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.

j. Include in the plan notification of modifications to historical facilities such that historical photographic records can be prepared prior to construction. Historical facilities include:

- K6-900 Launch Control Center
- K6-848 Vehicle Assembly Building
- J7-432 Remote Air Intake Building
- J8-1753 Remote Air Intake Building
- MLP-1 Mobile Launcher Platform 1
- MLP-2 Mobile Launcher Platform 2
- MLP-3 Mobile Launcher Platform 3
- K6-794 Thermal Protection System Facility
- K6-696 Orbiter Processing Facility 3
- K6-894 Orbiter Processing Facility 1 and 2

1.6.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.7 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection. This survey report will be signed by both the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.8 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings, plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.9 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. After receipt of such notice, the Contractor will inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 LAND RESOURCES

3.1.1 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities will be made only when approved.

3.2 AIR RESOURCES

Equipment operation, activities, or processes performed by the Contractor will be in accordance with all Federal and State air emission and performance laws and standards.

3.2.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; must be controlled at all times, including weekends, holidays and hours when work is not in progress. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.2.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.2.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor will comply with the provisions of the State of Florida rules.

3.2.4 Burning

Burning is prohibited on the Government premises.

3.3 MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT, Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS, and/or as shown on the drawings.

Article J-C-18 PCB Management, Article J-C-24 Hazardous Wastes, Article J-C-27 Disposal and Salvage of Materials, and Article J-C-17 Landfill Operations/Solid Waste Removal apply to material management and waste disposal on this project.

3.3.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed

so that no known or presumed hazardous or toxic waste will become co-mingled with solid waste. Painted metals and dust or debris resulting from painted metals is assumed to be contaminated with heavy metals and PCB's, and thus requiring special handling.

Trash items not requiring special handling, or which cannot be resold or recycled, shall be disposed of in receptacles slated for disposal in either the KSC landfill or the Brevard County landfill. The physical dimensions of the waste shall be within the handling capabilities of the landfill disposal equipment. The physical dimensions for the landfill handling capabilities are 8 feet in length x 8 feet in width.

The KSC landfill is an unlined Class III landfill with permit restrictions and limited capacity. Only the items listed in environmental contract clause Article J-D-28 will be accepted at the landfill.

The following wastes are not authorized for disposal at the KSC landfill:

(1) Any waste not permitted by DEP regulations to be disposed of in a Class III landfill as defined in Rule 62-701.200(14), FAC.

(2) Putrescible (brown bag) office waste.

(3) Chromated Copper Arsenate (CCA) treated wood.

(4) Liquid or non-liquid polychlorinated biphenyls (PCBs) (with the exception of PCB Bulk Product Waste).

(5) Friable Asbestos.

(6) Hazardous wastes as specified by the U.S. Environmental Protection Agency (EPA); EPA defines hazardous waste as those wastes that exhibit flammability, corrosivity, reactivity, and/or toxicity characteristics; (Per EPA's list of hazardous wastes, 40 CFR 261, Subpart D, and most recent revision thereof).

(7) Biomedical waste.

(8) Liquid wastes, including oil (containerized or non-containerized).

(9) Lead-acid batteries.

(10) Tires, other than "shredded waste tires."

(11) White goods (i.e. appliances).

(12) Unpainted Concrete: Unpainted concrete shall be stockpiled at the Diverted Aggregate Recycling and Collection Yard (DARCY located at the KSC landfill).

3.3.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the Government. Collect chemical waste in Government provided corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations, and environmental contract clause Article J-C-24, Hazardous Wastes.

3.3.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous and controlled waste shall be managed in accordance with all applicable statutes, rules, orders, and regulations which may include but are not limited to 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 266, 40 CFR 267, 40 CFR 268, 40 CFR 273, 40 CFR 279, 40 CFR 761, and KNPR 8500.1 Rev A-1. In no case shall the Contractor or the Contractor's representative transport hazardous waste from KSC. Reference Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.3.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Storage of fuel on the project site will be in accordance with all Federal, State, and local laws and regulations.

3.4 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Notify the Contracting Office 72 hours prior to beginning work in any historical facility.

3.5 PREVIOUSLY USED EQUIPMENT

The contractor will clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.6 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.7 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all personnel prior to commencing construction activities. Additional meetings must be conducted for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
08/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E 1609 (2001) Development and Implementation of a
Pollution Prevention Program

JOHN F. KENNEDY SPACE CENTER (KSC)

Article J-C-19 Recycling and Salvaging Materials

Article J-C-38 Non-Hazardous Waste Diversion Report

1.2 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. Solid waste shall be diverted from the landfill by recycling means wherever possible.

1.3 MANAGEMENT

Develop and implement a waste management program in accordance with ASTM E 1609 and as specified. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G

SD-11 Closeout Submittals

Records; G

1.5 MEETINGS

Conduct Construction Waste Management issues during preconstruction, pre-demolition, and regular project status meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to the details of waste

management. At a minimum, environmental and waste management goals and issues shall be discussed at the regular project status meetings:

1.6 WASTE MANAGEMENT PLAN

A waste management plan shall be submitted within 30 days after contract award and not less than 10 days before the pre-demolition meeting. The plan shall demonstrate how the project waste diversion goal shall be met and shall include the following:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.

e. Characterization, including estimated types and quantities, of the waste to be generated. The following wastes related to existing building systems are expected on this project include but are not limited to the following (list does not include Contractor generated waste):

1. Insulated wire is to be removed from KSC by the Contractor for recycling or disposal.

2. Unpainted metal is to be returned to the government for recycling.

3. Painted metals are to be segregated and disposed of in accordance with Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

4. Sealed lead-acid batteries are to have terminals tape, be palletized one-high on plastic sheets and shrink-wrapped. Return to the government for recycling as universal waste.
 5. Electronic components used on Simplex network communications (network related electronic circuit cards and power supplies) are to be returned to the government for re-use.
 6. Any removed electronic rack equipment is to be returned to the government for reuse.
-
- f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.
 - g. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.
 - h. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the Contracting Officer.
 - i. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.
 - j. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).
 - k. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste

Management Plan to each subcontractor, the Quality Control Manager, and the Contracting Officer.

1.7 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the Construction and Demolitions Project Form (KSC 7-648)

1.8 REPORTS

Submit the Construction and Demolition Projects Report (KSC Form 7-648 NS (02/07)) to the NASA Environmental Management Branch through the Contracting Officer (CO) on a monthly basis and keep a log on site per direction of the Contracting Officer in accordance with environmental contract clause, Article J-D-25, Recycling and Salvaging Materials.

1.9 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Separate materials by the following method:

1.9.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process).

Separate materials into the following category types as appropriate to the project waste and in accordance with environmental contract clause Article J-C-19:

- a. Concrete and masonry.

- b. Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).
 - (1) Ferrous.

 - (2) Non-ferrous.

- c. Wood (nails and staples allowed).

- d. Debris.

- e. Glass (colored glass allowed).

- f. Paper.
 - (1) Bond.

 - (2) Newsprint.

 - (3) Cardboard and paper packaging materials.

- g. Plastic.
 - (1) Type 1: Polyethylene Terephthalate (PET, PETE).

 - (2) Type 2: High Density Polyethylene (HDPE).

 - (3) Type 3: Vinyl (Polyvinyl Chloride or PVC).

 - (4) Type 4: Low Density Polyethylene (LDPE).

(5) Type 5: Polypropylene (PP).

(6) Type 6: Polystyrene (PS).

(7) Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

h. Gypsum.

i. Non-hazardous paint and paint cans.

j. Beverage containers.

k. Sealed lead-acid batteries.

1.9.2 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.10 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.10.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Coordinate reuse with the Contracting Officer. Sale or donation of waste suitable for reuse shall be considered.

1.10.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible. For additional information, please contact the NASA/KSC Recycling Manager.

The Contractor shall participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project in accordance with environmental contract clause, Article J-C-19.

1.10.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

1.10.4 Return

Set aside and protect mis-delivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 DISPOSAL

Disposal of wastes not recycled or salvaged shall be in accordance with 01 57 20.00 10 ENVIRONMENTAL PROTECTION and SECTION 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Notify the Contracting Officer prior to taking disposal action for any hazardous waste.

3.2 RECYCLING AND WASTE MINIMIZATION

3.2.1 Reuse

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those

specified in other sections to be salvaged and reinstalled, shall not be used in this project.

3.2.2 Recycle

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible. For additional information, please contact the NASA/KSC Recycling Manager.

The Contractor shall participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project in accordance with environmental contract clause, Article J-D-25.

3.3 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

Maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. Submit the Construction and Demolition Projects Report (KSC Form 7-648 NS (02/07)) to the NASA Environmental Management Branch through the Contracting Officer (CO) on a monthly basis and keep a log on site per direction of the Contracting Officer in accordance with environmental contract clause, Article J-C-38, Non-Hazardous Waste Diversion Report.

-- End of Section --

SECTION 01 78 00

CLOSEOUT SUBMITTALS
01/08

PART 1 GENERAL

1.1 SUBMITTALS

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

SD-03 Product Data

Warranty Management Plan

Two sets of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

SD-11 Closeout Submittals

Closeout submittals shall be submitted at acceptance (completion of final acceptance testing) of project work as follows:

Record Drawings

Updated 79K38766 design drawings showing final as-built conditions of the project. The manually prepared drawings must consist of 2 sets of the approved marked working as-built prints.

Warranty Management Plan

List of warranted equipment in accordance with paragraph entitled "Warranty Management Plan".

1.2 PROJECT RECORD DOCUMENTS

1.2.1 Record Drawings

This paragraph covers record 79K38766 design drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working record drawings" and "final record drawings" refer to contract drawings which are revised to be used for final record drawings showing as-built conditions.

As-Built shop drawing submittals shall be in accordance with the requirements of other sections.

1.2.1.1 Government Furnished Materials

Two sets of drawings 79K38766 drawings will be provided by the Government at the preconstruction conference.

1.2.1.2 Working Record and Final Record Drawings

Revise two (2) sets of 79K38766 paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and keep at least one set available on the jobsite at all times. As work depicted on the drawings is completed (generally by facility) submit for approval the other applicable drawing set sheets for approval with the as-built shop drawings for the facility.

Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. The working as-built marked prints and final record (as-built) shop drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer. Show on the working and final record drawings, but not limited to, the following information:

a. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation

plans and placing details, pipe sizes, insulation material, dimensions of equipment, etc.

b. Changes or modifications which result from the final inspection.

c. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.

d. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

e. Modifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.

(1) Place a Modification Delta at the location of each deletion.

(2) For new details or sections which are added to a drawing, place a Modification Delta by the detail or section title.

(3) For minor changes, place a Modification Delta by the area changed on the drawing (each location).

(4) For major changes to a drawing, place a Modification Delta by the title of the affected plan, section, or detail at each location.

(6) For changes to schedules or drawings, place a Modification Circle either by the schedule heading or by the change in the schedule.

(7) The Modification Delta size shall be 1/2 inch high unless the area where the delta is to be placed is crowded. Smaller size delta shall be used for crowded areas.

1.2.1.3 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and must be returned to the Contracting

Officer after approval by the Government. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor at no expense to the Government.

1.2.1.4 Manually Prepared Drawings

Employ only personnel proficient in the preparation of manually prepared drawings to modify the original contract drawing or prepare additional new drawings. Additions and corrections to the contract drawings must be neat, clean and legible, shall be done to the same level of detail, and match the adjacent existing line work, and lettering being annotated in type, density, size and style. Drafting work must be done using the same medium (pencil, plastic lead or ink) that was employed on the original contract drawings and with graphite lead on paper base material. The Contracting Officer will review record drawings for accuracy and legibility.

a. When final revisions have been completed, Letter or stamp each drawing with the words "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high. Mark original contract drawings either "Record" drawings denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date all original contract drawings in the revision block.

1.2.2 Final Approved Shop Drawings and Data Submittals

Furnish final approved project shop drawing and data submittals in accordance with the requirements of other Sections.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION 02 41 00

SELECTIVE DEMOLITION
10/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6

(2006) Safety Requirements for Demolition
Operations

1.2 GENERAL REQUIREMENTS

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer; refer to Section "Summary of Work" for additional requirements and the proposed sequence of work. Remove rubbish and debris from the project site daily; do not allow accumulations inside or outside the buildings. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions; G

SD-07 Certificates

Demolition Plan; G

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris to occupied portions of the building and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water. Vacuum and dust the work area daily.

All painted materials are assumed contaminated with heavy metals and PCB's. Demolition and work methods involving these materials shall not inherently produce dust; saw-cutting or grinding is prohibited. Reference Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS for related work and disposal requirements.

Work required on the project is in the vicinity of asbestos containing materials (ACM). The Contractor shall locate all ACM in any work area prior to starting work and avoid all contact with such materials during the progress of the work. Reference specification Section 02 82 13.00 98, ASBESTOS ABATEMENT, Section 1.2.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the Contracting Officer prior to beginning such work.

1.6.2 Existing Conditions Documentation

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Notify the Contracting Officer of any conditions that will prevent execution of the work as specified in the Contract documents. It is the Contractor's responsibility to verify and submit all required outages which will be required during the course of work.

Selected existing conditions are depicted graphically on the drawings. Graphical depictions are approximate in nature, do not indicate the exact size or location of the element shown, nor indicate any or all surrounding work. Drawings are diagrammatic in nature. The Contractor is responsible for confirming the actual existing conditions and making site measurements for the purpose of the procurement and installation of equipment and materials needed to execute the work and to coordinate with constraints imposed by the existing conditions.

1.6.3 Items to Remain in Place

Take necessary precautions to avoid damage to existing items (including but not limited to building elements, furniture, equipment, fixtures, and finishes) to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Ensure that structural elements are not overloaded. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.6.4 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.6.5 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.6.6 Facilities

Protect electrical and mechanical services and utilities. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.6.7 Protection of Personnel

Before, during and after the demolition work, the Contractor shall continuously evaluate the condition of the project, and take immediate action to protect all personnel working in and around the project site.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 FOREIGN OBJECT DAMAGE (FOD)

Space flight hardware and ground support equipment are subject to FOD from debris and waste material lying in the vicinity of such hardware. Remove all such materials that may appear due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. Anchor the fence and fabric to prevent displacement by wind. Remove barricade when no longer required.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the Contracting Officer.

1.10 REQUIRED DATA

Prepare a Demolition Plan. Include in the plan procedures for careful removal, disposition of materials specified to be salvaged or disposed of, work sequence, and utility outages required. Coordinate with Waste Management, Environmental Protection, Safety, and PCB Removal/Disposal Plans.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXISTING FACILITY MODIFICATIONS

3.1.1 Utilities and Related Equipment

3.1.1.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2 Masonry

Core drill and remove masonry so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Fire-seal to original rating.

3.1.3 Acoustic Ceiling Tile

Remove, neatly stack, and reuse acoustic ceiling tiles. Provide new tiles where broken or damaged. New tiles shall match existing.

3.1.4 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface

and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

- a. Concrete and Masonry: Completely fill and fire seal holes and depressions, left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.
- b. Where installation results in damaged or missing resilient tile flooring, patch to match the existing floor tile.

3.1.5 Fire Alarm Equipment

Salvage fire alarm devices and equipment and turn over to the Government. Salvaging of batteries will require hazardous waste handling.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except for salvaged, re-used, toxic, and hazardous waste items specified in related Sections, all materials and equipment removed shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.2.2 Government Materials and Equipment

Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage or disposal site, as directed within 15 miles of the work site. The following wastes related to existing building systems are expected on this project include but are not limited to the following (list does not include Contractor generated waste):

- a. Insulated wire is to be removed from KSC by the Contractor for recycling or disposal.

b. Unpainted metal is to be returned to the government for recycling.

c. Painted metals are to be segregated and disposed of in accordance with Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION.

d. Sealed lead-acid batteries are to have terminals taped, be palletized one-high on plastic sheet and shrink wrap. Return batteries to the government for recycling as universal waste.

e. Electronic components and computers used on Simplex Information Management System network communications (network related workstations, electronic circuit cards and power supplies) are to be returned to the government for re-use.

3.3 CLEANUP

Remove debris and rubbish from work site(s) daily. Remove and transport in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations in accordance with the following applicable specification sections:

- 01 57 20.00 10 ENVIRONMENTAL PROTECTION
- 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
- 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

-- End of Section --

SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
04/06

PART 1 . GENERAL

1.1 REFERENCES

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR (2004) Dangerous Goods Regulations

JOHN F. KENNEDY SPACE CENTER (KSC)

Article J-C-20 Spills

Article J-C-18 PCB Management

Article J-C-24 Hazardous Wastes

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

40 CFR 260 Hazardous Waste Management System: General

40 CFR 261 Identification and Listing of Hazardous Waste

40 CFR 262 Standards Applicable to Generators of Hazardous Waste

40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

49 CFR 178

Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act; 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

On-site Hazardous Waste Management Plan; G

Prior to start of work, a plan detailing the manner in which hazardous wastes, (to include PCB and hazardous materials containing wastes), shall be managed. Written documentation of weekly hazardous waste inspections shall be submitted on a monthly basis.

Notices of Non-Compliance and Notices of Violation

Notices of non-compliance or notices of violation, as specified.

SD-06 Test Reports

Recordkeeping

Information necessary to file state annual or EPA biennial reports for all hazardous waste transported, treated, stored, or disposed of under this contract. The Contractor shall not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. The submittal shall contain all the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter shall accompany the data to include the contract number, Contractor name, and project location.

Spill Response

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), the Contractor shall notify the Contracting Officer immediately. If the spill exceeds a reporting threshold, the Contractor shall follow the pre-established procedures for immediate reporting to the Contracting Officer.

Packaging Notifications

In accordance with 49 CFR 178.2(c), the Contractor shall acquire the appropriate notifications from the package manufacturers or any other persons certifying compliance with the packaging provisions and provide these to the Government.

SD-07 Certificates

Certification

Copies of the current certificates of registration required by 49 CFR 107, Subpart G issued to the Contractor and/or Subcontractors or written statements certifying exemption from these requirements.

Shipping Documents and Packagings Certification

All transportation related shipping documents to the Contracting Officer, including draft hazardous waste manifests, draft land disposal restriction notifications, draft asbestos waste shipment records, draft manifests for PCBs, draft bill of lading for hazardous materials, lists of corresponding proposed labels, packages, marks, and placards to be used for shipment, waste profiles, supporting waste analysis documents, for review a minimum of 14 days prior to anticipated pickup. Packaging assurances shall be furnished prior to transporting hazardous material; "generator copies" of hazardous waste manifests, land disposal restriction notifications, asbestos waste shipment records, "generator copies" of manifests used for initiating shipments of PCBs, bill of lading, supporting waste analysis documents shall be furnished when shipments are originated; and "receipt copies" of hazardous waste manifests, PCB manifests and asbestos waste shipment records at the designated disposal facility shall be furnished not later than 35 days after acceptance of the shipment.

1.4 QUALIFICATIONS

1.4.1 Training

The Contractor's hazardous materials employees shall be trained, tested, and certified to safely and effectively carry out their assigned duties. The Contractor's employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, shall be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans.

1.5 LAWS, REGULATIONS AND CONTRACT REQUIREMENTS

Work shall meet or exceed the minimum requirements established by Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and the Contractor shall be responsible for complying with amendments as they become effective. In the event that compliance exceeds the scope of work or conflicts with specific requirements of the contract, the Contractor shall notify the Contracting Officer immediately.

Requirements of Contract clause Article J-C-20 Spills, Article J-C-24 Hazardous Wastes, and Article J-C-18 PCB Management apply to hazardous materials handled, transported, and disposed of on this project.

PART 2 PRODUCTS

2.1 MATERIALS

The Government shall provide all of the materials required for containerizing, labeling, marking, and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards and IATA DGR and USACE EP 415-1-266. Details in this specification shall not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

The Government shall provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging shall meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Each packaging shall conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and shall be compatible with the material to be packaged as required by 40 CFR 262. The Contractor shall also provide other packaging related materials such as materials used to cushion or fill voids in over packed containers, etc. Sorbent materials shall not be capable of reacting dangerously with, being decomposed by, or being ignited by the hazardous materials being packaged. Additionally, sorbents used to treat free liquids to be disposed of in landfills shall be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.1.2 Markings

The Government shall provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 262, Section .32 (for hazardous waste) 40 CFR 761, Section .45 (for PCBs) 40 CFR 61, Section .149(d) (for asbestos) USACE EP 415-1-266 (for FUSRAP radionuclides). Markings shall be capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.3 Labeling

The Government shall provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels shall meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels shall be durable and weather resistant and capable of withstanding, without deterioration or substantial color change, a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation.

2.1.4 Spill Response Materials

The Contractor shall provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials shall be available at all times in which hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

The Contractor shall provide miscellaneous equipment and tools necessary to manage hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 ON-SITE HAZARDOUS WASTE MANAGEMENT PLAN

These paragraphs apply to Government owned waste only. Contractors are prohibited by 10 U.S.C. 2692 from storing Contractor owned waste on site for any length of time. The Contractor shall be responsible for ensuring compliance with all Federal, state, and local hazardous waste laws and regulations and shall verify those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Hazardous and controlled waste shall be managed in accordance with all applicable statutes, rules, orders, and regulations which may include but are not limited to 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 273, 40 CFR 279, 40 CFR 761, and KNPR 8500.1 Rev A-1. In no case shall the Contractor or the Contractor's representative transport hazardous waste from KSC.

The Contractor shall be responsible for identifying processes and operations and the location and nature of all potentially hazardous and controlled waste including any chemicals, paints, solvents, aerosol cans, petroleum, oil and lubricant (POL) products, lamps, mercury switches, etc. and their containers, as defined in 40 CFR 261, 40 CFR 273, 40 CFR 279, or 40 CFR 761. The Contractor shall prepare copies of Material Safety Data Sheets (MSDS) and a completed KSC Form 25-551 "Process Waste Questionnaire" (PWQ) for each material which may be generated as a waste and provides these to the Contracting Officer (CO) thirty (30) days before the start of the waste generation process. No substances shall be delivered to KSC without the appropriate Material Safety Data Sheets.

The Contractor shall obtain a Technical Response Package (TRP) from the CO within thirty (30) days after receipt of PWQ. The TRP will contain a hazard determination and analytical, packaging, labeling, and disposal requirements according to KNPR 8500.1 (as revised) and will provide site-specific waste management requirements to be followed by the Contractor.

The Government will provide DOT-compliant storage containers and labels. The CO will arrange for the containers to be available at the POL Supply Building, M6-894, at the request of the Contractor. The Contractor shall request storage containers in writing from the CO a minimum of three (3) days before the required need date. The Contractor shall be responsible for transporting the containers from Building M6-744 to the project site.

The Contractor shall establish an on-site satellite waste accumulation area within 50 feet (ft) of and within sight of any point where hazardous or controlled wastes may be generated. If a satellite accumulation area must be more than 50 ft from the point of generation, or out of sight of the generator, the Contractor shall provide a written request to the CO thirty (30) days before the start of the waste generating process. The CO will send a notification to the NASA Environmental Assurance Branch, TA-B1B, for their review and concurrence. The Contractor shall not place the satellite site in service before receiving written approval of the variance. The Contractor shall store potential or identified hazardous and/or controlled wastes in the appropriate properly labeled containers inside the accumulation area in accordance with KNPR 8500.1 (as revised).

The Environmental Protection Agency (EPA) has set the following standards for wastes collected at satellite accumulation areas:

- a. Hazardous wastes at satellite accumulation areas must be collected in approved containers.
- b. No more than 55 gallons per waste stream of hazardous waste or 1 quart per stream of acutely hazardous wastes may be accumulated.

c. Containers must be labeled with the words "Hazardous Waste" and with other words which identify the contents of the drum.

d. The waste being placed in the container must be compatible with the container.

e. A container holding hazardous waste must always be kept closed during accumulation except when adding or removing waste.

f. The site must be equipped with emergency equipment per 40 CFR 265.32.

g. A written contingency plan must be maintained for the site.

Personnel generating and managing the waste must have hazardous waste training per 40 CFR 265.16. The Contracting Officer may at any time during the course of the contract performance period require the Contractor to provide individual training records for any employee involved in the performance of this contract, and the contents of the course or courses completed to satisfy the training requirements. Attendance at KSC Training Course QG-211 "Hazardous Waste Management" will satisfy the above training requirements.

If more than 55 gallons per waste stream of hazardous waste are generated at a satellite accumulation site, documentation, including the waste type, quantity, locations, and organization responsible for the waste shall be provided on KSC Form 28-809 "Waste Support Request", to the Medical and Environmental Support Contract (MESC) Waste Management. The Contractor shall fax the waste support request to the Contracting Officer and MESC Waste Management at fax 867-9466.

If a hazardous/non-hazardous waste determination cannot be made by process knowledge and no MSDS is available for the waste stream, the container of waste shall be marked with a Hazardous Waste Determination In Progress (HWDIP) label until chemical analysis is completed. At the request of the Contractor, the CO will provide any analytical support required by the TRP. The CO will arrange for all sampling and testing of potentially hazardous or controlled waste.

Universal Waste (UW) - The EPA established Universal Waste regulations to ease the requirements for managing hazardous wastes that can be recycled. Items which meet the definition of UW can be collected and managed under requirements found in 40 CFR 273 and Chapter 62-730 and Chapter 62-737, FAC. Waste streams currently adopted by the State for management as UW are batteries, mercury-containing lamps and devices, and certain pesticides.

UW generators are called handlers and must comply with the following requirements:

- a. Handlers shall manage UW using the PWQ/TRP.
- b. Handlers shall manage UW in a way that prevents releases to the environment. Non-leaking containers in good condition shall be used if the UW is damaged or leaking.
- c. Handlers shall use the KSC Universal Waste Label and shall not accumulate universal wastes for more than six months.
- d. Handlers shall clearly show the length of time that the wastes have been accumulated by marking or labeling the container with the earliest date that the waste was generated or received.
- e. Handlers shall be familiar with proper waste handling and emergency response procedures. Attendance at the KSC training course QG-299 "Universal Waste Rule" will satisfy the above.

Used Oil - Any lubricant that has been refined from crude oil (or synthetic oil) that has been "used", and as a result of such use is contaminated by physical or chemical impurities shall be considered Used Oil. Used oil is managed according to regulations established in 40 CFR 279 and Chapter 62-710, FAC. The following waste generator standards shall apply to the management of used oil:

- a. Used oil containers, tanks, and associated piping must be marked "Used Oil".
- b. Used oil containers, tanks, and associated piping must be in good condition with no severe rusting, structural defects, deterioration, or leaks.
- c. Used oil containers must be kept in secondary containment.
- d. Containers storing used oil must be sealed or otherwise protected from the weather and stored on an oil-impermeable surface such as polyethylene sheeting, rigid plastic secondary containment, or epoxy-coated concrete.

Within 48 hours of having waste ready for disposal, the Contractor shall contact the CO to have MESC Waste Management pick-up and remove hazardous waste. Documentation including the waste type, quantity, locations, and

organization responsible for the waste will be provided on KSC Form 28-809 "Waste Support Request" to MESC Waste Management when requesting waste disposal. The Contractor shall fax the waste support request to the Contracting Officer and to MESC Waste Management at fax 867-9466.

The Contractor shall only use containers in good condition and compatible with the waste to be stored. The Contractor shall be responsible for ensuring containers are closed except when adding or removing waste. The Contractor shall be responsible for immediately marking all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and environmental contract clause Article J-C-24 Hazardous Wastes as soon as the waste is containerized. The Contractor shall be responsible for inspecting containers for signs of deterioration and shall be responsible for responding to any spills or leaks. The Contractor shall inspect all hazardous waste areas weekly and shall provide written documentation of the inspection. Inspection logs shall contain date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken.

3.1.1 Management Plan

The Contractor shall prepare a plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed as well as the management practices to be utilized. The plan shall identify the method to be used to ensure accurate piece counts and/or weights of shipments; shall identify waste minimization methods; shall propose facilities to be utilized for treatment, storage, and/or disposal; shall identify areas on-site where hazardous wastes are to be handled; shall identify whether transfer facilities are to be utilized; and if so, how the wastes will be tracked to ultimate disposal.

3.2 SPECIAL REQUIREMENTS FOR ASBESTOS WASTES

If work involves asbestos containing wastes, the Contractor shall manage these wastes in accordance with specification Section 02 82 13.00 98, ASBESTOS HAZARD CONTROL ACTIVITIES.

3.3 WASTE MINIMIZATION

The Contractor shall minimize the generation of hazardous waste to the maximum extent practicable. The Contractor shall take all necessary precautions to avoid mixing clean and contaminated wastes. The Contractor shall identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 shall apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals.

3.4 RECORDKEEPING

The Contractor shall be responsible for maintaining adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports. The Contractor shall be responsible for maintaining asbestos waste shipment records for a minimum of 3 years from the date of shipment or any longer period required by any applicable law or regulation or any other provision of this contract. The Contractor shall be responsible for maintaining bill of lading for a minimum of 375 days from the date of shipment or any longer period required by any applicable law or regulation or any other provision of this contract.

3.5 EMERGENCY CONTACTS

The Contractor shall be responsible for complying with the emergency contact provisions in 49 CFR 172, Section.604.

-- End of Section --

SECTION 02 82 13.00 98

ASBESTOS HAZARD CONTROL ACTIVITIES

04/06

PART 1 GENERAL

1.1 SUMMARY

No asbestos abatement work is in the contract scope, but the Contractor shall avoid and address existing asbestos containing materials in the work area as indicated in Section 1.2 of this specification section.

This section specifies the asbestos abatement requirements and the Contractor's applicable asbestos procedures, which include demolition or salvage of structures where asbestos is present, removal or encapsulation of materials containing asbestos, construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain asbestos, installation of products containing asbestos, asbestos spill/ emergency cleanup, transportation, disposal, storage, containment of and housekeeping activities involving asbestos or products containing asbestos, on the site or location at which construction activities are performed.

Asbestos Abatement work is categorized into four classes:

Class I Work: Activities involving the removal of Thermal System Insulation (TSI) and surfacing of Asbestos Containing Materials (ACM) and Presumed Asbestos Containing Material (PACM).

Class II Work: Activities involving the removal of ACM that is not TSI or surfacing material. This includes wallboard, floor tile, roofing, sidings, mastics and other materials.

Class III Work: Repair and Maintenance operations where ACM, including TSI and surfacing material is likely to be disturbed. Class III work cannot exceed more than one glovebag of material.

Class IV Work: Maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste, and debris from Class I, II, and III activities.

Conduct abatement work in accordance with the Class I, II, III, or IV Methods of Compliance as required by 29 CFR 1926, 40 CFR 61-SUBPART M, 49 CFR 171, 49 CFR 172, FAC CHAPTER 62-257, and FL-STAT 469.

1.2 ASBESTOS AVOIDANCE

No asbestos abatement work is in the contract scope, but the Contractor shall avoid and address existing asbestos containing materials in the work area as follows.

This work plan addresses areas associated with the replacement of central fire monitoring systems for fire alarm control panels throughout KSC. Asbestos-containing gypsum wall board, ceiling tiles, pipe insulation, joint compound, floor tiles, may be present and/or disturbed during the performance of this work. The Contractor shall plan and execute work to avoid all known or suspected asbestos-containing materials. Where avoidance is not possible and abatement is not indicated on the drawings, the Contractor shall immediately notify the Contracting Officer.

The Contractor shall be responsible for confirming the presence of ACM at the time actual work is performed in each facility.

The work of the project include installation of control equipment and associated conduit/wiring which may be in the vicinity of asbestos-containing materials, but does not require the direct contact or disturbance of any asbestos-containing materials, and no asbestos-containing materials will be disturbed by any aspects of the work being conducted the following protocol elements may be applied in lieu of abatement work and requirements identified in this specification section.

Protocol Elements For Work Conducted in the Vicinity of Asbestos-Containing Materials.

1. The Contractor shall have a designated Competent Person as defined by OSHA 29 CFR 1926.1101 for Class IV work on the job site at all time unless otherwise authorized by the Contracting Officer.

2. For Class IV work the Competent Person shall have received documented training that is equivalent in curriculum and training method to the 16-hour Operations and Maintenance course developed by

the EPA. Such course shall include "hands-on" training in the use of respiratory protection and work practices.

3. All employees involved in conducting work in the vicinity of asbestos-containing materials shall have received documented training equivalent in curriculum and training method to the Awareness training course developed by the EPA for maintenance workers who work in building containing asbestos. Such a course shall take at least 2-hours.

4. Prior to conducting any work in the area the Contractor shall have developed and implemented an Emergency Response Plan (ERP) that addresses the accidental disturbance of asbestos containing materials. The ERP can be included in the Contractors' Contingency Plan (Section 1.5) The ERP shall present emergency response procedures for the workers and require that as a minimum the following equipment is in the work area at all times that work is being conducted where asbestos materials could be accidentally disturbed or damaged in any way:

- a. Penetrating encapsulant
- b. Polyethylene sheeting
- c. Duct tape
- d. HEPA equipped vacuum cleaner
- e. Barricade tape
- f. Respiratory Protection For the Competent Person
- g. Asbestos waste disposal bag

5. Prior to conducting work in the area the Competent Person shall review and be familiar with the requirements of the ERP and the Contingency Plan.

6. Prior to conducting work in the area the Competent Person shall assure that the worker are familiar with the requirements and procedures of the ERP and the Contingency Plan.

7. Prior to conducting work in the area the Competent Person shall review the Drawing and Specifications to determine what, if any, asbestos-containing materials will be encountered in the work area.

8. Upon developing the desired route for all conduits, the Competent Person shall visually identify the location of all asbestos-containing materials defined in the drawings and specifications.

9. The Competent Person shall be fully responsible for ensuring that all workers know the exact location of all asbestos-containing materials in the work area and avoid the direct contact or disturbance of same as all the work of the project is conducted.

10. As long as all of the protocol elements for work to be conducted in the vicinity of asbestos-containing materials described above are rigorously followed, and no asbestos-containing materials are directly contract or disturbed, there will be no respiratory protection requirements for workers involved with these tasks.

Where work on the project requires abatement of or direct contact with asbestos-containing materials, the Contractor shall stop work and immediately notify the Contracting Officer. When an asbestos abatement contact change is approved, the Contractor shall comply with all of the following requirements of asbestos abatement indicated in this specification section.

1.3 DEFINITIONS

FLAC - Florida Licensed Asbestos Consultant as defined within the FL-STAT 469 ASBESTOS ABATEMENT.

IH - Kennedy Space Center Industrial Hygienist. This person can be either a government civil servant or an authorized government contractor. This person is responsible for the oversight and approval of the abatement procedures and the health, safety and welfare of those it affects.

1.4 REFERENCES

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

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7.1 (2004) Commodity Specification for Air

FLORIDA ADMINISTRATIVE CODE (FAC)

FAC CHAPTER 62-257 (1999) Florida Administrative Code, Asbestos Program

FLORIDA STATUTES (FL-STAT)

FL-STAT 469 (2005) Asbestos Abatement

JOHN F. KENNEDY SPACE CENTER (KSC)

KNPR 1840.19 KSC Industrial Hygiene Programs

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 94-113 (1994; 4th Ed) NIOSH Manual of Analytical Methods

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

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

29 CFR 1926.1101 Asbestos

40 CFR 61-SUBPART M National Emission Standard for Asbestos

40 CFR 763 Asbestos

49 CFR 171 General Information, Regulations, and Definitions

49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Work Schedule; G in accordance with the paragraph entitled, "Worker Protection," of this section.

Notification of Demolition/Renovation; G

SD-02 Shop Drawings

Submit items in accordance with the paragraph entitled, "Implementation Plan," of this section.
Coordination Drawings; G
Detailed Drawings; G

SD-06 Test Reports

Submit the following:

Initial Exposure Assessments; G in accordance with 29 CFR 1926

Notification of Demolition/Renovation; G
as part of the Implementation Plan; G.

Submit Air Monitoring Reports; G in accordance with paragraph entitled, "Air Monitoring Report" of this section.

Maintain Work Site Entry Logs; G of all personnel entering and leaving the regulated work area by the on-site competent person indicating the date and time of entry and egress.

Maintain Daily Site Inspection Logs; G by the on-site competent person indicating the date, time and results of the work area daily site inspections.

Maintain Waste Drum Inventory; G of all generated waste drums or containers indicating the location and approximate quantity of material in each container.

SD-07 Certificates

Submit the following certificates:

Asbestos Consultant's License from the State of Florida, Department of Business and Professional Regulation (DBPR)

Asbestos Contractor's License; G or other Contractor license approval from the State of Florida, Department of Business and Professional Regulation (DBPR).

Training Certification; G, and experience of Contractor's "Competent Person", supervisor, and workers.

Proficiency Analytical Test Certification

SD-08 Manufacturer's Instructions

Submit Material Safety Data Sheets; G in accordance with the paragraph entitled, "Licenses Permits, and Notices," of this section.

Submit Implementation Plan; G as identified in paragraph entitled, "Implementation Plan" prior to initial site set-ups or start of work.

SD-11 Closeout Submittals

Within 10 days after the completion of work, submit to the Contracting Officer a written summary and copies of the following items:

Notification of Demolition/Renovation.

Waste Disposal Permit and all Disposal Shipping Manifests and Tickets.

Daily site inspection logs, Negative pressure logs and other OSHA compliance inspection records.

Air Monitoring Reports or Independent Monitoring Data conducted during the abatement.

Calibration Records; G for sampling equipment taken before and after each air sample.

Work Site Entry Logs and Waste Drum Inventory maintained during the abatement task.

1.6 LICENSES PERMITS, AND NOTICES

The FLAC must possess a current license and comply with all Federal, State and Local Regulations. Only those consultants who are certified and licensed by DBPR are permitted to perform Asbestos Surveys or abatement specifications and plans as per Florida Statute FL-STAT 469.

The Contractor must possess a current Asbestos Contractor's License and secure all necessary licenses and permits associated with asbestos removal, transportation, and disposal as may be required by Federal, State, and local regulations. Only those Contractors who are certified and licensed by the State of Florida DBPR will be permitted to perform asbestos abatement activities at Kennedy Space Center.

A Waste Disposal Permit and all Disposal Shipping Manifests and Tickets are to be obtained.

Submit the following certificates:

Certification of participation in a Proficiency Analytical Test (PAT) program such as or equivalent to the American Industrial Hygiene Association PAT or Asbestos Analytical Registry (AAR) accreditation certificate, and Interlab QA/QC Program participation for the independent air monitoring agency selected by the Contractor before starting work.

Training Certification and accreditation certificates for the independent air monitoring agency's on-site personnel and a copy of independent air monitoring agency's Quality Control Program.

Certification documents by the Contractor verifying that employees have been provided current respirator fit test, training, and medical examinations in compliance with 29 CFR 1926.

Material safety data sheets as required for materials to be used on the specified project.

1.6.1 Notification

A written notice and any required fee's to obtain a Permit to demolish friable asbestos is to be sent to the State Asbestos Coordinator in accordance with FAC CHAPTER 62-257 by the Contractor. A copy of the notification is to be provided to the Government as part of the Implementation Plan.

1.7 IMPLEMENTATION PLAN

Prepare and submit a detailed, written Implementation Plan created, signed and sealed by a FLAC to the Government for approval, prior to the start of work, that includes the following:

Coordination drawings including site specific drawings of proposed work areas, clean room/change areas, mini-enclosures, shower, equipment room, waste loading/staging areas, locations of High Efficiency Particulate Air (HEPA) filtered negative pressure devices and exhaust points, work areas, emergency routing and areas to be modified.

Detailed drawings for asbestos abatement systems consisting of fabrication and assembly drawings for all parts of the work in sufficient detail to enable the Government to check conformity with the requirements of the contract documents.

A copy of Notification of Demolition/Renovation.

Plan of Action, including proposed procedures to be used in complying with the requirements of this specification and 29 CFR 1926, sequence of asbestos abatement work, the interfaces of trades involved in the performance of work, posting of licenses, permits, etc., methods to be used to assure the safety of building occupants and visitors to the site, disposal plan including location of approved disposal site, a detailed description of the methods employed to control pollution and a detailed work schedule. Expand upon the method for removal of ACM, the use of portable HEPA ventilation systems, closing out of the buildings HVAC system, method of removal to prohibit visible emissions in the work area, and packaging of removed debris.

Details of the decontamination areas and procedures, locations of staging areas, posting of warning signs, and details of negative air system to be used in the work area.

Sketch(s) or drawing(s) of complete contract area(s) showing the shower room, clean room, drum staging area, decontamination and containment areas, the negative air system, and exits. Indicate designation of the "Competent Person", and Site Supervisor.

Provide a written Air Monitoring Plan to be prepared under the direction of and signed/stamped by a Certified Industrial Hygienist (C.I.H.) or FLAC specifying monitoring criteria and a resulting action plan for implementation by the Competent Person. The Plan must identify the Competent Person to be on site at all times (unless otherwise authorized by the Contracting Officer) during hazardous abatement operations. The FLAC or his/her representative/competent person is responsible for ensuring OSHA compliance during all phases of the abatement activities. Issue instructions which require this person, independently of production pressures, to stop non-conforming operations. Provide a qualified back-up person in the event that the Competent Person is absent from job site.

Provide certification that the Contractor, his staff and abatement workers (including supervisors) have attended and successfully completed asbestos abatement course(s) including refresher courses as set forth in FL-STAT 469 and in accordance with 29 CFR 1926, and 40 CFR 763.

Provide verification of a Respiratory Protection Program in accordance with 29 CFR 1910 including confirmation of worker training in the care, use, and maintenance of respirators and fit test certification.

Provide a written description of respiratory equipment and protective clothing provided the abatement workers.

Provide documentation that all personnel assigned to the abatement project have been examined annually by a physician. Submit the physician's written opinion containing the results of the medical examination in compliance with 29 CFR 1926 for each employee who will be employed on this project. Establish, maintain, and make readily available for review all Work Site Entry Logs.

Procedures for enforcement of Personal Hygiene Practices.

Prepare and submit a Contingency Plan for emergencies including fire, accident, power failure, heating or cooling, negative air system failure,

respirator supplied air system failure, or any other event that may require modification of the work area isolation procedures. Include in the plan specific procedures for decontamination or work area isolation, safe exiting and the need for medical attention in the event of an emergency.

Document all procedures and policies that are in effect to ensure that the worker safety and environmental plans are enforced.

Submit the Implementation Plan is to be submitted to the Government for review, revised by the Contractor where required, and resubmitted for approval. Commencement of work will not be permitted until the Implementation Plan is given final approval.

1.8 AIR MONITORING REPORTS

Obtain the services of an independent Air Monitoring Agency accredited by the American Industrial Hygiene Association (AIHA), for analysis of airborne asbestos concentration levels. Provide a copy of the monitoring agency's Quality Control Program to the contracting officer prior to commencement of the abatement activities. The individual performing the on-site air monitoring must meet the requirements as set forth in FL-STAT 469 and 40 CFR 763 and perform sample collections in accordance with the approved Air Monitoring Plan.

Air Monitoring must be done under the direction of the FLAC by an independent Air Monitoring Contractor and meet the Florida statute FL-STAT 469 requirements.

Calibrate pumps before and after each air sample and submit calibration records to the Government.

Submit Air Monitoring Reports daily logs (AMR) listing the airborne fiber concentration in fibers/cc. Include in AMR the following information for each sample:

- Sample identification, Sample location,
- Employee Name, Social Security Number,
- Description of task being monitored,
- Exposure level results in (f/cc),
- Monitoring instrument identification number,
- Pre-calibration, post calibration and average flow rate of each sample,
- Sample date, start and stop times,
- Type of protective devices worn (if any),
- Project identification number, Facility number and name,
- Sampling and Analytical Methods used,

Contact name and company, and name of individual performing the sampling.

Submit all Independent Monitoring Data.

1.8.1 Air Sample Analytical Method

Airborne fiber sampling and analytical procedures are to be by Phase Contrast Microscopy (PCM) in accordance with 29 CFR 1926 or the most current version of the NIOSH 94-113, Method 7400.

1.8.2 Air Sampling Rate, Volumes and Frequency

Conduct daily monitoring utilizing sample rates, volumes and frequency in accordance with 29 CFR 1926 and retain for final submittal at closeout. The minimum number of samples or sample volumes may not be less than those specified below:

<u>Type of Sample</u>	<u>Volume</u>	<u>Minimum No. Samples</u>	<u>Location</u>
Prior to set-up (within 24 hrs)	1200L	2	Regulated Area
Personal, During work	400L	2	Personal B.Z.
Area samples, Adjacent to work area.	1200L	2	Regulated Area
Area samples at Negative Air Unit Exhaust.	1200L	1	In area of outlets

1.9 WORKER PROTECTION

Perform Initial Exposure Assessments and Employee Exposure Monitoring in accordance with 29 CFR 1926.1101 with input and approval of the FLAC.

The Contractor's Competent Person must conduct an exposure assessment immediately before or at the initiation of the abatement work to ascertain expected exposures during the abatement work.

Select and provide respiratory protection to employees and ensure they are utilized in accordance with 29 CFR 1926.

Submit the Work schedule indicating the work days, hours, and the number of workers per shift. Include a bar chart to identify the individual milestones through to the completion of the project (i.e., number of days to complete work site preparation, number of days to complete ACM removal, number of days to complete final cleaning and lockdown, etc.).

Submit the OSHA compliance inspection records as part of the closeout documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES AND SERVICES

The Government will make available at the work site, water at hose bibs and 120 Volt AC at receptacles for the Contractor's use. Provide water proof safety lighting where necessary for safe, adequate illumination.

All electrical equipment to be used inside the work areas must be powered from an Underwriters Laboratory (UL) approved Ground Fault Circuit Interrupter (GFCI). Do not exceed the manufacturer's limits per GFCI. Make all necessary connections and restore the site connections to their original condition or better prior to project completion.

Ensure all energized or pressurized systems inside the work area have been locked out, tagged out or otherwise rendered safe.

Provide temporary water from the existing building water source to control the generation of airborne dust, to allow for area, personnel, and equipment decontamination, and to supply decontamination unit needs. Also provide a backflow preventer at the source.

Provide temporary sanitary drainage piping to the decontamination unit sump and to the shower unit at a minimum slope of 2.0 percent, and temporary drainage piping to waste water pump and existing drain in accordance with local standards and as approved by the Contracting Officer.

3.2 WORK AREA PREPARATION

The Government will re-arrange equipment and storage areas to the extent of providing a direct and unobstructed path to the work area(s). During ACM removal, confine equipment and employees to the designated work area(s).

Unless otherwise directed by the Contracting Officer, the Contractor is to establish and maintain a 25 foot access control barrier zone(s) around the designated work area(s). Interference with the functional operation of the building occupants outside these areas is not be permitted.

All building supply and return air ducts from the mechanical system must be isolated to eliminate air flow into or out of containment area(s).

Any work area considered for asbestos removal which shows visual debris is to be interpreted as possible asbestos contamination. The designated work area must be pre-cleaned.

3.2.1 Pre-Cleaning

Shut down HVAC systems and seal all critical barriers prior to initiating pre-cleaning actions. Openings, including but not limited to, windows, corridors, doorways, elevator openings, skylights, ducts, grilles, diffusers, and any other penetrations between the contaminated work areas and uncontaminated areas, must be sealed with plastic sheeting with a minimum thickness of 6 mil.

Pre-clean all movable objects identified as contaminated by the Contracting Officer or his representative within the work area using a HEPA filtered vacuum and wet cleaning methods as appropriate. Remove these objects after cleaning and store in a protected area.

Pre-clean all surfaces in the work area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Methods that would raise dust, such as

dry sweeping or vacuuming with equipment not equipped with HEPA filters, are prohibited. Pay detailed attention to machinery or areas behind grilles and gratings.

Do not remove or otherwise disturb asbestos containing building materials during the pre-cleaning phase.

3.2.2 Work Area(s)

Inform all other Contractors on the site of the abatement work, of the nature of the Contractor's work with ACM and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other Contractor employers are not exposed to asbestos in accordance with 29 CFR 1926.

Use industry controls and work practice methods in accordance with 29 CFR 1926. Daily site inspection logs must be posted at the jobsite by the on-site competent person and signed/approved by the FLAC or his/her designated representative.

Use flame resistant, 6 mil polyethylene when constructing Negative Pressure Enclosures (NPE) or decontamination areas.

3.3 WASTE LOAD-OUT UNIT

Establish a waste load-out unit to provide for interim secure storage. Include an equipment room for storage of asbestos-contaminated items (drums, tools, equipment). All equipment and waste containers must be decontaminated prior to being taken out of the work area(s).

All asbestos-containing waste material is to be sealed in leak-tight disposal containers. Thoroughly wet all waste within the disposal containers.

Maintain proper labeling protocols and keep a running and final inventory of all filled disposal containers.

3.4 SIGNS AND MARKINGS

Post signs prior to commencing asbestos work as required in 29 CFR 1926. Post signs near the perimeter of the asbestos work areas, along the route of the temporary waste material holding (Drum Staging) area, around the

perimeter of the temporary holding area, and at all entrances to areas containing asbestos fibers. Signs must be conspicuous and legible.

Post telephone numbers and locations of emergency services including, but not limited to, fire, ambulance, doctor, and hospital, at a designated telephone located near the regulated area.

Post one copy of all permits at the work site perimeter in a accessible location outside the regulated area.

Post one copy of the Abatement Contractors current license at the work site perimeter in a accessible location outside the regulated area.

Hazard communication notification signs must be posted in accordance with KNPR 1840.19 requirements.

3.5 NEGATIVE AIR SYSTEM

Construct Negative Pressure Enclosures (NPE's) as required by 29 CFR 1926.

Duct each of the negative air units through the containment barrier walls to the outside of the work area(s). When the building is occupied, the ducts must exhaust into the outside air; otherwise, they may exhaust into an area of the building beyond the critical barriers. Never exhaust the units into the work area(s).

Provide each unit with temporary back-up electrical power (120 Volt AC) in the event of power failures or outages.

3.5.1 Testing

Design the negative air system to provide a minimum of four (4) air changes per hour and test before any work is begun. After the work area has been prepared, the decontamination unit set up, and the negative air units(s) installed, test the system. Prior to beginning abatement activities, a pre-work inspection and test will be conducted by the Contracting Officer or his representative to verify the adequacy of the containment system. Once activated, the negative air exhaust unit(s) must remain in operation until final clearance air monitoring has been performed and the Contracting Officer has approved their shutdown/removal. Maintain daily negative pressure logs for review by the FLAC and submit as part of the closeout documents.

Install a differential pressure meter or manometer to continuously measure pressure differential between inside and outside the work area for all Class I activities which utilize an NPE. Maintain a minimum pressure differential of 0.02 inches of water.

3.6 RESPIRATORY PROTECTION

All personnel engaged in the asbestos removal work in the Work Area must at all times wear respirators in accordance with 29 CFR 1926. Instruct and train each worker involved in asbestos abatement in proper respirator use, and require that each worker in the work area always wear a respirator from the start of any operation which may cause airborne asbestos fibers until the Work Area is released for re-occupancy. All respirators must be fitted by approved qualitative or quantitative test. Use respiratory protection appropriate for the fiber level encountered in the Work Area and as specified herein, or as required for other situations encountered.

3.6.1 Air Quality for Supplied Air Respiratory Systems

The Contractor is to provide air used for breathing in Type "C" supplied air respiratory systems that meets or exceeds CGA G-7.1, standards for Grade D air.

3.7 REMOVAL OF ASBESTOS

Use industry controls and work practices for all operations in accordance with 29 CFR 1926 Methods of Compliance for Class I, II, III, or IV asbestos work. The FLAC or his/her representative is responsible for these practices.

All Class I and II work must be supervised by an on site Competent Person at all times that work is in progress. All class III and IV work must be supervised by a Competent Person.

Following removal of contaminated items and asbestos material, seal the edges of adjacent surfaces, which were exposed when asbestos was removed, with an asbestos bridging sealant/encapsulant.

3.8 DAILY HOUSEKEEPING

Maintain a clean work area in accordance with 29 CFR 1926. Perform the following housekeeping functions at the end of each shift or prior to leaving the work site unattended:

- a. Prepare contaminated waste for disposal by packaging the waste and removing it from the work area.
- b. HEPA vacuum the work area.
- c. Visually inspect polyethylene in the work area and other high traffic areas.

3.9 CLEANING PROCEDURES

Clean the work area at the end of each day's abatement activities. Designate a separate, secured area within the work area for storage of debris until it can be properly disposed. Secure the work area after termination of the work day to prevent entry. Regularly dispose and replace disposable supplies, such as mop heads, sponges, and rags. Clean all equipment by HEPA vacuuming and wet wiping.

Clean all work areas in which abatement operations have been completed, starting at the ceiling and working down to the floors, by HEPA vacuuming and wet wiping. Prior to removal of worksite access controls and re-occupancy inspection by the Government, and upon satisfactory final clearance air sampling, and removal of polyethylene sheeting, perform a final cleaning (wet wipe) of all surfaces within the work area.

3.10 INSPECTION

Do not commence removal of asbestos materials prior to satisfactory pre-work inspection of work site controls and containment barriers by the Abatement Contractor and a Government designated IH Representative.

3.10.1 Initial Inspection

The Contractor and the Government will conduct a walk-through of the work area prior to beginning the abatement work to review existing conditions and ensure safe and practical conditions for the work to be implemented. Any damage to structures, surfaces, and equipment, which could be misconstrued as damage resulting from work is to be documented by the Contractor and submitted to the Contracting Officer at least one day prior to start of work.

Take background samples for work areas in accordance with 29 CFR 1926 prior to beginning the abatement work.

3.10.2 Daily Inspection

Maintain an access log of all personnel who enter the regulated work area. Through continuous surveillance and inspections of the worksite the Contractor must ensure the integrity of containment, proper function of the negative pressure system, and posting of signs and labels. The Contractor must also ensure, through frequent inspections during each work shift, that negative pressure is maintained, appropriate work practices are followed, appropriate protective clothing and equipment are used, and worker decontamination procedures are being followed.

Ensure that critical barriers and negative pressure enclosures remain effectively sealed and taped. Take immediate action to remedy defects immediately upon discovery. Details of the inspections are to be included in the Contractor's daily inspection log and posted in an accessible location outside the regulated area.

Provide updated copies of the Air Monitoring Reports, Daily Site Inspection Logs and Waste Drum Inventory to the Government at the end of each week of the abatement work.

NASA/Kennedy Space Center reserves the right to conduct periodic inspections and air monitoring in the work area(s). If the work area is unsafe as determined by the contracting officer, NASA/Kennedy Space Center will require the Contractor to stop work until the unsafe conditions are corrected.

3.10.3 Final Inspection

The thoroughness of asbestos removal is to be evaluated by visually inspecting the affected surfaces for residual asbestos material and accumulated dust and by air sampling. Evidence of residual asbestos or asbestos debris on any adjacent surfaces upon completion of the work is not acceptable.

Upon completion of the work, a thorough visual inspection of the work area must be conducted by the Abatement Contractor and a Government designated IH Representative to ensure no residual asbestos material, dust or debris remains. Final inspections must be documented on KSC FORM 32-95 provided by the Government designated IH /Representative.

Final aggressive air sampling is to be performed by the Government for each NPE work area after completion of a satisfactory visual inspection. The clearance criteria is 0.01 fibers per cubic centimeter (f/cc) of air as determined by PCM. Satisfactory fiber counts from all final samples are to be less than 0.01 f/cc. If any of the final air samples contain greater

than 0.01 f/cc the Contractor must repeat the final cleaning operation and the area re-tested until satisfactory clearance levels can be obtained.

Collect five (5) PCM final air samples for the first 5,000 square feet of containment plus one (1) additional PCM final air sample for each additional 5,000 square feet or one (1) air sample per room, whichever is greater. The number of final air samples may be reduced for small enclosures of less than approximately 2500 square feet. In no case may fewer than two (2) final samples be collected for any enclosure.

Clearance air sample volumes must meet the minimum volumes as indicated for analysis by NIOSH 94-113, Method 7400.

3.11 ASBESTOS WASTE AND CONTAMINATED MATERIALS

3.11.1 Removal of Asbestos Waste Materials

For purposes of this paragraph, asbestos waste materials are defined as those materials which contain or have been contaminated by asbestos and are not planned to be encapsulated and remain at the job site. They are primarily removed asbestos, disposable clothing and safety equipment, masking sheets, contaminated amended water, vacuum cleaner contents and filters.

Contain all asbestos waste material in two 6-mil polyethylene disposal bags, or two 6-mil disposal bags and a sealed leak-tight container such as, but not limited to, a steel or fiberboard drum. Pack the asbestos waste material while still wet. Clean the external surface of the waste containers by HEPA vacuuming and wet wiping before moving from the work area. Protect the interior of truck or dumpster with two layers of polyethylene sheeting.

Label and clearly mark all disposal containers, dumpsters and trucks, including the inside bags in accordance with 40 CFR 61-SUBPART M, 29 CFR 1910 of OSHA's Hazard Communications Standard, and 49 CFR 171 and 49 CFR 172, Hazardous Substances.

The labels must be conspicuous, legible, and affixed to plastic bags and drums indicating the name of the waste generator and the location (facility name & number) where the waste was generated.

Also provide a Waste Shipment Record (WSR) to the waste site owner in accordance with the instructions in "Figure 4" of 40 CFR 61-SUBPART M.

3.11.2 Work Area Disposal

After final inspection has been completed and the work area is released for occupancy, shut off and remove the Negative Air System units. Unseal all entrances and exits. Dispose of all plastic sheeting, tape, and any other trash and debris, except for critical barriers, in sealable plastic bags, or in drums and moved to the staging area. After final wet wipe of the work area and satisfactory clearance air sampling, dismantle critical barriers and the decontamination unit.

3.11.3 Decontamination Area And Support Area Disposal

Dismantle the decontamination area after the work area is released by the Contracting Officer for re-occupancy. Vacuum all surfaces of the decontamination unit before it is disassembled.

3.12 WASTE TRANSPORTATION AND DISPOSAL

Transport and dispose of asbestos waste in full compliance with 40 CFR 61-SUBPART M, SUBPART A, 49 CFR 171 and 49 CFR 172.

3.13 ASBESTOS ABATEMENT NOTICE AND CHECKLIST

A Pre-Work Inspection form (KSC Form 32-96) and a Clearance Reoccupancy Inspection form (KSC Form 32-95) will be provided by the Government designated IH Representative. to the Contracting Officer upon satisfactory completion of the work. At least three days prior to the planned commencement of work, coordinate and schedule all Pre-Work and Clearance Site inspections with the Government designated IH Representative. The completed forms are to be used to establish approval of the containment, work practices and final acceptance/re-occupancy of the work area(s).

3.14 FINAL ACCEPTANCE

The work will not be considered complete until the asbestos materials identified herein have been abated, the areas cleaned, satisfactory clearance air monitoring completed, all asbestos contaminated waste has been properly disposed of, and all project close out documents have been received by the Contracting Officer.

-- End of Section --

SECTION 26 05 00.00 40

COMMON WORK RESULTS FOR ELECTRICAL
08/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595 (Rev B; Am 1) Colors Used in Government Procurement

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA FB 1 (2007) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable

NEMA KS 1 (2001; R 2006) Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

NEMA OS 1 (2008) Standard for Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports

NEMA RN 1 (2005) Standard for Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA WD 6 (2002; R 2008) Standard for Wiring Devices ; Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code - 2008 Edition

UNDERWRITERS LABORATORIES (UL)

UL 1 (2005; Rev thru Jul 2007) Standard for Flexible Metal Conduit

UL 489 (2009) Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures

UL 6 (2007) Standard for Electrical Rigid Metal Conduit-Steel

UL 797 (2007) Standard for Electrical Metallic Tubing -- Steel

UL 870 (1995; Rev thru Jul 2003) Standard for Wireways, Auxiliary Gutters, and Associated Fittings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation
Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Submit manufacturer's catalog data for the following items; UL listing shall be evident on submittal:

Conduits, Raceways and Fittings; G
Wire and Cable; G
Splices and Connectors; G
Switches; G
Receptacles; G
Outlets, Outlet Boxes, and Pull Boxes; G
Circuit Breakers; G
Combination Transformer-Panelboard Units;G

1.3 INTERPRETATIONS OF DRAWINGS AND SPECIFICATIONS

It is the intent of these specifications and the contract drawings to provide a complete and workable facility.

Design drawings are diagrammatic and do not show all offsets, bends, elbows, or other specific elements that may be required for proper installation of the work. Such work shall be verified at the site. Additional bends and offsets, and conduit as required by vertical and horizontal equipment locations or other job conditions shall be provided to complete the work at no additional cost to the Government.

Except where shown in dimensional detail, the locations of fire alarm devices, receptacles, outlets, and other equipment shown on plans are approximate. Such items shall be placed to eliminate interference with ducts, piping, and equipment. Exact locations shall be determined in the field. Door swings shall be verified to ensure that equipment is properly located.

Equipment, conduit, and wire sizes indicated are minimum. Before installing any wire or conduit, the Contractor shall obtain the exact equipment requirements and shall install wire, conduit, disconnect switches, motor starters, heaters, circuit breakers, and other items of the correct size for the equipment actually installed.

1.4 CODES AND STANDARDS

Equipment design, fabrication, testing, performance, and installation shall, unless shown or specified otherwise, comply with the applicable requirements of NFPA 70.

Where materials and equipment are specified to conform to the standards of the Underwriters Laboratories (UL), the label of, or

listing with re-examination, in UL Elec Const Dir will be acceptable as sufficient evidence that the items conform to the requirements

1.5 COORDINATION

Fire system related requirements specified in SECTION 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY) and SECTION 28 31 33.00 10 FIRE ALARM REPORTING SYSTEM, RADIO TYPE shall take precedence over requirements in this section where conflicting.

Raceway and 120 VAC power wiring device or switching materials and methods in this section generally apply to all installations.

Installation of the electrical work shall be coordinated with the work of other trades.

1.6 PREVENTION OF CORROSION

Protect metallic materials against corrosion. Provide equipment enclosures with the standard finish by the manufacturer when used for most indoor installations. Do not use aluminum. Ferrous metals such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous parts shall be corrosion cadmium plated steel indoors or hot-dip galvanized/Type 316 stainless steel outdoors. All boxes installed in outdoor locations shall be NEMA 4X rated, Type 316 stainless steel or cast-metal construction.

1.7 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.8 FIELD FABRICATED NAMEPLATES

ASTM D 709. Provide laminated plastic nameplates for each equipment enclosure, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic and 0.125 inch thick. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. Nameplate color shall be as follows:

White letters on black background for equipment painted red.

White letters on red background for equipment not painted red.

PART 2 PRODUCTS

2.1 MATERIALS

Materials and equipment to be provided shall be the standard cataloged products of manufacturers regularly engaged in the manufacture of the products.

2.1.1 Rigid Steel Conduit

Rigid steel conduit shall comply with UL 6 and be galvanized by the hot-dip process. Rigid steel conduit shall be polyvinylchloride (PVC) coated in accordance with NEMA RN 1, where underground and in corrosive areas. Minimum conduit size shall be 3/4 inch unless otherwise indicated.

Fittings for rigid steel conduit shall be threaded and hot-dipped galvanized. Connections to boxes in exterior, wet, or damp locations shall be by liquid-tight hub.

Gaskets shall be solid. Conduit fittings with blank covers shall have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

Covers shall have captive screws and be accessible after the work has been completed.

2.1.2 Electrical Metallic Tubing (EMT)

EMT shall be in accordance with UL 797 and be zinc coated steel. Couplings and connectors shall be zinc-coated, raintight, gland compression with insulation throat. Crimp, spring, or setscrew type fittings are not acceptable. Minimum conduit size shall be 3/4 inch unless otherwise indicated.

2.1.3 Flexible Metallic Conduit

Flexible metallic conduit shall comply with UL 1 and be galvanized steel. Minimum conduit size shall be 3/4 inch unless otherwise indicated.

Fittings for flexible metallic conduit shall be specifically designed for such conduit.

Provide liquidtight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

Specifically design fittings for liquidtight flexible metallic conduit for such conduit and shall be hot-dipped galvanized cast metal construction.

2.1.4 Wireways and Auxiliary Gutters

Wireway and auxiliary gutters shall be a minimum 4- by 4 inch trade size conforming to UL 870. Gutters shall be provided without factory knockouts. Gutters provided with knockouts will not be accepted. Gutters located indoors shall be NEMA 1 type with galvanized or factory painted steel. Gutters located outdoors shall be NEMA 4X-SS (Type 316 stainless steel).

2.2 WIRE AND CABLE

Conductors installed in conduit shall be solid copper 600-volt type THHN/THWN. Minimum size shall be No. 12 unless otherwise indicated. Where existing circuits are tapped or extended color coding for the phase conductor (black-red-blue) shall remain consistent for the entire circuit, both existing and new.

2.3 SPLICES AND CONNECTORS

Make all splices in AWG No. 8 and smaller low voltage power conductors with approved insulated electrical type, Scotchlock or equal connectors.

2.4 SWITCHES

2.4.1 Safety Switches

Safety switches shall comply with NEMA KS 1, and be the heavy-duty type with enclosure, voltage, current rating, number of poles, and fusing as indicated. Switch construction shall be such that, when the switch handle in the "ON" position, the cover or door cannot be opened. Cover release device shall be coin-proof and be so constructed that an external tool shall be used to open the cover. Provisions to lock the handle in both the "OFF" position and "ON" position shall be provided.

Provide switches of the quick-make, quick-break type. Approve terminal lugs for use with copper conductors. Provide Class R fuse clips and install current limiting Class RK1 fuses properly sized to protect the fire alarm equipment.

2.5 RECEPTACLES

Unless otherwise indicated, receptacles shall be commercial grade, 20A, 125 VAC, 2-pole, 3-wire duplex conforming to NEMA WD 6, NEMA 5-20R.

Device plates shall be stainless or galvanized steel and designed specifically for the box and device attached to.

2.6 OUTLETS, OUTLET BOXES, AND PULL BOXES

Outlet boxes for use with conduit systems shall be in accordance with NEMA FB 1 and NEMA OS 1 and be not less than 1-1/2 inches deep. Junction boxes shall be provided without factory knockouts; boxes provided with knockouts will not be accepted. Junction boxes are to be sized per NFPA 70 minimums. Junction boxes located indoors shall be NEMA 1 type. Exterior junction boxes shall be NEMA 4X, Type 316 stainless steel or galvanized cast metal.

Fire alarm terminal cabinets and boxes housing fire alarm modules be hinged cover with back mounting panel and meet all related requirements specified in SECTION 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY).

2.7 CIRCUIT BREAKERS

Circuit-breaker interrupting rating shall be not less than those indicated and in no event less than 10,000 amperes root-mean-square (rms) symmetrical

at 120 volts, respectively. Multi-pole circuit breakers shall be the common-trip type with a single handle. Molded case circuit breakers shall be bolt-on type conforming to UL 489 and shall be UL listed for installation in the panelboard installed.

2.8 COMBINATION TRANSFORMER-PANELBOARD UNITS

Provide transformer and panelboard assembly in an integral NEMA 3R rated enclosure. Transformer shall be totally enclosed sealed type, copper wound with standard voltage taps, and 115 Degree rise with KVA and voltage ratings as indicated. Provide integral factory-installed transformer primary and secondary main breakers. Primary main breaker shall be rated 600-Volts AC, 35 KAIC. Secondary main breaker shall be rated 120/240-Volts AC, 10 KAIC. Branch breakers shall be rated 10 KAIC at 120 Volts AC. All bus work shall be copper and shall include a neutral bus and ground bus.

PART 3 EXECUTION

3.1 CONDUITS, RACEWAYS AND FITTINGS

Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.

Do not install crushed or deformed conduit. Avoid trapped conduit runs where possible. Take care to prevent the lodgment of foreign material in the conduit, boxes, fittings, and equipment during the course of construction. Clear any clogged conduit of obstructions or be replaced.

All metal conduit and raceway systems shall be installed to serve as a continuous equipment grounding conductor in accordance with NFPA 70. Expansion fitting with flexible ground strap must be provided in conduit run crossing building expansion joints.

Exposed ends of conduits or hole in boxes or enclosures must be sealed with watertight caps or plugs.

120-volt power wiring shall be installed in dedicated raceway system per NFPA 70 raceway system requirements. Fire alarm wiring shall be installed in separate conduit systems.

3.1.1 Rigid Steel Conduit

Make field-made bends and offsets with approved hickey or conduit bending machine. Conduit elbows larger than 2-1/2 inches shall be long radius.

Installed conduit shall show no signs of corrosion. Repair damaged galvanized finish by painting with a suitable zinc repair paint. Corrosion inhibiting compound must be used on all exterior areas.

Rigid conduit shall be installed unless specifically allowed by other specification section. Rigid conduit shall be installed at:

- All exterior locations.
- Mechanical equipment rooms.
- Electrical equipment rooms.
- Wet, damp, or spaces not air conditioned.
- Classified (explosion-proof) locations.
- Firewall, floor, or roof penetrations. Such penetrations shall be sleeved and fire sealed.

3.1.2 Electrical Metallic Tubing (EMT)

EMT shall be grounded in accordance with NFPA 70, using pressure grounding connectors especially designed for EMT.

EMT may be installed at the following locations if not subjected to mechanical damage:

- Air conditioned interior spaces.
- Above ceilings of air conditioned spaces.
- Within wall partitions.

3.1.3 Flexible Metallic Conduit

Use flexible metallic conduit in lengths less than 3 feet only where flexibility or vibration isolation is required.

Bonding wires shall be used in flexible conduit as specified in NFPA 70, for all circuits. Flexible conduit shall not be considered a ground conductor.

Liquidtight flexible metallic conduit shall be used in wet and oily locations.

3.1.4 Wireway and Auxiliary Gutter

Straight sections and fittings shall be bolted together to provide a rigid, mechanical connection and electrical continuity. Dead ends of wireways and auxiliary gutters shall be closed. Plug all unused conduit openings.

Wireways for overhead distribution and control circuits shall be supported at maximum 5 foot intervals.

Auxiliary gutters used to supplement wiring spaces for equipment not contained in a single enclosure shall contain no switches, overcurrent devices, appliances, or apparatus and be not more than 10 feet long.

3.2 WIRING

Feeder and branch circuit conductors shall be color coded as follows:

<u>CONDUCTOR</u>	<u>COLOR AC</u>
Phase A	Black
Phase B	Red
Phase -C	Blue
Neutral	White
Equipment Grounds	Green

Conductors shall be manufactured with colored insulating materials.

Splice in accordance with the NFPA 70. Provide conductor identification within each enclosure where a tap, splice, or termination is made and at the equipment terminal of each conductor. Terminal and conductor identification shall match as indicated.

Equipment ground conductors shall be installed with all circuits and connected to each device, box, or enclosure in accordance with NFPA 70.

Where several feeders pass through a common pullbox, the feeders shall be tagged to clearly indicate the electrical characteristics, circuit number, and panel designation.

3.3 SAFETY SWITCHES

Securely fasten switches to the supporting structure or wall, utilizing a minimum of four 1/4 inch bolts. Do not use sheet metal screws and small machine screws for mounting. Do not mount switches in an inaccessible location or where the passageway to the switch may become obstructed. Mounting height shall be 5 feet above floor level, when possible.

3.4 COMBINATION TRANSFORMER-PANELBOARD UNITS

Securely fasten units to the supporting structure or wall, utilizing a minimum of four 1/4 inch bolts; provide formed channel supporting system as required for support and to insure proper transformer ventilation. Do not use sheet metal screws and small machine screws for mounting. Do not mount units in an inaccessible location or where the passageway to the switch may become obstructed; maintain minimum NFPA 70 working clearances. Mounting height shall be 5 feet above floor level, when possible.

Make grounding connections to transformer secondary, incoming circuit, and outgoing branch circuits in accordance with NFPA 70 and Section 28 05 26.00 40 GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY.

3.5 WIRING DEVICES

3.5.1 Receptacles

Install receptacles as indicated in equipment enclosures.

Ground terminal of each flush-mounted receptacle shall be bonded to the outlet box with an approved green bonding jumper when used with dry wall type construction.

3.5.2 Device Plates

Device plates for receptacle outlets shall be marked indicating the supply panel and circuit number.

3.6 BOXES AND FITTINGS

Furnish and install pull and junction boxes where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right-angle bends shall have a pull or junction box installed at a convenient intermediate location.

Securely mount boxes and enclosures to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

3.7 IDENTIFICATION PLATES AND WARNINGS

Furnish and install identification plates for fire alarm equipment enclosures, and disconnect switches. Nameplate for fire alarm enclosures shall match designations on the approved shop drawings.

Furnish identification plates for all safety switches identifying the equipment served, voltage, phase(s) and power source.

3.8 PAINTING

Provide a painted red finish coat on the following, Color No. 11105 in accordance with FED-STD-595. After painting attach the appropriate engraved nameplate.

- Fire alarm equipment safety switches
- Pull and equipment boxes
- Outlet box (blank) covers
- Conduit fitting covers
- Equipment and terminal cabinets.

3.9 FIELD TESTING

After completion of the installation and splicing, and prior to energizing the conductors, perform wire insulation tests as herein specified before the conductors are energized.

Isolate completely all wire and cable from all extraneous electrical connections at equipment to prevent damage from test voltages.

Perform Insulation-Resistance Test on each field-installed conductor and combination transformer-panelboard winding/bus with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc . Take readings after the reading is constant for 5 seconds. Minimum insulation-resistance values shall not be less than 25 Megohms for 300 volt rated cable and 100 Megohms for 600 volt rated cable.

Verify proper outlet voltage on the combination transformer-panelboard unit after it is energized.

-- End of Section --

SECTION 28 05 26.00 40

GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY
08/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM B 3 (2001; R 2007) Standard Specification for Soft or Annealed Copper Wire

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

JOHN F. KENNEDY SPACE CENTER (KSC)

KSC-STD-E-0012E Facility Grounding and Lightning Protection Standard (2001)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code - 2008 Edition

NFPA 780 (2008) Standard for the Installation of Lightning Protection Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-889

(Rev B, Notice 3) Dissimilar Metals

UNDERWRITERS LABORATORIES (UL)

UL 467

(2007) Standard for Grounding and Bonding
Equipment

1.2 GENERAL REQUIREMENTS

Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL applies to work specified in this section.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Submit equipment and performance data for the following items including life, test, system functional flows, safety features, and mechanical automated details.

Submit Manufacturer's catalog data for the following items:

- Ground Rods; G
- Ground Wires; G
- Connectors and Fasteners; G
- Bonding; G

SD-06 Test Reports

Submit Test Reports for the following tests on grounding systems in accordance with the paragraph entitled, "Field Tests," of this section. Within the report include certified record of ground-resistance tests on each driven ground rod, ground rod assembly, and other grounding electrodes. Include within the record the number of rods driven and their depth at each location to meet the

required resistance-to-ground measurements specified. Include a statement describing the condition of the soil at the time of measurement.

Bond Resistance Test; G
Ground Resistance Tests; G
Continuity Isolation Test; G

PART 2 PRODUCTS

2.1 GROUND RODS

Ground rods must conform to the requirements of NFPA 70.

Ground rods must be copper-clad steel rods not less than 3/4 inch in diameter and not less than 10-feet long per section. Ground rods must be clean and smooth and have a cone-shaped point on the first section and be die-stamped near the top with the name or trademark of the manufacturer and the length of the rod in feet.

2.2 GROUND WIRES

Ground wires for AC power systems must be in accordance with Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL.

Ground wires for bonding non-current carrying hardware to earth grounding electrodes must be soft drawn copper, in accordance with ASTM B 3, stranded, with green insulation or bare. Wire size shall be as indicated or if not indicated in accordance with NFPA 70.

2.3 CONNECTORS AND FASTENERS

Grounding and bonding fasteners and connectors must conform to the requirements of UL 467, and Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL.

Grounding and bonding fasteners must be copper or bronze.

Bonding straps and jumpers must be copper and have a cross-sectional area of not less than No. 6 AWG. Bonding straps and jumpers for shock-mounted devices with hinged joints must be made of woven-wire braid wire.

PART 3 EXECUTION

3.1 BONDING AND GROUNDING

Bonding and grounding requirements must be in accordance with NFPA 70.

3.2 GROUNDING ELECTRODES

Minimum ground rod section must be 10 feet. Thread sections together and exothermically fusion weld.

Install ground rods so that the top of the rod is not less than 12 inches below finished grade.

3.3 GROUND GRIDS

Ground grids must consist of a series of ground rods installed with interconnecting grounding conductors between ground rods. Space ground rods as noted.

Do not bury ground grid less than 18 inches below the finish grade. Grounding conductors must not be less than No. 4/0AWG and must be exothermically fusion welded together at crossover points and to ground rods.

3.4 EQUIPMENT GROUNDING

Metallic raceway systems must have electrical continuity with equipment individually and be directly connected to the building ground, independent of the raceway system.

Polarized receptacles, lighting fixtures, and equipment enclosures must be grounded with an identified (green color) insulated conductor, not smaller than No. 12 AWG, connected to the branch circuit equipment grounding conductor.

Noncurrent carrying metallic parts of electrical equipment, including metallic cable sheaths, conduit, raceways, and electrical structural members, must be bonded together and connected to the ground grid or ground connection rods.

Feedline surge protective device, (SPD), grounding should be in accordance with NFPA 780 and KSC-STD-E-0012E. Bonding of feedline SPD may be bonded to air terminal cabling provided a secondary feedline SPD is installed at the transceiver and bonded to the local facility ground.

3.5 GROUNDING CONNECTIONS

Ground connections must be bonded connections in accordance with paragraph entitled, "Bonding."

Weld ground connections that are buried or in inaccessible locations.

Bolt connections in accessible locations. Connections to steel building columns in accessible locations must be cast-copper-alloy clamp lugs bolted to the structure.

Clean, grease, and remove foreign matter from ground connection surfaces. Do not penetrate clad material in the cleaning process. Make connection between like metals where possible. Where dissimilar metals are welded, brazed, or clamped, follow the weld kit manufacturer's instructions. Connections between dissimilar metals must not produce galvanic action in accordance with MIL-STD-889.

3.6 BONDING

3.6.1 Type of Bonds

Accomplish bonding of metal surfaces by welding or clamping.

3.6.1.1 Welding

Bonding connections underground shall be by welding. Welding must be by the exothermic process. Within the welding procedure, include the proper mold and powder charge and conform to the manufacturer's recommendations.

Welding processes must be of the exothermic fusion type that will make a connection without corroding or loosening. Process must join all strands and not cause the parts to be damaged or weakened. Completed connection or joint must be equal or larger in size than the conductors joined and have the same current-carrying capacity as the largest conductor.

3.6.1.2 Clamping

In external locations, use clamping only where a disconnect type of connection is required. Connection device may utilize spring-loaded jaws or threaded type clamping fasteners. Construct device such that positive contact pressure is maintained at all times. Use machine bolts with spring-type lock washers.

Where indicated, use irreversible type splice or tap connection to connect grounding electrode conductors of different sizes together.

3.6.2 Cleaning of Bonding Surfaces

Thoroughly clean surfaces that comprise the bond before joining. Apply an appropriate abrasive with gentle and uniform pressure to ensure a smooth and uniform surface. Do not remove excessive metal from the surface. Clean clad metals in such a manner that the cladding material is not penetrated by the cleaning process. Then clean bare metal with an appropriate solvent to remove any grease, oil, dirt, corrosion preventives, and other contaminants. Bond to the cleaned area must be made within one hour after cleaning. Seal joint and refinish the exposed surfaces within two hours of exposure to prevent oxidation. When additional time is required, apply a corrosion preventive compound until the area can be refinished.

3.6.3 Bonding Straps and Jumpers

Install jumpers such that the vibration by the shock-mounted device will not change its electrical characteristics.

Bond straps directly to the basic structure and do not penetrate any adjacent parts. Install straps in an area that is accessible for maintenance.

Use single straps for the bonds and install such that they will not restrict movement of structural members. Do not connect two or more straps in series.

Install straps such that they will not weaken structural members to which they are attached.

3.6.4 Equipment and Enclosure Bonding

Each metallic enclosure and all electrical equipment must be bonded to ground. At least one copper connection must be made from the system ground point to one or more enclosures in the area such that all enclosures and equipment provide a low-impedance path to ground when properly bonded together.

3.6.5 Bonding of Conduit and Raceway Systems

Bond all metal conduit, fittings, junction boxes, outlet boxes, armored and metal sheathed cable, and other raceways. Take care to ensure adequate electrical contact at the joints and terminations.

3.6.5.1 Rigid Metal Conduit and Terminations

Threaded connections must be wrench-tight and there must be no exposed threads. Ream all ends of the conduit to remove burrs and rough edges. Conduits entering boxes and enclosures must be bonded to the box with bonding-type locknuts, one outside and one inside.

3.6.5.2 Flexible Metal Conduit

Flexible conduit must have an integral grounding conductor.

3.7 FIELD TESTS

Perform the following tests in the Contractor in the presence of the Contracting Officer.

3.7.1 Bond Resistance Test

Resistance of any bond connection must not exceed 0.5 milliohm. Rework bonds that exceed this resistance at no additional cost to the Government.

3.7.2 Ground Resistance Tests

Test Grounding systems for ground resistance. Total resistance from any point on the ground network to the building counterpoise must not exceed 50 milliohms.

3.7.3 Continuity Isolation Test

Perform continuity test on all power receptacles to ensure that the ground terminals are properly grounded to the facility ground system.

-- End of Section --

SECTION 28 31 00.01 98

FIRE DETECTION AND ALARM (PROPRIETARY)
10/07

PART 1 GENERAL

1.1 REFERENCES

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

FM GLOBAL (FM)

FM P7825 (2005) Approval Guide

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41 (1991; R 1995) IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2008; Amendment 2009) Life Safety Code

NFPA 70 (2008; AMD 1 2008) National Electrical Code - 2008 Edition

NFPA 72 (2010) National Fire Alarm Code

NFPA 75 (2008) Protection of Information Technology Equipment

NFPA 90A (2008; Errata 2009) Standard for the Installation of Air Conditioning and Ventilating Systems

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)

NICET 1014-7 (2003) Program Detail Manual for Certification in the Field of Fire Protection Engineering Technology (Field Code 003) Subfield of Automatic Sprinkler System Layout

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595 (Rev B; Am 1) Colors Used in Government Procurement

UNDERWRITERS LABORATORIES (UL)

UL 1449 (2006; Rev thru Sep 2009) Surge Protective Devices

UL 268 (2009) Standard for Smoke Detectors for Fire Alarm Signaling Systems

UL 346 (2005) Waterflow Indicators for Fire Protective Signaling Systems

UL 497B (2004; Rev thru Oct 2008) Protectors for Data Communication and Fire Alarm Circuits

UL 521 (1999; Rev thru Jul 2005) Heat Detectors for Fire Protective Signaling Systems

UL 2196 (2001; Rev thru Dec 2006) Tests for Fire Resistive Cables

UL Fire Prot Dir (2009) Fire Protection Equipment Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Evidence of the Contractor's State Certification to the Contracting Officer for approval, prior to any work being started on the Fire Alarm System; G

SD-02 Shop Drawings

Submit the following in accordance with the paragraph entitled, "General Requirements". Separate submittals for each facility shall be provided.

Connection Drawings; G
Floor Plan Drawings; G
Module Schematic Drawings; G
As-Built Drawings; G
Software Programs; G
Fire Alarm System Acceptance Tests (For Preliminary and Final Tests); G

SD-03 Product Data

Product data shall indicate current applicable approvals or listings issued by UL, FM, or other Nationally Recognized Testing Laboratory and compliance with applicable NFPA standards.

Submit Manufacturer's Catalog Data in a single submittal for the following items:

Fire Alarm Control Panel Modules; G
Addressable Modules/Devices; G
Heat-Actuated Detectors; G
Smoke Detectors; G
Water Flow Alarm Devices; G
Valve Tamper Switches; G
Remote Auxiliary Control Relays; G
Power Source; G
Line Voltage Surge Suppressors; G
Low Voltage Surge Suppressors
Wiring (Wire and multi-conductor cable); G

SD-05 Design Data

Design Analysis and Calculations; G
Submit separate battery calculations for each facility.

List of parts and components; G
Provide a list of parts and components for the installed system by manufacturer's name, part number, and nomenclature, and recommended stock level required for normal maintenance and unscheduled repairs.

SD-07 Certificates

Submit Quality Assurance Plan consisting of the following in accordance with the paragraph entitled, "Quality Assurance" of this section.; G

KSC - Transfer of Responsibility for the designated portion of the Fire Alarm System; shall be submitted in accordance with the paragraph entitled. "Field Testing" of this specification; G

Contractor Readiness Affirmation - For Preliminary Fire Alarm Testing; shall be submitted in accordance with the paragraph entitled. "Field Testing" of this specification; G

SD-10 Operation and Maintenance Data

Submit Operation and Maintenance Data; G bound in manual format and grouped by technical sections consisting of manufacturer's standard brochures, schematics, procedures, recommended spare parts, recommended test equipment, and safety precautions. Provide one single .pdf format of the O&M Manual on a single CD.

1.3 GENERAL REQUIREMENTS

Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL, , and Section 28 31 33.00 10 FIRE ALARM REPORTING SYSTEM, RADIO TYPE apply to work specified in this section.

Submittals shall be submitted for approval in the following sequence with each approved prior to the next submittal:

1. Product Data (Catalog Data), Proof of UL, (Underwriter Laboratory UL Fire Prot Dir listed), FM, (Factory Mutual FM P7825 approved for intended use and function), or other Nationally Recognized Testing Laboratory Listings, Contractor's Certifications, Quality Assurance Plan, Qualification Test Procedure. Submit within 30 days after notice to proceed.

The following shall be submitted for each facility modified:

2. Contractor shall sign and submit the KSC - Transfer of Responsibility form at the time of system outage for each system to be modified. Form is provided in the Contract Solicitation and Delivery Order.

3. Connection Drawings, Floor Plan Drawings, Module Schematic Drawings, Design Analysis and Battery Calculations, List of Parts and Components shall be submitted within 45 days of starting work at the applicable facility.

4. New and revised Fire alarm control panel and network software program information and Acceptance Test Procedures for the applicable facility shall be submitted no later than 21 days prior to the scheduled preliminary test. Contractor sign and submit the Readiness Affirmation form no later than seven (7) days prior to the scheduled preliminary test; form is provided in the Contract Solicitation and Delivery Order. Two sets minimum of the As-Built drawings, software program information, and test procedure forms shall be complete and available for reference at the preliminary test.

5. As-Built Shop Drawings, Panel and Network software programs, Battery Calculations, Operations Manual, and final Acceptance Test Procedures shall be submitted for approval no later than fourteen 14 days prior to the scheduled final acceptance test. Two sets minimum of the As-Built drawings, NFPA 72 Fire Alarm System Record of Completion form, and all other documentation shall be complete and available for reference at the final test.

The following shall be submitted after acceptance (successful completion of the final test) of each facility modified:

6. Record As-Built submittal for all Shop Drawings, Panel and Network software programs, Battery Calculations, Completed Final Test Procedures, NFPA 72 Fire Alarm System Record of Completion form and Operations Manuals, shall be submitted within fourteen 14 days after completion of the final acceptance test. This submittal shall include two (2) sets of CD ROM digital media of all the As-Built Shop Drawings, Design Analysis, Battery Calculations and Program software information.

7. Marked-up As-Built design drawings and warranty information for the facility in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.

Connection Drawings shall consist of point-to-point wiring diagrams of internal and external wiring including, but not limited to, all fire alarm field devices, panel wiring, and interconnection between other building systems and components and the fire alarm system. Wire label designations matching the field installation shall be indicated on these drawings.

Floor Plan Drawings shall indicate equipment locations, device locations with address designation, and conduit/wiring routing from the fire alarm control panel(s) to all field devices including looped Class A circuit routing requirements if applicable.

Available existing facility fire alarm control panel connection drawing files (.DWG or .DXF) shall be provided to the Contractor. Reference the paragraph entitled "AVAILABILITY OF CADD DRAWING FILES" in Section 01 11 00.00 98 SUMMARY OF WORK. These drawings shall be used as the basis of new connection drawings. New work shall be incorporated on the existing drawings without major modifications to existing content. These connection drawings will then be used as the basis for updating the existing facility fire alarm control panel connection drawings maintained by KSC fire alarm maintenance organizations.

Module schematic drawings (minimum size 8-1/2 by 11 inches) for zone input modules, relay modules, addressable zone and relay modules, serial data modules, and network interface modules to be provided with connection drawings.

All drawings shall be computer aided design (CAD) generated. Digital media compact disc (CD) submittals shall include .DWG or .DXF files for all drawings: Connection Diagrams, Module Schematics, Battery Calculations, Floor plans and Fire Service Floor Plans. Also on this CD provide a complete copy of the aforementioned drawings in PDF format on the same CD.

As-Built Drawings shall include connection drawings, floor plan drawings, module schematics, software programs, design and Battery calculations, and all other data required to fully document the completed system. After final testing is complete, record copies including digital media and hard copies of all new and revised software, drawings, and analysis/calculations shall be provided incorporating approved comments and all changes. As-Built drawings shall document final system configuration including, but not limited to location of the fire alarm control panel, all initiating and auxiliary control devices, signaling line devices, additional cabinets, Central Fire Monitoring System reporting equipment, and all other equipment associated with the fire alarm system(s). Also, annotate the location and address setting for each multiplexed addressable device (when used), deviations from and amendments to the as-built drawings, and field installation changes, concealed and visible.

Software Programs Provide both hard copy and compact discs, for all new and/or existing programmable fire alarm control panels affected by the project. Provide system executable file and report file on the compact disc. Program information for fire alarm control panel including program listings, system point summary, and addressable device switch settings. Corrected program information shall include panel and network programs and sequence of operations in matrix format that clearly shows interaction of system components. For modifications to existing programs, additions and deletions to the program report text shall be annotated in the approval submittals such that they are clearly evident during review; the final and as-built submittals shall not be so annotated.

Fire Alarm System Acceptance Tests shall be conducted in accordance with the paragraph entitled, "Field Testing" of this specification. Prepare a test procedure and test record form for conducting complete tests on control panels, reporting systems, wiring systems, and field devices installed in accordance with the manufacturer's requirements and these specifications. Test procedure must identify each device and circuit to be tested, describe the initial condition, each step or function in the test, required test result, and equipment to be employed. Test procedures are to be written to minimally disrupt facility operations (minimize and/or group activation of evacuation appliances, AHU shutdown, etc.) Provide test forms with suitable spaces for recording test results on all equipment, devices, and wiring to be tested. Test record forms also have identified spaces for verification signatures of official witnesses and dates of the test.

Design Analysis and Calculations must be submitted for approval for the Fire-Alarm and Detection Systems consisting of the battery capacity and loading calculations in accordance with the paragraph entitled, "Fire Alarm Control Panel for new NDU installations and the new remote auxiliary power supply installations only. For facility fire alarm control panels undergoing minor revision to connect to new CRMS equipment, batteries capacity shall be verified by testing.

- a. Battery test shall be performed prior to the system outage to verify the capability of the existing batteries.
- b. Battery testing shall be re-performed during the preliminary and final test.

List of parts and components shall be provided for the installed system by manufacturer's name, part number, and nomenclature, and recommended stock level required for normal maintenance and unscheduled repairs.

1.4 SYSTEM REQUIREMENTS

Fire-alarm system shall be modular type, microprocessor based, supervised, non-coded electrical fire alarm system with NFPA 72 Style D, (Class A), initiating device circuits and NFPA 72 Style 6 signaling line circuits, and Style 7 network interface circuits.

All styles of Class A initiating device, signaling line, notification appliance and control circuits must use diverse routing in accordance with NFPA 72. The outgoing and return redundant circuit conductors must not be run in the same cable assembly, enclosure or raceway.

System must conform to all the applicable requirements of NFPA 70, NFPA 72, NFPA 75, NFPA 90A, and NFPA 101.

Fire alarm systems must contain all of the equipment, devices, programming and circuits required for system operation in accordance with NFPA Codes and KSC requirements, including remote reporting to and remote control from existing, Simplex based equipment.

Provide all additional equipment, cabinets, conduit, and labor to meet the requirements and intent of this specification.

Components installed under this contract cannot be more than one (1) year older than the date of installation.

1.5 QUALITY ASSURANCE PLAN

Equipment to be provided under this specification must be that manufactured fire-alarm equipment which meets the requirements of the section entitled, "System Requirements." It must be the latest standard design, and must be listed by Underwriters' Laboratories or approved by Factory Mutual and be suitable for its intended service. All devices installed must function with the control panel and not interfere with the operation of the control panel.

1.6 SERVICES OF A CERTIFIED FIRE ALARM SPECIALIST

Services of a Certified Specialist thoroughly experienced in fire detection and alarm work must be provided on site to perform or directly supervise the installation, make all necessary adjustments, make all adjustment and perform all tests on the fire alarm system at the site.

Fire Alarm specialist is considered certified when the specialist holds a valid Fire Alarm System, Level III Certification from the National Institute for Certification in Engineering Technologies NICET 1014-7 or a valid Level III Fire Alarm Engineering Technician Certification from the International Municipal Signal Association (IMSA) or is licensed by the State of Florida as a Fire Alarm Contractor I in accordance with Florida State Statute, Chapter 489, Part II.

Certification of other recognized agencies with equivalent requirements will be considered. Evidence of the Contractor's State Certification and the basis of certification must be provided to the Contracting Officer and be approved by the Contracting Officer prior to any work being performed at Kennedy Space Center.

PART 2 PRODUCTS

2.1 FIRE ALARM CONTROL EQUIPMENT

Where indicated provide new Simplex Model 4100U network display unit (NDU) fire alarm control panel (FACP) equipment or modify existing facility fire alarm control panels to connect to new Central Fire Radio Monitoring System (CRMS) equipment. All modular equipment, new and existing shall be UL listed for use with each other.

Fire alarm control panels must contain power-on, alarm, supervisory, and trouble indicating lights plainly visible when the cabinet is closed. It must also contain the following functions and must be accessible only by unlocking and opening the unit:

- Alarm Silence
- Trouble Silence
- Supervisory Silence
- Alarm/Trouble Acknowledge
- System Reset

Central Radio Monitoring System Reporting Bypass Switch - Provide function on new NDU panels and existing facility fire alarm control panels.

Fire alarm control panel must contain all components necessary to monitor and supervise all initiating device circuits. When any detector, manual alarm station (pull box), water flow switch, pressure switch, etc., connected to the fire alarm control panel is activated, the control panels visual alarm, alarm indicator and audible signal must be activated. This must cause all notification appliances to be activated, including all associated auxiliary control functions. The control panel must visually indicate the addressable device or zone in alarm and transmit an alarm condition to the remote Central Fire Monitoring System.

Fire alarm control panel must contain all components necessary to monitor and supervise all supervisory device circuits. When any valve tamper switch, low air pressure switch, water level indicator, maintenance bypass switch, loss of CRMS radio communications, or other supervisory device connected to the control panel is activated, the control panel supervisory visual indication and supervisory audible device must be activated. The control panel must visually indicate the addressable device or zone in supervisory alarm and transmit a supervisory condition to the remote Central Fire Monitoring System. The loss of CRMS radio communication signal shall be such that it automatically resets once radio communication function is restored.

Fire alarm control panel must include maintenance by-pass switches for CRMS reporting functions. By-pass switches must be supervised to report supervisory when in the maintenance (by-pass) position.

Panel and remote power supply equipment must monitor and report as trouble, open supervised circuits, ground faulted supervised circuits, removal of detector or device, removal or failure of control panel module, , loss of primary power, power supply trouble, low battery voltage, loss of battery voltage, and activation of the alarm silence switch. All trouble signals must be identified by initiating, notification appliance, auxiliary control, or signaling line circuit. Trouble signals must activate the control panel trouble visual indication and trouble audible devices, and send a trouble signal to the remote Central Fire Monitoring System.

Provide annunciation of unacknowledged supervisory and trouble signals to the CRMS system as indicated.

Fire alarm control panels shall be provided with all hardware required to connect to new CRMS radio transceivers or existing Simplex FACP data networks including but not limited to addressable relay cards/modules, serial output (DAC or Printer as required by and coordinated with CRMS radio transceiver manufacturer) card/module, zone module or addressable zone module, and Style 7 fire alarm control panel network interface modules.

All relays must be continuous duty and have self-cleaning Form C dry contacts of silver or an alloy of equivalent performance. Supervisory relays must be suitably protected against dust by individual covers.

Where indicated, provide FACP modules required for installation of a multiple addressable device network. Network must utilize polling methods and provide two-way Style 6 supervised communications between the fire alarm control panel and addressable smoke detectors and monitor, signal, or control addressable modules.

Where indicated install a separate terminal cabinet adjacent to the fire alarm control panel for interfacing device field wiring to the control panel. Install terminal strips for all field wiring circuits plus 25 percent spare. Where a terminal cabinet is installed, install terminal strips to accommodate remote reporting circuits.

Fire alarm control panels, terminal cabinets, surge suppression cabinets, auxiliary power supply cabinets, and battery cabinets (when used) must be steel, provided with a hinged cover and an integral pin-tumbler cylinder lock (Mortise or Standard Rim Cylinder from Best Lock Company) with removable core that accepts the key presently in use with other control units existing in the area; lock core will be provided by the government. Cabinets must be painted with a prime coat and one or more finish coats of scratch-resistant baked enamel. Finish coat must be red unless otherwise indicated. Cabinets and boxes installed in damp or wet locations shall be NEMA 4X rated constructed of stainless steel or cast metal.

Fire alarm control panel and remote auxiliary power supplies must operate from a power supply with 120 grounded V(AC) input and 24 V(DC) output. All modules and field wiring shall operate using the supervised 24 V(DC) power supply output. System must operate satisfactorily with power input voltage varying from 85 to 110 percent of nominal value. Power supply output must be capable of powering all initiation, signaling, annunciation, and control devices during alarm condition with 25 percent minimum spare capacity.

All fire alarm control panels and auxiliary power supplies shall be provided with a fused DC power input and shall have a DC disconnect switch integral with the equipment provided (2P, 30 Amp rated minimum) or a separate fused safety switch shall be provided.

Batteries, charger, and power transfer equipment must provide the means of automatically supplying the entire fire alarm system with battery backup power in event of a primary power system failure. System must switch to battery power in event of AC power failure and switch back to AC power upon return of primary power. Control panels and auxiliary power supplies must be able to operate when the backup batteries are disconnected for any reason. System must control charging currents and floating voltage levels to maintain batteries in optimum condition. Provide capability to recharge batteries in event of discharge. Wiring must be fused to protect against battery over-current and polarity reversal. Primary power, battery, or charging equipment failure must result in a fire alarm control panel trouble signal and visual indication.

Battery modules must be sealed (no corrosive fumes) and spill-proof. Batteries must be listed for fire alarm service and must be suitable for high discharge currents required under alarm conditions. Batteries must be sized to operate the fire alarm and detection system in normal supervisory condition for 24 hours, minimum, and then operate the system in the alarm mode for 5 minutes (facilities with bells) or 10 minutes (facilities with speakers), minimum.

2.1.1 Simplex Network Display Unit (NDU) Fire Alarm Control Panel

Unit must be a fully addressable system, Simplex Model 4100U, with 392,000 addressable analog points to include addressable CRMS reporting relay modules, zone input module, and serial data output (DAC or printer as required). Construction must be modular with solid-state, microprocessor based electronics. Modules must be equipped with transient suppression. System must include non-volatile programmable operating system memory for all operating requirements. Panel must include all modules required for network communication interface with the existing Simplex Central Fire Monitoring System, including Style 7 module for remote reporting circuits.

2.2 CRMS REPORTING EQUIPMENT

2.2.1 FACP Reporting Using Existing K6-1193 (VABR) Summary Reporting Panel AB

Existing Summary Reporting Panel A equipment currently installed at K6-1193 (VABR) shall be modified with redundant network cards to communicate with other Simplex fire alarm control panels on existing Network 2, redundant processors, and redundant power supplies. The existing monitor zone wiring transfer relays shall be removed and all telephone wiring to remote facility fire alarm control panels shall be directly connected to the Summary Reporting Panel A's zone monitor modules. Provide additional relay outputs and zone monitor modules for connecting to radio transceiver inputs as indicated. When the primary processor fails the redundant processor shall automatically transfer and monitor the connected facility zone module wiring; manual transfer switch/LED control between primary and secondary processors shall also be provided. The processor monitoring the connected facilities shall communicate with Summary Reporting Panel B via Simplex Network 2 to transmit all alarm signals to the CRMS.

2.2.2 FACP Reporting Via Simplex Network 2 Using Existing K6-1193 (VABR) Summary Reporting Panel B

Existing Summary Reporting Panel B equipment currently installed at K6-1193 (VABR) shall be modified to report alarm, supervisory, and trouble signals from connected facilities indicated to the CRMS using serial data means. Modify Summary Reporting Panel B to include redundant processors, redundant power supplies, and redundant network cards for connection to Simplex Network 2. Each processor shall control and connect to a separate CRMS radio unit using a serial data output card, addressable relays, and zone module inputs. When the primary processor is operating the secondary processor shall not send any serial or relay to its radio unit and vice versa; redundant signals shall not be received at the CRMS for any given alarm.

2.2.3 FACP Reporting Via Simplex Network 1 Using New K6-848 (VAB) Tower D NDU

A New NDU will be installed in Tower D of K6-848 (VAB) and connected to the existing Tower A NDU via a network connection to the existing Tower D FACP to report alarm, supervisory, and trouble signals from connected facilities indicated to the CRMS using serial data means. The new Tower D NDU shall have redundant processors and power supplies. Each processor shall control and connect to a separate CRMS radio unit using a serial data output card, addressable relays, and zone module inputs. When the primary processor is operating the secondary processor shall not send any serial or relay to its radio unit and vice versa; redundant signals shall not be received at the CRMS for any given alarm.

2.2.4 FACP Reporting Via a Radio Transceiver

Where indicated, fire alarm control panel shall report to the Central Fire Monitoring System using a radio transceiver located at the facility. Reporting circuit(s) consist of multiple (2) wire, Style B, (Class B), circuit(s) as indicated from the radio transceiver zone module to the fire alarm control panel alarm, supervisory, and trouble relays via shielded cable. An End-of-Line resistor, (value and wattage coordinated with radio manufacturer for equipment provided), is required at the end of each FACP reporting circuit. Where a serial data interface is required, provide required shielded data cable, connectors, and connections to insure proper communications and circuit supervision.

Fire alarm control panels shall be provided with all hardware required to connect to new CRMS radio transceivers or existing Simplex FACP data networks including, but not limited to, addressable relay or relay card modules, zone or addressable input modules to monitor radio trouble contact, and serial output (DAC or Printer as required) module.

2.2.5 Simplex FACP Reporting Via Network Connections

Provide all FACP hardware and software required to digitally connect to existing Style 7 networked Simplex FACP's. These existing Simplex networks will provide a communications path back to new CRMS Equipment via K6-1193 (VABR) Summary Reporting Panel B or via K6-848 (VAB) Tower D NDU. The FACP equipment provided must be capable of digitally communicating with existing networked Simplex FACP's in order to activate interconnect evacuation alarm schemes or for other purposes. Network connections shall be via Style 7 fiber optic cable, copper telephone cable plant, and/or custom installed wiring as indicated, but must be capable of communicating with other existing network cable or fiber media.

Contractor shall provide or modify dedicated house communication cable as indicated between the fire alarm control cabinet and the facility telephone

terminal cabinet. Install a 4-point minimum terminal strip in the TTC and FACP/FATC for termination of cabling. Install communication circuit surge suppressors at the FACP/FATC location.

2.3 ADDRESSABLE MODULES/DEVICES

Addressable modules must be solid-state and UL listed for use with the Fire Alarm Control panel. Modules must be suitable for individual outlet box mounting or group mounting within a control enclosure.

Modules must be field addressable to individually communicate with the fire alarm control panel using multiplexed communication techniques. Communication circuit wiring connections must be suitable for supervised Style 6 operation. Module power must be derived from the communication circuit or 24 V(DC) power supply supervised by the fire alarm control panel. Invalid address setting, component failure, or power failure must initiate a trouble signal at the fire alarm control panel.

Enclosure housing a single isolated module (not grouped with other modules or no other modules nearby) shall be manufacturer's standard outlet box mounting and cover.

Enclosures housing more than one (1) module shall be hinged door type with back panel for module mounting. Enclosure door shall be provided an integral pin-tumbler cylinder lock (Mortise or Standard Rim Cylinder) with removable Best Lock core that accepts the key presently in use with other control units existing in the area; lock core will be provided by the government. Enclosure shall be adequately sized to allow a minimum of 2-inch wiring space around the cabinet perimeter and all module termination points. Additionally spare space for future modules shall be provided as indicated. Provide terminal strips with 25-percent spare capacity for interfacing all module connections to field wiring; include terminals for cable shield drain wires. Paint enclosures with a prime coat and one or more finish coats of red enamel to provide a smooth, hard, and durable finish. Enclosures must include an engraved phenolic nameplate labeled, "FIRE ALARM CRMS REPORTING MODULES".

Addressable modules for initiation circuits must be supervised 4-wire Class A type unless otherwise indicated. Two-wire Class B modules are acceptable when installed in the same box or enclosure as the connected initiating device.

Addressable relay modules for control and/or remote reporting circuits (addressable relays) must include two (2) fused Form-C contacts rated at 2 Amperes for 28 V(DC) or 120 V(AC).

2.4 HEAT-ACTUATED DETECTORS

Heat-actuated detectors must be alarm-initiating devices designed for use with automatic/manual fire alarm systems in accordance with UL 521.

Heat-actuated detectors must be rated 136 degrees F fixed temperature with 15 degree F per minute rate-of-rise feature unless otherwise indicated. Detectors must be self-restorable for the rate-of-rise feature and non-restorable for the fixed temperature feature. Detectors must have a rate-of-rise principle of operation, which uses an air chamber, a vent and a flexible metal diaphragm. The fixed temperature principle of operation must be by a fusible solder joint. Heat detectors shall be made individually addressable by connection to addressable modules. Addressable modules shall be provided in accordance with the paragraph entitled, "Addressable Modules/Devices".

Electronic addressable type heat detectors shall be listed for use with the fire alarm control panel and shall only be used in air conditioned spaces. When providing electronic type heat detectors contractor shall insure that detector spacing requirements from lighting fixtures complies with manufacturer's installation requirements. Addressable detector or base shall include circuitry and user selectable switching required for assigning each detector a unique address on the fire alarm control panel communication bus. Invalid address switch settings or component failure shall initiate a trouble signal at the fire alarm control panel. Detector head shall plug into a separate receptacle type base wired to the FACP signaling line circuit which shall power and monitor the detector. Base shall be supervised to initiate a trouble signal at the fire alarm control panel if the detector is removed. A light emitting diode indicator shall provide a visual indication when the detector initiates an alarm.

Detectors must have a set of normally open contacts that close to initiate an alarm. Wiring connections must be suitable for supervised Class A operation, and must be made with terminal blocks capable of accepting No. 18 through No. 14 AWG diameter solid copper conductors. All components of the detectors must be rust and corrosion resistant.

2.5 SMOKE DETECTORS

Smoke detectors must be alarm-initiating devices designed for use with automatic/manual fire alarm systems in accordance with UL 268.

Smoke detectors must be 2.5 percent per foot nominal obscuration (photo-electric) type. Detector must be listed for use with fire alarm control panel installed, and must include all required accessories. Detectors and accessories provided must be rust and corrosion resistant. Detector head must be a plug-in unit. Unit must contain no moving parts, nor must it require readjustment or removal to resume normal operation after an alarm.

All detector openings must be screened to prevent the entry of insects and debris.

Detector head must plug into a separate receptacle type base. Base must include screw terminals suitable for No. 18 through No. 14 AWG diameter solid copper conductors for all wiring connections required. Base must be supervised to initiate a trouble signal at the fire alarm control panel if the detector is removed. A light emitting diode indicator must provide a visual indication when the detector initiates an alarm.

Provide addressable detector(s) bases. Addressable detector or base must include circuitry and user selectable switching required for assigning each detector a unique address on the fire alarm control panel communication bus. Invalid address switch settings or component failure must initiate a trouble signal at the fire alarm control panel.

Detectors must be the 2-wire Class A type powered from the panel alarm initiation or communication bus circuit; separate power sources are not acceptable.

2.6 WATER FLOW ALARM DEVICES

Water flow devices must be alarm-initiating devices designed for use with automatic/manual fire alarm systems, in accordance with UL 346.

Water flow alarm devices must conform to UL or FM requirements for the particular type of sprinkler system. Contacts must have a minimum of 2 single pole, double throw contacts rated 5 amps at 28 V(DC) or 250 V(AC). Switch shall have an adjustable instant-recycle pneumatic-retard time delay setting with a range incorporating the desired set-point of 60 seconds.

2.6.1 Pressure Switch

Pressure switch alarm must be wired to make or break an alarm circuit depending on rise or fall of water pressure.

2.6.2 Vane-Type Flow Switch

Vane-type flow alarm must make or break an alarm circuit upon deflection by a volume of flowing water that equals or exceeds the capacity of a single sprinkler.

2.7 VALVE TAMPER SWITCHES

Valve tamper switches must be supervisory initiating devices designed for use with automatic/manual fire alarm systems, in accordance with UL 346.

Valve tamper switches must conform to UL or FM requirements for use on the specified valve. Contacts must have a minimum of 2 single pole, double throw contacts rated 5 amps at 28 V(DC) or 250 V(AC).

2.8 REMOTE AUXILIARY CONTROL RELAYS

Remote control relays must have continuous duty coils rated 24 V(DC). Where relays are used on Style Z, (Class A), parallel wired supervised circuits, coils must incorporate supervisory current blocking diode. Relays must have a minimum of 2 single pole, double throw contacts rated 5 amps at 28 V(DC) or 250 V(AC). Where auxiliary control circuits connected to the relay are protected at a higher ampacity than the relay contacts are rated, fusing rated to protect the relay contacts must be installed in the relay enclosure.

Addressable type relays, where indicated or provided, shall be in accordance with the paragraph entitled, "Addressable Modules/Devices".

Mount remote auxiliary control relays in enclosures indicated or, if not indicated, in manufacturer's required enclosure.

Paint enclosures with a prime coat and one or more finish coats of red enamel to provide a smooth, hard, and durable finish. Enclosure must be labeled with an engraved phenolic nameplate labeled, "F/A RELAY."

Remote auxiliary control relays must be mounted and supervised within 3 feet of the controlled device in accordance with NFPA 101.

2.9 POWER SOURCE

Normal power to the local systems for all purposes, including separate powered indicating/alarm devices, must be 120 volts 60 hertz. System must operate satisfactorily between 85 and 110 percent of normal voltage. Fire-alarm-system disconnect/protective device must be a fused switch with a red factory finish as specified herein for manual alarm stations. Mount this disconnect switch adjacent to the fire alarm control panel. In addition, it must be marked FIRE-ALARM DISCONNECT FED FROM (indicate supplying circuit) with 1/2 inch high letters in white paint or engraved phenolic identification plates fastened with sheet metal screws. Switch must be

capable of being locked in the "on" or "off" position. This feature must not interfere with the circuit protection capability of the device. Switch must be equipped with surge suppression for all phase and neutral conductors. Install current limiting Class RK1 fuses properly sized to protect the fire alarm equipment.

2.10 WIRING

Provide wiring in accordance with NFPA 70 and NFPA 72. Conductors must be copper. Conductors for 120 V(AC) circuits must be No. 12 AWG minimum with 600 Volt rated THHN/THWN insulation.

Conductors installed on fire alarm systems must be solid copper with an insulation rating of not less than 300 volts. Conductors must be marked with the size, voltage rating and manufacturer's name permanently marked on the conductor jacket at no less than 2 feet intervals. Conductor size and color are listed below. Where modifications are made to existing systems, the new or added conductors must match the size and color-coding of the existing system.

Conductors for multiplexed communication circuits, signaling line circuits, radio transceiver reporting circuits, radio transceiver trouble contact circuits, and network communication circuits must be solid copper, shielded, twisted pairs meeting UL 2196. Cable must be listed as Type FPL, Power-Limited Fire Protective Signaling Cable. Conductor size must be not less than No. 18 AWG diameter for circuits connecting to radio transceiver subscriber units and No. 16 AWG for other circuits.

Direct current initiating device (manual pull station) circuits must be a two loop circuit per NFPA 72, Class A. Conductor size must be not less than No. 16 AWG diameter. Conductor insulation must be Type TFN for No. 16 AWG diameter, and Type THHN/THWN for No. 14 AWG diameter and larger.

Direct current auxiliary control relay circuits must be parallel wired per NFPA 72, Class A. Conductor size must be not less than No. 16 AWG diameter. Conductor insulation must be Type TFN for No. 16 AWG and Type THHN/THWN for No. 14 AWG diameter and larger.

Direct current power leads must be not less than No. 16 AWG diameter. Conductor insulation must be Type TFN for No. 16 AWG and Type THHN/THWN for No. 14 AWG diameter and larger.

2.11 SURGE SUPPRESSORS

Provide line voltage and low voltage surge suppression devices to suppress all voltage transients which might damage the control panel components.

Install surge suppression in accordance with UL 497B on each conductor of fire alarm circuits which extend beyond a building. Locate protection as close as practical to the point where the circuits leave the building. Install protectors in surge suppression cabinets of adequate size with power rated terminal strips for all wiring connections. Paint enclosures with a prime coat and one or more coats of red baked enamel finish to provide a smooth, hard, and durable finish. Provide a copper ground bus inside the cabinet and connect protectors to an earth ground electrode system in accordance with the manufacturer's requirements and NFPA 70. An etched metal or engraved laminated plastic identification plate labeled, "Fire Alarm Cabinet," must be affixed to the cabinet door of the alarm-control unit to identify the cabinet as a fire-alarm cabinet. For cabinets painted red the identification plate must have white letters on a black background.

2.11.1 Line Voltage Surge Suppressors

Suppressor must be UL 1449 listed with a maximum 330 volt clamping level. Suppressor must also meet IEEE C62.41 category B tests for surge capacity. Suppressor must be a multi-stage construction which includes inductors and silicon avalanche zener diodes. Suppressor must have a long-life indicating lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Unless otherwise indicated, wire in series with the incoming power source to the protected equipment using screw terminations. Where specifically indicated to provide parallel connected surge suppressors mounted directly to the safety switch using a knockout hole.

2.11.2 Low Voltage Surge Suppressors

Provide for all circuits which leave the building shell and as shown on the contract drawings. When circuits interconnect two (2) or more buildings, provide an arrester at the circuit entrance to each building. Suppressor must be UL 497B listed, with a maximum 30 volt clamping level and a maximum response time of 5 nanoseconds. Suppressor must have multi-stage construction and both differential/common mode protection.

PART 3 EXECUTION

3.1 SYSTEM SEQUENCE OF OPERATION

3.1.1 Existing Facility Fire Alarm Control Panels - Radio CRMS Reporting using FACP Relay/Radio Zone Interface

Unless otherwise indicated, the existing sequence of operations for modified fire alarm control panels shall not be changed except as required to provide the modified CRMS reporting indicated. Generally when revising programs:

- a. Unless otherwise indicated, existing software points and control equations used for local control functions (evacuation alarms, AHU shutdown, bypass functions, etc.) and not related to CRMS reporting shall not be modified.
- b. Existing software points and control equations used for CRMS reporting are to be modified (add, change, delete) as required to achieve new CRMS reporting indicated.
 - i.) To minimize re-testing requirements, existing CRMS interface points used for IMS or 2120 interface tables shall be re-used and re-grouped to the greatest extent possible to achieve the new reporting configuration.
 - ii.) Software shall be reviewed to insure all initiation devices, supervisory devices/conditions and trouble conditions are assigned to CRMS reporting points and/or control equations.
 - iii.) Point names for new relay outputs are to conform to KSC point name and format standards.
- c. Radio transceiver trouble contacts shall be wired to the fire alarm control panel and shall implement a supervisory alarm that automatically resets once radio communications is restored.
- d. A CRMS reporting bypass shall be programmed (or where existing reporting bypass functions exist, such programming modified) to disconnect all alarm and trouble reporting functions. The fire alarm control panel's supervisory relay shall be turned ON to report supervisory to the CRMS when activated. For network display units (NDU) communicating via a serial data output or Simplex fire alarm control panels communicating over a data network, supervisory signals other than CRMS reporting bypass shall be disconnected along with alarm and trouble functions.

e. Existing Simplex Information Management System (IMS) units at K6-900 (LCC), Simplex 4100 Summary Reporting Panel, and Simplex 2120 software shall be modified as required for any facility fire alarm system disconnected from these existing reporting systems.

3.1.2 Network Connected Fire Alarm Panel Reporting via NDU at K6-848.

Existing and new Network Display Units shall be programmed to report alarm, supervisory, and trouble signals to a radio transceiver via a serial data output module for all other fire alarm control panel nodes connected to its network.

a. The NDU Network interface program shall be programmed to recognize all alarm, supervisory, and trouble public points broadcast on the network by other fire alarm control panel nodes.

b. The NDU shall transmit to the radio receiver serial data input all alarm, supervisory, and trouble signals received. These signals shall also be displayed locally with descriptive text format and alarm type (alarm-supervisory-trouble). Where indicated, the NDU shall also activate relays connected to relay transceiver zones for summary reporting functions indicated.

c. Broadcast points from other network nodes shall be programmed such that the NDU operates silently and does not require local acknowledgement or reset as these broadcast public points change state.

d. NDU trouble and supervisory conditions directly related to the condition of NDU hardware shall activate the corresponding summary trouble or supervisory relay as well as activate it's local audible and visual annunciations.

3.1.3 Network Connected Fire Alarm Panel Reporting via K6-1193 (VABR) Summary Reporting Panel B.

Existing K6-1193 Summary Reporting Panel B shall be programmed to transmit all indicated alarm, supervisory, and trouble signals received from remote facility fire alarm control panels on Network 2 to radio transceiver(s) for final transmission to the CRMS.

a. Both the Summary Reporting Panel B primary and redundant processor serial data cards are to be connected to dedicated CRMS radio transceivers, 1 and 2, for reporting to the CRMS. Only one serial data card shall transmit data depending upon which processor is in operation. In the event the primary processor or Radio Transceiver 1

fails, primary processor radio communications shall cease and all communications shall be transferred to the redundant processor and Radio Transceiver 2. Existing fail-over programming and manual processor transfer means shall also similarly transfer the serial data radio reporting.

b. The Summary Reporting Panel B interface program shall be programmed to recognize all alarm, supervisory, and trouble public points broadcast on the network by other facility fire alarm control panel and Summary Reporting Panel A nodes as indicated.

c. Summary Reporting Panel B shall transmit to the radio receiver serial data for all alarm, supervisory, and trouble signals received. These signals shall also be displayed locally with descriptive text format and alarm type (alarm-supervisory-trouble).

d. Broadcast points from other network nodes shall be programmed such that Summary Reporting Panel B operates silently and does not require local acknowledgement or reset as these broadcast public points change state.

e. Where indicated, separate radio transceivers with summary alarm reporting data are installed at each facility to provide back-up to the serial data reporting radios; FACP programming shall be per applicable provisions of previous paragraph 3.1.1.

f. Summary Reporting Panel B trouble and supervisory conditions directly related to the condition of hardware shall activate the corresponding summary trouble or supervisory relay as well as activate it's local audible and visual annunciations.

3.2 INSTALLATION

Prior to performing any installation or modification work to existing Fire Alarm system(s), a Transfer of Responsibility Form must be completed by the COTR and signed by the Contractor and Institutional Services Contractor (ISC) Fire Protective Systems designee (reference Contract Solicitation or Delivery Order for copy of the form). The completed form will be turned over to the Contracting Officer by the COTR. A copy of the completed "Transfer of Responsibility" Form shall be permanently affixed to the affected fire alarm control panel throughout the construction period.

Install all equipment in accordance with manufacturer's recommendations, and this Section.

3.2.1 Fire Alarm Control Panel Cabinets

Install equipment in each protected building, located where indicated, and complete with all indicated accessories and devices. Install equipment in accessible locations in such a manner as to prevent damage from vibration or jarring. Equipment requires a minimum of 3 feet clearance directly in front of the panel for maintenance per NFPA 70. With multiple equipment, the 3 feet clearance is required directly in front of the complete configuration. In addition, a 28 inch clear aisle way must be provided for access to the equipment.

Wiring within fire alarm control panel(s) and reporting equipment must be in accordance with the paragraph entitled, "Installation in Cabinets and Boxes."

3.2.2 Addressable Modules and/or Devices

Install zone addressable modules at accessible locations indicated. Configure module address switches to settings indicated on approved shop submittals. Modules must be identified individually adjacent to their mounting.

Mount control zone addressable modules used for smoke control, AHU shutdown, etc. in accessible locations within 3 feet of the device to be controlled. Control modules connected to separately energized control wiring from auxiliary systems must not be installed in the same enclosure with initiation and signal zone addressable modules.

Where zone addressable modules are grouped within an enclosure, wiring must be in accordance with the paragraph entitled, "Installation in Cabinets and Boxes."

3.2.3 Heat-Actuated Detectors

Ceiling-mount detectors unless otherwise indicated. Location, number, and general arrangement to be as indicated. Field installation locations must comply with NFPA 72.

Configure addressable electronic heat detector address switch settings as approved on shop drawings and submittals. Detectors must not be installed until work by other trades is completed.

Detectors shall be located no closer than 12-inches from any part of lighting fixtures; for electronic type addressable detectors, space separation from lighting fixture shall be in accordance with the manufacturer's requirements, but no closer than 12-inches. Detectors shall be mounted and no closer than 36-inches from any supply or return diffuser.

Devices mounted in acoustical, lay-in type ceilings shall utilize 'T' bar corner plate/bracket. Cut ceiling tile as required to accommodate plate and device wiring.

3.2.4 Smoke Detectors

Smoke detector location, number, and general arrangement must be as indicated; field installation must be in accordance with NFPA 72. Detectors must not be installed until the work of other trades is complete.

Devices mounted in acoustical, lay-in type ceilings shall utilize 'T' bar corner plate/bracket. Cut ceiling tile as required to accommodate plate and device wiring.

Configure addressable smoke detector address switch settings as approved on shop drawings and submittals. Detectors must not be installed until work by other trades is completed.

Locate detectors no closer than 1829 millimeter(6 feet) from a fluorescent light fixture. Locate detectors no closer than 914 millimeter(3 feet) from any return air diffuser and no closer than 1829 millimeter(6 feet) from any supply diffuser. Detectors installed in areas subject to moisture or exterior atmospheric conditions must be UL listed or FM approved for such locations.

3.2.5 Auxiliary Control Relays

Remote control relays must be installed and supervised in accessible locations within 3 feet of the device to be controlled.

3.2.6 Wiring

Wiring must conform to the requirements of NFPA 70 and the following special requirements:

Install fire alarm system circuits in a separate raceway system. Route each circuit type (Initiating, Notification, Signaling, and Control)

through a dedicated separate conduit or raceway system configured to comply with NFPA 72 Class "A" conduit system requirements. 60-Hertz power circuits must not enter enclosures containing fire alarm circuits except where required to connect to the fire alarm system.

Conductors must be continuous from a terminal point at one device to a terminal point at the next device and from a device to the fire alarm (control) panel. Break wires at each terminal; wires must not be looped over a terminal. Approved explosion proof devices provided with pigtail wiring connection leads must be terminated on a field installed terminal strip installed in the box on which the device is mounted. Install solderless ring tongue terminal lugs with manufacturer's required tooling on the device wiring connection leads. This ring type lug is to be used on stranded wire only. Termination of solid wire must be made on compression or screw type terminals. When screw type terminals are used the conductor must be captured under 80 percent of the screw head surface.

Conductor colors are listed below and must be in accordance with FED-STD-595. Where modifications are made to existing systems, the new or added conductors must match the size and color-coding of the existing system.

Conductors for multiplexed communication circuits, radio unit input zone wiring, and remote station signaling circuits must be marked with circuit designation, and consistent color-coding for the positive and negative loops must be maintained throughout the cable system.

Direct current initiating device circuits must be a two loop circuit per NFPA 72, Style D, (Class A), with the positive loop conductor colored blue, Color No. 15102, and the negative loop conductor colored black, Color No. 17038.

Direct current auxiliary device control relay circuits must be parallel wired per NFPA 72, Style Z, (Class A). Positive conductor must be colored yellow, Color No. 13591 and the negative conductor must be colored brown, Color No. 10055.

Direct current power circuit positive conductor must be colored red, Color No. 11105 and the negative conductor must be colored black, Color No. 17038.

3.2.7 60-Hertz Power

60-hertz power to fire alarm control panels or separately powered devices must be 120 volts. There must be one black phase conductor, one white or gray solidly grounded neutral conductor and one green equipment grounding conductor. Conductor size must be as shown on the drawing with the minimum

size No. 12 AWG copper. Install surge arrestors in accordance with NFPA 72 and NFPA 70.

Circuit Breakers used to supply AC power to the fire alarm control panel shall be clearly identified. Provide a permanently label white background with red lettering adjacent to the circuit breaker.

3.2.8 Installation in Cabinets and Boxes

Install wiring in control cabinets and boxes in a neat and orderly manner with wire properly grouped, tie-wrapped, or laced parallel and perpendicular to the major axis, supported and identified. Control wiring must be continuous from device to device with no splices unless otherwise indicated. All wires entering or leaving control cabinets, boxes, and devices must be permanently marked and terminated on screw terminals (shielded cable drain wire shall be terminated on screw terminals, but need not be marked). Marking must be consistent throughout the fire alarm system and must be the same as the identification shown on the connection drawings.

Wire labels shall correspond to the approved connection drawings and use a method indicating the destination of the other end of the wire. Labels in control panel equipment or between fire alarm terminal cabinets shall indicate the destination of the other end by cabinet number (or cabinet identifier)-terminal strip designation-terminal strip number. Labels in fire alarm terminal cabinets shall indicate connection in control panel equipment by fire alarm cabinet number-module identifier-module terminal strip identifier-terminal strip number.

3.2.9 Conduit and Raceways

Minimum size for fire alarm system initiating, notification, signaling line and control circuit conduits and raceways must be 3/4 inch. Installation must be in accordance with NFPA 70.

All Class A initiating device, signaling line, notification appliance, and control circuits must use diverse routing in accordance with NFPA 72. The outgoing and return redundant circuit conductors must not be run in the same cable assembly, enclosure, or raceway. The outgoing and return circuit conductors are permitted to be run in a single conduit or raceway for drops that enter or exit an individual device or control unit enclosure.

Use flexible metal conduit, maximum length 6 feet, as the final connecting raceway to a fire alarm device mounted on vibrating equipment or on a suspended ceiling.

Where devices, junction boxes, and cabinets are installed outdoors, arrange conduit systems to drain away from the box; conduit shall enter the box from the side or bottom only and drain type fittings shall be installed.

Conduit through fire-resistant rated walls, floors, ceilings, must be fire-stopped in a manner that maintains the fire-resistant rating of the wall, floor or ceiling.

Conduit installed in a vertical position must be parallel with walls and perpendicular with the floor and ceiling. Conduit installed in a horizontal position must be parallel with the floor and ceiling and be perpendicular with the walls. Changes in direction of runs must be made with symmetrical bends. Bends of over one inch in diameter must be factory made elbows.

3.2.10 Water Flow Alarm and Valve Tamper Switches

Install switches in accordance with the manufacturer's requirements and make final connections using liquid-tight flexible metallic conduit. Adjust time delays on flow switches to 60 seconds to prevent false alarms due to momentary water movement.

3.3 FIELD TESTING

After complete installation of the equipment and at such time as directed by the Contracting Officer, conduct tests to demonstrate that the installation requirements of this specification have been met and that the sequential functions of the system comply with the requirements specified herein. Tests covered in the following paragraphs must be done in two parts:

- a. Contractor Checkout - This test shall be performed by the Contractor to remove all troubles, ground faults, ensure all devices are fully functional and operational, and test the programming to ensure the installation meets the contract drawings and specifications. For modification and rehabilitation work, the Contractor is not responsible for existing troubles and ground faults that are not in contract scope. The existing troubles and ground faults that are not in contract scope shall be clearly conveyed by the Contractor in the Transfer of Responsibility form. Upon successful completion of Contractor Checkout, the Contractor shall submit Contractor Readiness Affirmation (reference Contract Solicitation or Delivery Order) prior to requesting the preliminary test.
- b. Preliminary - This test shall be performed by the Contractor using the approved test procedure and witnessed by the Government

construction inspectors. As-built fire alarm system drawings shall be verified against the system installed and all red-lines annotated and summarized on a single set of as-built drawings. The test procedures shall be followed as written and all red-lines annotated on a single Test Procedure. The summarized set of drawings and test procedures shall be initialed and dated by the construction inspector and the fire alarm vendor. The Preliminary test shall not be complete until all steps in the test procedure have been satisfactorily completed. This includes any additional steps required to complete 100% testing of the fire alarm system and its associated functionality.

c. Final Acceptance - After the successful completion of the preliminary test, a Final Acceptance test shall be scheduled. The final acceptance test procedure and as-built drawings shall have incorporated all red lines from the preliminary test. The Contractor shall provide a copy of the consolidated redlines for the as-built drawings and preliminary test procedures from the preliminary test. The Contracting Officer and the Authority Having Jurisdiction or their designee(s) shall witness the final acceptance test for the fire alarm system. During the Final Acceptance Test, the Contractor shall have two corrected as-built drawings and Final Acceptance Test Procedures for use in conducting the final acceptance test. On both preliminary and final tests, follow the approved testing procedures.

3.3.1 External System Wiring

Perform the following tests on the external system wiring before connection to the control panel:

Check continuity of circuits with an ohmmeter. Insert temporary jumpers in appropriate sockets of missing detectors and install the end-of line resistor when this test is performed. Resistance reading for each circuit must be the value of the end-of-line resistor, plus or minus 10 percent.

Each wire must be checked for grounds with a 250-volt insulation resistance test set. Resistance to ground must not be less than 20 mega ohms. Each wire tested shall be insulated from ground, and all other wire within the same conduit or raceway system shall be grounded. The conduit/raceway system shall be verified grounded prior to insulation resistance testing by verifying a short circuit between the conduit/raceway and ground.

3.3.2 Fire Alarm System Acceptance Tests

After completion of the above tests, connect the external system wires to the appropriate terminals in the control panel and perform the following tests:

With the control panel energized, demonstrate the proper operation of all indicating lights and alarms.

During re-acceptance tests activate each automatic and manual alarm device to demonstrate proper operation.

Each time an initiating or supervisory circuit is activated, verify that the associated device address, notification appliances circuits, auxiliary control circuits, and alarm reporting to the Central Fire Monitoring System is activated and the correct information is displayed by the CRMS workstations.

Turn off power to each separately powered panel or device to simulate loss of power and to demonstrate operation of the trouble alarm.

For new valve tamper switches installed, open and close water suppression system valves requiring tamper switches, to demonstrate proper operation. Supervision of wiring for each device shall also be verified to include open trouble annunciation, ground annunciation, and alarm over trouble and ground.

For new flow switches installed, activate water flow/pressure switches by water flow at the inspectors test valve to demonstrate proper operation. Set water flow time delay between 45 and 90 seconds. Supervision of wiring for each device shall also be verified to include open trouble annunciation, ground annunciation, and alarm over trouble and ground.

Demonstrate each alarm initiating circuit to operate its associated alarm-control and auxiliary control units and remote reporting.

Demonstrate each alarm control unit to operate in all modes.

Demonstrate capacity and the operation of the battery backup system to operate as required by these specifications by disconnecting the 120 volt, 60 Hz power from the fire alarm (control) panel and operating the system as specified for backup operation.

During re-acceptance tests, demonstrate all circuits interconnecting with other systems fire protection, smoke control, HVAC, security and safety, elevators, etc., to operate as specified on alarm from the associated zone or zones.

Test multiplex equipment, devices, and wiring in accordance with NFPA 70 and manufacturer's requirements. Remove and ground one lead at each addressable device to demonstrate open circuit trouble, ground fault trouble, and operation over ground fault with an open circuit. Alternate between (+) and negative (-) leads during the device testing process.

Test network communications loop. Ground fault must not degrade network communications. The Token must be passed in opposite directions to maintain communications throughout all network nodes. At the same time the abnormal status condition of the communication loop must be reported to the CRMS. When a group of nodes becomes isolated from the rest of the network caused by multiple open faults, the isolated group must automatically form a sub-network with all common interaction of monitoring and control remaining intact. The status of the network faults must be transmitted to the CRMS.

3.3.3 Reacceptance System Tests

Perform reacceptance testing after system components are added or deleted; after any modification, repair, or adjustment to system hardware or wiring; or after any change to software. All components, circuits, systems, operations, or site specific software functions known to be affected by the change or identified by a means that indicates the system operational changes must be 100 percent tested. In addition, also test 10 percent of the initiating devices and 10 percent of all output circuits that are not directly affected by the change and verify proper system operation.

Battery capacity test with a 10 minute full facility evacuation alarm test at the end of the battery standby period shall also be performed for all reacceptance tests.

Upon completion of the modification, functionally test the existing devices that were reinstalled and test the devices that are on both sides of the point of connection of the new devices (signaling line circuit modifications to install addressable module cabinets). All newly installed devices must be tested in accordance with the paragraph entitled, "Fire Alarm System Acceptance Tests."

After final acceptance testing has been successfully completed, submit test data under the terms of the "GENERAL REQUIREMENTS" clause of this specification section.

3.3.3.1 Modified Facility FACP's Connected to Radio Units Directly or Over a Network.

Includes modified facility fire alarm panels directly connected to radio units via relay methods. Also applies to modified, (software or hardware),

facility fire alarm panels communicating data to radio units via an NDU or K6-1193 (VABR) Summary Reporting Panel B (examples: K6-848, J8-1708, K6-494). Re-acceptance testing shall include the following specific elements:

- a. All local FACP evacuation and control bypass functions (evacuation signal, AHU Shutdown, etc.) shall be turned ON as appropriate during the testing procedure to bypass facility evacuation and control actions.
- b. With the CRMS bypass function off, each input logic point (List, Pseudo, Zone, Addressable Device, etc.) in an equation activating a reporting signal shall be activated by initiating an alarm at an appropriate field device or activating the appropriate function. If any existing reporting signal point list or Pseudo point equation was added or modified for new reporting purposes, then all inputs in the added or modified lists/equations shall also be re-tested by initiating alarms at the appropriate field devices.
- c. For facilities transmitting reporting point data using K6-1193 (VABR) Summary Reporting Panel B, testing in paragraph b. above shall be repeated with Summary Reporting Panel B operating on the redundant processor and radio. Activate only the minimum number of field devices or functions necessary in order to test all reporting signals to the CRMS.
- d. With the CRMS bypass function ON, activate each reporting signal and verify no CRMS signal except the supervisory related to the use of this bypass function.
- e. Additional devices shall be activated as required to achieve the NFPA 72 required thresholds of 10-Percent or 50-total initiation devices.
- f. With the appropriate bypass functions OFF, 10-Percent of control function outputs (HVAC shutdown, etc.) shall be re-tested.
- g. With multiple trouble and supervisory signals on the system, additional unacknowledged trouble and supervisory signals shall be verified to re-sound at the CRMS workstations.
- h. RF Communications with the radio unit shall be interrupted and supervisory signal (over circuit with ground and open trouble) shall be verified at the local FACP. RF communications shall be restored and supervisory signal shall verify clear without operator intervention.

- i. Battery capacity shall be re-tested (to include the radio CRMS equipment).
- j. Facility evacuation audible/visual alarm shall be re-tested at the end of the battery test.

3.3.3.2 Non-Modified Facility FACP's Connected to Radio Units Directly or Via Network Methods

Includes panels reporting through networks to K6-1193 (VABR) Summary Reporting Panel B, but do not require FACP hardware/software modifications. Re-acceptance testing shall include the following specific elements:

- a. All local FACP evacuation and control bypass functions (evacuation signal, AHU Shutdown, etc.) shall be turned ON as appropriate during the testing procedure to bypass evacuation and control actions.
- b. Each existing IMS network and CRMS reporting point (List, Pseudo, Zone, Addressable Device, etc.) shall also be re-tested by initiating alarms at the appropriate field device or function key. Remote reporting to the CRMS workstations from both the NDU and the local facility radio shall be verified. Local indications at the NDU shall also be verified for each signal.
- c. The following specific conditions shall be verified to report to the CRMS workstations for each facility fire alarm control panel network node as applicable to existing CRMS programming:
 - i.) System Trouble
 - ii.) FACP Failure
 - iii.) Network Communications Degraded
 - iv.) Network Communications Failure
 - v.) Ground Trouble
 - vi.) Power Trouble
 - vii. Battery Trouble
 - viii.) AC Power Trouble
 - ix.) Power Supply Trouble
 - x.) Unacknowledged Trouble
 - xi.) Unacknowledged Supervisory
- d. For facilities transmitting reporting point data using K6-1193 (VABR) Summary Reporting Panel B, testing in paragraphs b. and c. above shall be repeated with Summary Reporting Panel B operating on the redundant processor and radio. Activate only the minimum number of field devices or functions necessary in order to test all reporting signals to the CRMS.

- e. If a CRMS Bypass function is available at the facility, activate each reporting signal with the bypass ON and verify no CRMS signal except the supervisory related to the use of this bypass function.
- f. Back-up radio battery capacity shall be tested.
- g. Once testing is complete the FACP shall be restored to normal configuration and returned to service.

3.3.3.3 K6-1193 (VABR) Summary Reporting Panels

Re-acceptance testing shall include the following specific elements on each of the two (2) Summary Reporting Panels:

- a. With the primary processor operating, alarm and trouble CRMS reporting for all zones (remote facilities) shall be verified by activating the monitored signals at each remote facility. Remote reporting to the CRMS workstations via Summary Reporting Panel B and local indications at the VABR shall be verified.
- b. For both Summary Reporting Panels A and B, the primary processor shall be simulated failed to transfer to the secondary back-up processor. With the secondary processor operating, alarm and trouble CRMS reporting for all zones (remote facilities) shall be verified at the summary panel terminal cabinet by opening and shorting each zone. Remote reporting to the CRMS workstations and local indications at the VABR shall be verified.
- c. Battery capacity shall be re-tested (to include the radio CRMS equipment).

3.4 PAINTING

Manufacturer's standard finish equipment surfaces damaged during construction must be brought to as-new condition by touchup or repainting to the satisfaction of the Contracting Officer, or replaced with new undamaged equipment at no additional cost to the Government.

Paint all fire alarm equipment and appurtenances red, Color No. 11105 in accordance with FED-STD-595.

-- End of Section --

SECTION 28 31 33.00 10

FIRE ALARM REPORTING SYSTEM, RADIO TYPE
04/06

PART 1 GENERAL

1.1 REFERENCES

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

FM GLOBAL (FM)

FM P7825 (2005) Approval Guide

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code -
2008 Edition

NFPA 72 (2010) National Fire Alarm Code

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES
(NICET)

NICET 1014-7 (2003) Program Detail Manual for
Certification in the Field of Fire Protection
Engineering Technology (Field Code 003)
Subfield of Automatic Sprinkler System Layout

UNDERWRITERS LABORATORIES (UL)

UL 827 (1996; Rev thru Jan 2007) Central Station
Alarm Services

UL 864 (2003; Rev thru May 2007) Control Units and Accessories for Fire Alarm Systems

UL Fire Prot Dir (2009) Fire Protection Equipment Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Submittals in this section shall be submitted for approval in the following sequence with each approved prior to the next submittal:

1. Submit within 30 days after notice to proceed - All Product Data (SD-03) and Certified Equipment Specialist Certificates (SD-07).

The following shall be submitted for equipment provided at each facility reporting to the CRMS. These submittals may be incorporated into and submitted with facility fire alarm submittals described in Section 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY) if desired.

2. Submit within 45 days of starting work at the facility - Shop Drawings (SD-02), Design Data (SD-05). Where drawing and design data is common to multiple facilities it shall be annotated to indicate all facilities involved and can be submitted once.
3. Submit no later than 21 days prior to the scheduled preliminary test - Preliminary Acceptance Test Reports (SD-06). Additionally, two (2) up-to-date sets, minimum, of all as-Built documentation (SD-02 shop drawings and SD-05 design data) shall be complete and available for reference and inspection at the preliminary test.
4. Submit no later than 14 days prior to the scheduled final test - Final Acceptance Test Reports (SD-06), Operations and Maintenance Data (SD-10), and As-Built documentation (SD-02 Shop Drawings and SD-05 Design Data). Additionally, another (2) two sets of test procedures and all as-built documentation shall be complete and available for reference and inspection at the final test.
5. Submit within 14 days of system acceptance - Marked-up As-Built design drawings and warranty information for the facility in accordance

with Section 01 78 00 CLOSEOUT SUBMITTALS, As-Built Shop Drawings (SD-02), Design Data (SD-05), Operations and Maintenance Manuals (SD-10) and record copies of the completed and signed-off preliminary and final acceptance test (SD-06) procedures. Include two (2) sets of CD ROM digital media of all the as-built documentation.

SD-02 Shop Drawings

All shop drawings shall be computer aided design (CAD) generated. All submittals shall include hard copies and .pdf copies on digital media compact disc(s) (CD's). In addition, final closeout as-built submittals shall include .DWG or .DXF files for all shop drawings.

Changes during the installation shall be documented and incorporated onto the applicable shop drawing(s) to insure a current as-built configuration drawing. Latest version of all shop drawings shall be available at each acceptance test and shall be updated as required as a result of the testing and inspection process. Final closeout as-built drawings with all changes incorporated and representing as-built installation shall be submitted after acceptance testing is complete.

Equipment Lay-out Drawings; G

Provide equipment layout drawings for all remote facility radio subscriber unit configurations including:

1. Make, model, and manufacturer of each piece of equipment and components within it.
2. All wiring connections and their function shall be indicated. Layout and connector type shall match actual equipment provided. Wiring/cabling from each terminal or port shall be indicated by table or other method, and shall include destination, wire/cable type, and connector type.

Connection Drawings; G

Connection drawings shall consist of point-to-point wiring diagrams depicting wiring and interconnection between facility and other building systems. Wire label designations matching the field installation shall be indicated on these drawings. Provide separate drawings for AC power and data connections.

Floor Plan Drawings; G

Floor plan drawings shall indicate equipment locations, device locations, interconnecting conduit/raceways, and wiring to be installed within specific conduit, or other raceway systems. Indicate diverse conduit/wiring routing requirements where required. Provide specific construction and installation details as required on these sheets.

As-Built Drawings; G

As-Built drawings shall be provided for all shop drawings submitted. As-Built drawings shall document final system configuration including, but not limited to all equipment locations, equipment layouts, interconnecting wiring, additional cabinets, and all other equipment associated with the central station system(s). Annotate deviations due to contract changes and field installation changes, concealed and visible.

SD-03 Product Data

Product data shall indicate current applicable approvals or listings issued by UL, (Underwriter Laboratory UL Fire Prot Dir listed), FM, (Factory Mutual FM P7825 approved for intended use and function).

Provide standard manufacturer's catalog data, technical data sheets, and user manuals for the following equipment that are adequate to allow government review and approval for use in developing shop drawings and then field construction. Annotate actual equipment and options provided. Where different types of the same item are used, provide separate data as required.

Radio Subscriber Unit with Zone Inputs; G
Radio Subscriber Unit Relay Output Interface; G
Radio Subscriber Unit Serial Data Interface to Simplex 4100 FACP; G
Antenna equipment (including cables, connectors, and surge suppression); G
Radio Transceiver Unit and Subscriber Unit Power Equipment (batteries, step down transformer); G
Line Voltage Surge Suppressors; G
Low Voltage Surge Suppressors; G
Power Wiring/Cabling; G
Data Cabling Components and Cable; G

SD-05 Design Data

All calculated, tabulated, or custom written design data (including programming data) shall be computer generated using Microsoft Word or Excel applications. All submittals shall include hard copies and digital media compact disc(s) (CD's). CD submittals shall include .doc or .xls files for all submittals. Also on the same CD provide a signed and dated record copy of the submittal in PDF format.

Changes during the installation shall be documented and incorporated onto the applicable submittals to insure a current as-built configuration. Latest version of all submittals shall be available at each acceptance test and shall be updated as required as a result of the testing and inspection process. Final closeout as-built submittals with all changes incorporated and representing as-built installation shall be submitted after acceptance testing is complete.

Battery Calculations; G

Substantiating battery calculations for supervisory and alarm power requirements. Provide for equipment not backed-up by UPS units with generator source. Ampere-hour requirements for each system component and the battery recharging period shall be included.

SD-06 Test Reports

All test report submittals shall be computer generated using Microsoft Word or Excel applications. All submittals shall include hard copies and digital media compact disc(s) (CD's). CD submittals shall include .doc or .xls files for all submittals. Also on the same CD provide a signed and dated record copy of the submittal in PDF format.

Feedline Cable Test; G

Where required, provide results of facility feedline cable tests for contractor fabricated feedline cables. For each cable, include Facility and Cable ID, Cable Type, Test Results, and Calculated Feedline Loss.

Procedures for the following (2) tests may be incorporated into and submitted with facility fire alarm testing described in Section 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY) if desired:

1. Preliminary Acceptance Test; G - Provide For Each Remote Facility

2. Final Acceptance Test; G - Provide For Each Remote Facility. Include NFPA 72 Fire Alarm System Record of Completion form.

SD-07 Certificates

Certified Equipment Specialists; G

Services of a Certified Specialists thoroughly experienced in fire alarm central station and information technology work must be provided on site to perform or directly supervise the installation, make all necessary adjustments, make all adjustment and perform all tests on the fire alarm system at the site. Provide separate specialists from each major equipment vendor.

Specialist is considered certified for modifications to equipment specifically listed for fire alarm use when the specialist holds a valid Fire Alarm System, Level III Certification from the National Institute for Certification in Engineering Technologies NICET 1014-7 or a valid Level III Fire Alarm Engineering Technician Certification from the International Municipal Signal Association (IMSA) or is licensed by the State of Florida as a Fire Alarm Contractor I in accordance with Florida State Statute, Chapter 489, Part II.

Certification of other recognized agencies with equivalent requirements will be considered. Evidence of the Contractor's State Certification and the basis of certification must be provided to the Contracting Officer and be approved by the Contracting Officer prior to any work being performed at Kennedy Space Center.

SD-10 Operation and Maintenance Data

Submit separate bound information grouped by categories indicated below consisting of manufacturer's standard brochures, schematics, procedures, recommended spare parts, recommended test equipment, and safety precautions. All hard copy submittals shall include a digital media compact disc with the manual in .pdf, .doc. or .xls format.

Installation Manuals; G

Submit all applicable manufacturers' instructions for all equipment detailing installation materials, tooling, and methods required to properly install all system components including safety precautions.

Operation and Maintenance Manuals; G

Six complete copies of all applicable manufacturer's operating instructions, programming manuals, service manuals, or any other literature outlining step-by-step procedures required for system startup, configuration, programming, operation, shutdown, and maintenance. Manuals submitted with Installation Manuals for installation purposes that contain operations and maintenance information shall also be included with this submittal.

Parts Lists; G

Provide spare parts data in .doc or .xls software format for each different item of material and equipment specified. Data shall include a complete list of parts and supplies with the current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after 1 year of service.

Parts list shall be grouped for each equipment submittal type required in SD-03 PRODUCT DATA; also complete part numbers for all integrated assemblies as provided and used on this contract shall also be provided.

1.3 GENERAL REQUIREMENTS

a. Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL, Section 28 05 26.00 40 GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY, and Section 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY) apply to and interface with work specified in this section.

1.3.1 Standard Products

a. Material and equipment shall be the commercial off-the-shelf standard products of a manufacturer regularly engaged in the manufacture of CRMS products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that can provide service within 24 hours.

b. Components installed under this contract cannot be more than one (1) year older than the date of installation.

1.3.2 Keys and Locks

Provide locked enclosures only where indicated or specified. Locks shall be keyed alike; all keys shall be turned over to the government.

1.3.3 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and verify field conditions prior to submitting shop drawings. Contractor shall advise the Contracting Officer of any discrepancy before performing the work.

1.3.4 Compliance

Equipment shall comply with NFPA 72. The equipment furnished shall be listed by Underwriters Laboratories, Factory Mutual Engineering and Research or other Nationally Recognized Testing Laboratory testing to the equivalent applicable product standards.

1.3.5 Delivery and Storage

All equipment delivered and placed in storage shall be protected from the weather, humidity and temperature variations, dirt, dust, and other contaminants.

1.4 SYSTEM OPERATION

a. The facility radio subscriber units shall report alarms to the central station alarm automation system via radio controller equipment. All subscriber radio to radio controller to alarm automation system communications shall be supervised in accordance with NFPA 72.

PART 2 PRODUCTS

2.1 REMOTE FACILITY FIRE ALARM RADIO SUBSCRIBER UNITS

a. Provide subscriber units as indicated with radio transceivers manufactured by AES/Intellinet Corporation, Model KSC 7788F. Unit shall be RF Type 6 per NFPA 72 and UL listed for Central Station Service per UL 827 and UL 864. Unit shall comply with FCC Rules, part 15 and 90. Radio subscriber units shall be fully compatible with and listed for use with the central station radio controller equipment provided.

b. All units of a common configuration shall be interchangeable with the other devices furnished by the manufacturer. Each transmitter and any interface devices shall be the manufacturer's current commercial product completely assembled, wired, tested at the factory, and delivered ready for installation and operation.

2.1.1 Frequency Allocation

The unit shall operate in the radio frequency range of 130-174 MHz with 12.5 KHz channel spacing. Specific KSC licensed frequency will be provided at the time of award.

2.1.2 Power Requirements

a. Units shall be powered by a combination of locally available 120 VAC, as indicated, and standby batteries. Step-down low voltage AC power transformers, if required, shall be UL listed for use with the radio transceiver. In the event of loss of 120 VAC power, the transceiver shall automatically switch to battery operation with no interruption of protective service. Upon restoration of ac power, transfer back to normal ac power supply shall be automatic and the battery shall be recharged. The battery and battery charger shall be installed within the transmitter housing.

b. All power trouble conditions including low battery voltage, AC power failure, and charger trouble shall be reported to the CRMS workstations via the central station controller equipment and, if provided, activate the local trouble contact. AC power failure signal shall include programmable delay time to eliminate unnecessary signals due to short power outages.

2.1.2.1 Battery Standby Power

The battery shall be sealed; UL listed for use with the unit and incorporate battery output fusing. Radio fire alarm subscriber unit standby battery

capacity shall provide sufficient power to operate the unit in a normal standby status for a minimum of 24 hours and shall be capable of all communications during that period.

2.1.3 Functional Requirements

2.1.3.1 Facility Fire Alarm Control Panel Connections

a. Radio subscriber units shall incorporate the provisions for auxiliary interconnection to existing facility fire alarm systems. Unit shall have a minimum of eight (8) input zones to provide general reporting via Fire Alarm Control Panel dry relay contacts as indicated. Zones shall be Class B type with end-of-line resistor supervised for open circuit and ground fault conditions. An additional radio Form-C dry relay contact for trouble conditions (antenna cut, loss of power, low battery, etc.) shall also be provided if required by listing agency.

b. Where a serial digital data interface to a fire alarm control panel is required, provide a serial data module in addition to the 8 input zones specified above. Serial data module must be supervised for wiring or communication trouble conditions and must be compatible for communications with Simplex 4100 to 4100U model series fire alarm control panels.

c. Where a digital control output is required; provide relays with Form-C contacts controlled from the remote monitoring locations.

d. All wiring trouble conditions shall be reported to the CRMS workstations via the central radio controller equipment and, if required, activate the local trouble contact.

2.1.3.2 Generation of Signals

Each radio subscriber unit shall be a standard design which allows the immediate transmission of all initiated signals. Units shall have memory capability. Multiple, simultaneous alarms shall not result in the loss of any messages. Messages shall be stored until they are transmitted and confirmed received.

2.1.3.3 Power Output and Antenna

a. The radio frequency (RF) power output of each radio subscriber unit shall be sufficient for reliable alarm reporting. The minimum RF power output shall be 5 Watts unless otherwise indicated.

b. Standard gain antenna mounted directly on the radio enclosure shall be provided unless otherwise indicated. It shall be assumed that units will require relocation to within 10 feet of the indicated location to compensate for RF signal quality issues. Where indicated provide separate standard gain antenna or high db high gain antenna with outdoor mounting provisions indicated. Use manufacturer's required and listed interconnecting cables and Polyphaser IS-B50HN-C1 or equal surge protector for such antennas.

2.1.3.4 Local Indications

Unit shall include local diagnostic indications for communications, trouble, and alarm status. Local reset means shall also be provided.

2.1.4 Radio Subscriber Unit Enclosures

a. Radio transceiver, input zone assembly, serial data module, battery charger, and batteries shall be housed in the manufacturer's standard metal enclosure.

b. Provide separate enclosure(s) as required for 120 VAC power supply components including but not limited to receptacle, plug-in step-down power transformer, and AC power surge suppression.

c. Enclosure front door shall be hinged and lockable. Indoor units shall be rated NEMA 1 and outdoor units shall be rated NEMA 4X (fiberglass type). All enclosures shall be painted manufacturer's standard fire alarm red.

d. Internal components shall be protected from vandalism by a tamper-proof lock on the enclosures. The housing shall allow access to all internal components for testing, servicing, and replacement at the installation site.

e. Each enclosure shall be labeled on the front surface with the wording "FIRE MONITORING SYSTEM TRANSCEIVER UNIT ####" (indicate assigned transceiver code number). The label shall be in accordance with Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL.

2.1.5 Wiring

Wiring shall be listed for use with the radio transceiver. Use 300V FPL rated shielded cable or cable as required by the radio transceiver manufacturer.

2.1.6 Special Tools and Spare Parts

Special tools necessary for the programming and maintenance of the equipment shall be furnished, used during the installation as required, and turned over to the government.

PART 3 EXECUTION

3.1 GENERAL

All work shall be installed as shown and in accordance with the manufacturer's recommendations, unless otherwise specified. Necessary interconnections, services, and adjustments required for a complete and operational system shall be provided. Electrical work shall be in accordance with NFPA 70 and NFPA 72.

3.1.1 Power Supply for the System

Connect equipment to new and/or existing branch circuits indicated.

3.1.2 Wiring for Systems

a. Install the fire alarm circuits in dedicated and separate conduit or raceway systems, and in accordance with Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL. 60-Hertz AC power circuits must not enter enclosures containing fire alarm circuits except where required to connect to system components.

b. All wiring shall be labeled at each connection point. Wire labels shall correspond to the approved shop drawings and use a method indicating the destination of the other end of the wire. Labels shall indicate the destination of the other end by enclosure identifier, equipment identifier, port number or terminal strip designation/terminal strip number.

3.2 RADIO FREQUENCY SUBSCRIBER UNITS

a. Radio subscriber units shall be installed where indicated on the drawings, in accordance with the manufacturer's instructions, and in accordance with NFPA 72.

b. Prior to installing radio equipment, the Contractor shall request Government support to verify RF reception at radio transceiver locations

indicated. Location shall be adjusted up to 10-feet as necessary. Radio units, power supply cabinets, and other associated shall be securely mounted such that cabinets do not interfere with antenna operation.

c. All wiring leaving subscriber unit cabinets shall be installed in accordance with the manufacturer's requirements and utilize dedicated conduit systems in accordance with Section 26 05 00.00 40 COMMON WORK RESULTS FOR ELECTRICAL. Connection to facility fire alarm equipment shall be in accordance with applicable requirements of Section 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY).

d. Surge suppression in accordance with applicable requirements of Section 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY) shall be installed on the 120 VAC power input to the radio subscriber unit.

e. The manufacturer's recommended surge suppressor shall be installed between the unit and any exterior mounted antenna not directly mounted to the transceiver enclosure. Surge suppressor shall be installed within a Type 316 NEMA 4X stainless steel junction box, adequately sized for the suppressor and coaxial cables including adequate bending and connect/disconnect space. Surge suppressor and box shall be installed adjacent to where the coaxial cable enters the building interior. Coaxial cable indicated shall be installed in rigid steel conduit from the transceiver to the surge suppressor, and shall include adequate bend radius and/or junction box size for the coaxial cable installed; do not use L, C or T form type conduit fittings. Coaxial cable from the surge suppressor to the antenna shall be as indicated and shall leave the bottom or side of the box and be arranged to prevent water entry; opening shall also be sealed to prevent insect and debris entry. Install outdoor antennas securely to facility structure using Type 316 stainless steel supporting structure/hardware, and locate to minimize probability of being struck by lightning.

f. A feedline cable test shall be conducted for all contractor fabricated feedline cables. This test shall include Continuity, and Short Circuit tests, Voltage Standing Wave Ratio, (VSWR), Test and an Insertion Loss Test. VSWR and Insertion Loss Tests should be conducted at the operating frequency of the system. The VSWR test should be conducted with a calibrated 50 ohm load connected to one end of the cable. Results of the VSWR test should be 1.1:1 or lower. Results of the insertion loss test are to be within .5dB of calculated cable and connector loss.

g. Grounding shall be in accordance with the manufacturer's requirements and Section 28 05 26.00 40, GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY. Radio subscriber units and surge suppressors shall be directly connected to earth ground and bonded to any other system equipment ground available including AC power. Earth ground, antenna surge suppressor ground, fire alarm equipment ground, and AC power ground shall all be bonded together. Provide provisions for terminating and grounding shielded cable shields in accordance the manufacturer's requirements.

h. Prior to powering up the subscriber unit, the Contractor shall request Government support to locally program the field radio subscriber unit.

3.3 TESTING

The following tests shall be performed for each connected facility (see 3.3.1).

1. Contractor Checkout - This test shall be performed by the Contractor to remove all troubles, ground faults, ensure all equipment is fully functional and operational, communications are established, and programming is initially tested to ensure the installation meets the contract drawings and specifications. Upon successful completion of Contractor Checkout, the Contractor shall submit Contractor Readiness Affirmation prior to requesting the preliminary test.

2. Preliminary - This test shall be performed by the Contractor using the approved test procedure and witnessed by the Government construction inspectors. As-built documentation shall be verified against the system installed and all red-lines annotated and summarized on a single set of documents. The test procedures shall be followed as written and all red-lines annotated on a single Test Procedure. The summarized set of drawings and test procedures shall be initialed and dated by the construction inspector and the fire alarm vendor(s). The Preliminary test shall not be complete until all steps in the test procedure have been satisfactorily completed. This includes any additional steps required to complete 100% testing of the system and its associated functionality.

3. Final Acceptance - After successful completion of the preliminary test, a Final Acceptance test shall be scheduled. The final acceptance test procedure and as-built documentation shall have incorporated all red lines from the preliminary test. The Contractor shall provide a copy of the consolidated redlines for the as-built documentation and preliminary test procedures from the preliminary test. The Contracting Officer and the Authority Having Jurisdiction or their designee(s) shall witness the final acceptance test for the system. During the Final Acceptance Test, the Contractor shall have two corrected sets of as-built documentation and Final Acceptance Test Procedures for use in conducting the final acceptance test.

3.3.1 Radio Subscriber Unit Acceptance Testing

Radio subscriber unit testing for all new and existing radios shall be in accordance with NFPA 72 at each facility. Testing shall include the following:

a. Prior to connecting to facility fire alarm control panel equipment the following testing shall be completed.

1. Check continuity of circuits with an ohmmeter. Check each wire for grounds with a 250-volt insulation resistance test set. Resistance to ground must not be less than 20 meg-Ohms. Each wire tested shall be insulated from ground, and all other wire within the same conduit or raceway system shall be grounded. The conduit/raceway system shall be verified grounded prior to insulation resistance testing by verifying a short circuit between the conduit/raceway and ground.

2. Verify AC power supply and battery voltages are within acceptable tolerances.

b. After radio subscriber unit power-up perform the following testing prior to connecting to the facility fire alarm control panel.

1. Verify radio communicates to all required Central Station head-end equipment and correctly annunciates all alarm zone signals.

2. Verify any radio fault conditions including AC power fail, circuit supervision, communications loss, and loss of battery voltage correctly annunciate at central station head-end equipment.

3. Verify correct operation of local radio subscriber unit indications and reset functions.

c. After a radio subscriber unit is connected to the facility fire alarm control panel, perform end-to-end preliminary and final acceptance testing from the facility fire alarm control panel to the CRMS workstations in accordance with requirements of SECTION 28 31 00.01 98 FIRE DETECTION AND ALARM (PROPRIETARY). Testing also shall include the following:

1. Each time a facility fire alarm control panel alarm, trouble, or supervisory signal is activated, verify that reporting to the Central Radio Monitoring System is activated.

2. Individually turn off AC power and disconnect DC power to demonstrate operation of the trouble signals. Verify correct trouble signal is received at the CRMS workstations and, if

required, locally at the facility fire alarm control panel. Verify correct time delay for transmission of AC power failure signal.

3. Disconnect antenna and verify correct trouble signal is received at the CRMS workstations and, if provided, locally at the FACP. Next, initiate multiple fire alarm panel signals. Restore antenna and verify correct signals are received at the CRMS workstations.

4. Demonstrate supervision of all circuit wiring. Verify alarm over ground fault for all zones and that the correct signals are received at the CRMS workstations and, if required, locally at the facility fire alarm control panel.

5. Demonstrate capacity and the operation of the battery backup system to operate as required by these specifications by disconnecting the 120 volt, 60 Hz power from the fire alarm (control) panel and operating the system as specified for backup operation.

d. After all radio subscriber units are operating on the network:

1. Use the radio network management software to determine which three (3) radio subscriber units are being used most for signal relaying purposes. Disconnect the antennas to these units and verify the other radio subscriber units re-configure to re-establish communications to the head-end equipment.

-- End of Section --

